



Designation: **D 3779 – 95a02**

## **Standard Performance Specification for Women’s and Girls’ Woven Rainwear and All-Purpose, Water-Repellent Coat Fabrics<sup>1</sup>**

This standard is issued under the fixed designation D 3779; 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 women’s and girls’ woven 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 woven fabrics used for linings and interlinings, nor is this performance specification applicable to bonded or laminated fabrics.

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:*

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<sup>1</sup> This specification is under the jurisdiction of ASTM Committee D-13 on Textiles and is the direct responsibility of Subcommittee D13.561 on Performance Standards for Textile Fabrics—Apparel.

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- D 123 Terminology Relating to Textiles<sup>2</sup>  
D 434 Test Method for Resistance to Slippage of Yarns in Woven Fabrics Using a Standard Seam<sup>2</sup>  
D 1424 Test Method for Tear Resistance of Woven Fabrics by Falling-Pendulum (Elmendorf) Apparatus<sup>2</sup>  
D 2262 Test Method for Tearing Strength of Woven Fabrics by the Tongue (Single Rip) Method (Constant-Rate-of-Traverse Tensile Testing Machine)<sup>2</sup>  
D 2724 Test Methods for Bonded, Fused, and Laminated Apparel Fabrics<sup>2</sup>  
D 2905 Practice for Statements on Number of Specimens for Textiles<sup>2</sup>  
D 5034 Test Method for Breaking Force and Elongation of Textile Fabrics (Grab Test)<sup>3</sup>  
2.2 *AATCC Test Methods*:<sup>4</sup>  
8 Colorfastness to Crocking: AATCC 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 Washing, Domestic, and Laundering, Commercial: Accelerated  
96 Dimensional Changes in Laundering of Woven and Knitted Textiles Except Wool  
107 Colorfastness to Water  
116 Colorfastness to Crocking: Rotary Vertical Crockmeter Method  
119 Color Change Due to Flat Abrasion (Frosting): Screen Wire Method  
124 Appearance of Durable Press Fabrics After Repeated Home Launderings  
132 Colorfastness to Dry Cleaning  
135 Dimensional Changes in Automatic Home Laundering of Durable Press Woven or Knit Fabrics  
172 Colorfastness to Non-Chlorine Bleach in Home Laundering  
188 Colorfastness to Chlorine Bleach in Home Laundering  
Evaluation Procedure 1 Gray Scale for Color Change  
Evaluation Procedure 2 Gray Scale for Staining  
Evaluation Procedure 3 AATCC Chromatic Transference Scale

NOTE 1—The specified dated editions of the ASTM test methods that prevail in this specification are referenced in Section 7.

### 3. Terminology

3.1 For definitions of textile terms used in this specification, refer to the individual ASTM and AATCC test methods and to Terminology D 123.

### 4. Specification Requirements

4.1 The properties of fabrics for women's and girls' woven rainwear and all-purpose, water-repellent coats shall conform to the specification requirements in Table 1.

### 5. Significance and Use

5.1 Upon mutual agreement between the purchaser and the supplier, woven fabrics intended for this end use should meet all of the requirements listed in Table 1 of this specification.

5.2 It is recognized that for purposes of fashion or aesthetics the ultimate consumer of articles made from these fabrics may find acceptable fabrics that do not conform to all of the requirements in Table 1. Therefore, one or more of the requirements listed in Table 1 may be modified by mutual agreement between the purchaser and the supplier.

5.2.1 In such cases, any references to the specification shall specify that: This fabric meets ASTM Specification D 3779 except for the following characteristic(s).

5.3 Where no prepurchase agreement has been reached between the purchaser and the supplier, and in case of controversy, the requirements listed in Table 1 are intended to be used as a guide only. As noted in 5.2, ultimate consumer demands dictate varying performance parameters for any particular style of fabric.

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

### 6. Sampling

6.1 Tests shall be performed on the fabric as it will reach the consumer. Any "partially cured" or "post-cured" fabrics should first be processed in accordance with the fabric manufacturer's instructions.

