



Designation: D 3781 – 02

Standard Performance Specification for Men's and Boys' Knitted Rainwear and All-Purpose, Water-Repellent Coat Fabrics¹

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1. Scope

1.1 This performance specification covers men's and boys' knitted rainwear and all-purpose water-repellent coat fabrics composed of any textile fiber or mixture of textile fibers.

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

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

2. Referenced Documents

2.1 ASTM Standards:²

D 123 Terminology Relating to Textiles

D 231 Method of Testing and Tolerances for Knit Goods³

D 2594 Test Methods for Stretch Properties of Knitted Fabrics Having Low Power

D 2724 Test Methods for Bonded, Fused, and Laminated Apparel Fabrics

D 2905 Practice for Statements on Number of Specimens for Textiles

2.2 AATCC Methods:⁴

8-1974 Colorfastness to Crocking: AATCC Crockmeter Method

15-1976 Colorfastness to Perspiration

16-1974 Colorfastness to Light

22-1974 Water Repellency: Spray Test

23-1975 Colorfastness to Burnt Gas Fumes

35-1974 Water Resistance: Rain Test

61-1975 Colorfastness to Washing, Domestic, and Laundering, Commercial: Accelerated

96-1975 Dimensional Changes in Laundering of Woven and Knitted Textiles Except Wool

116-1974 Colorfastness to Crocking: Rotary Vertical Crockmeter Method

124-1975 Appearance of Durable Press Fabrics After Repeated Home Launderings

132-1976 Colorfastness to Drycleaning

135-1973 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 Sodium Chypochlorite 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—Reference to test methods in this specification gives only the permanent part of the designation of ASTM, AATCC, or other test methods. The current editions of each test method cited shall prevail. The specific dated editions of the ASTM test methods that prevail in this document are referenced in Section 7.

3. Terminology

3.1 Definition:

3.1.1 *dimensional change, n*— in pressing and finishing of textiles, the change in dimensions of a fabric caused by pressing and finishing during garment manufacture.

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

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *pressing and finishing*—This term takes into account all of the industrial pressing and finishing treatments used in garment production.

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 Discontinued, see 1979 *Annual Book of ASTM Standards*, Part 32.

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

NOTE 2—No standard method is available for reproducing on a laboratory level the results of industrial press or finishing treatments, or both, used in the manufacture of woven outerwear garments.⁵

4. Specification Requirements

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

⁵ The development of a standard method has been referred to Subcommittee D13.59 on Fabric Test Methods, General.

TABLE 1 Specification Requirements

NOTE 1—Class in a, b, c and DP is based on a numerical scale of 5 for negligible or no color change, color transfer, or wrinkle to 1 for very severe color change, color transfer, or wrinkle. The numerical rating in Table 1 or a higher numerical rating is acceptable.

Characteristic	Requirements	Section
Bursting strength (load) (ball burst)	50 lbf (222 N) min	7.1
Dimensional change:		
Pressing and finishing	2 % max, in each direction	7.2.1
After five launderings	3 % max, in each direction	7.2.2
After three dry cleanings	2 % max, in each direction	7.2.3
Growth	3 % max, in each direction	7.2.4
Colorfastness:		
Burnt gas fumes—2 cycles:		7.3.1
Shade change, original fabric	Class 4 ^A min	
Shade change after one laundering or one dry cleaning	Class 4 ^A min	
Sodium Hypochlorite Bleach	Class 4 ^A min	7.3.7
Non-Chlorine Bleach	Class 4 ^A min	7.3.8
Laundering:		7.3.2
Shade change	Class 4 ^A min	
Staining	Class 3 ^B min	
Drycleaning:		7.3.3
Shade change	Class 4 ^A min	
Crocking:		7.3.4
Dry	Class 4 ^C min	
Wet	Class 3 ^C min	
Perspiration (acid phase):		7.3.5
Shade change	Class 4 ^A min	
Staining	Class 3 ^B min	
Light (40 AATCC FU) (xenon-arc)	Step 4 ^A min	7.3.6
Water resistance (categories based on minimum time for 1-g weight increase at following head pressures):		7.4
2 ft (600 mm)	30 s (shower)	
2 ft (600 mm)	2 minutes (rain)	
3 ft (915 mm)	5 minutes (storm)	
Water repellency:		7.5
Smooth-textured fabrics:		
Original	90, min	
After five launderings or three dry cleanings	70, min	
Rough-textured:		
Original	80, min	
After five launderings or three dry cleanings	70, min	
Fabric appearance (see 7.6.1.1)	DP 3.5 ^D , min.	7.6
Flammability	pass	7.7

^A AATCC Gray Scale for Color Change.

^B AATCC Gray Scale for Staining.

^C AATCC Chromatic Transference Scale.

^D For durable press fabrics only.

5. Significance and Use

5.1 Knitted fabrics should meet all of the requirements in Table 1 to be suitable for use in the manufacture of rainwear and all-purpose, water-repellent coats for men and boys.

5.2 It is recognized that for purposes of fashion or aesthetics the ultimate consumer of articles made from these fabrics may find acceptable some fabrics that do not conform to all of the requirements in Table 1. For example, the fabric could be dyed in shades that do not meet the requirement in Table 1 for colorfastness to light, yet be acceptable to the ultimate consumer because the shade is fashionable. In such cases, one or more of the requirements may be modified by mutual agreement between the purchaser and the seller.

5.2.1 If any of the requirements in Table 1 are modified by mutual agreement between the purchaser and the seller, any reference to the specification shall specify that "this fabric meets ASTM Specification D 3781 except for the following characteristic(s)."

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

6. Sampling

6.1 Tests shall be performed on the fabrics 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.

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 Method (See Note 1)

7.1 *Bursting Strength*—Determine the bursting strength, in the standard atmosphere for testing textiles, as directed in Method D 231 using an approved type of constant-rate-of-traverse machine equipped with a bursting attachment or an approved type of diaphragm bursting tester as agreed upon between the purchaser and the seller.

NOTE 3—There is no overall correlation between the results obtained with the CRT machine equipped with a bursting attachment and the diaphragm bursting tester. Consequently, these two bursting testers cannot be used interchangeably. In case of controversy, the CRT machine equipped with a bursting attachment method shall prevail.

NOTE 4—The precision of the ball burst method using the CRT machine equipped with a bursting attachment and the precision of the diaphragm bursting tester method are being established by Subcommittee D13.59 on Fabric Test Methods, General. The test methods are accordingly not recommended for acceptance testing unless preceded by an interlaboratory check test in the laboratory of the purchaser and the laboratory of the seller.