



# Standard Practice for Evaluation of Launderable Woven Dress Shirts and Sports Shirts<sup>1</sup>

This standard is issued under the fixed designation D 4231; 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:

D 123 Terminology Relating to Textiles<sup>2</sup>

D 1683 Test Method for Failure in Sewn Seams of Woven Fabrics<sup>3</sup>

D 1776 Practice for Conditioning Textiles for Testing<sup>4</sup>

D 3136 Terminology Relating to Labels for Textile and Leather Products Other Than Textile Floor Coverings and Upholstery<sup>2</sup>

D 3477 Performance Specification for Men's and Boy's Woven Dress Shirt Fabrics<sup>4</sup>

D 3938 Guide for Determining or Confirming Care Instructions for Apparel and Other Textile Consumer Products<sup>4</sup>

D 4154 Performance Specification for Men's and Boys' Knitted and Woven Beachwear and Sports Shirt Fabrics<sup>4</sup>

### 2.2 AATCC Test Methods:

88B Appearance of Seams in Wash and Wear Items After Home Laundering<sup>5</sup>

143 Appearance of Apparel and Other Textile End Products After Repeated Home Launderings<sup>5</sup>

150 Dimensional Changes in Automatic Home Laundering of Garments<sup>5</sup>

172 Colorfastness to Non-Chlorine Bleach in Home Laundering<sup>5</sup>

188 Colorfastness to Chlorine Bleach in Home Laundering<sup>5</sup>  
Evaluation Procedure 1<sup>5</sup>

Evaluation Procedure 2<sup>5</sup>

Evaluation Procedure 8<sup>5</sup>

Standardization of Home Laundry Test Conditions<sup>5</sup>

## 3. Terminology

3.1 *Definitions*—For definitions of textile terms used in this practice, refer to the individual ASTM Standards and AATCC Test Methods and to Terminology D 123.

### 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

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.61 on Apparel.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 07.01.

<sup>3</sup> Discontinued 1999, see 1998 *Annual Book of ASTM Standards*, Vol 07.01.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 07.02.

<sup>5</sup> *AATCC Technical Manual*, available from the American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709.

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 D 3477 or Performance Specification D 4154 as appropriate.

6.3 *Shirt Performance Characteristics Prior to Laundering.*

6.3.1 *Seam Failure*—Evaluate seam failure as directed in Test Method D 1683.

6.3.2 *Seam Pucker*—Examine shirt(s) for seam pucker using AATCC Method 88B and photographs described in Figs. 2, 3, and 4.

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. 1). Specimens shall be mounted as directed in AATCC Method 143, using appropriate photographic standards as described in Fig. 2, Fig. 3, and Fig. 4<sup>6</sup> 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 D 3136.

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,

<sup>6</sup> Photographic standards for evaluating shirt components are available from ASTM Headquarters. Order PCN: ADJD4231.

