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Standard Performance Specification for Woven Napery and Tablecloth Fabrics: Household and Institutional[1]

This standard is issued under the fixed designation D 4111; 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 woven fabrics comprised of any textile fiber or mixture of fibers to be used in napery and tablecloths (household and institutional).

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

1.3 *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[2]

D 1336 Test Method for Distortion of Yarn in Woven Fabrics[2]

D 1424 Test Method for Tear Resistance of Woven Fabrics by Falling-Pendulum (Elmendorf) Apparatus[2]

D 1682 Test Methods for Breaking Load and Elongation of Textile Fabrics[2]

D 2261 Test Method for Tearing Strength of Woven Fabrics by the Tongue (Single Rip) Method (Constant-Rate-of-Extension Tensile Testing Machine)[2]

D 2262 Test Method for Tearing Strength of Woven Fabrics by the Tongue (Single Rip) Method (Constant-Rate-of-Traverse Tensile Testing Machine)[2]

D 2724 Test Methods for Bonded, Fused, and Laminated Apparel Fabrics[2]

D 2905 Practice for Statements on Number of Specimens for Textiles[2]

2.2 *AATCC Methods:*[3]

8 Colorfastness to Crocking: AATCC Crockmeter Method

16 Colorfastness to Light

23 Colorfastness to Burnt Gas Fumes

61 Colorfastness to Washing, Domestic, and Laundering, Commercial: Accelerated

92 Chlorine, Retained, Tensile Loss: Single Sample Method

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

130 Soil Release: Oily Stain Release Method

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

Evaluation Procedure No. 1 Gray Scale for Color Change

Evaluation Procedure No. 2 Gray Scale for Staining

Evaluation Procedure No. 3 AATCC Chromatic Transference Scale

2.3 *Federal Standard:*[4]

16 CFR, Chapter II–Consumer Product Safety Commission Subchapter D–Flammable Fabrics Act Regulations

2.4 *Military Standard:*[5]

MIL-STD-105D Sampling Procedures and Tables for Inspection by Attributes

NOTE 1—Reference to test methods in this 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:*

3.1.1 For definitions of textile terms used in this specification refer to the individual ASTM and AATCC methods and to Terminology D 123.

3.2 Definitions found in a dictionary of common terms are

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[2] *Annual Book of ASTM Standards*, Vol 07.01.

[3] Available from American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709.

[4] Available from Superintendent of Documents, Government Printing Office, Washington, DC 20402.

[5] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

suitable for this specification.

4. Specification Requirements

4.1 The properties of woven fabrics for napery and tablecloths for household and institutional uses 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 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 D 4111 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.

TABLE 1 Specification Requirements

NOTE 1—Class for color change, color transfer, and DP rating is based on a numerical scale of 5 for negligible or no wrinkle, color change, or color transfer to 1 for severe wrinkle, color change, or color transfer.

Characteristic	Requirements	Section
Breaking strength (*load*) (CRT):		7.1
Household	133 N (30 lbf), min	
Institutional	242 N (55 lbf), min	
Yarn distortion	1 mm (0.05 in.), max	7.2
Tongue-tear strength:		7.3
Household	9 N (2 lbf), min	
Institutional	13 N (3 lbf), min	
Colorfastness:		
Burnt gas fumes—1 cycle:		
Shade change, original fabric	Class 4[A], min	7.4.1
Shade change, after one laundering	Class 4[A], min	
Chlorine Bleach	Class 4[A], min	7.4.5
Non-Chlorine Bleach	Class 4[A], min	7.4.6
Light (20 AATCC FU) (xenon-arc)	Step 4[A], min	7.4.2
Crocking:		7.4.3
Dry	Class 4[B], min	
Wet	Class 3[B], min	
Laundering:		7.4.4
Shade change	Class 4[A], min	
Staining	Class 3[C], min	
Dimensional change	5 %, max	7.5
Fabric appearance (see 7.6.1.1)	DP 3.5[D], min	7.6
Chlorine retention	see 7.7.1.1	7.7
Retention of hand, character, and appearance	see 7.9	7.9
Soil release	Class 4, min	7.10

[A] AATCC Gray Scale for Color Change.
[B] AATCC Chromatic Transference Scale.
[C] AATCC Gray Scale for Staining.
[D] For durable-press (DP) fabrics only.

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 (see Note 1)

7.1 *Breaking Strength* (*Load*)—Determine the dry-breaking strength (load) as directed in the grab test procedure of Test Methods D 1682, using a constant-rate-of-traverse (CRT) tensile-testing machine with the speed of the pulling clamp at 305 ± 13 mm (12 ± ½ 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 seller. 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 *Yarn Distortion*—Determine the yarn distortion as directed in Test Method D 1336.

7.3 *Tear Strength*—Determine the tear strength as directed in Test Method D 2262.

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

7.4 *Colorfastness*:

7.4.1 *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 Method 23 after 1 cycle.

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

NOTE 4—There are distinct differences in spectral distribution between the various types of machines listed in AATCC 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.

7.4.3 *Crocking*—Determine the colorfastness to crocking as directed in AATCC Method 8 for solid shades and AATCC Method 116 for prints, or as agreed upon between the purchaser and the seller.

7.4.4 *Laundering*—Determine the colorfastness to laundering as directed in the applicable procedure of AATCC Method 61. The test conditions shall be as specified by the seller.

7.4.5 *Colorfastness to Chlorine Bleach*—Determine the colorfastness to chlorine bleach as directed in AATCC Method 188.

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

7.5 *Dimensional Change*—Determine the maximum-dimensional change after 5 launderings, or as agreed upon between the purchaser and the seller, as directed in the applicable procedure in AATCC Method 96 for institutional fabrics, or as directed in the applicable procedure in AATCC Method 135 for household fabrics.

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

7.6 *Fabric Appearance*—Determine the fabric 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 7.5.1.

7.6.1 For fabrics not intended for use in "durable-press" products determine the fabric smoothness after pressing as specified in 10.2.5 of Test Methods D 2724.

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

7.7 *Chlorine Retention*—Determine the potential damage caused by retained chlorine as directed in AATCC Method 92.

7.7.1 Make breaking-strength (load) tests, after scorching as specified in 6.3 of AATCC Method 92, as directed in 7.1.

7.7.1.1 The breaking-strength (load) of fabrics treated as in 7.7 shall have decreased no more than 25 % from that of the original fabric, and shall not show noticeable scorching.

7.8 *Absorptive Capacity*—No acceptable method is available for the determination of the absorptive capacity of fabrics for napery and tablecloths.[6]

7.9 *Retention of Hand, Character, and Appearance*—Fabric tested as specified in 7.5.1 shall not change more in hand, character, or appearance than in the limitation set upon prior agreement between the purchaser and the seller.

7.10 *Soil Release*—Determine the soil release properties after 5 launderings as directed in the applicable procedure in AATCC Method 130.

7.10.1 Selection of the staining agents shall be as agreed upon between the purchaser and the seller.

8. Keywords

8.1 chlorine retention; soil release; tablecloth

[6] The development of a method has been referred to Subcommittee D13.59 on Fabric Test Methods, General.