



Standard Specification for 100 % Cotton Denim Fabrics¹

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1. Scope

1.1 This specification covers performance requirements for 100 % cotton woven denim fabrics, prior to the manufacture of jeans, casual apparel, work clothing, and outerwear.

1.2 This specification is not applicable to woven denim fabrics used as interlinings or protective clothing.

1.3 This specification covers the performance of denim fabric on rolls ready for garment manufacturing.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.5 *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 to determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

D123 Terminology Relating to Textiles

D434 Test Method for Resistance to Slippage of Yarns in Woven Fabrics Using a Standard Seam (Withdrawn 2003)²

D1230 Test Method for Flammability of Apparel Textiles (Withdrawn 2010)²

D1424 Test Method for Tearing Strength of Fabrics by Falling-Pendulum (Elmendorf-Type) Apparatus

D3107 Test Methods for Stretch Properties of Fabrics Woven from Stretch Yarns

D3774 Test Method for Width of Textile Fabric

D3776 Test Methods for Mass Per Unit Area (Weight) of Fabric

D3882 Test Method for Bow and Skew in Woven and Knitted Fabrics

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

D7022 Terminology Relating to Apparel

2.2 AATCC Standards³:

Test Method 8 Colorfastness to Crocking: Crockmeter Method

Test Method 16.3 Colorfastness to Light: Xenon-Arc

Test Method 61 Colorfastness to Laundering: Accelerated

Test Method 109 Colorfastness to Ozone in the Atmosphere Under Low Humidities

Test Method 116 Colorfastness to Crocking: Rotary Vertical Crockmeter Method

Test Method 135 Dimensional Changes of Fabrics after Home Laundering

Evaluation Procedure 1 Gray Scale for Color Change

Evaluation Procedure 2 Gray Scale for Staining

Evaluation Procedure 8 AATCC—9 Step Chromatic Transference Scale

2.3 Federal Standard:

16 CFR 16.10, Chapter II, Subchapter D—Flammable Fabrics Act Regulations⁴

2.4 Other Document:

Glossary of AATCC Standard Terminology³

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 edition of each test method cited shall prevail.

3. Terminology

3.1 For all terminology relating to D13.61, Apparel, refer to Terminology D7022.

3.1.1 The following terms are relevant to this standard: denim, indigo dyed, jeans, heavy-weight, light-weight, medium-weight.

3.2 For all other terms related to textiles, see Terminology D123 and the Glossary of AATCC Standard Terminology.

3.3 *Definitions of Terms Specific to This Standard:*

¹ This specification is under the jurisdiction of ASTM Committee D13 on Textiles and is direct responsibility of Subcommittee D13.61 on Apparel.

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² The last approved version of this historical standard is referenced on www.astm.org.

³ Available from American Association of Textile Chemists and Colorists (AATCC), P.O. Box 12215, Research Triangle Park, NC 27709, <http://www.aatcc.org>.

⁴ Available from US Government Printing Office, Washington, DC 20402.



TABLE 1 Performance Requirements

Characteristics	Heavy Weight	Requirements Medium Weight	Light Weight	Section
Breaking Strength (Force), CRT:				7.1
Warp	801 N (180 lbf), min	578 N (130 lbf), min	356 N (80 lbf), min	
Filling	312 N (70 lbf), min	244 N (55 lbf), min	178 N (40 lbf), min	
Elmendorf Tear Strength:				7.2
Warp	51 N (11.5 lbf), min	35 N (8.0 lbf), min	18 N (4.0 lbf), min	
Filling	18 N (4.0 lbf), min	15 N (3.5 lbf), min	13 N (3.0 lbf), min	
Yarn Slippage:				7.3
(1/4-in. Separation)	222 N+ (50 lbf +)	133 N+ (30 lbf +)	111 N+ (25 lbf +)	
Skewness:				7.4
3 × 1 Twill, only		8 % ± 3 % (wtl) ^A		
2 × 1 Twill, only		4.5 ± 3 % (wtl) ^A		
Stretch (Warp Elongation) as agreed upon between purchaser and supplier				7.5
Width as agreed upon between purchaser and supplier				7.6
Weight as agreed upon between purchaser and supplier				7.7
Dimensional Change, %				
Laundrying				7.8
Preshrunk (each direction)		4.0 % max,		
Flammability		Class I		7.9

^A WTL = with the twill line.

3.3.1 *heavy-weight, adj*—fabric mass (weight) of 466 g/m² (13.75 oz/yd²) or greater.

3.3.2 *light-weight, adj*—fabric mass (weight) of 271 g/m² (8.00 oz/yd²) or less.

3.3.3 *medium-weight, adj*—fabric mass (weight) of 272 g/m² – 465 g/m² (8.01 oz/yd² – 13.74 oz/yd²).

