



# Standard Performance Specification for Towel Products for Institutional and Household Use<sup>1</sup>

This standard is issued under the fixed designation D5433; 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 specification covers the evaluation of specific performance characteristics of importance in woven and knitted kitchen towel, dishcloth, crash towel, huck towel, washcloth, hand towel, bath towel, and bath sheet products for use in institutional and household environments.

1.2 This specification may be used by mutual agreement between the purchaser and the supplier to establish purchasing specification requirements.

1.3 The requirements in [Tables 1 and 2](#) apply to the length and width directions for those properties where fabric direction is pertinent.

1.4 This specification is not applicable for coated and laminated products, nonwoven products, or terry fabrics used for apparel.

1.5 *This standard does not purport to address all of the safety problems, 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:<sup>2</sup>

[D123 Terminology Relating to Textiles](#)

[D1424 Test Method for Tearing Strength of Fabrics by Falling-Pendulum \(Elmendorf-Type\) Apparatus](#)

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

[D2905 Practice for Statements on Number of Specimens for Textiles<sup>3</sup>](#)

[D3136 Terminology Relating to Care Labeling for Apparel, Textile, Home Furnishing, and Leather Products](#)

[D3786 Test Method for Bursting Strength of Textile Fabrics—Diaphragm Bursting Strength Tester Method](#)

[D4772 Test Method for Surface Water Absorption of Terry Fabrics \(Water Flow\)](#)

[D5034 Test Method for Breaking Strength and Elongation of Textile Fabrics \(Grab Test\)](#)

[D6797 Test Method for Bursting Strength of Fabrics Constant-Rate-of-Extension \(CRE\) Ball Burst Test](#)

[D7023 Terminology Relating to Home Furnishings](#)

### 2.2 AATCC Methods:<sup>4</sup>

[8 Colorfastness to Crocking: Crockmeter Method](#)

[16 Option 3 Colorfastness to Light: Xenon-Arc Lamp, Continuous Light](#)

[61 Colorfastness to Laundering: Accelerated](#)

[88B Smoothness Appearance of Seams in Fabrics after Repeated Home Laundering](#)

[135 Dimensional Changes of Fabrics after Home Laundering](#)

[96 Dimensional Changes in Commercial Laundering of Woven and Knitted Fabrics Except Wool](#)

[116 Colorfastness to Crocking: Rotary Vertical Crockmeter Method](#)

[179 Skewness Change in Fabric and Garment Twist Resulting from Automatic Home Laundering](#)

[Evaluation Procedure 1 Gray Scale for Color Change](#)

[Evaluation Procedure 2 Gray Scale for Staining](#)

[Evaluation Procedure 8 AATCC 9-Step Chromatic Transference Scale](#)

NOTE 1—Reference to test methods in this specification give only the pertinent part of the designation of ASTM, AATCC, or other test methods. The current edition of each test method shall prevail.

## 3. Terminology

3.1 For definitions of terms relating to Home Furnishings, [D13.63](#), refer to Terminology [D7023](#).

3.1.1 The following terms are relevant to this standard: bath sheet, bath towel, crash towel, fingertip towel, huck towel, terry towel, towel.

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

<sup>1</sup> 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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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto: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> Withdrawn. The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

<sup>4</sup> Available from American Association of Textile Chemists and Colorists (AATCC), P.O. Box 12215, Research Triangle Park, NC 27709.

