



Designation: D 3690 – 02

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

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1. Scope

1.1 This performance 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 performance 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:²

- D 123 Terminology Relating to Textiles
- D 751 Test Methods for Coated Fabrics
- D 1175 Test Methods for Abrasion Resistance of Textile Fabrics (Oscillatory Cylinder and Uniform Abrasion Method)³
- D 1203 Test Methods for Volatile Loss from Plastics Using Activated Carbon Methods
- D 2097 Methods of Flex Testing of Finish on Upholstery Leather
- D 2136 Test Method for Coated Fabrics—Low-Temperature Bend Test
- D 2905 Practice for Statements on Number of Specimens for Textiles

¹ This specification is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.63 on Home Furnishings.

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

D 3884 Test Method for Abrasion Resistance of Textile Fabrics (Rotary Platform, Double Head Method)

D 4157 Test Method for Abrasion Resistance of Textile Fabrics (Oscillatory Cylinder Method)

D 5034 Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)

2.2 AATCC Test Methods:⁴

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:⁵

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.⁴

⁴ Available from American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709.

⁵ Available from Chemical Fabrics and Film Association, 1230 Keith Bldg., Cleveland, OH 44115.

4. Significance and Use

4.1 Fabrics intended for this end-use should meet all the requirements listed in Table 1.

4.2 It should be recognized that fabric can be produced utilizing an almost infinite number of combinations of construction variables (e.g., type of fibers, percentage of fibers, yarn twist, yarn number, warp and pick count, chemical and mechanical finished). Additionally, fashion and aesthetics dictate that the ultimate consumer may find acceptable articles made from fabrics that do not conform to all of the requirements in Table 1.

4.2.1 Hence, no single performance specification can possibly apply to all the various fabrics that could be utilized for this end-use.

4.3 The uses and significance of particular properties and test methods are discussed in the appropriate sections of the specified 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. Test Methods (see Note 1)

6.1 *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-extension (CRE) tensile testing machine.

6.2 *Tongue Tear Strength*—Determine tongue tear strength as directed in Procedure B of CFFA Method 20 using a CRT tensile testing machine.

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

6.4 *Adhesion of Coating to Substrate:*

6.4.1 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.

6.4.2 Report adhesion in pounds-force per inch (newtons per metre) of width.

6.5 *Surface Abrasion:*

6.5.1 Determine the surface abrasion as directed in Sections 33 to 42 of Test Methods D 4157.

6.5.2 After 200 cycles, the test specimens are rated visually for color change.

6.6 *Resistance to Flexing*—Determine the resistance to flexing as directed in Methods D 2097 with the specimens mounted face side out.

6.7 *Blocking at Elevated Temperature*— Determine the blocking at elevated temperature as directed in CFFA Method 5.

6.8 *Resistance to Cracking at Low Temperature*— Determine the resistance to cracking at low temperature as directed in Test Method D 2136 with the cold chamber temperature at $-10 \pm 1^\circ\text{F}$ ($-23 \pm 1^\circ\text{C}$).

6.9 *Colorfastness:*

TABLE 1 Performance Requirements

Property	Requirements			Section
	Grade A	Grade B	Grade C	
Breaking strength (load) (CRT Method): ^A				6.1
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) ^A				6.2
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:				6.3
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	6.4
Surface abrasion	no appreciable color change at 200 cycles, grade A, B, and C			6.5
Resistance to flexing	no cracking or delamination at 15 000 cycles, grade A, B, and C			6.6
Blocking at elevated temperature	rating 2, min, no blocking; coating adheres slightly, grade A, B, and C			6.7
Resistance to cracking at low temperature	no cracking at $-10 \pm 1^\circ\text{F}$ ($-23 \pm 1^\circ\text{C}$), grade A, B, and C			6.8
Colorfastness to crocking: ^B				6.9.1
Dry	grade 4.0 min ^C	grade 4.0 min ^C	grade 4.0 min ^C	
Wet	grade 4.0 min ^C	grade 4.0 min ^C	grade 4.0 min ^C	
Colorfastness to light (xenon) ^A (120 AATCC fading units)	Step 4 min ^D	Step 4 min ^D	Step 4 min ^D	6.9.2
Loss of plasticizer	10 % max	10 % max	10 % max	6.10
Hydrolytic stability:				6.11
Adhesion	must maintain 75 % of original strength, grade A, B, and C			6.11.3.1
Surface abrasion	no cracking or delamination at 25 000 cycles, grade A, B, and C			6.11.3.2
Resistance to flexing	no breaks in coating at 15 000 cycles, grade A, B, and C			6.11.3.3
Flammability	pass	pass	pass	6.12

^A 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 Note 2).

^B grade 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.

^C AATCC 8-step Chromatic Transference Scale.

^D AATCC Gray Scale for Color Change.