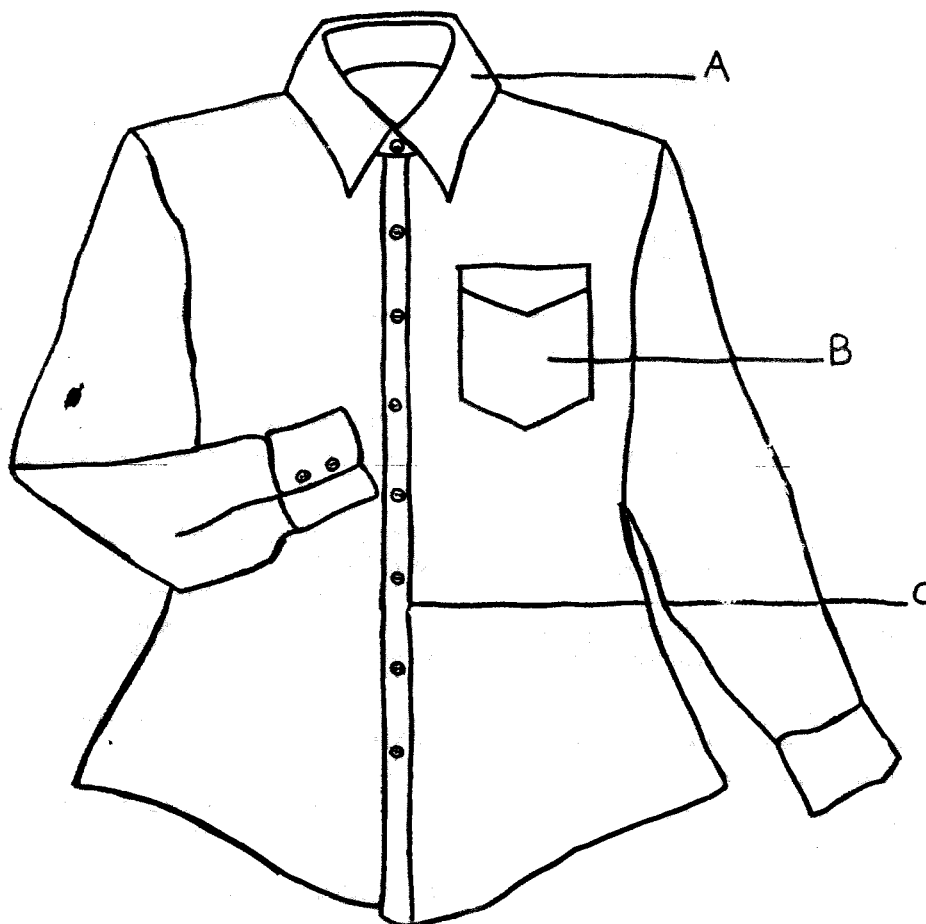


FIG. 1 Diagram of Shirt Components

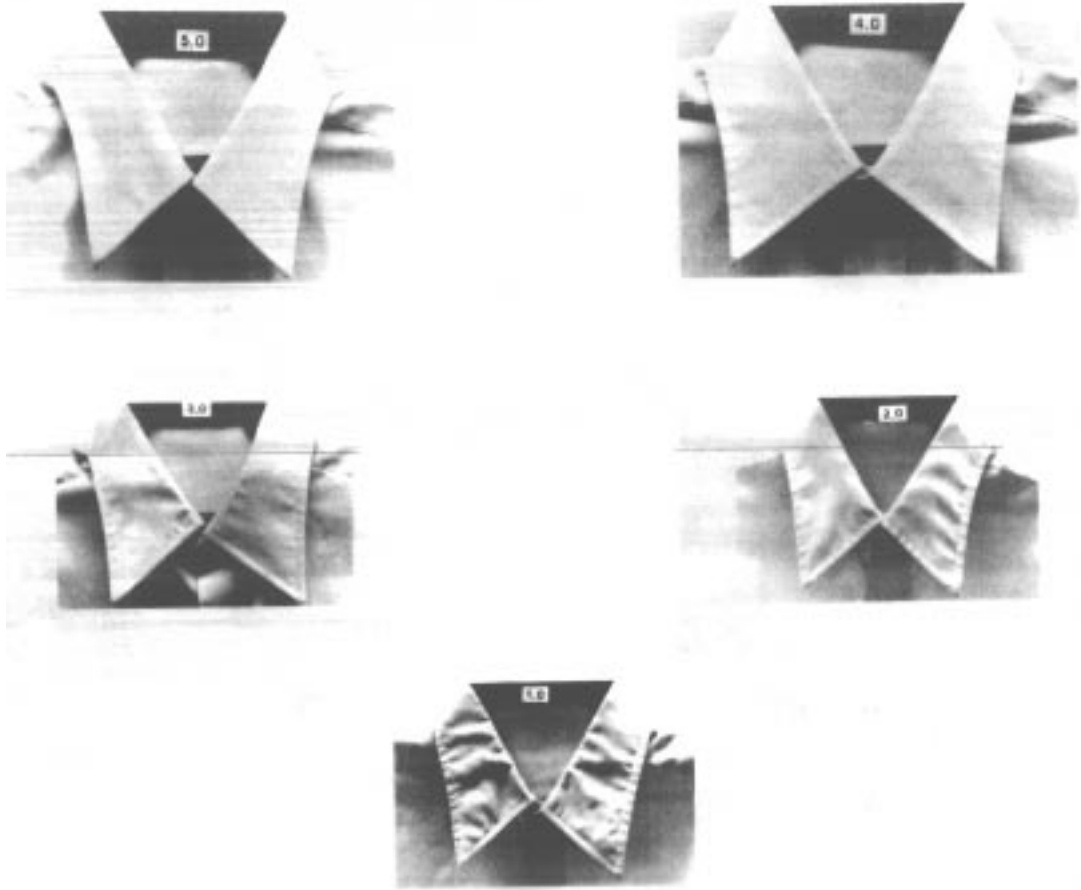


FIG. 2 Collar 5

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.

