

METHOD 5552
July 20, 1978

SHRINKAGE IN LAUNDERING; CLOTH OTHER THAN

COTTON AND LINEN

1. SCOPE

1.1 This method is intended for determining the dimensional stability of woven cloth containing fibers other than cotton or linen and cloth composed of mixtures of either cotton or linen and other fibers, when subjected to a normal laundering procedure. It may be used for some knitted cloths or other items as specified. The dimensional stability is determined by a change in a measured distance of the material after subjection to test.

2. TEST SPECIMEN

2.1 Woven and warp knitted (single layer) cloth. Unless otherwise specified in the procurement document, the specimen shall be a square of cloth at least 22 by 22 inches (559 by 559 mm), except for cloth narrower than 22 inches (559 mm), when the specimen shall be 22 inches (559 mm) long and the full width of the cloth.

2.2 Cloth 18 inches (457 mm) and less in width. Unless otherwise specified in the procurement document, the specimen shall be at least 22 inches (559 mm) in length and measurements in the width direction shall be the full width of the cloth.

2.3 Circular and tubular knit cloths. Unless otherwise specified in the procurement document, the specimen shall be at least 22 inches (559 mm) in length and the width of the cloth as received.

3. NUMBER OF DETERMINATIONS

3.1 Unless otherwise specified in the procurement document, three specimens from each sample unit shall be tested in each of the warp (wale) and filling (course) directions.

4. APPARATUS, REAGENTS AND METHOD CITED

4.1 Apparatus. The apparatus shall conform to the requirements specified in Method 5550.

4.2 Reagent.

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4.2.1 Detergent. Soap conforming to the requirements of P-S-1792, Soap, Laundry (Neutral and Built), Type II, Class 1. A stock solution of the soap may be prepared by dissolving 1 pound of chip soap in 1 gallon of hot water (0.45 kg in 4 L). When cooled, this forms a thick homogenous jelly which may be used as required.

4.3 Method cited.

Method 5550, Shrinkage in Laundering; Cotton, Linen, and Blended Cotton and Linen Cloth.

5. PROCEDURE

5.1 Preparation of specimen.

5.1.1 Woven and warp knitted (single layer) cloth. Unless otherwise specified in the procurement document, 3 specimens shall be selected from the cloth (sample unit) as follows: One specimen from each side of the cloth within 3 inches (76 mm) of the selvage and 1 specimen from the center of the cloth. No two specimens shall contain the same filling yarns or courses. The specimen shall be laid without tension on a flat surface, care being taken that the cloth is free from wrinkles or creases. Three distances, each a minimum of 18 inches (457 mm), shall be measured and marked off parallel to each of the warp and filling or wale and course directions of the specimen. The distances shall be a minimum of 6 inches (152 mm) apart and at least 1 inch (25 mm) from any edge of the specimen. The distance shall be marked with indelible ink and a fine-pointed pen or by sewing fine threads into the cloth or by stamping. The measured distance shall be parallel to the respective yarns.

5.1.2 Circular and tubular knit cloths. Three distances, each a minimum of 18 inches (457 mm) shall be measured and marked off parallel to the wale direction of the specimen. The distances shall be a minimum of 6 inches (152 mm) apart. Three width measurements shall be made and marked off parallel to the course direction of the specimen. The distances shall be a minimum of 6 inches (152 mm) apart.

5.1.3 Cloth 18 inches (457 mm) and less in width. Three distances, each a minimum of 18 inches (457 mm) shall be measured and marked off parallel to the warp or wale direction. Three width measurements shall be made and marked off along the full width of the cloth parallel to the filling or course direction. The distance shall be a minimum of 6 inches (152 mm) apart.

5.2 Washing. Water at a temperature of $100 \pm 4^\circ\text{F}$ ($38^\circ \pm 2^\circ\text{C}$) and not over 50 parts per million hardness shall be added to the wash wheel to a depth of $7 \pm 1/2$ inches (178 ± 13 mm) inside the wheel (cage). Sufficient soap shall be added to furnish a good running suds. The specimen shall be placed in the wash wheel with other similar cloth to make up a dry load of $3 \pm 1/4$ pounds (1360 ± 113 g).

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5.2.1 The wash wheel shall then be started and run for 15 minutes. At the end of the 15 minute period, the machine shall be stopped and the soap solution drained off.

5.2.2 Water at a temperature of $100 \pm 4^{\circ}\text{F}$ ($38^{\circ} \pm 2^{\circ}\text{C}$) shall be again added to the wash wheel to give a depth of $7 \pm 1/2$ inches (178 ± 13 mm) inside the wheel (cage). The wash wheel shall be started and run for a period of 5 minutes, again stopped, and the water drained off.

5.2.3 For a third time, the wash wheel shall be filled with water at a temperature of $100 \pm 4^{\circ}\text{F}$ ($38^{\circ} \pm 2^{\circ}\text{C}$) to give a depth of $7 \pm 1/2$ inches (178 ± 13 mm), and run for an additional 10 minutes. At the end of the 10-minute period, the wash wheel shall be stopped and the water drained off.

5.3 Extraction. The specimen shall be removed from the wash wheel and the excess water removed by extraction for a period of 5 minutes.

5.4 Drying.

5.4.1 Knit cloths. After extraction, specimens of knit cloth shall be spread out on the drying tray to remove wrinkles, but not distorted, and permitted to dry overnight at room temperature. A current of air from an electric fan may be directed onto the specimen, or the specimen on the drying tray may be placed in the drying oven at a temperature of 221° to 230°F (105° to 110°C) to facilitate drying.

5.4.2 Woven cloths. After extraction, the specimen shall be dried as described in 5.4.1. The dry specimen shall be allowed to cool for 5 minutes, sprinkled with water to permit damp pressing, and allowed to stand in this condition for 5 minutes.

5.4.2.1 When specified by the procurement document, the cloth shall be pressed without drying.

5.5 Pressing.

5.5.1 Knit cloths. Unless otherwise specified in the procurement document, knit cloth shall not be pressed before measuring the shrinkage. When pressing of knit cloth is specified in the procurement document, the specimen shall be pressed as described in 5.5.2.

5.5.2 Woven cloth. The extracted specimen (5.3) or the dried and dampened specimen (5.4.2) shall be smoothed to remove wrinkles, but not distorted and then pressed either with a flat-bed press or hand-iron. The head of the press or the hand-iron shall be at a temperature of 275° to 300°F (135° to 149°C) during the pressing operation. When a hand-iron is used, the iron shall not be slid back and forth on the specimen, but simply pressed down upon it in a manner simulating the action of the flatbed press.

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5.6 Evaluation. The specimen shall be laid out without tension on a flat surface in standard atmosphere until moisture equilibrium is reached. Care shall be taken that the specimen is smooth and free from wrinkles or creases. The previously measured distance marked on the specimen shall again be measured in both the warp and filling or wale and course directions.

5.7 Calculation of results. The dimensional stability of the specimen shall be calculated as follows:

$$\text{Shrinkage, percent} = \frac{A - B}{A} \times 100$$

Where: A = Average of initial measurements (3 specimens).

B = Average measurement after laundering (3 specimens).

6. REPORT

6.1 The shrinkage of the sample unit in the warp (wale) direction and in the filling (course) direction shall be the average of the specimens tested from each direction, respectively, and shall be reported separately to the nearest 0.1 percent.

6.1.1 When a test result registers elongation rather than shrinkage, each elongation result shall be prefixed with a minus sign, with both the minus sign and the value in parenthesis.

6.2 Each individual value used to calculate the average shall also be reported.