Designation: D4232 – 14

Standard Performance Specification for Men's and Women's Dress and Vocational Career Apparel Fabrics[1]

This standard is issued under the fixed designation D4232; 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 the performance requirements for woven fabrics for men's and women's dress and vocational career apparel.

1.2 This performance specification is not applicable to career apparel fabrics that do not patently fit the category of Career Dress Apparel. Performance specifications for such fabrics should be as agreed to between the purchaser and the seller. This performance specification is not applicable to overcoat or topcoat uniform fabrics.

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D434 Test Method for Resistance to Slippage of Yarns in Woven Fabrics Using a Standard Seam (Withdrawn 2003)[3]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

D2262 Test Method for Tearing Strength of Woven Fabrics by the Tongue (Single Rip) Method (Constant-Rate-of-Traverse Tensile Testing Machine) (Withdrawn 1995)[3]

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

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

16.3 Colorfastness to Light: Xenon-Arc

23 Colorfastness to Burnt Gas Fumes

61 Colorfastness to Laundering: Accelerated

116 Colorfastness to Crocking: Rotary Vertical Crockmeter Method

124 Smoothness Appearance of Fabrics After Repeated Home Laundering

132 Colorfastness to Drycleaning

135 Dimensional Change of Fabrics after Home Laundering

172 Colorfastness to Powdered Non-chlorine Bleach in Home Laundering

188 Colorfastness to Sodium Hypochlorite Bleach in Home Laundering

Evaluation Procedure 1 AATCC Gray Scale for Color Change

Evaluation Procedure 2 AATCC Gray Scale for Staining

Evaluation Procedure 8 AATCC 9-Step Chromatic Transference Scale

A Glossary of AATCC Standard Terminology

[1] This performance 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.

[4] AATCC Technical Manual, available from American Association of Textile Chemists and Colorists (AATCC), P.O. Box 12215, Research Triangle Park, NC 27709, http://www.aatcc.org.

2.3 *Federal Standard:*[5]

16 CFR, Chapter II-Consumer Product Safety Commission Subchapter D-Flammable Fabrics Act Regulations

2.4 *Military Standard:*[6]

MIL-STD-105D Sampling Procedures and Tables for Inspection by Attributes

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 editions of each test method cited shall prevail.

3. Terminology

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

3.1.1 The following terms are relevant to this standard: career apparel, career dress apparel, career vocational apparel.

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. Specification Requirements

4.1 The properties of woven fabrics for men's and women's career apparel 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 performance specification.

5.2 It is recognized that where more critical requirements call for higher performance levels, 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. One or more of the requirements may be modifed 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 D4232 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.

[5] Available from Superintendent of Documents, Government Printing Office, Washington, DC 20402.

[6] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

6. Sampling

6.1 *Lot Sample*—As a lot sample for acceptance testing, take at random the number of rolls as directed in and applicable specification or other agreement between the purchaser and the supplier, such as an agreement to use MIL-STD-105D.

6.2 *Laboratory Sample*—From each roll or piece in the lot sample, cut two laboratory samples the full width of the fabric and at least 375 mm (15 in.) along the selvage.

7. Test Methods (See Note 1)

7.1 *Breaking Force*—Determine the dry breaking force as directed in Test Method D5034, using a constant rate of traverse (CRT) tensile testing machine with the speed of the pulling clamp at 300 ± 10 mm (12 ± 0.5 in.)/min.

NOTE 2—If preferred, the use of a constant-rate-of-extension (CRE) testing machine is permitted. The crosshead speed should be as agreed between the purchaser and the supplier. There may be no overall correlation between the results obtained with the CRT machine and the CRE machine, consequently, these two breaking load testers cannot be used interchangeably. In case of controversy, the CRT machine will prevail.

7.2 *Yarn Slippage*—Determine the yarn slippage as directed in Test Method D434.

NOTE 3—The precision of Test Method D434 is being established, and it may not be suitable for fabrics with a low number of ends and picks per inch.