**6.5.2 Seam Failure—**Evaluate seam failure as directed in Test Method D 1683.

**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. 2-4 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 non-chlorine bleach, or AATCC Method 180 for chlorine 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 D 1776 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.

**7.3.3.1 Chest Width—**With shirt closed, measure across front of shirt 25 mm (1 in.) below functional armhole seam (A

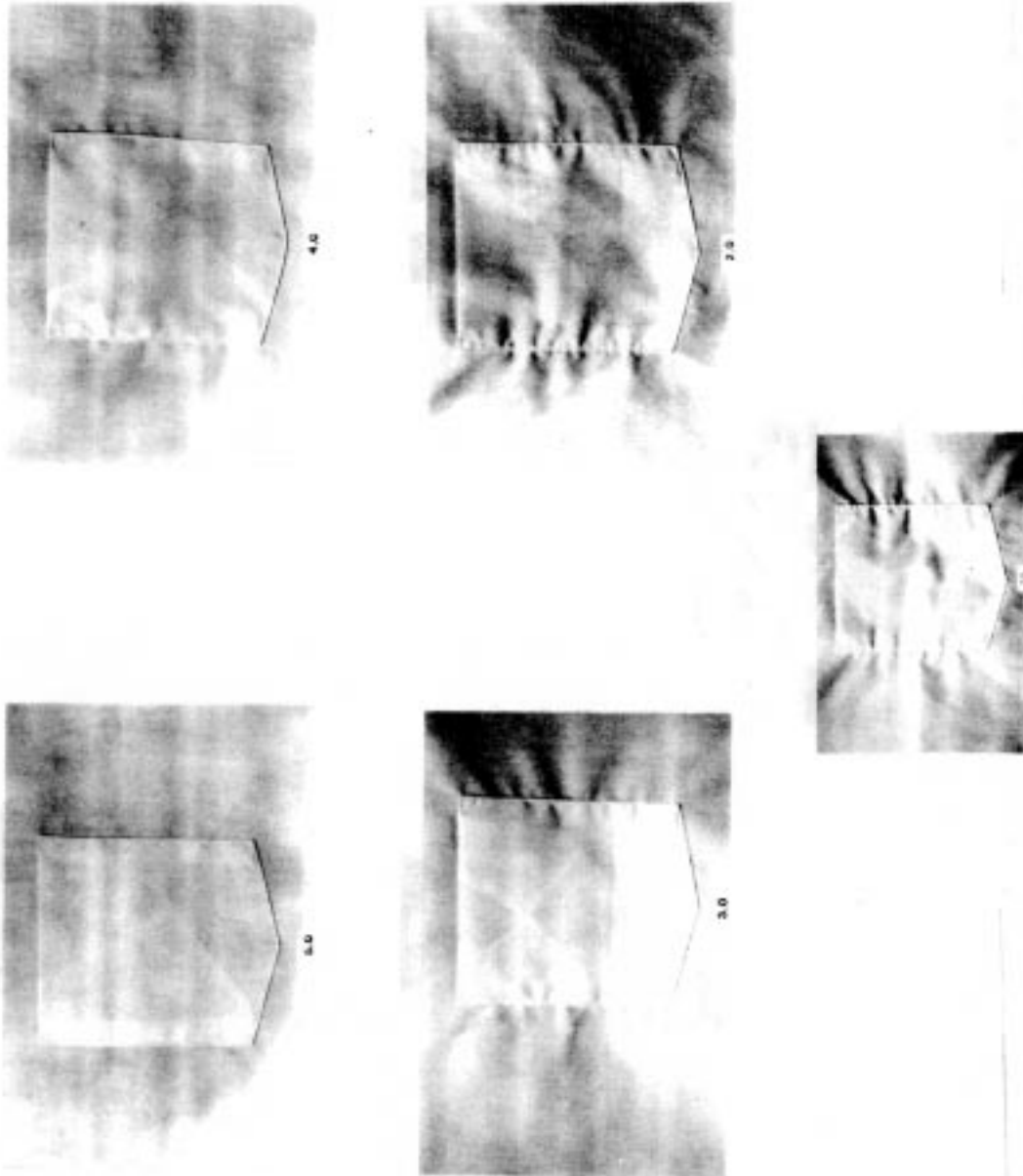


FIG. 3 Pocket

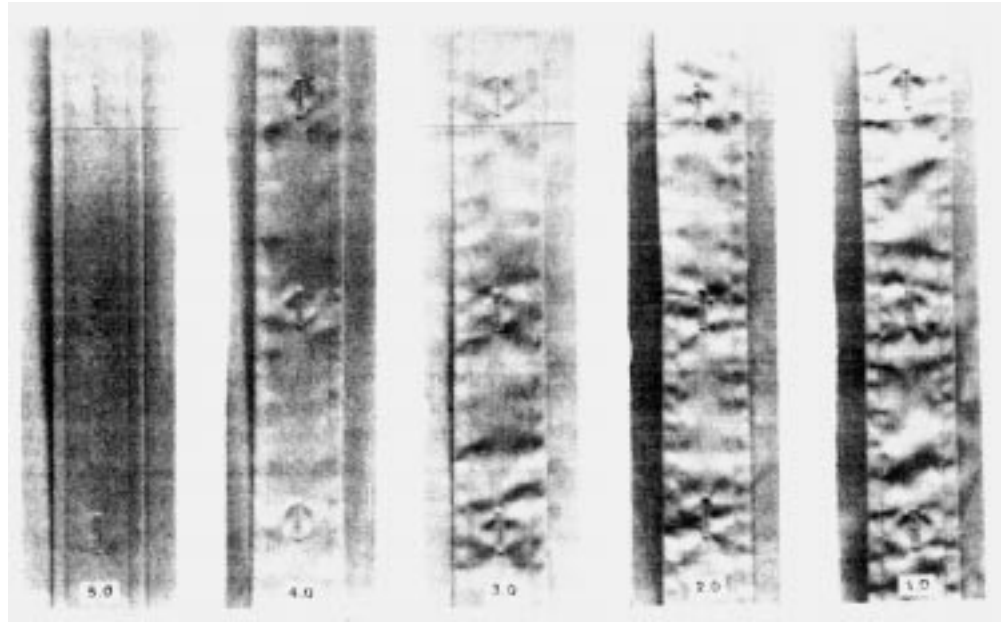


FIG. 4 Placket

TABLE 1 Water Temperature for Home Laundering

Cold	Up to 29° C (Up to 85°F)
Warm	32° to 43° C (90° to 110° F)
Hot	54° to 66° C (130° to 150° F)

to A, Fig. 5). Take the measurement from edge to edge, not seam to seam, making sure top and bottom are smooth and free of wrinkles and creases, and record.

NOTE 3—For the total chest girth, double the chest width measurement.

7.3.3.2 *Waist width*—With shirt closed, measure across front of shirt at narrowest point (B to B, Fig. 5). Take measurement from edge to edge, not seam to seam, and record.

NOTE 4—For the total waist girth, double the waist width measurement.

7.3.3.3 *Body Length*—With shirt closed, turn shirt with back facing up and lay flat. Measure center back from bottom of collar band to bottom of hem edge ( to C, Fig. 5) and record.

7.3.3.4 *Sleeve Length*—With shirt closed, turn shirt with back facing up and lay flat. Measure a sleeve from bottom of collar band at center of collar band to bottom edge of cuff (D to D, Fig. 5) and record.

7.3.3.5 *Collar Length*—With shirt opened, lay collar flat with label down, measure from center of button to far end of buttonhole opening or far end of loop (E to E, Fig. 5), and

record. When shirt has neither buttonhole nor loop, measure from collar V to collar V (F to F, Fig. 5) and record.