**TABLE 1 Woven or Knitted Terry Fabric Specification Requirements**

|                                | Terry Requirements       |                          |                                     | Section        |
|--------------------------------|--------------------------|--------------------------|-------------------------------------|----------------|
|                                | Kitchen Towels           | Dishcloths               | Bath, Hand, Washcloths, Bath Sheets |                |
| Breaking Strength (CRE)        |                          |                          |                                     | <b>7.1</b>     |
| Length                         | 178 N (40 lbf) min       | 220 N (50 lbf) min       | 178 N (40 lbf) min                  |                |
| Width                          | 133 N (30 lbf) min       | 178 N (40 lbf) min       | 133 N (30 lbf) min                  |                |
| Bursting Strength (knits only) |                          |                          |                                     | <b>7.1.3</b>   |
| Diaphragm                      | 222 N (50 lbf) min       | 222 N (50 lbf) min       | 222 N (50 lbf) min                  | <b>7.1.4</b>   |
| Dimensional Change:            |                          |                          |                                     |                |
| Length                         | 10 % max                 | 10 % max                 | 10 % max                            |                |
| Width                          | 5 % max                  | 5 % max                  | 4 % max                             |                |
| Skew                           | 5 % max                  | 5 % max                  | 5 % max                             | <b>7.1.5</b>   |
| Colorfastness: <sup>A</sup>    |                          |                          |                                     |                |
| Laundering:                    |                          |                          |                                     | <b>7.1.6.1</b> |
| Shade Change                   | Grade 4 <sup>B</sup> min | Grade 4 <sup>B</sup> min | Grade 4 <sup>B</sup> min            |                |
| Staining                       | Grade 3 <sup>C</sup> min | Grade 3 <sup>C</sup> min | Grade 3 <sup>C</sup> min            |                |
| Crocking:                      |                          |                          |                                     | <b>7.1.6.2</b> |
| Dry                            | Grade 4 <sup>D</sup> min | Grade 4 <sup>D</sup> min | Grade 4 <sup>D</sup> min            |                |
| Wet                            | Grade 3 <sup>D</sup> min | Grade 3 <sup>D</sup> min | Grade 3 <sup>D</sup> min            |                |
| Light (20 AATCC AFU)           | Grade 4 <sup>B</sup> min | Grade 4 <sup>B</sup> min | Grade 4 <sup>B</sup> min            | <b>7.1.6.3</b> |
| Absorbency                     | Pass                     | Pass                     | Pass                                | <b>7.1.7</b>   |
| Laundered Appearance           | Acceptable               | Acceptable               | Acceptable                          | <b>7.2.1</b>   |

<sup>A</sup> Class for color change and color transfer is based on a numerical scale of 5 for negligible or no color change or color transfer to 1 for severe color change or color transfer. The numerical rating in Table 1 or higher is acceptable.

<sup>B</sup> AATCC Gray Scale for Color Change.

<sup>C</sup> AATCC Gray Scale for Staining.

<sup>D</sup> AATCC 9-Step Chromatic Transference Scale.

**TABLE 2 Non Terry Fabric Requirements**

|                                | Dishcloths               | Huck & Crash Towels      | Section        |
|--------------------------------|--------------------------|--------------------------|----------------|
| Breaking Strength (CRE)        |                          |                          | <b>7.1</b>     |
| Length                         | 220 N (50 lbf) min       | 178 N (40 lbf) min       |                |
| Width                          | 178 N (40 lbf) min       | 133 N (30 lbf) min       |                |
| Bursting Strength (knits only) |                          |                          | <b>7.1.3</b>   |
| Diaphragm                      | 222 N (50 lbf) min       | 222 N (50 lbf) min       | <b>7.1.4</b>   |
| Dimensional Change:            |                          |                          |                |
| Length                         | 10 % max                 | 10 % max                 |                |
| Width                          | 5 % max                  | 5 % max                  |                |
| Skew                           | 5 % Acceptable           | 5 % Acceptable           | <b>7.1.5</b>   |
| Colorfastness: <sup>A</sup>    |                          |                          |                |
| Laundering:                    |                          |                          | <b>7.1.6.1</b> |
| Shade Change                   | Grade 4 <sup>B</sup> min | Grade 4 <sup>B</sup> min |                |
| Staining                       | Grade 3 <sup>C</sup> min | Grade 3 <sup>C</sup> min |                |
| Crocking:                      |                          |                          | <b>7.1.6.2</b> |
| Dry                            | Grade 4 <sup>D</sup> min | Grade 4 <sup>D</sup> min |                |
| Wet                            | Grade 3 <sup>D</sup> min | Grade 3 <sup>D</sup> min |                |
| Light (20 AATCC FU)            | Step 4 <sup>B</sup> min  | Step 4 <sup>B</sup> min  | <b>7.1.6.3</b> |
| Absorbency                     | Pass                     | Pass                     | <b>7.1.7</b>   |
| Laundered Appearance           | Acceptable               | Acceptable               | <b>7.2.1</b>   |

<sup>A</sup> Class for color change and color transfer is based on a numerical scale of 5 for negligible or no color change or color transfer to 1 for severe color change or color transfer. The numerical rating in Table 1 or higher is acceptable.