7.3 *Tearing Strength*—Determine the tearing strength as directed in Test Method D2262.

NOTE 4—If preferred, the use of either Test Methods D1424 or D2261 is permitted with existing requirements as given in this performance specification. There may be no overall correlation between the results obtained with the tongue tear machines and the Elmendorf machine. Consequently, these tear testers cannot be used interchangeably. In case of controversy, Test Method D2262 shall prevail.

7.4 *Dimensional Change:*

7.4.1 *Pressing and Finishing During Garment Manufacturing*—Mark specimen(s) as directed in 4.4 of AATCC Test Method 135. Press and finish specimen(s) as agreed to by the purchaser and the supplier with respect to time, cycles, temperature, steam, vacuum, and mechanical pressure of the presshead. Measure the specimen(s) and calculate the dimensional change as directed in Sections 6 and 7 of AATCC Test Method 135.

7.4.1.1 If no agreement has been made between the purchaser and the supplier, press the specimen(s) using a flat-bed steam press according to the cycle in 10.1.4.1 through 10.1.4.5 of Test Methods D2724.

7.4.2 *Laundering*—Determine the maximum dimensional change after 5 launderings as directed in the applicable procedure in AATCC Test Method 135 or as agreed to by buyer and supplier.

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

NOTE 5—Launderable fabrics are expected to be drycleanable except where all or part of the fabric is not drycleanable and is so labeled. For example, the fabric could contain a functional finish soluble in the solvent,

TABLE 1 Specification Requirements

NOTE 1—Grade in colorfastness and durable press requirements are based on a numerical scale of 5 for negligible color change, color transfer, or durable press rating, and to 1 for very severe color change, color transfer, or durable press rating.

Characteristics	Career Dress Apparel Fabric Requirements	Career Vocational Apparel Fabric Requirements	Section
Breaking strength (load) (CRT):			
Category I	267 N (60 lbf), min	312 N (70 lbf), min	7.1
Category II	178 N (40 lbf), min	222 N (50 lbf), min	
Category III	156 N (35 lbf), min	178 N (40 lbf), min	
Yarn slippage, 6-mm, (¼-in.) separation:			
Category I	111 N (25 lbf), min	111 N (25 lbf), min	7.2
Category II	89 N (20 lbf), min	89 N (20 lbf), min	
Category III	67 N (15 lbf), min	67 N (15 lbf), min	
Tongue tear strength:			
Category I	20 N (4.5 lbf), min	27 N (6.0 lbf), min	7.3
Category II	16 N (3.5 lbf), min	18 N (4.0 lbf), min	
Category III	11 N (2.5 lbf), min	11 N (2.5 lbf), min	
Dimensional stability:			
Pressing and finishing	2 % shrink, 0.5 % gain, max	2 % shrink, 0.5 % gain, max	7.4.1
After 5 washes	2.5 % max	2.5 % max	7.4.2
After 3 drycleanings	2.5 % max	2.5 % max	7.4.3
Fabric Smoothness Appearance (see 7.5.1):			
Category I	SA, 3.5 min	SA, 3.0 min	7.5
Category II	SA, 3.5 min	SA, 3.0 min	
Category III	SA, 3.0 min	SA, 3.0 min	
Flammability	pass	pass	7.6
Colorfastness to:			
Laundering:[D]			
Shade change	Grade 4, min[A]	Grade 4, min[A]	7.7.1
Staining	Grade 3, min[B]	Grade 3, min[B]	
Drycleaning			
Shade change	Grade 4, min[A]	Grade 4, min[A]	7.7.2
Crocking:[D]			
Dry	Grade 4, min[C]	Grade 4, min[C]	7.7.3
Wet	Grade 3, min[C]	Grade 3, min[C]	
Burnt gas fumes—2 cycles			
Shade change, original fabric	Grade 4, min[A]	Grade 4, min[A]	7.7.4
Shade change, after one laundering or one drycleaning	Grade 4, min[A]	Grade 4, min[A]	
Light (xenon-arc)			
Outdoor (40 AATCC FU)	Grade 4, min[A]	Grade 4, min[A]	7.7.5
Indoor (20 AATCC FU)	Grade 4, min[A]	Grade 4, min[A]	
Perspiration:[D]			
Shade change	Grade 4, min[A]	Grade 4, min[A]	7.7.6
Staining	Grade 3, min[B]	Grade 3, min[B]	
Ozone—2 cycles	Grade 4[A]	Grade 4[A]	7.7.7
Sodium Hypochlorite Bleach	Grade 4[A] , min	Grade 4[A] , min	7.7.8
Powdered Non-chlorine Bleach	Grade 4[A] , min	Grade 4[A] , min	7.7.9

