Designation: D3995 – 14

Standard Performance Specification for Men's and Women's Knitted Career Apparel Fabrics: Dress and Vocational[1]

This standard is issued under the fixed designation D3995; 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 the minimum performance requirements for men's and women's knitted fabrics for dress and vocational career apparel composed of any textile fiber or mixtures of textile fibers.

1.2 This performance specification is not applicable to career apparel fabrics such as those used in protective clothing, that do not patently fit the categories Career Apparel or Career Apparel, Dress (see Terminology D7022 for these terms). Minimum performance specifications for such fabrics should be as agreed between the purchaser and the seller.

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

1.4 The following precautionary statement pertains only to the test methods portion, Section 7, of this 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:*[2]

D123 Terminology Relating to Textiles

D2724 Test Methods for Bonded, Fused, and Laminated Apparel Fabrics

D2905 Practice for Statements on Number of Specimens for Textiles (Withdrawn 2008)[3]

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-Traverse (CRT) Ball Burst Test

D7022 Terminology Relating to Apparel

2.2 *AATCC Methods:*[4]

AATCC 8 Colorfastness to Crocking: Crockmeter Method

AATCC 15 Colorfastness to Perspiration

AATCC 16.3 Colorfastness to Light

AATCC 23 Colorfastness to Burnt Gas Fumes

AATCC 61 Colorfastness to Laundering: Accelerated

AATCC 116 Colorfastness to Crocking, Rotary Vertical Crockmeter Method

AATCC 124 Smoothness Appearance of Fabrics After Repeated Home Laundering

AATCC 132 Colorfastness to Drycleaning

AATCC 135 Dimensional Changes of Fabrics After Home Laundering

AATCC 172 Colorfastness to Powdered Non-Chlorine Bleach in Home Laundering

AATCC 188 Colorfastness to Sodium Hypochlorite Bleach in Home Laundering

Evaluation Procedure 1 Gray Scale for Color Change

Evaluation Procedure 2 Gray Scale for Staining

Evaluation Procedure 8 Chromatic 9-Step Transference Scale

2.3 *Federal Standard:*[5]

16 CFR 1610 Standard for Flammability of Clothing Textiles

NOTE 1—The specific dated editions of ASTM test methods that prevail in this standard are referenced in Section 7 on Test Methods.

3. Terminology

3.1 For all terminology related to Apparel see Terminology D7022.

[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] 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.

3.1.1 The following terms are relevant to this standard: career apparel, career apparel, dress, career apparel, vocational, dimensional change in pressing and finishing, pressing and finishing.

3.2 For terms relating to chemical or colorfastness testing, refer to specific AATCC methods. For definitions of all other textile terms see Terminology D123.

4. Specification Requirements

4.1 The properties of knitted fabric for men's and women's career apparel shall conform to the specification requirement in Table 1.

5. Significance and Use

5.1 Upon mutual 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 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 modifed 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 ASTM Specification D3995 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 significance and use of particular properties and test methods are discussed in the appropriate sections of the specified test methods.

6. Sampling

6.1 Tests shall be performed on the fabric as it will reach the consumer. Any "partially finished" or "post-finished" fabrics or those which will be pleated, creased, steamed, or pressed during manufacturing should be processed in accordance with the fabric manufacturer's instructions before tests are made.

6.2 Unless otherwise agreed upon, as when specified in an applicable material specification, take the number of specimens directed in each of the applicable test methods.

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.

Characteristics	Requirements		Section
	Career Dress Apparel	Career Vocational Apparel	
Bursting strength (ball burst)	60 lbf (267 N) min	60 lbf (267 N) min	7.1
Dimensional stability (each direction):			
Pressing and finishing	2 % max shrinkage, 0 % growth	2 % max shrink, 0 % growth	7.2.1
After 5 washes	3 % max	3 % max	7.2.2
After 3 drycleanings	3 % max	3 % max	7.2.4
Fabric smoothness	Grade 4, SA, min	Grade 3, SA, min	7.3
Flammability	Grade 1 or Grade 2	Grade 1 or Grade 2	7.4
Colorfastness:			
Laundering:[D]			7.5.1
Color change	Grade 4, min[A]	Grade 4, min[A]	
Staining	Grade 3 or 4, min,[B]	Grade 3 or 4, min[B]	
Sodium Hypochlorite Bleach	Grade 4, min[A]	Grade 4, min[A]	7.5.8
Powdered Non-Chlorine Bleach	Grade 4, min[A]	Grade 4, min[A]	7.5.9
Drycleaning:			7.5.3
Color change	Grade 4, min,[A]	Grade 4, min[A]	
Crocking:[D]			7.5.4
Dry	Grade 4, min[C]	Grade 4, min[C]	
Wet	Grade 3, min[C]	Grade 3, min[C]	
Burnt Gas Fumes—1 cycle:			7.5.5
Shade change, original fabric and after 1 laundering or 1 drycleaning	Grade 4, min	Grade 4, min[A]	
Light: (xenon-arc)			7.5.6
Outdoor (40 AATCC SFU)	Grade 4, min[A]	Grade 4, min[A]	
Indoor (20 AATCC SFU)	Grade 4, min[A]	Grade 4, min[A]	
Perspiration:[D]			7.5.7
Color change	Grade 4, min[A]	Grade 4, min[A]	
Staining	Grade 3, min[B]	Grade 3, min[B]	

[A] AATCC Gray Scale for Color Change.
[B] AATCC Gray Scale for Staining.
[C] AATCC 9-Step Chromatic Transference Scale.
[D] See Note 6.

