



# Standard Performance Specification for Men's, Women's, and Children's Woven Handkerchief Fabrics<sup>1</sup>

This standard is issued under the fixed designation D4153; 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 manufacture of men's, women's, and children's handkerchiefs, both utilitarian and decorative.

1.2 This performance specification is not applicable to open-work fabrics such as lace which is used primarily to decorate handkerchiefs, or woven fabrics used for the manufacture of scarves.

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:*<sup>2</sup>

D123 Terminology Relating to Textiles

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Strength of Woven Fabrics by the Tongue (Single Rip) Method (Constant-Rate-of-Traverse Tensile Testing Machine) (Withdrawn 1995)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>

D2905 Practice for Statements on Number of Specimens for Textiles (Withdrawn 2008)<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).

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

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

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

116 Colorfastness to Crocking: Rotary Vertical Crockmeter Method

124 Appearance of Durable Press Fabrics after Repeated Home Launderings

135 Dimensional Changes in Automatic Home Laundering of Woven or Knit Fabrics

172 Colorfastness to Non-chlorine Bleach in Home Laundering

188 Colorfastness to Chlorine Bleach in Home Laundering

2.3 *Federal Standard:*

16CFR—Code of Federal Regulations, Chapter II—Consumer Product Safety Commission, Subchapter D—Flammable Fabrics Act Regulations<sup>5</sup>

2.4 *Military Standard:*

MIL-STD—105 Sampling Procedures and Tables for Inspection by Attributes<sup>6</sup>

NOTE 1—Reference to test methods in this performance specification 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:*

<sup>4</sup> 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 U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, <http://www.access.gpo.gov>.

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

3.1.1 For definitions of textile terms used in this specification, refer to the individual ASTM and AATCC test methods and to Terminology **D123**. Definitions found in a dictionary of common terms are suitable for terms used in this performance specification.

#### 4. Specification Requirements

4.1 The properties of woven fabric for men's, women's, and children's handkerchiefs shall conform to the specification requirements in **Table 1**.

#### 5. Significance and Use

5.1 Upon mutual agreement between the purchaser and the supplier, 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 D4153 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 an applicable specification or other agreement between the purchaser and the seller, such as an agreement to use MIL-STD-105.

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.

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 **D2905** 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 **D5034**, 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) testing machine is permitted. The crosshead speed should be as agreed upon 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 shall prevail.

7.2 *Tear Strength*—Determine the tear strength as directed in Test Method **D2262**.

**NOTE 3**—If preferred, the use of Test Method **D1424** or Test Method **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 three testers cannot be used interchangeably. In case of controversy, Test Method **D2262** shall prevail.

7.3 *Dimensional Change in Laundering*—Determine the maximum dimensional change after five launderings, or as agreed upon between the purchaser and the supplier, as directed in the applicable procedure in AATCC Test Method 135.

#### 7.4 Colorfastness:

7.4.1 *Laundering*—Determine the colorfastness to laundering as directed in AATCC Test Method 61. The test conditions shall be as specified by the supplier.

**NOTE 4**—It has been reported that the results for staining, obtained by standard AATCC Test Methods, on fabrics dyed to dark shades that

**TABLE 1 Specification Requirements**

**NOTE 1**—The grades of colorfastness and SA rating are 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.

Characteristic	Requirements	Section
Breaking strength (load) (CRT) <sup>A</sup>	80 N (18 lbf), min	7.1
Tongue tear strength <sup>A</sup>	4.5 N (1 lbf)	7.2
Dimensional change:		
After 5 launderings	50 % max	7.3
Colorfastness to:		
Laundering: <sup>F</sup>		7.4.1
Shade change	Grade 4 <sup>B</sup> min	
Staining	Grade 3 <sup>C</sup> min	
Burnt gas fumes:		7.4.2
Alteration in shade: 1 cycle on original and after 1 washing	Grade 4 <sup>B</sup> min	7.4.2
Crocking: <sup>F</sup>		7.4.3
Dry	Grade 4 <sup>D</sup> min	
Wet	Grade 3 <sup>D</sup> min	
Perspiration: <sup>F</sup>		7.4.4
Shade change	Grade 4 <sup>B</sup> min	
Staining	Grade 3 <sup>C</sup> min	
Light (xenon arc) <sup>A</sup>		7.4.5
20 AATCC Fading units	Grade 4 <sup>B</sup> min	
Chlorine Bleach	Grade 4 <sup>B</sup> , min	7.4.6
Non-chlorine Bleach	Grade 4 <sup>B</sup> , min	7.4.7
Fabric appearance (see 7.5.1.1)	DP 3.5 <sup>E</sup> min	7.5
Flammability	pass	7.6

<sup>A</sup> More than one method can be used to measure these properties. These methods cannot be used interchangeably since there can be no overall correlation between them (see **Note 2**, **Note 3**, and **Note 6**).

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

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

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

<sup>E</sup> For durable press fabrics only.

<sup>F</sup> See **Note 4**.

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.

**7.4.2 Burnt Gas Fumes**—Determine the colorfastness to burnt gas fumes on the original fabric and after one laundering as directed in AATCC Test Method 23.

NOTE 5—Washing conditions shall be the same as those used in 7.3.

**7.4.3 Crocking**—Determine the colorfastness to dry and wet crocking as directed in AATCC Test Method 8 for solid shades and AATCC Test Method 116 for prints or as agreed upon between the purchaser and the supplier (see Note 4).

**7.4.4 Perspiration**—Determine the colorfastness to perspiration as directed in AATCC Test Method 15 (see Note 4).

**7.4.5 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.

**7.4.6 Colorfastness to Chlorine Bleach Method 172**—Determine colorfastness to light as directed in AATCC Test Method 16.

**7.4.7 Colorfastness to Non-chlorine Bleach Method 188**—Determine colorfastness to light as directed in AATCC Test Method 16.

**7.5 Fabric Appearance After Repeated Home Launderings**—Determine the fabric appearance as directed in 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 7.3 for washable fabrics.

**7.5.1** For fabrics not intended for use in “Durable Press” products, determine the fabric smoothness after pressing as specified in Section 5.12 of AATCC Test Method 96.

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

**7.6 Flammability**—The flammability requirements shall be as agreed upon between the purchaser and the supplier, provided they met or exceed those of 16CFR–Part 1610 of the Flammable Fabrics Act Regulations.

## 8. Keywords

8.1 fabric; handkerchief; performance; specification; woven fabric

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