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Standard Performance Specification for Vinyl-Coated and Urethane-Coated Upholstery Fabrics— Indoor¹

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1. Scope

1.1 This specification covers performance requirements for vinyl-coated and urethane-coated upholstery fabrics produced with woven, knit, or nonwoven substrates which are used in the manufacture of new indoor furniture.

1.2 This specification is not applicable to fabrics used in porch, deck, or lawn furniture; nor for plain knit fabrics and plain, tufted, or flocked, woven upholstery fabrics.

1.3 These requirements apply to 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:

- D 123 Terminology Relating to Textiles²
 - D 751 Test Methods for Coated Fabrics³
 - D 1175 Test Methods for Abrasion Resistance of Textile Fabrics (Oscillatory Cylinder and Uniform Abrasion Method)⁴
 - D 1203 Test Methods for Volatile Loss from Plastics Using Activated Carbon Methods⁵
 - D 2097 Methods of Flex Testing of Finish on Upholstery Leather⁷
 - D 2136 Test Method for Coated Fabrics—Low-Temperature Bend Test⁸
 - D 2905 Practice for Statements on Number of Specimens for Textiles⁶
 - D 5034 Test Method for Breaking Force and Elongation of Textile Fabrics (Grab Test)⁶
- 2.2 AATCC Test Methods:⁹
- 8 Colorfastness to Crocking: AATCC Crockmeter Method

16 Colorfastness to Light

116 Colorfastness to Crocking: Rotary Vertical Crockmeter Method

Evaluation Procedure 1 Gray Scale for Color Change

Evaluation Procedure 3 Chromatic Transference Scale

2.3 *Chemical Fabrics and Film Association Standards*:¹⁰

CFFA-5 Test for Blocking

CFFA-20 Test for Tearing Strength, Procedure B—Tongue Method

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 *blocking, n*—the measurement of the development of surface tack and the thermal softening point of the material.

3.1.2 *hydrolytic stability, n*—the ability to withstand the environmental effects of high humidity.

3.1.3 *tack tear, n*—the measurement of the resistance of a coated fabric to tearing under conditions simulating an installation that has been tacked in place.

3.1.3.1 *Discussion*—Tack tear is intended primarily for testing vinyl-coated fabrics for furniture or automotive applications.

3.2 For definitions of other textile terms used in this specification, refer to Terminology D 123 and to the Technical Manual of the American Association of Textile Chemists and Colorists.⁹

4. Significance and Use

4.1 This specification covers the performance requirements for vinyl-coated and urethane-coated upholstery fabrics used in the manufacture of indoor furniture that will be subjected to normal, nonabusive consumer usage. There are three class designations for breaking strength, tear strength, and tack-tear resistance to identify the varying degrees of durability or performance. These classifications are: Class A—heavy duty; Class B—medium duty; and Class C—light duty.

4.2 It is recognized that for purposes of fashion or aesthetics, the ultimate consumer of articles made from these fabrics may find acceptable some fabrics that do not conform to all of the requirements in Table 1. For example, the fabric could be dyed in shades that do not meet the requirement in

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

³ *Annual Book of ASTM Standards*, Vol 09.02.

⁴ Discontinued—Replaced by D 4157 and D 4158, *Annual Book of ASTM Standards*, Vol 07.01.

⁵ *Annual Book of ASTM Standards*, Vol 08.01.

⁶ *Annual Book of ASTM Standards*, Vol 07.02.

⁷ *Annual Book of ASTM Standards*, Vol 15.04.

⁸ *Annual Book of ASTM Standards*, Vols 09.01 and 09.02.

⁹ Available from American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709.

¹⁰ Available from Chemical Fabrics and Film Association, 1230 Keith Bldg., Cleveland, OH 44115.

D 3690

Table 1 for colorfastness to light, yet be acceptable to the ultimate consumer because the shade is fashionable. In such cases, one or more of the requirements may be modified by mutual agreement between the purchaser and the supplier.

4.2.1 If any of the requirements in Table 1 are modified by mutual agreement between the purchaser and the supplier, any reference to the specification shall specify that: "This fabric meets ASTM Specification D 3690 except for the following characteristic(s)."

4.3 The uses and significance of particular properties are discussed in the appropriate sections of the specific methods.

5. Performance Requirements

5.1 The properties of vinyl-coated or urethane-coated upholstery fabrics shall conform to the specification requirements of one of the three categories in Table 1.

