



Designation: **D4231 – 01 (Reapproved 2008) D4231 – 14**

Standard Practice for Evaluation of Launderable Woven Dress Shirts and Sports Shirts¹

This standard is issued under the fixed designation D4231; 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 the evaluation of specific characteristics of importance in launderable woven dress shirts and sport shirts.

1.2 Any launderable woven dress shirt or sport shirt may be evaluated using this practice, but it shall not be construed to be a standard of performance.

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

1.4 This practice is not intended to be used in the evaluation of woven dress shirts or sport shirts when drycleaned or hand-washed.

2. Referenced Documents

2.1 *ASTM Standards:*²

[D123 Terminology Relating to Textiles](#)

[D1683 Test Method for Failure in Sewn Seams of Woven Apparel Fabrics](#)

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

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

[D3477 Performance Specification for Men's and Boys' Woven Dress Shirt Fabrics \(Withdrawn 2005\)](#)³

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

[D7022 Terminology Relating to Apparel](#)

2.2 *AATCC Test Methods:*

[88B Appearance Smoothness of Seams in Wash-and-Wear Items After Fabrics After Repeated Home Laundering](#)⁴

[143 Appearance of Apparel and Other Textile End Products After Repeated Home Launderings](#)⁴

[150 Dimensional Changes in Automatic of Garments after Home Laundering of Garments](#)⁴

[172 Colorfastness to Powdered Non-Chlorine Bleach in Home Laundering](#)⁴

[188 Colorfastness to Chlorine-Sodium Hypochlorite Bleach in Home Laundering](#)⁴

[Evaluation Procedure 1](#)⁴

[Evaluation Procedure 2](#)⁴

[Evaluation Procedure 8](#)⁴

[Monograph M6 Standardization of Home Laundry Test Conditions](#)⁴

2.3 *ASTM Adjuncts:*⁵

Shirt Components- 15 Photographs

3. Terminology

3.1 *Definitions*—For definitions of textile terms used in this practice, refer to the individual [ASTM Standards and Standards](#), [AATCC Test Methods and to Methods, Terminology D123](#) and Terminology related to Apparel [D7022](#).

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 Aug. 1, 2008; Feb. 1, 2014. Published October 2008; March 2014. Originally approved in 1989. Last previous edition approved in 2004 as D4231 – 01; D4231 – 01(2008). DOI: 10.1520/D4231-01R08; 10.1520/D4231-14.

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 *AATCC Technical Manual*, available from American Association of Textile Chemists and Colorists (AATCC), P.O. Box 12215, Research Triangle Park, NC 27709, <http://www.aatcc.org>.

⁵ Photographic standards for evaluating shirt components are available from ASTM International Headquarters. Order Adjunct NO. : [ADJD4231](#).

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *dress shirt, n*—a shirt designed to be worn with a tie and jacket and made with a specific collar size or numerical designation.

3.2.1.1 Discussion—

For men's dress shirts, an additional size designation may be used to identify the sleeve length.

3.2.2 *sport shirt, n*—a shirt designed to be worn either informally or with a jacket, and which uses an alphabetical, numerical, or alphanumerical size designator.

4. Significance and Use

4.1 This practice may be used to evaluate pertinent performance characteristics of men's and boys' launderable woven dress shirts and sport shirts.

4.2 The characteristics to be evaluated and the acceptance criteria assigned to these areas shall be set by mutual agreement between purchaser and supplier.

4.3 The uses and significance of specific properties are discussed in the appropriate test methods and performance specifications.

5. Sampling, Selection, and Number of Specimens

5.1 *Primary Sampling Unit*—For the test methods used in this practice, consider boxes or other shipping containers to be the primary sampling unit.

5.2 *Laboratory Sampling Unit*—For the test methods used in this practice, take a minimum of two garments from each primary sampling unit to serve as both the laboratory sample and the test specimens.

6. Characteristics and Conditions

6.1 *Characteristics*—The characteristics to be evaluated and the acceptance criteria assigned to these areas shall be set by mutual agreement between purchaser and supplier.