<sup>B</sup> AATCC Gray Scale for Color Change.

<sup>C</sup> AATCC Gray Scale for Staining.

<sup>D</sup> AATCC 9-Step Chromatic Transference Scale.

## 4. Specification Requirements

4.1 *Product*—The properties to be evaluated and the acceptance criteria assigned to these areas shall be set by mutual agreement between the purchaser and the supplier.

4.2 *Fabrics*—The properties of fabrics for institutional and household kitchen towels, dishcloths, huck towels, crash towels, washcloths, hand towels, bath towels, and bath sheets shall conform to the specification requirements in **Tables 1 and 2**.

## 5. Significance and Use

5.1 Upon mutual agreement between the purchaser and the supplier, woven or knitted products intended for this end use

should meet all of the requirements listed in **Table 1** of this specification for terry products and **Table 2** for non terry products.

5.2 It is recognized that for purposes of fashion or aesthetics the ultimate consumer of articles made from these fabrics may find acceptable products that do not conform to all of the requirements in **Table 1** or **Table 2**. Therefore, one or more of the requirements listed in **Table 1** or **Table 2** may be modified by mutual agreement between the purchaser and the seller.

5.2.1 In such cases, any references to the specification shall specify that: This product meets ASTM Specification 63-707 except for the following characteristic(s).

5.3 Where no prepurchase agreement has been reached between the purchaser and the supplier, and in case of controversy, the requirements listed in **Table 1** or **Table 2** are intended to be used as a guide only. As noted in 5.2, ultimate consumer demands dictate varying performance parameters for any particular style.

5.4 The significance and use of particular properties and test methods are discussed in the appropriate sections of the specified test methods.

## 6. Sampling

6.1 *Acceptance Testing Lot*—Unless there is prior agreement, consider as a lot for acceptance testing all material of a single item as a single shipment.

6.2 *Lot Samples and Laboratory Samples*—For acceptance testing, take lot samples and laboratory samples as directed in each of the applicable test methods.

6.3 *Specimens*—Take the number of specimens directed in each of the applicable test methods. Perform the tests on the product as it reaches the customer. Any “partially finished” or “post-finish” fabrics should be processed in accordance with the fabric manufacturer’s instructions.

6.4 If the applicable test method does not specify the number of specimens, use the procedures in Practice **D2905** to determine the number of specimens per laboratory sample unit.

6.4.1 Use a reliable estimate of the variability of individual observations on similar materials in the user’s laboratory,

6.4.2 A95 % probability level, and

6.4.3 An allowable difference of 5 % of the average between the test results on laboratory sampling units and the average for the laboratory sampling unit. The average for a laboratory sampling unit is the average that would be obtained by applying the test method to all of the potential specimens from that laboratory sampling unit.

## 7. Testing for Household and Institutional Use

7.1 *Test Methods—Fabric Testing*—The physical and colorfastness properties of the fabric in the products shall be evaluated as directed in the following:

7.1.1 *Breaking Strength*—Determine the breaking strength as directed in Test Method **D5034**, using a constant-rate-of-extension (CRE) tensile testing machine.

NOTE 2—If preferred, the use of a constant-rate-of-traverse (CRT) tensile testing machine may be used. There may be no overall correlation between the results obtained with the CRT machine and with the CRE machine. Consequently, these two breaking strength testers cannot be used interchangeably. In case of controversy the CRE method (Test Method **D5034**) shall prevail.

7.1.2 *Tear Strength*—Determine the tear strength as directed in Test Method **D1424**.