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

**TABLE 1 Specification Requirements**

NOTE 1—Class 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	Requirements	Section
Breaking strength (load) (CRT)	178 N (40 lbf), min	7.1
Yarn slippage	6.3-mm (¼-in.) separation at 25 111 N (25 lbf), min	7.2
Tongue tear strength	13 N (3 lbf), min	7.3
Dimensional change:		
Pressing and finishing	2 % max	7.4.1
After five launderings	3 % max	7.4.2
After three dry cleanings	2 % max	7.4.3
Colorfastness:		
Burnt gas fumes—2 cycles:		
Shade change, original fabric	Class 4 <sup>A</sup> , min	7.5.1
Shade change after one laundering or one dry cleaning	Class 4 <sup>A</sup> , min	
Chlorine Bleach	Class 4 <sup>A</sup> , min	7.5.9
Non-Chlorine Bleach	Class 4 <sup>A</sup> , min	7.5.10
Laundering:		7.5.2
Shade change	Class 4 <sup>A</sup> , min	
Staining	Class 3 <sup>B</sup> , min	
Dry cleaning (shade change)	Class 4 <sup>A</sup> , min	7.5.3
Crocking:		7.5.4
Dry	Class 4 <sup>C</sup> , min	
Wet	Class 3 <sup>C</sup> , min	
Water:		7.5.5
Shade change	Class 4 <sup>A</sup> , min	
Staining	Class 4 <sup>B</sup> , min	
Perspiration:		7.5.6
Shade change	Class 4 <sup>A</sup> , min	
Staining	Class 3 <sup>B</sup> , min	
Light (20 AATCC FU)	Step 4 <sup>A</sup> , min	7.5.7
Frosting	Class 4 <sup>A</sup> , min	7.5.8
Water resistance (categories based on minimum time for 1-g weight increase at following head pressures):		
2 ft (600 mm)	30 s (shower)	7.6
2 ft (600 mm)	2 minutes (rain)	
3 ft (915 mm)	5 minutes (storm)	
Water repellence:		
Smooth-textured fabrics:		
Original	90, min	7.7
After five launderings or three dry cleanings	70, min	
Rough-textured:		
Original	80, min	7.8
After five launderings or three dry cleanings	70, min	
Fabric appearance (see 7.8.1.17.8.1.1)	DP 3.5 min <sup>D</sup>	7.8
Flammability	pass	7.97.9

<sup>A</sup> AATCC Gray Scale for Color Change.

<sup>B</sup> AATCC Gray Scale for Staining.

<sup>C</sup> AATCC Chromatic Transference Scale.

<sup>D</sup> For durable-press fabrics only.

6.2 Unless otherwise agreed upon, as when specified in an applicable material specification, take the number of specimens directed in each of the applicable test methods.

6.2.1 If there has been no prior agreement and the test method does not specify the number of specimens, use the procedures in Practice D 2905 to determine the number of specimens, such that the user may expect at the 95 % probability level that the test result is no more than 5 % of the average above or below the lot average (that is, the average that would be obtained by applying this method to the entire lot) when using a reliable estimate of variability of individual observations on similar materials in the user's laboratory under conditions of single-operator precision.

## 7. Test Methods (See Note 1)

7.1 *Breaking Force*—Determine the dry breaking force, in the standard atmosphere for testing textiles, as directed in Test Method D 5034, using a constant rate of traverse (CRT) tensile testing machine with the speed of the pulling clamp at  $300 \pm 10$  mm ( $12 \pm 0.5$  in.)/min.

NOTE 2—If preferred, the use of a constant-rate-of-extension (CRE) tensile testing machine is permitted. The crosshead speed should be as agreed upon between the purchaser and the seller. 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 CRT method, Test Method D 5034, shall prevail.

7.2 *Resistance to Yarn Slippage*—Determine the resistance to yarn slippage as directed in Test Method D 434.

NOTE 3—The precision of Test Method D 434 is being established, and it may not be suitable for fabrics with low yarn counts (see 5.2) in terms of ends and picks per inch.

7.3 *Tongue Tear Strength*—Determine the tongue tear strength as directed in Test Method D 2262.

NOTE 4—If preferred, use of Test Method D 1424 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 and with the Elmendorf machine. Consequently, these two tongue tear testers cannot be used interchangeably. In case of controversy, Test Method D 2262 shall prevail.

7.4 *Dimensional Change*:

7.4.1 *Pressing and Finishing During Garment Manufacturing*—Mark specimen(s) as directed in 4.3.1 of AATCC Test Method 135. Press and finish specimen(s) as agreed upon between the purchaser and the supplier with respect to time, cycles, temperature, steam, vacuum, and mechanical pressure of the press head. Measure the specimen(s) and calculate the dimensional change as directed in Sections 4 and 7 of AATCC Test Method 135 (see Note 2).