6.2 *Fabric Performance Characteristics*—Evaluate the selected characteristics of the shirt fabric by methods directed in Performance Specification **D3477** or Performance Specification **D4154** as appropriate.

6.3 *Shirt Performance Characteristics Prior to Laundering.*

6.3.1 *Seam Failure*—Evaluate seam failure as directed in Test Method **D1683**.

6.3.2 *Seam Pucker*—Examine shirt(s) for seam pucker using AATCC Method 88B and photographs described in **Fig. 1**, **Fig. 2**, and **Fig. 3** (See **ASTM D4231**)⁵.

6.3.3 *Shade Difference*—Examine shirts(s) for shade difference from part to part as directed in AATCC Evaluation Procedure 1.

6.3.4 *Shirt Appearance*—Evaluate the shirts for appearance of fabric and all component parts such as, but not limited to, seams, pockets, collars, and top centers (front placket) (see **Fig. 4**). Specimens shall be mounted as directed in AATCC Method 143, using appropriate photographic standards as described in **Fig. 1**, **Fig. 2**, and **Fig. 3**⁵ and AATCC 88B. Acceptable performance requirements shall be as agreed between the purchaser and supplier.

6.3.5 *Other Defects*—Examine shirt(s) for any other obvious defects.

6.3.6 *Dimensional Change*—Measure shirt(s) prior to laundering as directed in Section 7.

6.4 *Laundering Conditions:*

6.4.1 *Wash Conditions*—Wash and dry shirts according to the care label, using the applicable procedure in AATCC Method 150. Temperatures shall conform to those stated in **Table 1** of Terminology **D3136**.

6.4.1.1 Use any domestically available household laundry detergent as agreed between the purchaser and supplier.

6.4.1.2 When testing with chlorine bleach is indicated, introduce 1 cup of any liquid chlorine household bleach containing 5.25 % sodium hypochlorite (5 % available chlorine) into the washer in the manner directed on the bleach container. When testing with nonchlorine bleach is indicated, introduce any dry nonchlorine household bleach based on a 1 % sodium perborate-sodium carbonate solution having a pH of 10.7 to 11.3 into the washer in the amount and manner directed on the bleach container.

6.4.2 *Ironing Conditions*—When ironing is to be done, iron the shirt(s) as directed in Section 7.4.3 of AATCC Method 150, except that ironing conditions shall be in accordance with the care label.

6.5 *Shirt Performance Characteristics After Home Laundering—*

6.5.1 *Dimensional Change*—Evaluate the dimensional changes after five launderings, or the number agreed upon between the purchaser and supplier. Determine the dimensional change as directed in AATCC Method 150.

NOTE 1—A negative dimensional change indicates shrinkage; a positive dimensional change indicates growth.

NOTE 2—Garment manufacturing dynamics can have an influence on dimensional stability of the finished product, therefore the fabric dimensional stability cannot be used exclusively.

