



Designation: ~~D3181~~—~~10~~ **D3181** – 15

Standard Guide for Conducting Wear Tests on Textiles¹

This standard is issued under the fixed designation D3181; 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 guide is designed to provide data on which a prediction can be based concerning the intended to provide guidance for the design of an experiment for the purpose of developing a prediction of expected wear performance of a wide variety of textiles in end-use apparel and textile products when exposed to actual use conditions.~~

1.2 ~~This guide recommends the use of a product for which a history of its performance is known from laboratory testing and consumer use as the basis for statistical significance of new product's performance, however, other design or experimental approaches may be used.~~

1.3 ~~The wide variety of textile products and the conditions under which consumers will use products prevents the inclusion of all types of wear trial experiments for research and development, product innovation studies, and special needs such as those for healthcare industry or military.~~

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

~~D123 Terminology Relating to Textiles~~

2.1.1 ~~Fabric and Apparel Tests:~~

~~D1335 Test Method for Tuft Bind of Pile Yarn Floor Coverings~~

~~D2051 Test Method for Durability of Finish of Zippers to Laundering~~

~~D2052 Test Method for Colorfastness of Zippers to Drycleaning~~

~~D2057 Test Method for Colorfastness of Zippers to Laundering~~

~~D2058 Test Method for Durability of Finish of Zippers to Drycleaning~~

~~D2261 Test Method for Tearing Strength of Fabrics by the Tongue (Single Rip) Procedure (Constant-Rate-of-Extension Tensile Testing Machine)~~

~~D2594 Test Method for Stretch Properties of Knitted Fabrics Having Low Power~~

~~D3107 Test Methods for Stretch Properties of Fabrics Woven from Stretch Yarns~~

~~D3511 Test Method for Pilling Resistance and Other Related Surface Changes of Textile Fabrics: Brush Pilling Tester~~

~~D3512 Test Method for Pilling Resistance and Other Related Surface Changes of Textile Fabrics: Random Tumble Pilling Tester~~

~~D3514 Test Method for Pilling Resistance and Other Related Surface Changes of Textile Fabrics: Elastomeric Pad~~

~~D3884 Guide for Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method)~~

~~D3885 Test Method for Abrasion Resistance of Textile Fabrics (Flexing and Abrasion Method)~~

~~D3886 Test Method for Abrasion Resistance of Textile Fabrics (Inflated Diaphragm Apparatus)~~

~~D3936 Test Method for Resistance to Delamination of the Secondary Backing of Pile Yarn Floor Covering~~

~~D3938 Guide for Determining or Confirming Care Instructions for Apparel and Other Textile Products~~

~~D3939 Test Method for Snagging Resistance of Fabrics (Mace)~~

~~D4157 Test Method for Abrasion Resistance of Textile Fabrics (Oscillatory Cylinder Method)~~

~~D4231 Practice for Evaluation of Launderable Woven Dress Shirts and Sports Shirts~~

¹ This guide is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.60 on Fabric Test Methods, Specific. Current edition approved June 1, 2010/July 1, 2015. Published July 2010/September 2015. Originally approved in 1973. Last previous edition approved in 2008/2010 as ~~D3181—95 (2008)~~:D3181 – 10. DOI: 40.1520/D3181-10;10.1520/D3181-15.

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.

