



Designation: D4119 – 22

Standard Performance Specification for Men's and Boys' Knitted Dress Shirt Fabrics¹

This standard is issued under the fixed designation D4119; 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 knitted fabrics comprised of any textile fiber or mixture of fibers, used in men's and boy's dress shirts.

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

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:²

- D123 Terminology Relating to Textiles
- D2594 Test Method for Stretch Properties of Knitted Fabrics Having Low Power
- D2724 Test Method for Bond Strength of Bonded, Fused, and Laminated Apparel Fabrics
- D3786 Test Method for Bursting Strength of Textile Fabrics—Diaphragm Bursting Strength Tester Method
- D3787 Test Method for Bursting Strength of Textiles—Constant-Rate-of-Traversal (CRT) Ball Burst Test

D7022 Terminology Relating to Apparel (Withdrawn 2022)³

2.2 AATCC Methods:⁴

- TM8 Colorfastness to Crocking: Crockmeter Method
 - TM15 Colorfastness to Perspiration
 - TM16.3 Colorfastness to Light: Xenon-Arc
 - TM23 Colorfastness to Burnt Gas Fumes
 - TM61 Colorfastness to Laundering: Accelerated
 - TM96 Dimensional Changes in Laundering of Woven and Knitted Textiles Except Wool
 - TM116 Colorfastness to Crocking: Rotary Vertical Crockmeter Method
 - TM124 Smoothness Appearance of Fabrics after Repeated Home Launderings
 - TM132 Colorfastness to Drycleaning
 - TM135 Dimensional Changes of Fabrics after Home Laundering
 - TM172 Colorfastness to Powdered Non-chlorine Bleach in Home Laundering
 - TM188 Colorfastness to Sodium Hypochlorite Bleach in Home Laundering
 - EP1 Gray Scale For Color Change
 - EP2 Gray Scale for Staining
 - EP8 AATCC 9-Step Chromatic Transference Scale
 - M11 A Glossary of AATCC Standard Terminology
- #### 2.3 Federal Standard:⁵
- 16 CFR 1610, 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 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.

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>.

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.

3. Terminology

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

3.1.1 The following terms are relevant to this standard: dimensional change; pressing and finishing.

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 method, or the Glossary of AATCC Standard Terminology.

3.4 Definitions of terms found in a dictionary of common terms are suitable for this performance specification.

4. Specification Requirements

4.1 The properties of fabrics for men’s and boy’s knitted dress shirts shall conform to the specification requirements in Table 1.

5. Significance and Use

5.1 Upon agreement between the purchaser and the seller, 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 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 upon agreement between the purchaser and the seller.

5.2.1 In such cases, any references to the specification shall specify that: “This fabric meets ASTM Specification D4119 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 methods are discussed in the appropriate sections of the specified 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 Method (See Note 1)

7.1 *Bursting Strength*—Determine the bursting strength, in the standard atmosphere for testing textiles, as directed in Test Method D3787 using an approved type of constant-rate-of-traverse (CRT) machine equipped with a bursting attachment or Test Method D3786 using an approved type of diaphragm bursting tester as agreed upon between the purchaser and the seller.

NOTE 2—There is no overall correlation between the results obtained with the CRT machine equipped with a bursting attachment and the diaphragm bursting tester. Consequently, these two bursting testers should not be used interchangeably. In case of controversy, the CRT machine equipped with a bursting attachment method shall prevail.

NOTE 3—The precision of the ball burst method using the CRT machine equipped with a bursting attachment and the precision of the diaphragm bursting tester method are being established by Subcommittee D13.59. The methods are accordingly not recommended for acceptance testing unless preceded by an interlaboratory check test in the laboratory of the purchaser and the laboratory of the seller using randomized replicate specimens of the material to be evaluated.

7.2 Dimensional Change:

7.2.1 *Pressing and Finishing During Manufacturing*—Mark specimen(s) in AATCC TM135. Press and finish specimen(s) as agreed upon between the purchaser and the seller with respect to time cycles, temperature, steam, vacuum, and mechanical pressure of the press head. Measure the specimen(s) and calculate the dimensional change as directed in AATCC TM135 (see Note 4).

NOTE 4—No method is available for reproducing on a laboratory level the results of industrial press or finishing treatments, or both, used in the manufacture of garments.

TABLE 1 Specification Requirements

NOTE 1—Grade in a,b,c and SA is 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. The numerical rating in Table 1 or a higher numerical rating is acceptable.

