



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

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 ( $\epsilon$ ) 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:<sup>2</sup>

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[D3477 Performance Specification for Men's and Boys' Woven Dress Shirt Fabrics \(Withdrawn 2005\)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

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

[D7022 Terminology Relating to Apparel](#)

<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.

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

<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> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

### 2.2 AATCC Test Methods:

[88B Smoothness of Seams in Fabrics After Repeated Home Laundering<sup>4</sup>](#)

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

[150 Dimensional Changes of Garments after Home Laundering<sup>4</sup>](#)

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

[188 Colorfastness to Sodium Hypochlorite Bleach in Home Laundering<sup>4</sup>](#)

[Evaluation Procedure 1<sup>4</sup>](#)

[Evaluation Procedure 2<sup>4</sup>](#)

[Evaluation Procedure 8<sup>4</sup>](#)

[Monograph M6 Standardization of Home Laundry Test Conditions<sup>4</sup>](#)

### 2.3 ASTM Adjuncts:<sup>5</sup>

[Shirt Components- 15 Photographs](#)

## 3. Terminology

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

### 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 alphanumeric size designator.

<sup>4</sup> 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>.

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

**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 ADJD4231)<sup>5</sup>.

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<sup>5</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.

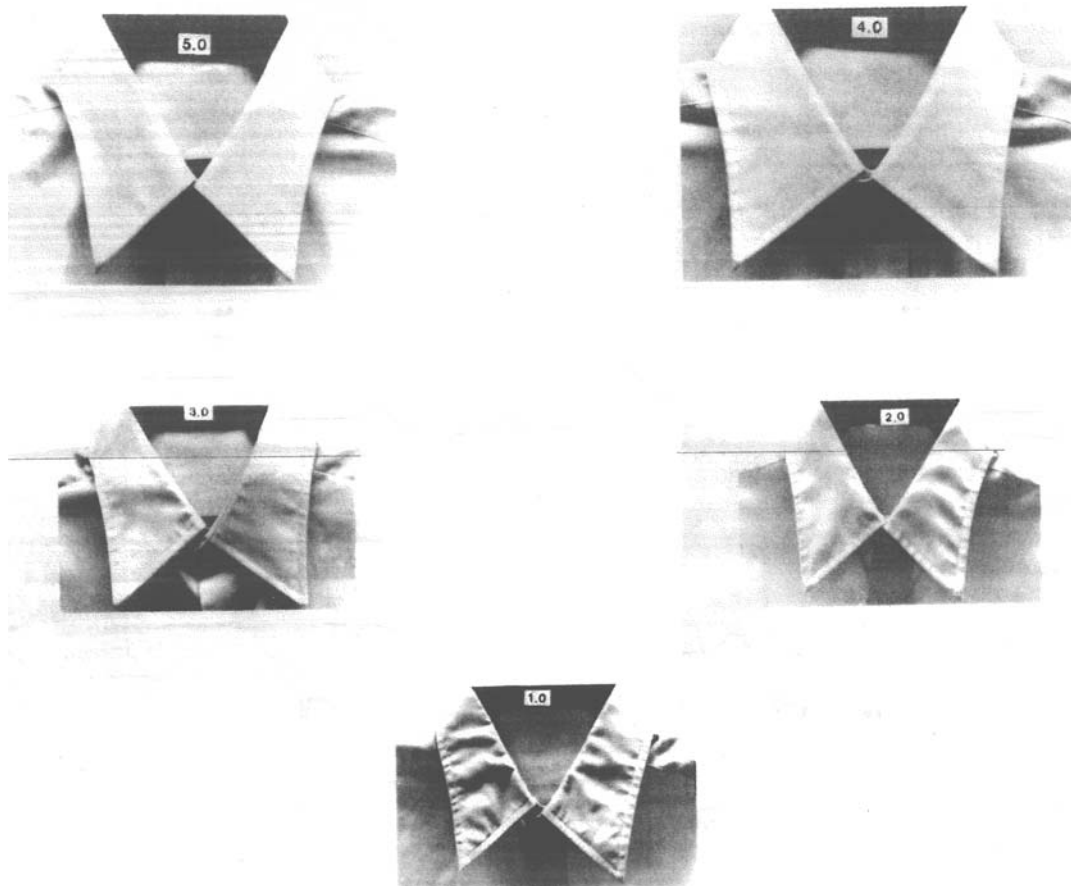


FIG. 1 Collar 5

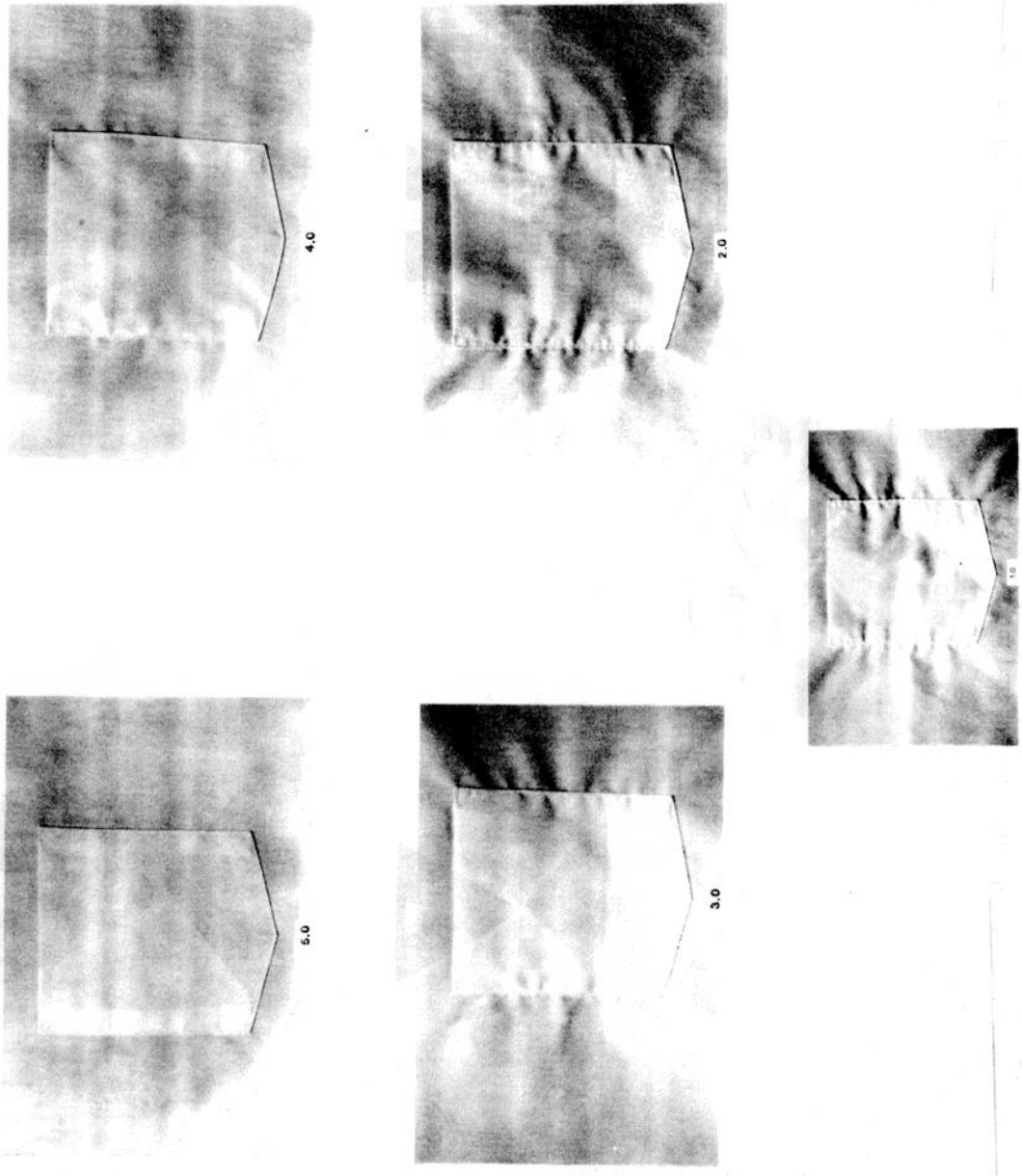


FIG. 2 Pocket

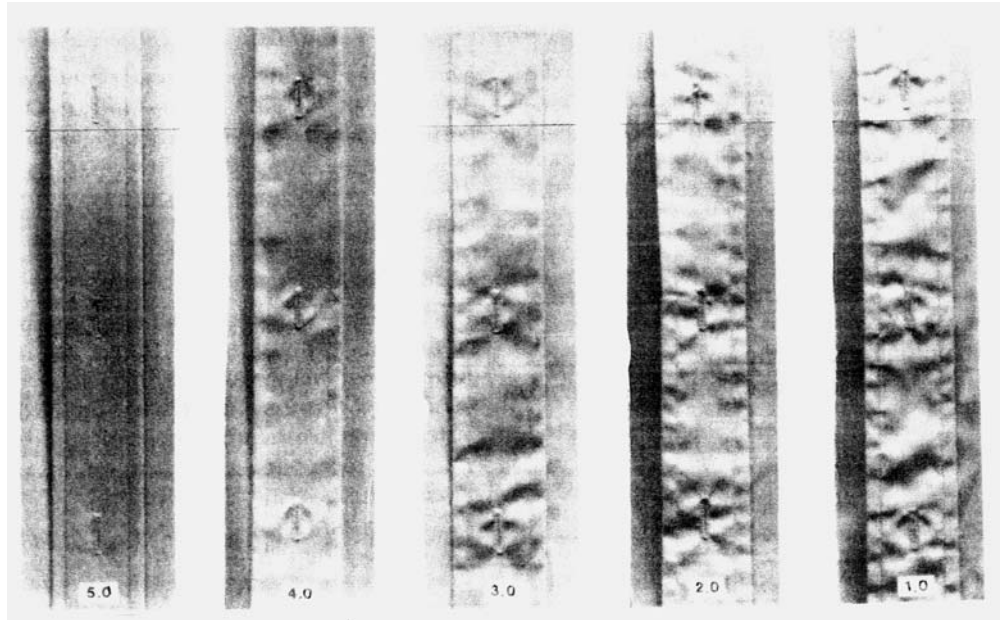


FIG. 3 Placket

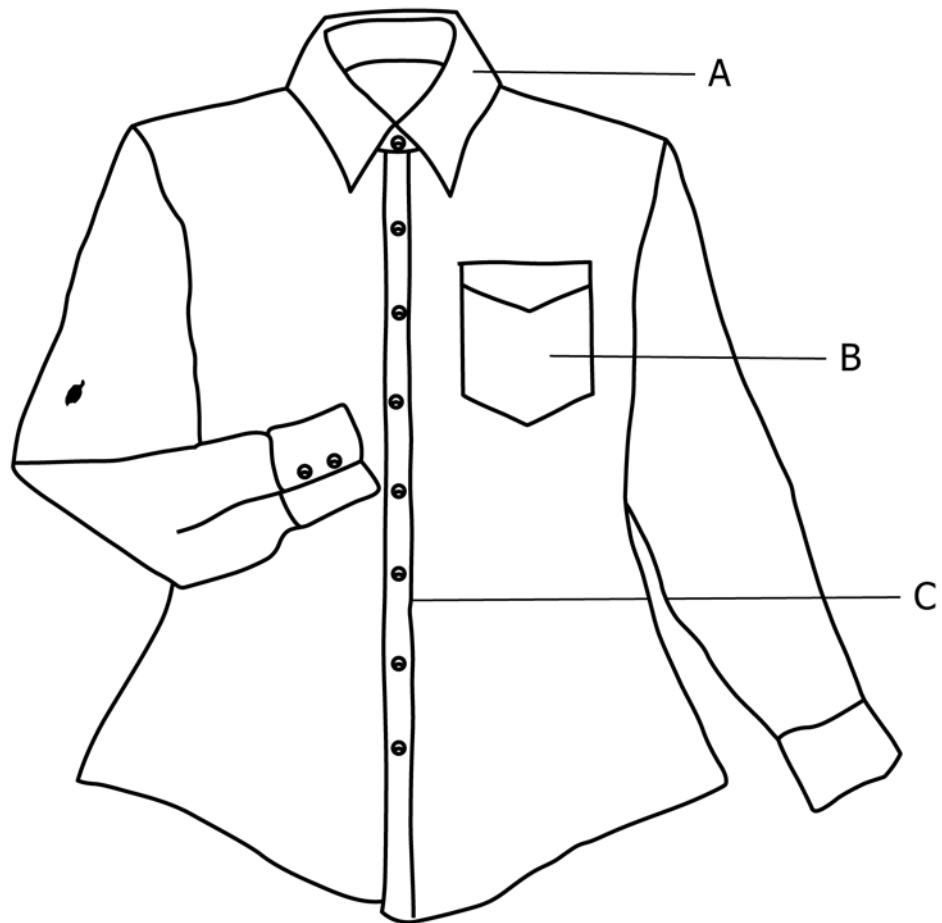


FIG. 4 Diagram of Shirt Components

