



Designation: ~~D6321–98~~ (Reapproved 2004) D6321/D6321M – 13

Standard Practice for the Evaluation of Machine Washable T-Shirts¹

This standard is issued under the fixed designation ~~D6321~~; D6321/D6321M; 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 practice covers test methods and procedures used to evaluate important characteristics of machine washable T-shirts. T-shirts may be made of knitted fabric composed of any textile fiber(s) or blend of fibers and intended to be used as underwear or as an outer garment.

1.2 T-shirts' characteristics may be assessed either as a final product or at any intermediate processing stage.

1.3 This practice excludes T-shirts intended for hand washing or dry cleaning care.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as ~~the~~ standard. The values ~~given in parentheses are provided for information only~~; stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.5 *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 standards 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](#)

[D1776 Practice for Conditioning and Testing Textiles](#)

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

[D3787 Test Method for Bursting Strength of Textiles—Constant-Rate-of-Traverse \(CRT\) Ball Burst Test](#)

[D3887 Specification for Tolerances for Knitted Fabrics](#)

[D3940 Test Method for Bursting Strength \(Load\) and Elongation of Sewn Seams of Knit or Woven Stretch Textile Fabrics](#)

(Withdrawn 1995)³

[D4154 Performance Specification for Men's and Boys' Knitted and Woven Beachwear and Sports Shirt Fabrics](#) ~~d6321m-13~~

[D4156 Performance Specification for Women's and Girls' Knitted Sportswear Fabrics](#)

[D7022 Terminology Relating to Apparel](#)

2.2 *AATCC Test Methods:*⁴

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

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

[Evaluation Procedure 7, Instrumental Assessment of the Change in Color of a Textile Specimen](#)

[Method 107, Colorfastness to Water](#)

[Method 150, Dimensional Changes in Automatic of Garments after Home Laundering of Garments](#)

[Method 172, Colorfastness to Powered Non-Chlorine Bleach in Home Laundering](#)

[Method 179, Skewness Change in Fabric and Garment Twist in Fabrics and Garments After Resulting from Automatic Home Laundering](#)

2.3 *Other Documents:*

[A Glossary of AATCC Standard Terminology](#)⁴

[Standardization of Home Laundry Text Test Conditions](#)⁴

¹ This practice is under the jurisdiction of ASTM Committee [D13](#) on Textiles, and is the direct responsibility of Subcommittee [D13.61](#) on Apparel. Current edition approved ~~Oct. 1, 2004~~ March 1, 2013. Published ~~November 2004~~ April 2013. Originally approved in 1998. Last previous edition approved in ~~1998~~ 2004 as ~~D6321–98~~ D6321–98(2004). DOI: ~~10.1520/D6321-98R04~~ 10.1520/D6321_D6321M-13.

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.

⁴ Available from AATCC, PO Box 12215, Research Triangle Park, NC 27709.



3. Terminology

~~3.1 Definitions:~~

~~3.1.1 T-shirt, n—a knitted garment, typically constructed of jersey or 1 by 1 rib fabric, used as either an undergarment or as an outer casual top with a rib collar, hemmed sleeves and bottom, and a body configuration that resembles the letter “T”.~~

~~3.1.1.1 Discussion—~~

T-shirts may have either crew or v-neck styles; short or long sleeve lengths, and be adorned with appliques, embroidery, or garment printing or combinations of adornments. Henley and polo-style shirts are excluded.

3.1.2 For definitions of other textile terms used in this standard, refer to terminology in Terminology [D123](#) and Glossary of AATCC Standard Terminology.

3.1 For all terminology relating to D13.61 refer to Terminology [D7022](#).

3.1.1 The following terms are relevant to this standard: T-shirt.

3.1.2 For definitions of other textile terms used in this standard, refer to terminology in Terminology [D123](#) and Glossary of AATCC Standard Terminology.

4. Significance and Use

4.1 This practice may be used to evaluate pertinent characteristics of washable T-shirts.

4.2 T-shirts may be subject to extra processes such as garment dyeing, garment washing, printing, application of embroidery or trims. An individual process or combination of processes may affect the performance of the final product.

4.3 This practice may be used by mutual agreement between the purchaser and the supplier to establish purchasing specifications.

5. Sampling, Selection, and Number of Specimens

5.1 *Lot Sample*—Take a lot sample as directed in an applicable material specification or as agreed between purchaser and supplier, such as an agreement to take at random some fixed number of shipping containers or garments from each lot.

5.2 *Laboratory Sample*—From each lot sampling unit, take five T-shirts to be used as the laboratory sample.

5.3 *Test Specimen*—From each laboratory sample, two T-shirts are to be tested as-received and two T-shirts that are to be laundered. The fifth T-shirt is to be retained as a control specimen and not tested.

6. Fabric Performance Characteristics

6.1 Evaluate fabric designated for T-shirt manufacture using Specification [D3887](#), [D3787](#), Performance Specification [D4154](#), or Performance Specification [D4156](#) as appropriate.

7. Garment Performance Characteristics

7.1 Assessments Prior to Machine Laundering (As-Received State):

7.1.1 Condition T-shirts in standard atmospheres for testing $20 \pm 3^{\circ}\text{C}$ ($70[70 \pm 2^{\circ}\text{F}]2^{\circ}\text{F}$) and $65 \pm 2\%$ RH according to Practice [D1776](#) for 4 hrs.

7.1.2 *Shade Difference*—Examine each of the four T-shirts for shade difference, garment panel-to-panel, using AATCC Evaluation Procedure 1 or 7.

NOTE 1—Difference results may be obtained when using the subjecting assessment in AATCC Evaluation Procedure 1 when using the instrumental assessment in AATCC Evaluation Procedure 7.

7.1.3 *Defects*—Examine the four T-shirts for needle cutting, seam appearance, surface irregularities, or any other defect and record the information.

7.1.4 *Seam Performance*—Determine seam performance for the two as-received T-shirts as directed in Test Method [D3940](#).

7.1.5 *Bursting Force*—If the fabric is not available for [6.1](#), determine bursting strength on the as-received T-shirts using [D3787](#) or [D3786](#).

7.2 Specimen Preparation Prior to Laundering:

7.2.1 Condition T-shirts to the standard atmospheres of $20 \pm 3^{\circ}\text{C}$ ($70[70 \pm 2^{\circ}\text{F}]2^{\circ}\text{F}$) and 65% RH as specified in Practice [D1776](#) for at least 4 h.

7.2.2 Lay the two T-shirts designated for laundering on a flat surface without tension, aligning sides and sleeves and smoothing to minimize folds and wrinkles.

7.2.3 Mark the dimensions to be measured with an indelible marking pen.

7.2.3.1 For garment dimensional change, mark the locations according to AATCC TM 150 and as shown in [Fig. 1](#) using a plastic or metal tape graduated in increments of millimetres ($\frac{1}{16}$ in.; in.):