#### 7.4 Precision and Bias:

7.4.1 *Precision*—In order to establish the precision and bias of this practice, a sufficient number of garments manufactured to tight tolerances are required. In spite of repeated efforts to acquire these garments, the subcommittee has been unsuccessful. Once the garments are acquired, an interlaboratory test will be conducted.

7.4.2 *Bias*—The method in this practice for measuring shirts has no known bias and may be used as a referee method.

## 8. Report

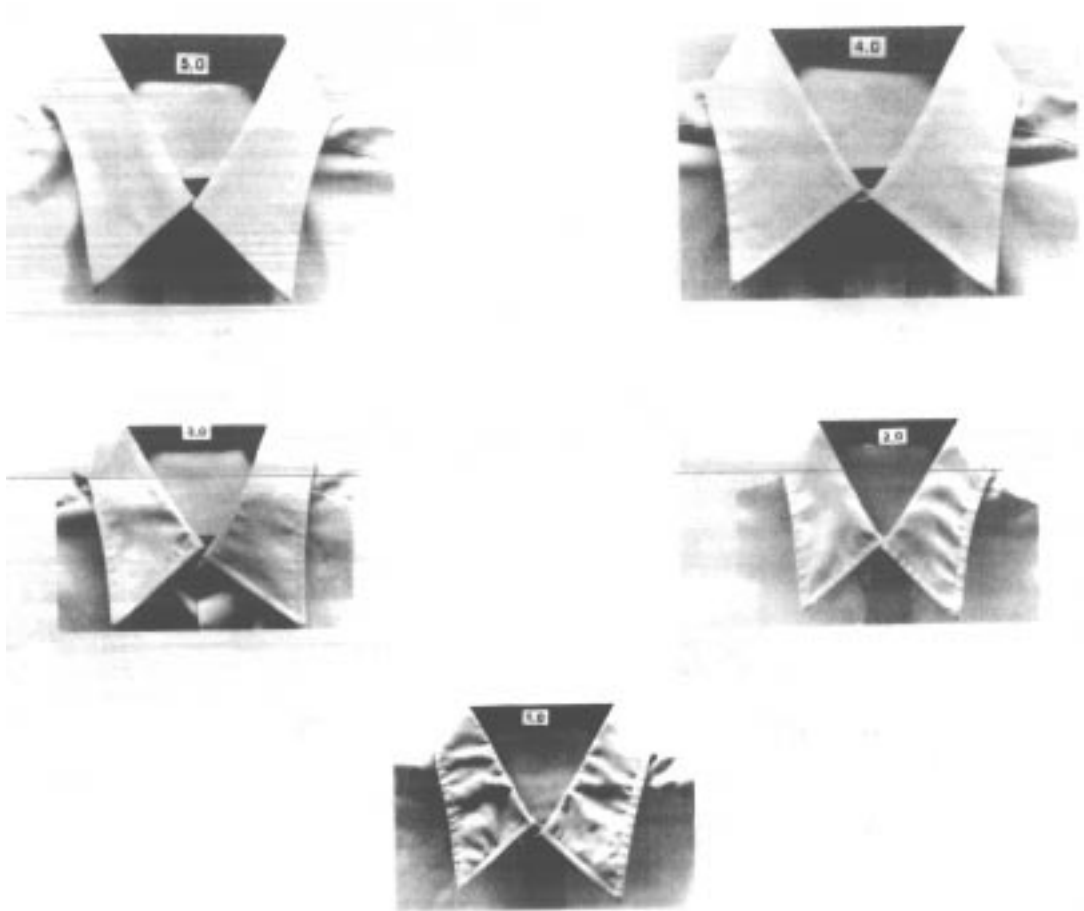
8.1 State that the specimens were tested as directed in Practice D 4231.

8.2 Report the following information:

- 8.2.1 Objective of test,
- 8.2.2 Description and identification of shirt(s),
- 8.2.3 Number of shirts tested,
- 8.2.4 List of performance characteristics evaluated and the results of each, and
- 8.2.5 Conclusions, if appropriate.

## 9. Keywords

9.1 dress shirt; shirt; sport shirt



**FIG. 5 Diagram for Marking and Measurement Locations (See 7.3)**

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