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.

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 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.

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)

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.

7.3.3.1 *Chest Width*—With shirt closed, measure across front of shirt 25 mm (1 in.) below functional armhole seam (A 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 D4231.

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.

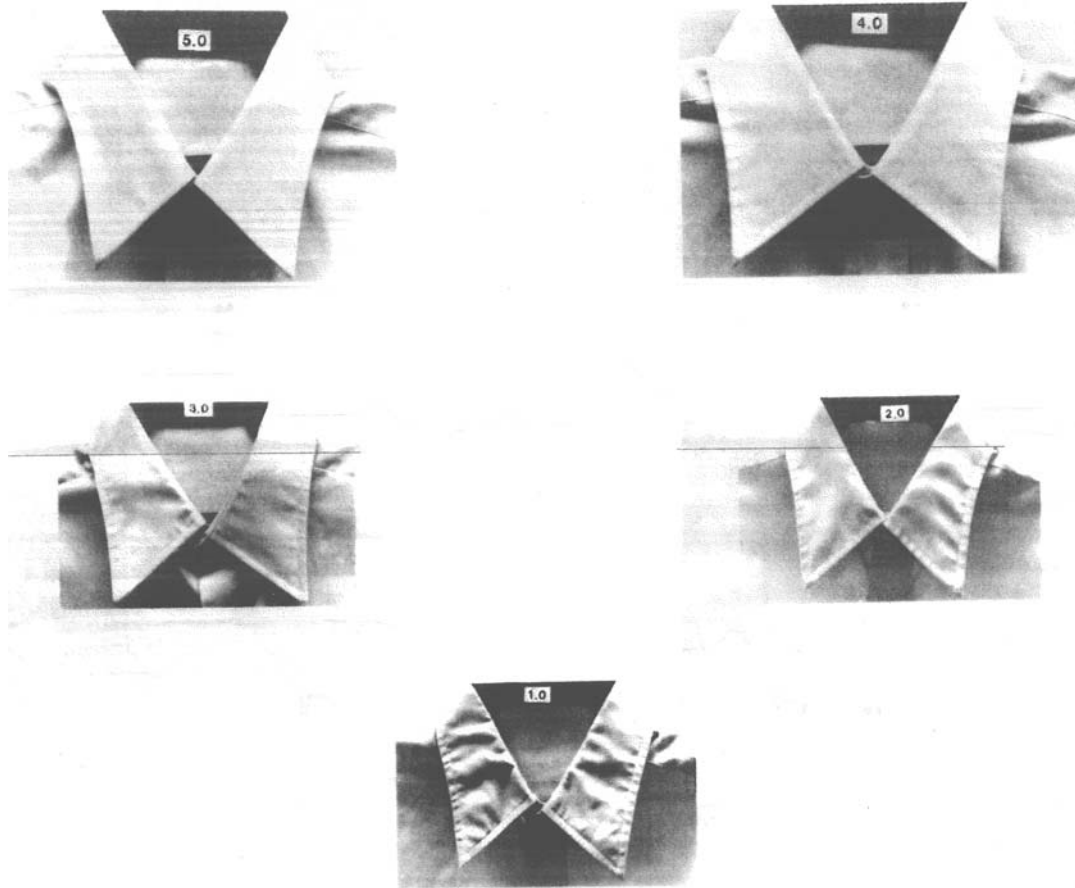


FIG. 5 Diagram for Marking and Measurement Locations (See 7.3)

## 9. Keywords

9.1 dress shirt; shirt; sport shirt

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