7.4.2 *Laundering*—Determine the maximum dimensional change after five launderings as directed in the applicable procedure in AATCC Test Method 135 (see Notes 6 and 7).

7.4.2.1 The wash conditions and drying procedure shall be as specified by the supplier.

7.4.3 *Dry Cleaning*—Determine the maximum dimensional change after three dry cleanings in accordance with 10.1 through 10.1.4 of Test Methods D 2724.

NOTE 5—Launderable fabrics are expected to be dry-cleanable except where all or part of the fabric is not dry-cleanable and is so labeled. 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. “Dry-cleanable” goods are to be dry-cleaned only.

NOTE 6—Specimens prepared for 7.4.1 may be used for 7.4.2 and 7.4.3, as desired. When this is done, the dimensional change due to laundering or dry cleaning is calculated using Eq 1. The dimensional change to pressing and finishing is determined on the fabrics as it will reach the user. It is not additive to the dimensional change to laundering or dry cleaning of the fabric as it will reach the consumer (see 6.1).

$$\text{Percent Dimensional Change} = 100(D_1 - D_2)/D_2 \quad (1)$$

where:

$D_1$  = measurement after laundering or dry cleaning, and

$D_2$  = measurement after pressing and finishing.

7.5 *Colorfastness*:

7.5.1 *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.

NOTE 7—Washing conditions shall be the same as those used in 7.4.2.1. Dry cleaning conditions shall be the same as those used in 7.4.3.

7.5.2 *Laundering*—Determine the colorfastness to laundering as directed in the applicable procedure of AATCC Test Method 61. The test conditions shall be as specified by the supplier (see Note 5).

7.5.3 *Colorfastness to Dry Cleaning*—Determine colorfastness to dry cleaning as directed in AATCC Test Method 132 (see Note 5).

7.5.4 *Colorfastness to Crocking*—Determine colorfastness to dry and wet crocking as directed in AATCC Test Method 8 for solid shades and AATCC Test Method 166 for prints or as agreed upon between the purchaser and the supplier.

7.5.5 *Colorfastness to Water*—Determine colorfastness to water as directed in AATCC Test Method 107.

7.5.6 *Colorfastness to Perspiration*—Determine colorfastness to perspiration as directed in AATCC Test Method 15.

7.5.7 *Colorfastness to Light*—Determine colorfastness to light as directed in AATCC Test Method 16.

NOTE 8—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 E shall prevail.

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

7.5.9 *Colorfastness to Chlorine Bleach*—Determine colorfastness to chlorine bleach as directed in AATCC Test Method 188.

7.5.10 *Colorfastness to Non-Chlorine Bleach*—Determine colorfastness to non-chlorine bleach as directed in AATCC Test Method 172.

7.6 *Water Resistance (Rain Test)*—Determine the water resistance (rain test) on the original fabric and after three launderings as in 7.4.2.1 or three dry cleanings as in 7.4.3 as directed in AATCC Test Method 35.

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

7.7 *Water Repellency (Spray Test)*—Determine the resistance to water repellence (spray test) on the original fabric and after five launderings as in 7.4.2.1 or three dry cleanings as in 7.4.3 as directed in AATCC Test Method 22.

7.7.1 Determine the resistance to wetting of laundered or dry-cleaned fabrics after pressing as specified by the supplier.

7.8 *Fabric Appearance*—Determine the fabric appearance as directed in Section 7 of AATCC Test Method 124 after laundering using the wash-and-wear cycle or the normal cycle as agreed upon between the purchaser and the supplier as specified in 7.4.2.1 for washable fabrics or after dry cleaning as specified in 7.4.3 for dry-cleanable fabrics (see Note 6).

7.8.1 For fabrics not intended for use in “durable-press” garments, determine the fabric smoothness after pressing as specified in 5.12 of AATCC Test Method 96.

7.8.1.1 The fabric smoothness durable-press (DP) rating of such fabrics shall have decreased no more than ½ DP rating from that of the fabric before it is dry-cleaned or laundered.

7.9 *Flammability*—The flammability requirements shall be as agreed upon between the purchaser and the supplier, except when regulated by applicable Government mandatory standards.

## **8. Keywords**

8.1 fabric; performance; rainwear; specification; water repellent

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