



Designation: D3181 – 15 (Reapproved 2019)

## Standard Guide for Conducting Wear Tests on Textiles<sup>1</sup>

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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

### 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

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](#)

[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](#)

[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 \(Withdrawn 1994\)](#)<sup>3</sup>

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:*<sup>4</sup>

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](#)

<sup>1</sup> 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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<sup>2</sup> 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.

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

<sup>4</sup> *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.

- 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 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 of Garments after Home Laundering
- 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 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.

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 *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](#)).

