



Designation: D4232 – 23

# Standard Performance Specification for Woven Career Apparel Fabrics: Dress and Vocational<sup>1</sup>

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 ( $\epsilon$ ) 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 career apparel: dress and vocational.

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, 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:<sup>2</sup>

D123 Terminology Relating to Textiles

D434 Test Method for Resistance to Slippage of Yarns in Woven Fabrics Using a Standard Seam (Withdrawn 2003)<sup>3</sup>

<sup>1</sup> 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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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

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)<sup>3</sup>

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

D7022 Terminology Relating to Apparel (Withdrawn 2022)<sup>3</sup>

2.2 AATCC Test Methods:<sup>4</sup>

TM8 Colorfastness to Crocking: Crockmeter

TM15 Colorfastness to Perspiration

TM16.3 Colorfastness to Light: Xenon-Arc

TM23 Colorfastness to Burnt Gas Fumes

TM61 Colorfastness to Laundering: Accelerated

TM109 Colorfastness to Ozone in the Atmosphere under Low Humidities

TM116 Colorfastness to Crocking: Rotary Vertical Crockmeter Method

TM124 Smoothness Appearance of Fabrics After Repeated Home Laundering

TM132 Colorfastness to Drycleaning

TM135 Dimensional Change of Fabrics after Home Laundering

TM158 Dimensional Changes on Dry Cleaning 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

M11 A Glossary of AATCC Standard Terminology

2.3 Federal Standard:<sup>5</sup>

CFR 1610 Chapter II-Consumer Product Safety Commission Subchapter D-Flammable Fabrics Act Regulations

<sup>4</sup> 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>.

<sup>5</sup> Available from Superintendent of Documents, Government Printing Office, Washington, DC 20402.

## 2.4 ANSI Standard:<sup>6</sup>

### ANSI/ASQ Z1.4 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**.

<sup>6</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

3.1.1 The following terms are relevant to this standard: career 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**.

**TABLE 1 Specification Requirements**

NOTE 1—Grade in colorfastness is based on a numerical scale of 5 for negligible color change or color transfer rating, and to 1 for very severe color change or color transfer, or durable press rating. A grade for fabric smoothness requirements is based on SA-5 for a very smooth, pressed, finished appearance to a grade of SA-1 crumpled, creased and severely wrinkled appearance.

Characteristics	Career Dress Apparel Fabric Requirements	Career Vocational Apparel Fabric Requirements	Section
Breaking strength (load) (CRE):			
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	Class 1	Class 1	7.6
Colorfastness to:			
Laundering: <sup>D</sup>			
Shade change	Grade 4, min <sup>A</sup>	Grade 4, min <sup>A</sup>	7.7.1
Staining	Grade 3, min <sup>B</sup>	Grade 3, min <sup>B</sup>	
Drycleaning			
Shade change	Grade 4, min <sup>A</sup>	Grade 4, min <sup>A</sup>	7.7.2
Crocking: <sup>D</sup>			
Dry	Grade 4, min <sup>C</sup>	Grade 4, min <sup>C</sup>	7.7.3
Wet	Grade 3, min <sup>C</sup>	Grade 3, min <sup>C</sup>	
Burnt gas fumes—2 cycles			
Shade change, original fabric	Grade 4, min <sup>A</sup>	Grade 4, min <sup>A</sup>	7.7.4
Shade change, after one laundering or one drycleaning	Grade 4, min <sup>A</sup>	Grade 4, min <sup>A</sup>	
Light (xenon-arc)			
Outdoor (40 AFUs)	Grade 4, min <sup>A</sup>	Grade 4, min <sup>A</sup>	7.7.5
Indoor (20 AFUs)	Grade 4, min <sup>A</sup>	Grade 4, min <sup>A</sup>	
Perspiration: <sup>D</sup>			
Shade change	Grade 4, min <sup>A</sup>	Grade 4, min <sup>A</sup>	7.7.6
Staining	Grade 3, min <sup>B</sup>	Grade 3, min <sup>B</sup>	
Ozone—2 cycles	Grade 4 <sup>A</sup> , min	Grade 4 <sup>A</sup> , min	7.7.7
Sodium Hypochlorite Bleach	Grade 4 <sup>A</sup> , min	Grade 4 <sup>A</sup> , min	7.7.8
Powdered Non-chlorine Bleach	Grade 4 <sup>A</sup> , min	Grade 4 <sup>A</sup> , min	7.7.9

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

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

<sup>C</sup> AATCC 9-Step Chromatic Transference Scale.

<sup>D</sup> See **Note 7**.

4.2 The uses of Career Apparel Dress fabrics vary with weight as follows:

Category	Mass (Weight)	Typical End-Uses
I—Heavy-weight	200 g/m <sup>2</sup> (6.0 oz/yd <sup>2</sup> ) and above	Pants, suits, blazer, waiter-type jackets, vests, coveralls, etc.
II—Medium-weight	150 g/m <sup>2</sup> (4.5 oz/yd <sup>2</sup> ) and above, but less than 200 g/m <sup>2</sup> (6.0 oz/yd <sup>2</sup> )	Pants, jackets, dresses, shirts and blouses, gowns, smocks, lab coats, etc.
III—Light-weight	Below 150 g/m <sup>2</sup> (4.5 oz/yd <sup>2</sup> )	Tops (shirts, blouses) and dresses

4.3 The uses of Career Apparel Vocational fabrics vary with weight as follows:

Category	Mass (Weight)	Typical End-Uses
I—Heavy-weight	270 g/m <sup>2</sup> (8.0 oz/yd <sup>2</sup> ) and above	Pants, jackets, lab coats, coveralls, etc.
II—Medium-weight	150 g/m <sup>2</sup> (4.5 oz/yd <sup>2</sup> ) and above, but less than 270 g/m <sup>2</sup> (8.0 oz/yd <sup>2</sup> )	Shirts, smocks, aprons, lab coats, nurses dresses, etc
III—Light-weight	Below 150 g/m <sup>2</sup> (4.5 oz/yd <sup>2</sup> )	Light duty shirts, blouses, dresses, smocks, etc.

## 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 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 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.

## 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 ANSI/ASQ Z1.4.

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 extension (CRE) tensile testing machine with the speed of the pulling clamp at 300 mm ± 10 mm (12 in. ± 0.5 in.)/min. (See **Note 2**.)

**NOTE 2**—If preferred, the use of a constant-rate-of-traverse (CRT) 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 CRE machine will prevail.

7.2 *Yarn Slippage*—Determine the yarn slippage as directed in Test Method **D434**. (See **Note 3**.)

**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 **D2261**. (See **Note 2** and **Note 4**.)

**NOTE 4**—If preferred, the use of either Test Methods **D1424** or **D2262** 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 **D2261** shall prevail.

### 7.4 Dimensional Change:

7.4.1 *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 the supplier with respect to time, cycles, temperature, steam, vacuum, and mechanical pressure of the press-head or using the procedure in AATCC TM158. Measure the specimen(s) and calculate the dimensional change as directed in Sections 8 and 9 of AATCC TM135.

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 AATCC TM158.

7.4.2 *Laundering*—Determine the maximum dimensional change after 5 launderings as directed in the applicable procedure in AATCC TM135 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. (See **Note 5** and **Note 6**.)

**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, or the fiber could be degraded by the solvent. Goods labeled “Drycleanable” 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**).

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

where:

$D_1$  = measurement after laundering or drycleaning, and