



Designation: D3181 – 15

Standard Guide for Conducting Wear Tests on Textiles¹

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1. Scope

1.1 This guide is intended to provide guidance for the design of an experiment for the purpose of developing a prediction of expected wear performance of 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

2.1.1 Fabric and Apparel Tests:

- D2051 Test Method for Durability of Finish of Zippers to Laundering
- D2052 Test Method for Colorfastness of Zippers to Dry-cleaning
- 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)
- 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
- 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)
- D6321 Practice for the Evaluation of Machine Washable T-Shirts
- D6797 Test Method for Bursting Strength of Fabrics

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.

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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.

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

D7022 Terminology Relating to Apparel

2.2 *AATCC Standards:*⁴

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 Smoothness of Seams in 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 Fabrics Except Wool)

116 Colorfastness to Crocking: Rotary Vertical Crockmeter
 Method

117 Colorfastness to Heat: Dry (Excluding Pressing)

124 Appearance of Fabrics After Repeated Home Launder-
 ing

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 of Garments after Home Lau-
 ndering

179 Skewness Change in Fabric Resulting from Home
 Laundering

183 Transmittance or Blocking of Erythemally Weighted
 Ultraviolet Radiation through Fabrics

186 Weather Resistance: UV Light and Moisture Exposure

192 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

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

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 Termi-
 nology 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 pro-
 vided.

5. Significance and Use

5.1 This guide may be used to evaluate textiles used in
 apparel. Earlier publications contained information for use in
 trials for upholstered furniture products, floor coverings, win-
 dow treatments, and bed, bath, and table linens. That informa-
 tion 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 con-
 struction details as well as specific fabrics, fibers, dyeings,
 finishing, fabrication techniques, etc.

5.3 This guide provides for flexibility in design and evalu-
 ation since the information sought from each wear test will
 vary (see **Appendix X1**).

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

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 *Laboratory Equipment*, to perform designed tests.
- 6.2 *Facilities for Conditioning Textiles*.
 - 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 Define the objectives of the test.
- 8.2 List the information to be obtained from the test.
- 8.3 Determine the type and design of the textile product(s) to be tested.

Wear Test Identification Number _____
 Wear Level _____
 Fabric Identification _____

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

	PARTICIPANTS										etc.
	1	2	3	4	5	6	7	8	9	10	
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