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) 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 (Note 1)

7.1 *Bursting Strength*—Determine the bursting strength as directed in Test Methods D3787 or D3786.

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 cannot be used interchangeably. In case of controversy, Method D3787 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 Garment Manufacturing*—Where applicable mark the specimen(s) as directed in Section 4.3.1 of AATCC Method 135. Press and finish specimen(s) as agreed by 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 Sections 6 and 7 of AATCC Method 135.

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 according to the cycle in 10.1.3.1 through 10.1.3.5 of Test Methods D2724.

7.2.2 *Home Laundering*— Determine the maximum dimensional change after five launderings as directed in the applicable procedure in AATCC Method 135 or as agreed upon between the purchaser and the seller.

7.2.2.1 The wash conditions and drying procedure shall be as agreed upon between the purchaser and the seller (see Notes 4 and 5).

7.2.3 *Institutional Laundering*—The wash conditions and drying procedure shall be as agreed upon between the purchaser and the seller.

7.2.4 *Drycleaning*— Determine the maximum dimensional change after three drycleanings as directed in 10.1.3.1 through 10.1.3.5 of Test Methods D2724 (see Notes 4 and 5).

NOTE 4—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, which would be the case with poly(vinyl) chloride fiber. "Drycleanable" goods are to be drycleaned only.

NOTE 5—Specimens prepared for 7.2.1 may be used for 7.2.2, 7.2.3, and 7.2.4 as desired. When this is done, the dimensional change due to laundering or drycleaning is calculated using Eq 1, due to laundering. The dimensional change to pressing and finishing will have occurred in the fabric before it reaches the user. Therefore, it should not be included as a part of the dimensional change to laundering or drycleaning of the fabric as it will reach the consumer (see 6.1).

$$\% \text{ dimensional change} = 100\ (D_2 - D_1)/D_2 \qquad (1)$$

where:

D_1 = measurement after laundering or drycleaning, and
D_2 = measurement after pressing and finishing.

7.3 *Fabric Smoothness Appearance*—Determine the fabric smoothness appearance, as directed in AATCC Method 124, after laundering using the wash-and-wear cycle, or the normal cycle as agreed upon between the purchaser and the seller, as specified in 7.2.2 or 7.2.3 for washable fabrics or after drycleaning as specified in 7.2.4 for drycleanable fabrics.

7.3.1 For washable fabrics not intended for use in "durable press" garments determine the fabric smoothness after pressing as specified in Section 5.12 of AATCC Method 96.

7.3.1.1 The fabric smoothness durable press (SA) rating of such fabrics, and the SA rating of drycleaned fabrics, shall have decreased no more than 1/2 SA rating from that of the fabric before it is laundered or drycleaned.

7.4 *Flammability*— The flammability requirements shall be as agreed upon between the purchaser and the seller, except when regulated by applicable Government mandatory standards.

7.5 *Colorfastness:*

7.5.1 *Home Laundering*— Determine the colorfastness to laundering of home laundered fabrics as directed in Method AATCC 61.

NOTE 6—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.

7.5.2 *Institutional Laundering*—Determine the colorfastness to laundering of institutional laundered fabrics as agreed upon between the purchaser and the seller.

7.5.3 *Drycleaning*— Determine the colorfastness to drycleaning as directed in AATCC Method 132 (Note 2).

7.5.4 *Crocking*—Determine the colorfastness to dry and wet crocking as directed in AATCC Method 8 for solid shades or AATCC Method 116 for prints or as agreed upon between the purchaser and the seller (see Note 6).

7.5.5 *Burnt Gas Fumes*— Determine the colorfastness to burnt gas fumes on the original fabric and after one laundering as in 7.2.2 or 7.2.3 or after one dry cleaning as in 7.2.4 as directed in AATCC Method 23.

7.5.6 *Light*—Determine colorfastness to light as directed in AATCC Method 16.3.

NOTE 7—There are distinct differences in spectral distribution between the various types of machines listed in AATCC Method 16.3, 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 3 shall prevail.

7.5.7 *Perspiration*— Determine the colorfastness to perspiration as directed in AATCC Method 15 (see Note 6).

7.5.8 *Colorfastness to Sodium Hypochlorite Bleach*—Determine the colorfastness to sodium hypochlorite bleach as directed in Method AATCC 188.

7.5.9 *Colorfastness to Powdered Non–Chlorine Bleach*—Determine the colorfastness to non—chlorine bleach as directed in Method AATCC 172.

7.6 When a claim is made for a special performance characteristic not covered by this specification, it should be tested as directed in a test method and performance standard mutually acceptable to the purchaser and the seller.

8. Keywords

8.1 career apparel; smoothness