[A] AATCC Gray Scale for Color Change.
[B] AATCC Gray Scale for Staining.
[C] AATCC 9-Step Chromatic Transference Scale.
[D] See Note 7.

or the fiber could be degraded by the solvent. Goods labeled "Dryleanable" are to be drycleaned 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 drycleaning is calculated using Eq 1. The dimensional change to pressing is determined on the fabric as it will reach the user. It is not additive to the dimensional change to laundering or drycleaning of the fabric as it will reach the consumer (see 6.1).

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

where:

D_1 = measurement after laundering or drycleaning, and
D_2 = measurement after pressing and finishing.

7.4.3 *Dimensional Change in Drycleaning*— Determine the maximum dimensional change after three drycleanings as directed in 10.1.1 through 10.1.5 of Test Methods D2724, or as agreed to by the purchaser and the supplier.

7.5 *Fabric Smoothness Appearance*—Determine the fabric appearance as directed in AATCC Test Method 124 after laundering, using the conditions agreed to by the purchaser and the supplier, or as specified in 7.4.2 or 7.4.2.1 for washable fabrics, or after drycleaning as specified in7.4.3 for drycleanable fabrics (see Note 8).

7.5.1 The fabric smoothness (SA) rating of such fabrics, and the SA rating of drycleaned fabrics, shall have decreased no more than 0.5 SA rating from that of the fabric before it is laundered or drycleaned.

7.6 *Flammability*—The flammability requirements shall be as agreed between the purchaser and the supplier, provided they meet or exceed those of Part 1610 of the Flammable Fabrics Act Regulations.

7.7 *Colorfastness:*

7.7.1 *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 (Note 7 and Note 8).

NOTE 7—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.

7.7.2 *Drycleaning*—Determine the colorfastness to drycleaning as directed in AATCC Test Method 132.

7.7.3 *Crocking*—Determine the colorfastness to crocking as directed in AATCC Test Method 8 for solid shades and AATCC Test Method 116, for prints, or as agreed to by the purchaser and the supplier (see Note 7).

7.7.4 *Burnt Gas Fumes*—Determine the colorfastness to burnt gas fumes on the original fabric and after one laundering or drycleaning, in accordance with AATCC Test Method 23.

NOTE 8—Washing conditions shall be the same as those noted in 7.4.2.1. Drycleaning conditions shall be the same as those used in 7.4.3.

7.7.5 *Light*—Determine colorfastness to light as directed in AATCC Test Method 16.3 – Option 3.

7.7.6 *Perspiration*—Determine colorfastness to perspiration as directed in AATCC Test Method 15 (see Note 7).

7.7.7 *Colorfastness to Ozone*—Determine colorfastness to ozone as directed in AATCC Test Method 109.

7.7.8 *Colorfastness to Sodium Hypochlorite Bleach*—Determine colorfastness to light as directed in AATCC Test Method 188. The test conditions shall be as specified by the seller.

7.7.9 *Colorfastness to Powdered Non-chlorine Bleach*—Determine colorfastness to light as directed in AATCC Test Method 172. The test conditions shall be as specified by the seller.

8. Keywords

8.1 career apparel; fabric; performance; specification