- [D4390 Practice for Evaluation of the Performance of Terry Bathroom Products for Household Use \(Withdrawn 1994\)³](#)
[D4966 Test Method for Abrasion Resistance of Textile Fabrics \(Martindale Abrasion Tester Method\)](#)
[D4970 Test Method for Pilling Resistance and Other Related Surface Changes of Textile Fabrics: Martindale Tester](#)
[D5034 Test Method for Breaking Strength and Elongation of Textile Fabrics \(Grab Test\)](#)
[D5035 Test Method for Breaking Force and Elongation of Textile Fabrics \(Strip Method\)](#)
~~[D4724](#)~~~~[D6321 Practice for the Evaluation of the Performance of Machine Washable and Drycleanable Bedcoverings and Accessories](#)~~[Machine Washable T-Shirts](#)
[D6797 Test Method for Bursting Strength of Fabrics Constant-Rate-of-Extension \(CRE\) Ball Burst Test](#)
[D6828 Test Method for Stiffness of Fabric by Blade/Slot Procedure](#)
 2.1.2 *Other ASTM Standards:*
[D123 Terminology Relating to Textiles](#)
[D4850 Terminology Relating to Fabrics and Fabric Test Methods](#)
~~[D4852](#)~~~~[D7022 Practice for Evaluation of Attached Upholstery Fabrics](#)~~[Terminology Relating to Apparel](#)
 2.2 *AATCC Standards:*
~~[5 Evaluation Procedure: Subjective Evaluation of Fabric Hand⁴⁴](#)~~
 2.2.1 *Colorfastness and Physical Properties:*
[8 Colorfastness to Crocking: AATCC Crockmeter Method](#)
[15 Colorfastness to Perspiration](#)
[16 Colorfastness to Light](#)
[61 Colorfastness to Laundering: Accelerated](#)
~~[88B Appearance](#)~~[Smoothness of Seams in Wash-and-Wear Items—Fabrics After Repeated Home Laundering](#)
[88C Appearance of Creases in Wash-and-Wear Items After Home Laundering](#)
[96 Dimensional Changes in Commercial Laundering of Woven and Knitted Textiles \(Excluding Fabrics Except Wool\)](#)
~~[H9116 Color Change Due to Flat Abrasion \(Frosting\): Screen Wire Colorfastness to Crocking: Rotary Vertical Crockmeter Method](#)~~
~~[H20117 Color Change Due to Flat Abrasion \(Frosting\): Emery Method](#)~~[Colorfastness to Heat: Dry \(Excluding Pressing\)](#)
~~[H21 Carpet Soiling: Visual Rating Method⁴](#)~~
~~[H22 Carpet Soiling: Service Soiling Method⁴](#)~~
~~[H23 Carpet Soiling: Accelerated Soiling Method⁴](#)~~
[124 Appearance of Fabrics After Repeated Home Launderings](#)[Laundering](#)
[125 Colorfastness to Perspiration and Light](#)
[128 Wrinkle Recovery of Fabrics: Appearance Method](#)
[130 Soil Release: Oily Stain Release Method](#)
~~[135 Dimensional Changes of Fabric after Home Laundering](#)~~
~~[143 Appearance of Apparel and Other Textile End Products after Repeated Home Laundering](#)~~
~~[150 Dimensional Changes in Automatic of Garments after Home Laundering of Woven Garments](#)~~
[179 Skewness Change in Fabric Resulting from Home Laundering](#)
[183 Transmittance or Blocking of Erythemally Weighted Ultraviolet Radiation through Fabrics](#)
~~[158](#)~~~~[186 Dimensional Changes on Drycleaning in Perchloroethylene: Machine Method](#)~~[Weather Resistance: UV Light and Moisture Exposure](#)
~~[163](#)~~~~[192 Color Fastness: Dye Transfer in Storage: Fabric-to-Fabric](#)~~[Weather Resistance of Textiles: Sunshine-Arc Lamp Exposure With and Without Wetting](#)
[202 Relative Hand Value of Textiles: Instrumental Method](#)
 2.2.2 *Vapor, Water and Moisture Management Tests:*
[22 Water Repellency: Spray Test](#)
[35 Water Resistance: Rain Test](#)
[42 Water Resistance: Impact Penetration](#)
[70 Water Repellency: Tumble Jar Dynamic Absorption Test](#)
[79 Absorbency of Textiles](#)
[127 Water Resistance: Hydrostatic Pressure Test](#)
[193 Aqueous Liquid Repellency: Water/Alcohol Solution Resistance Test](#)
[195 Liquid Moisture Management Properties of Textiles Fabrics](#)
[197 Vertical Wicking of Textiles](#)
[198 Horizontal Wicking Textiles](#)

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ *Annual AATCC Technical Manual*, available from American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709; NC 27709, www.aatcc.org.

[199 Drying Time of Textiles: Moisture Analyzer Method](#)

[200 Drying Rate of Textiles at their Absorbant Capacity: Air Flow Method](#)

[201 Drying Rate of Fabrics: Heated Hot Plate Method](#)

2.2.3 Evaluation Procedures:

[EP1 Gray Scale for Color Change](#)

[EP2 Gray Scale for Staining](#)

[EP5 Fabric Hand: Guidelines for Subjective Evaluation](#)

[EP6 Instrumental Color Measurement](#)

[EP7 Instrumental Assessment of the Change in Color of a Test Specimen](#)

[EP8 AATCC 9–Step Chromatic Transference Scale](#)

[EP9 Visual Assessment of Color Difference of Textiles](#)

[EP12 Instrumental Assessment of Degree of Staining](#)

2.2.4 AATCC Monographs:

[M5 Standardization of Hand Laundering for Fabrics and Textiles](#)

[M6 Standardization of Home Laundering Test Conditions](#)

2.3 Other Documents:

~~[Knit Upholstery Fabric Standards and Guidelines⁵](#)~~

~~[Woven Upholstery Fabric Standards and Guidelines⁶](#)~~

3. Terminology

3.1 For all terms relating to D13.60 Fabric Test Methods, Specific, refer to Terminology [D4850](#); for terms related to D13.61 Apparel, refer to Terminology [D7022](#).