NOTE 3—If preferred, the use of Test Methods **D2261** is permitted with existing requirements as given in this specification. There may be no overall correlation between the results obtained by the tongue tear method (Test Method **D2261**) and the Elmendorf machine (Test Method **D1424**). In case of controversy, Test Method **D1424** shall prevail.

7.1.3 *Bursting Strength*—Determine the bursting force of knit fabrics as directed in Test Methods **D3786** or **D6797** as agreed between the purchaser and the seller.

NOTE 4—There is no overall correlation between the results obtained with the CRE machine equipped with a bursting attachment and the diaphragm bursting tester. Consequently, these two bursting testers cannot be used interchangeably. In case of controversy, the motor-driven diaphragm tester method (Test Method **D3786**) shall prevail.

7.1.4 *Dimensional Change*—Determine the maximum dimensional change after five launderings following permanently attached care label instructions, or as directed in AATCC Method **135** for household use or AATCC Method **96** for institutional use as agreed upon between the purchaser and the supplier.

7.1.4.1 The wash conditions and drying procedure shall be as specified by the seller when using AATCC Method **135** for household products or AATCC Method **96** for institutional products.

7.1.4.2 When chlorine bleach is to be used, introduce one cup of any liquid chlorine household bleach containing 5.25 % sodium-hypochlorite (5.0 % available chlorine) into the washer in the manner directed on the bleach container. When non-chlorine bleach is to be used, introduce it into the washer in the amount and manner directed on the bleach container.

7.1.5 *Skewness*—Before and after laundering, determine the skew of the fabrics as directed in AATCC Method **179** Option 1. Applicable tolerances for skew should be agreed upon between the purchaser and the supplier.

7.1.6 *Colorfastness*:

7.1.6.1 *Laundering*—Determine the colorfastness to laundering as directed in Test 4-A of AATCC Method **61** unless otherwise agreed upon between the purchaser and the supplier.<sup>5</sup>

NOTE 5—For all unbleachable items, Test 3-A will be used.

7.1.6.2 *Crocking*—Determine colorfastness to dry and wet crocking as directed in AATCC Method **8** for solid shades and AATCC Method **116** for prints or as agreed upon between the purchaser and the supplier.

7.1.6.3 *Light*—Determine colorfastness to light as directed in AATCC Method **16** Option 3.

NOTE 6—There is a distinct difference in spectral distribution between the various types of machines listed in AATCC Method 16, with no overall correlation between them. Consequently, these machines cannot be used interchangeably. In cases of controversy, AATCC Method **16** Option 3 shall prevail.

7.1.7 *Absorbency*—Determine the absorbency for terry products as directed in Test Method **D4772**. For other products in this specification, the absorbency test method shall be as agreed upon between the purchaser and the supplier. Acceptable absorbency shall be as agreed upon between the purchaser and the supplier.

7.2 *Product*—The physical characteristics of the product shall be evaluated as directed in the following:

7.2.1 *Appearance*—Before and after laundering, determine the appearance of selvages, hems, seams and dobby border, and hem failure or such other appearance characteristics as are agreed upon between the purchaser and the supplier.

<sup>5</sup> Multifiber Test Fabric, No. 10 is available from Test Fabrics, Inc., P.O. Box 420, Middlesex, NJ 08841.

## 8. Report

8.1 State that the specimen(s) were tested as directed in Performance Specification D5433. Describe the fiber content, the type of fabric, the type(s) of product tested, and identify the components.

8.2 The report shall include the following additional information:

- 8.2.1 Objective of the test,
- 8.2.2 Description and identification of product(s),
- 8.2.3 Description of the method of sampling used,
- 8.2.4 List of performance characteristics evaluated, the test method used for each, and the results of each,
- 8.2.5 Number of laundering cycles and the wash conditions used, and

8.2.6 Conclusion(s), if appropriate.

## 9. Conformance

9.1 When the purchaser and the supplier have agreed upon specific requirements for the characteristics that are to be considered, products that fail to meet these requirements may be rejected. Rejection should be reported to the supplier in writing. In case of disagreement with the results of the test, the supplier may make claim for a retest.

## 10. Keywords

10.1 bath products; household; institutional; kitchen products; toweling

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