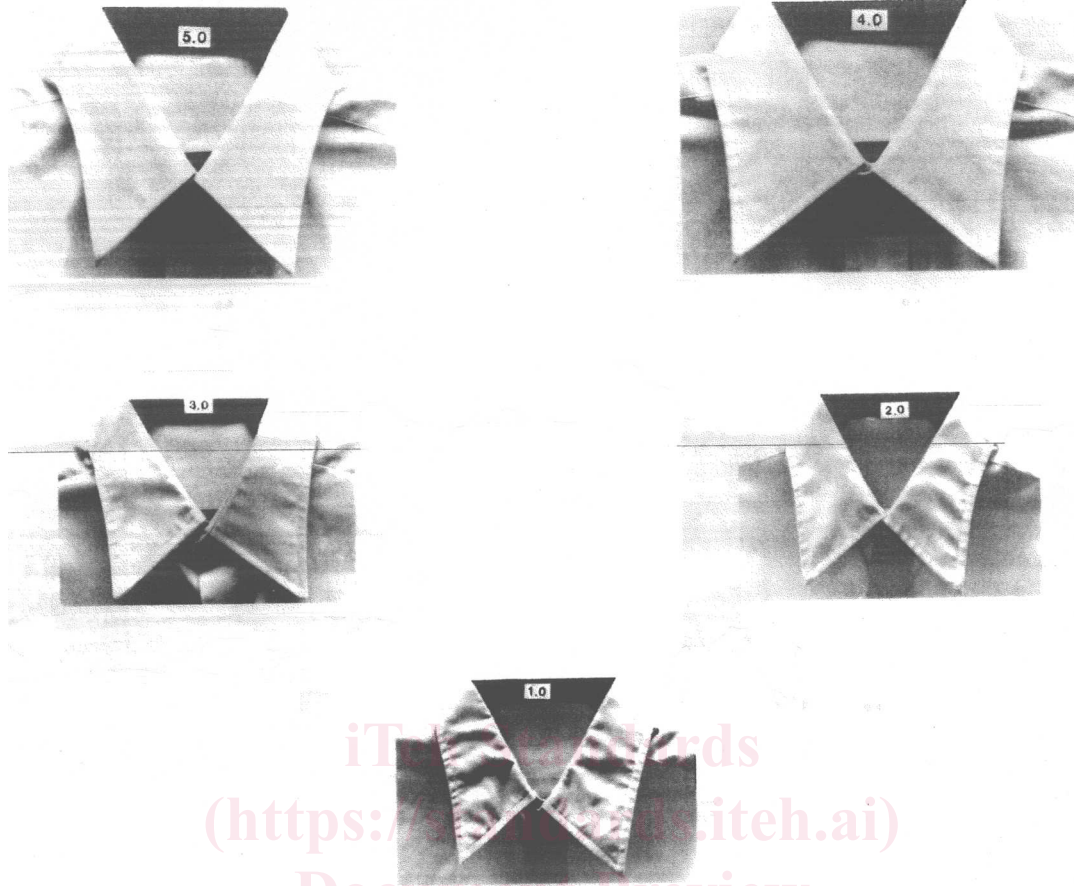


FIG. 1 Collar 5

ASTM D4231-14

<https://standards.iteh.ai/catalog/standards/sist/982f1a2-3e78-462a-860a-d357083e2475/astm-d4231-14>

6.5.2 *Seam Failure*—Evaluate seam failure as directed in Test Method D1683.

6.5.3 *Shade Difference*—Determine shade differences from part to part as directed in AATCC Evaluation Procedure 1.

6.5.4 *Shirt Appearance*—Evaluate the shirt(s) for appearance of fabric and all component parts, such as, but not limited to, seams, pockets, collars, and top centers (front placket). Specimens shall be mounted as directed in AATCC Method 143, using appropriate photographic standards as described in Figs. 1-3 and AATCC 88B. Acceptable performance requirements shall be as agreed between the purchaser and supplier.

6.5.5 *Other Defects*—Examine shirts for any other obvious defects.

6.6 *Test Methods*—

6.6.1 *Colorfastness*—When testing with bleach is indicated, test according to the directions in AATCC Method 172 for powdered non-chlorine bleach, or AATCC Method 180 for chlorine-sodium hypochlorite bleach, as appropriate.

7. Method for Measuring Shirts

7.1 *Scope*—This method specifies how to measure the significant dimensions of shirts for use in determining dimensional change after refurbishing.

7.2 *Significance and Use*—Standard methods of measuring shirts are required before reproducible results can be obtained for changes in dimensions after laundering.

7.3 *Procedure:*

7.3.1 Expose the shirt(s) to standard conditions as specified in Practice D1776 for at least 4 h, or longer, as agreed between the purchaser and supplier.

7.3.2 Lay the shirt(s) without tension, on a flat surface. The fabric shall be smooth and free of wrinkles and creases.

7.3.2.1 Mark the dimension to be measured with a suitable marking device.

7.3.3 Unless otherwise agreed upon between the purchaser and supplier, make measurements at the following locations as shown in Fig. 5.