3.1.1 The following terms are relevant to this standard: *control textile, end-use, evaluation period, grade, participant, performance property, rating, wear level, wear-refurbishing cycle, wear-service condition, wear test.*

3.2 For all other terminology related to textiles, see Terminology [D123](#).

4. Summary of Guide

4.1 Textiles are subjected to actual wear under service conditions. This practice recommends a control textile having a known wear performance history to be included with other items being tested. Statistical methods for design of test and analysis of data are included that are applicable to all wear tests. Standard procedures for evaluation of textiles are provided.

5. Significance and Use

5.1 This guide may be used to evaluate textiles used in ~~apparel, upholstered furniture, apparel.~~ Earlier publications contained information for use in trials for ~~upholstered furniture products, floor coverings, window treatments, and bed, bath, and table linens.~~ That information is now located in [Appendix X1](#).

5.2 This guide may be used for several purposes:

5.2.1 To determine the comparative performance of new or existing products,

5.2.2 To determine the suitability of current products in different end-uses, and

5.2.3 To evaluate and compare the effect of wear of construction details as well as specific fabrics, fibers, dyeings, finishing, fabrication techniques, etc.

5.3 This guide provides for flexibility in design and evaluation since the information sought from each wear test will vary (see [Appendix X1](#)).

5.4 This guide may be used to compare the wear performance of two or more textiles when these are included in the same test, or to compare a textile whose properties have not been evaluated with one having a known performance history.

5.5 The standard test methods and guides listed in [2.1](#) and [2.2](#) are not to be considered as limited to only those cited. It is recognized that textile innovations of chemistries on fibers and fabrics may require the use of other standards methods or modifications to existing standards. Further, product development efforts within companies may call for the use of internal procedures when investigation of worthiness of the innovation or prediction of consumer preference or satisfaction is questioned.

6. Apparatus and Facilities

6.1 ~~Viewing Board, Laboratory Equipment,~~ with standard lighting, as specified in AATCC 124. to perform designed tests.

6.2 ~~Smoothness Appearance Replicas,~~ as specified in AATCC 124.

6.3 ~~Gray Scale for Color Change,~~ as specified in AATCC Evaluation Procedure 1.⁷

6.4 ~~Soil Release Replicas,~~ as specified in AATCC 130-1981.

6.5 ~~Pilling Standards,~~ as specified in Test Method [D3512](#).

6.6 *Seam Puckering Standards*, as specified in AATCC 88B-1984.

6.7 *Crease Retention Standards*, as specified in AATCC 88C.

6.2 *Photographic Standards for Evaluating Shirt Components (collar, pocket, placket), Facilities for Conditioning Textiles*, as specified in Practice **D4231**.

6.2.1 *Environmental Chambers*, if required.

6.2.2 *Facilities*—for participants to be interviewed, fill out worksheets, change clothes, etc.

6.3 *Work Sheets*, to record data (see **Fig. 1**).

7. Sampling, Selection, and Number of Specimens

7.1 *Division into Lots*—For acceptance testing, divide the product into lots as agreed upon between the purchaser and the supplier.

7.2 *Lot Sample*—As a lot sample for acceptance testing, take at random the number of shipping cartons directed in an applicable material specification or other agreement between the purchaser and the supplier.

NOTE 1—A realistic specification or other agreement between the purchaser and the supplier requires taking into account the variability between shipping cartons, between items within a carton, and between specimens within an item so as to provide a sampling plan which has a meaningful producer’s risk, meaningful consumer’s risk, acceptable quality level, and limiting quality level.

7.3 *Laboratory Sample*—As a laboratory sample for acceptance testing, take at least two items from each shipping carton in the lot sample.

7.4 *Test Specimens*—Take test specimens from each item in the laboratory sample as directed in the individual test methods or as agreed upon between the purchaser and the supplier. Perform each test on the product as it will reach the consumer.

7.5 For some wear trials where two elements of a textile are being evaluated for specific benefits, a laboratory specimen might require a test garment to be made with one full side from fabric with one application (fiber content, or other element under consideration) and the other full side having the untreated (fiber content or other element) to be compared by a study participant.

8. Procedure

8.1 Decide on the type and design of the textile to be tested.

8.1 Define the objectives of the test clearly.

Wear Test Identification Number _____
 Wear Level _____
 Fabric Identification _____

ASTM D3181-15

<https://standards.iteh.ai/catalog/standards/sist/d93864b0-32a6-4f88-bd60-7968323080ce/astm-d3181-15>

	PARTICIPANTS										
	1	2	3	4	5	6	7	8	9	10	etc.
Evaluation Date											
Times Worn											
Hours Worn											
Times Refurbished											
Abrasion											
Bagging											
Color Change											
Crease Retention											
Dimensional Stability											
Fabric Smoothness											
Holes											
% Length Change											
% Width Change											
Pilling											
Seam Puckering											
Snagging											
Washdown (Hand)											
Wear Wrinkling											
Etc.											

FIG. 1 Example of a Wear Test Work Sheet