Characteristic	Requirements	Section
Bursting strength (load) (ball burst)	222 N (50 lbf)	7.1
<i>Dimensional change:</i>		
Pressing and finishing	2 % max	7.2.1
After 5 launderings (see 7.2.2.2 if shrinkage exceeds 3%)	3 % max	7.2.2
After 3 drycleanings	3 % max	7.2.3
Growth	3 % max	7.2.4
<i>Colorfastness:</i>		
Burnt gas fumes—2 cycles:		
Shade change, original fabric	Grade 4 ^A , min	7.3.1
Shade change after 1 laundering	Grade 4 ^A , min	
or		
1 drycleaning		
<i>Laundering:</i> ^E		
Shade change	Grade 4 ^A , min	7.3.2
Staining	Grade 3 ^B , min	
<i>Drycleaning:</i>		
Shade change	Grade 4 ^A , min	7.3.3
<i>Crocking:</i> ^E		
Dry	Grade 4 ^C , min	7.3.4
Wet	Grade 3 ^C , min	
<i>Perspiration:</i> ^E		
Shade change	Grade 4 ^A , min	7.3.5
Staining	Grade 3 ^B , min	
Light (20 AFUs) (xenon-arc)	Grade 4 ^A , min	7.3.6
Sodium Hypochlorite Bleach	Grade 4 ^A , min	7.3.7
Powdered Non-Chlorine Bleach	Grade 4 ^A , min	7.3.8
Fabric smoothness appearance (see 7.4.1)	SA 3.5 ^D , min	7.4
Flammability	Class 1	7.5

^A AATCC Gray Scale for Color Change.
^B AATCC Gray Scale for Staining.
^C AATCC 9-Step Chromatic Transference Scale.
^D For durable press fabrics only.
^E See Note 8.

7.2.1.1 If no agreement has been made between the purchaser and the seller, press the specimen(s) using a flat-bed steam press and using a cycle as directed in 10.1.4.1 through 10.1.4.5 of Test Methods **D2724**.

7.2.2 *Laundering*—Determine the maximum-dimensional change after five launderings as directed in the applicable procedure in AATCC TM135 (Notes 5 and 6).

7.2.2.1 The wash conditions and drying procedure shall be as specified by the seller.

7.2.2.2 When the dimensional change after five launderings exceeds 3 %, determine the stretch of the fabric after five launderings as directed in Test Methods **D2594** using a 2.2-N (0.5-lbf) load. If the difference between the percent stretch of the laundered fabric and the percent shrinkage due to laundering does not exceed 3 % shrinkage, then the fabric meets the specification requirements in **Table 1**.

7.2.3 *Drycleaning*—Determine the maximum-dimensional change after three drycleanings as directed in 10.1.1 through 10.1.4 of Test Methods **D2724** (Notes 5 and 6).

7.2.4 *Growth*—Determine the growth of the fabric as directed in Test Methods **D2594**.

NOTE 5—Launderable fabrics are expected to be dry-cleanable except where all or part of the fabric is not dry-cleanable and is so labeled. For example, the fabric could contain a functional finish that is soluble in the solvent, or the fiber could be degraded by the solvent, which would be the case with poly(vinyl chloride) fiber. Goods labeled “Dry-cleanable” are to be drycleaned only.

NOTE 6—Specimens prepared for 7.2.1 may be used for 7.2.2 and 7.2.3 as desired. When this is done, subtract the pressing and curing dimensional change from the total dimensional change to obtain that portion due to laundering or drycleaning. The dimensional change to pressing and finishing is determined on the fabric as it will reach the user. It is not to be added to the dimensional change due to laundering or drycleaning of the fabric as it will reach the consumer (see 6.1).

7.3 Colorfastness:

7.3.1 *Burnt Gas Fumes*—Determine the colorfastness to burnt gas fumes on the original fabric and after one laundering or one drycleaning as directed in AATCC TM23.

NOTE 7—Washing conditions shall be the same as those used in 7.2.2.1. Drycleaning conditions shall be the same as those used in 7.2.3.

7.3.2 *Laundering*—Determine the colorfastness to laundering as directed in the applicable procedure of AATCC TM61. The test conditions shall be as directed in AATCC TM135 (Note 5).

NOTE 8—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.

7.3.3 *Drycleaning*—Determine colorfastness to drycleaning as directed in AATCC TM132 (Note 5).

7.3.4 *Crocking*—Determine colorfastness to dry and wet crocking as directed in AATCC TM8 for solid shades and AATCC TM116 for prints, or as agreed upon between the purchaser and the seller (see Note 8).

7.3.5 *Perspiration*—Determine colorfastness to perspiration as directed in AATCC TM15 (see Note 8).

7.3.6 *Light*—Determine colorfastness to light as directed in AATCC TM16.3 Option 3.

7.3.7 *Colorfastness to Sodium Hypochlorite Bleach*—Determine colorfastness to sodium hypochlorite bleach as directed in AATCC TM188. The test conditions shall be as specified by the seller.

7.3.8 *Colorfastness to Powdered Non-chlorine Bleach*—Determine colorfastness to light as directed in AATCC TM172. The test conditions shall be as specified by the seller.

7.4 *Fabric Smoothness Appearance*—Determine the fabric appearance as directed in AATCC TM124 after laundering using the wash-and-wear cycle or the normal cycle as agreed upon between the purchaser and seller as specified in 7.2.2.1 for washable fabrics or as specified in 7.2.3 for dry-cleanable fabrics (see Note 5).

7.4.1 The fabric smoothness SA rating of such fabrics, and the SA rating of dry-cleaned fabrics, shall have decreased no more than 0.5 SA rating from that of the fabric before it is laundered or drycleaned.

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

8. Keywords

8.1 shirt

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