4. Significance and Use

4.1 Upon agreement between purchaser and supplier, fabrics intended for this end use should meet all of the requirements listed in Table 1 of this specification.

4.2 It is recognized that for purposes of fashion or aesthetics, the ultimate consumer of apparel made from these fabrics may find the product acceptable, even if it does not conform to all of the requirements in Table 1 or Table 2. One or more of the requirements listed in Table 1 or Table 2, therefore, may be modified upon agreement between the purchaser and the supplier.

4.2.1 In such cases, any references to this specification must specify the following: “This fabric meets ASTM Specification D6554 except for the following characteristic(s):” All exceptions must be noted.

4.3 Where no prepurchase agreement has been reached between the purchaser and the supplier, and in case of controversy, the requirements listed in Tables 1 and 2 are intended to be used as a guide only. As noted in 4.2, ultimate consumer demands dictate varying performance parameters for any particular style of fabric.

5. Sampling

5.1 *Lot Sample*—As a lot sample for acceptance testing, select at random the number of rolls designated in an applicable specification or other agreement between the purchaser and the supplier.

5.2 *Laboratory Sample*—After removing the outer layer from each roll or piece in the lot sample, cut two laboratory

TABLE 2 Colorfastness Requirements

	Non-Indigo Dyed	Indigo Dyed and Sulfur Black Colors	Section
Colorfastness:			
Ozone, two cycles, shade change			7.10.1
Original ^A	Grade 4 min	Grade 3.5 min	
After one laundry cycle ^A	Grade 4 min	Grade 4 min	
Laundrying:			7.10.2
Shade change ^A	Grade 3.5, min	Grade 2, min	
Stain ^B	Grade 3, min	Grade 2, min	
Light ^A (20 AATCC FU)(xenon-arc):	Grade 4, min	Grade 4, min	7.10.3
Crocking: ^{C,D}			7.10.4
Dry	Grade 4, min	Grade 3, min	
Wet	Grade 1.5, min	Grade 1.5, min	

Scale

^A AATCC Gray Scale for Color Change^B AATCC Gray Scale for Staining^C AATCC Chromatic Transference^D See Note 2.

NOTE 1—Grade for color change or color transfer is based on a numerical scale of 5 for negligible to 1 for severe color change or color transfer. These properties may not be relevant if the denim will be garment wet processed. Other properties may be negotiable between customer and supplier.

samples spanning the full width of the fabric and at least 1 m (1 yd) in length, along the selvage.

6. Specification Requirement

6.1 The properties of woven denim fabrics conform to **Tables 1 and 2** specifications.

7. Test Methods

7.1 *Breaking Strength (Force)*—Determine the dry-breaking strength (force) as directed in the grab test procedure of Test Method **D5034**, using the constant-rate-of-traverse (CRT) tensile-testing machine with the speed of the pulling clamp at 300 ± 10 mm. Constant-rate-of-extension (CRE) tensile testing machinery may be used upon agreement between purchaser and supplier, recognizing that the two tensile testers do not necessarily yield similar results.

7.2 *Tear Strength*—Determine the tear strength as directed in Test Method **D1424**.

7.3 *Yarn Slippage*—Determine the resistance to yarn slippage as outlined in Test Method **D434**.

7.4 *Skewness*—Determine skewness as directed in Test Method **D3882**; bow measurements also may be determined.

7.5 *Warp Elongation*—Determine warp elongation as outlined in Test Method **D3107**.

7.6 *Width*—Determine fabric width as outlined in Test Method **D3774**.

7.7 *Weight*—Determine fabric weight as outlined in Test Method **D3776**.

7.8 *Dimensional Change*—Determine dimensional change as outlined in AATCC Test Method 135. Measurements should be made after three laundry cycles.

7.8.1 The wash conditions and drying procedures shall be as directed in the applicable procedure in AATCC Test Method 135. This procedure does not simulate garment finishing.

7.9 *Flammability*—The flammability test and requirements shall meet or exceed the applicable Flammable Fabrics Act mandatory standards as specified in Part 1610 of the Flammable Fabrics Act Regulations. For additional information see Test Method **D1230**.

7.10 Colorfastness to:

7.10.1 *Ozone*—Determine the colorfastness to ozone as directed in AATCC Test Method 109.

7.10.2 *Laundering*—Determine the colorfastness to laundering as directed in AATCC Test Method 61. The test conditions shall be as agreed upon between the purchaser and supplier.

NOTE 2—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.

7.10.3 *Light*—Determining the colorfastness to light as directed in AATCC Test Method 16 using Option E.

7.10.4 *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 upon between the purchaser and the supplier (see **Note 2**).

8. Keywords

8.1 apparel; denim; jeans; pants; specifications

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