6. Sampling

6.1 Tests shall be performed on the fabric as it will reach the consumer.

6.2 Select the lot samples as specified in the applicable test methods. In the absence of such instructions in a specific test method, select the lot sample as agreed upon between the purchaser and the supplier.

6.3 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.

6.3.1 If there has been no prior agreement and the test method does not specify the number of specimens, use the procedures in Practice D 2905 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 true average (that is, a theoretical average from an infinite number of observations) 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 D 5034, using a constant rate of traverse (CRT) tensile testing machine with the speed of the pulling clamp at 300 ± 10 mm ($12 \pm \frac{1}{2}$ in.)/min.

NOTE 2—If preferred, the use of a constant-rate-of-extension (CRE) tensile testing machine is permitted. The crosshead speed should be as agreed between the purchaser and the supplier. There may be no overall correlation between the results obtained with the CRT machine and with the CRE machine. Consequently, these two breaking load testers cannot be used interchangeably. In case of controversy, the CRT method shall prevail.

7.2 *Tongue Tear Strength*—Determine tongue tear strength as directed in Procedure B of CFFA Method 20 using a CRT tensile testing machine (see Note 2).

7.3 *Tack-Tear Resistance*—Determine the tack-tear resistance as directed in Sections 43 to 47 of Test Methods D 751.

7.4 *Adhesion of Coating to Substrate:*

7.4.1 Determine the adhesion of coating to substrate as directed in Sections 39 to 42 of Test Methods D 751, with the speed of the pulling clamp at $12 \pm \frac{1}{2}$ in. (305 ± 13 mm)/min.

TABLE 1 Performance Requirements

Property	Requirements			Section
	Class A	Class B	Class C	
Breaking strength (load) (CRT Method): ^D				7.1
Length	244 N (55 lbf), min	222 N (50 lbf), min	200 N (45 lbf), min	
Width	244 N (55 lbf), min	222 N (50 lbf), min	178 N (40 lbf), min	
Tongue tear strength (CRT Method) ^D				7.2
Length	27 N (6 lbf), min	18 N (4 lbf), min	13 N (3 lbf), min	
Width	22 N (5 lbf), min	13 N (3 lbf), min	9 N (2 lbf), min	
Tack-tear resistance:				7.3
Length	133 N (30 lbf), min	111 N (25 lbf), min	67 N (15 lbf), min	
Width	133 N (30 lbf), min	89 N (20 lbf), min	67 N (15 lbf), min	
Adhesion of coating to substrate	525 N/m (3.0 lbf/in.), min	525 N/m (3.0 lbf/in.), min	525 N/m (3.0 lbf/in.), min	7.4
Surface abrasion	no appreciable color change at 200 cycles, Class A, B, and C			7.5
Resistance to flexing	no cracking or delamination at 15 000 cycles, Class A, B, and C			7.6
Blocking at elevated temperature	rating 2, min, no blocking; coating adheres slightly, Class A, B, and C			7.7
Resistance to cracking at low temperature	no cracking at $-10 \pm 1^\circ\text{F}$ ($-23 \pm 1^\circ\text{C}$), Class A, B, and C			7.8
Colorfastness to crocking: ^A				7.9.1
Dry	class 4.0 min ^B	class 4.0 min ^B	class 4.0 min ^B	
Wet	class 4.0 min ^B	class 4.0 min ^B	class 4.0 min ^B	
Colorfastness to light (xenon) ^D (120 AATCC fading units)	Step 4 min ^C	Step 4 min ^C	Step 4 min ^C	7.9.2
Loss of plasticizer	10 % max	10 % max	10 % max	7.10
Hydrolytic stability:				7.11
Adhesion	must maintain 75 % of original strength, Class A, B, and C			7.11.3.1
Surface abrasion	no cracking or delamination at 25 000 cycles, Class A, B, and C			7.11.3.2
Resistance to flexing	no breaks in coating at 15 000 cycles, Class A, B, and C			7.11.3.3
Flammability	pass	pass	pass	7.12

^A Class in b and c is based on a numerical scale of 5 for negligible color transfer or color change to 1 for very severe color transfer or color change. The numerical rating in Table 1 or higher is acceptable.

^B AATCC Chromatic Transference Scale.

^C AATCC Gray Scale for Color Change.

^D There is more than one standard test method that can be used to measure breaking strength, tongue tear strength, and lightfastness. These test methods cannot be used interchangeably since there may be no overall correlation between them (see Notes 2 and 3).