



# Standard Performance Specification for Men's and Boys' Woven Dress Shirt Fabrics<sup>1</sup>

This standard is issued under the fixed designation D 3477; 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 woven fabrics to be used in the manufacturing of dress shirts for men and boys.

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

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

1.4 The following precautionary caveat pertains only to the test method portion, Section 7, of this performance specification: *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:

- 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 1905 Test Method for Dimensional Changes in Laundering of Woven or Knitted Textiles<sup>3</sup>
- D 2261 Test Method for Tearing Strength of Woven Fabrics by the Tongue (Single Rip) Method (Constant-Rate-of-Extension Tensile Testing Machine)<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>4</sup>

### 2.2 AATCC Methods:<sup>5</sup>

- 8 Colorfastness to Crocking: AATCC Crockmeter Method
- 15 Colorfastness to Perspiration
- 16 Colorfastness to Light
- 23 Colorfastness to Burnt Gas Fumes
- 61 Colorfastness to Washing, Domestic and Laundering, Commercial: Accelerated
- 116 Colorfastness to Crocking; Rotary Vertical, Crockmeter Method
- 124 Appearance of Durable Press Fabrics after Repeated Home Launderings
- 132 Colorfastness to Drycleaning
- 135 Dimensional Changes in Automatic Home Laundering of Durable Press Woven or Knit Fabrics  
Evaluation Procedure 1 Gray Scale for Color Change  
Evaluation Procedure 2 Gray Scale for Staining  
Evaluation Procedure 3 AATCC Chromatic Transference Scale
- 2.3 Federal Standard:<sup>6</sup>
  - 16 CFR, Chapter II—Consumer Product Safety Commission, Subchapter D—Flammable Fabrics Act Regulations
- 2.4 Military Standard:<sup>7</sup>
  - 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 Definitions:

3.1.1 For definitions of 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 *dress shirt, n— for boys*, a shirt made with a specific collar size or numerical size and designed to be worn with a tie and jacket.

3.2.2 *dress shirt, n— for men*, a shirt made with a specific

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 07.01.

<sup>3</sup> Discontinued—See 1977 *Annual Book of ASTM Standards*, Part 32.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 07.02.

<sup>5</sup> AATCC Technical Manual, available from the American Association of Textile Chemists and Colorists, P. O. Box 12215, Research Triangle Park, NC 27709.

<sup>6</sup> Available from Superintendent of Documents, Government Printing Office, Washington, DC 20402.

<sup>7</sup> Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

**TABLE 1 Specification Requirements**

Characteristic	Requirements	Section
Breaking strength (load)	111 N (25 lbf), min	7.1
Yarn slippage	67 N (15 lbf), min	7.2
Tear strength	6.7 N (1.5 lbf), min	7.3
<i>Dimensional change:</i>		
Pressing	1 % max, in each direction	7.4.1
Pressing and laundering	2 % max, in each direction	7.4.2
Drycleaning	2 % max, in each direction	7.4.3
<i>Colorfastness to:</i>		
Laundering		
Alteration in shade	class 4, min <sup>A</sup>	7.5.1
Staining	class 3, <sup>B</sup> min <sup>A</sup>	
Drycleaning		
Alteration in shade	class 4, <sup>C</sup> min <sup>A</sup>	7.5.2
Burnt Gas Fumes		
Alteration in shade: 1 cycle on original, and after 1 washing or 1 drycleaning, or both	class 4, <sup>C</sup> min <sup>A</sup>	7.5.3
Crocking		
Dry	class 4, <sup>D</sup> min <sup>A</sup>	7.5.4
Wet	class 3, <sup>D</sup> min <sup>A</sup>	
Perspiration (acid phase)		
Alteration in shade	class 4, <sup>C</sup> min <sup>A</sup>	7.5.5
Staining	class 4, <sup>B</sup> min <sup>A</sup>	
Light (20 AATCC SFU) (Xenon arc)	class 4, <sup>C</sup> min <sup>A</sup>	7.5.6
<i>Fabric appearance</i>	DP 3.5, min <sup>A</sup>	7.6
<i>Flammability</i>	pass	7.7

<sup>A</sup> Class in colorfastness and DP requirements is based on a numerical rating of 5 for negligible or no color change, color transfer, or fabric wrinkle to a numerical rating of 1 for very severe color change, color transfer, or fabric wrinkle.

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

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

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

collar size and sleeve length where appropriate, and designed to be worn with a tie and jacket.

#### 4. Specification Requirements

4.1 The properties of fabric for men's and boys' woven dress shirts 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 seller.

5.2.1 In such cases, any references to the specification shall specify that: This fabric meets Specification D 3477 except for the following characteristic(s).

5.3 Where no prepurchase agreement has been reached between the purchaser and the seller, 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 an 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

7.1 *Breaking Strength*—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/min ( $12 \pm 0.5$  in./min).

NOTE 2—If preferred, use of a constant-rate-of-extension (CRE) tensile testing machine is permitted. The crosshead speed should be as agreed upon between the buyer and supplier. However, in case of controversy, the CRT method shall prevail.

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

7.3 *Tear Strength*—Determine the tear strength as directed in Test Method D 1424.

NOTE 3—If preferred, use of Test Methods D 2262 or D 2261 is permitted with existing requirements as given in this standard. There may be no overall correlation between the results obtained with the tongue tear machines and the Elemendorf machine. Consequently, these three testers can not be used interchangeably. In case of controversy, Test Method D 1424 shall prevail.

#### 7.4 Dimensional Change:

7.4.1 *Pressing During Manufacturing*— Mark the specimen(s) as directed in 4.3.1 of AATCC Method 135. Press the specimen(s) as agreed upon by the buyer and supplier with respect to time, temperature, and the selection of dry or steam heat. Measure each specimen and calculate the dimensional change as directed in Sections 6 and 7 of AATCC Method 135 (see 3.2.1).

7.4.2 *Laundrying*—Determine the dimensional change in laundrying of fabrics in accordance with AATCC Method 135 (Note 4). Use the same specimens and gage marks on which the shrinkage due to pressing was calculated. This will produce a total shrinkage (pressing and laundrying) as would result from manufacturing pressing and subsequent laundrying and pressing.

NOTE 4—Under this standard a washable fabric also shall be drycleanable unless specifically labeled “Do Not Dryclean.” “Drycleanable” goods are to be drycleanable only.

7.4.2.1 The wash conditions and drying procedure shall be as specified by the seller. In the case of a non durable press fabric, press as specified in 12.1.4 of Test Method D 1905 before measuring shrinkage.

7.4.3 *Drycleaning*—Determine the dimensional change in drycleaning in accordance with 10.1.1 to 10.1.4 of Test Method D 2724 (Note 4).

#### 7.5 Colorfastness:

7.5.1 *Laundrying*—Determine the colorfastness to laundrying in accordance with AATCC Test Method 61 (1975). The test conditions shall be as specified by the seller (Note 4).

7.5.2 *Drycleaning*—Determine the colorfastness to drycleaning in accordance with AATCC Test Method 132 (Note 4).

7.5.3 *Burnt Gas Fumes*—Determine the colorfastness to burnt gas fumes on the original fabric, after one washing cycle, in accordance with AATCC Test Method 23 (washing conditions shall be as for dimensional change in laundrying) and after 1 dry cleaning.

7.5.4 *Crocking*—Determine the colorfastness to dry and wet crocking in accordance with AATCC Test Method 8 for solid shades or AATCC Test Method 116 for prints or as agreed between the purchaser and the seller.

7.5.5 *Perspiration*—Determine the colorfastness to perspiration in accordance with AATCC Test Method 15 (acid phase).

NOTE 5—Published work indicates that AATCC Method 15 (acid phase) predicts wear performance accurately and consistently.<sup>8</sup>

7.5.6 *Light*—Determine the colorfastness to light as directed in AATCC Test Method 16.

NOTE 6—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.

7.6 *Fabric Appearance After Repeated Home Laundryings*—Determine the fabric appearance in accordance with AATCC Test Method 124 under the conditions used in 7.4.2.

7.6.1 For fabrics not intended for use in “Durable Press” products determine the fabric appearance after pressing as specified in 12.1.4 of Test Method D 1905.

7.7 *Flammability*—The flammability requirements shall be as agreed between the purchaser and the seller, provided they meet or exceed those of Part 1610 of the Flammable Fabrics Act Regulations (see 2.3).

## 8. Keywords

8.1 fabric; performance; shirt; specification

<sup>8</sup> See Gobeil, N. B., and Mueller, B. J., *Textile Chemist and Colorist*, Vol 6, p. 249, 1974.

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