# Dimensional Changes of Fabrics after Home Laundering

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## Foreword

Standard laundering procedures remain consistent to allow valid comparison of results. Standard procedures represent, but may not exactly replicate, current consumer practices, which vary over time and among households. Alternate laundering procedures and machine parameters may be found in Laboratory Procedure (LP) 1, Home Laundering: Machine Washing and LP2, Home Laundering: Hand Washing (see 12.3).

## 1. Purpose and Scope

1.1 This test method is intended for the determination of dimensional (length and width) changes of fabrics when subjected to home laundering procedures. Four washing temperatures, three agitation cycles, and four drying procedures provide standard parameters to represent common home care options.

1.2 This test is applicable to all fabrics suitable for home laundering.

## 2. Principle

2.1 Pairs of benchmarks are applied to the fabric before laundering. The distance between each pair is measured before laundering and remeasured after a specified number of standard laundering cycles. Percent change is calculated. A negative value indicates shrinkage; a positive value indicates growth. A value close to zero indicates little or no change.

## 3. Terminology

3.1 **dimensional change,** n.—a generic term for changes in length or width of a fabric specimen subjected to specified conditions. The change is usually expressed as a percentage of the initial dimension of the specimen.

3.2 **growth,** n.—a dimensional change resulting in an increase of length or width of a specimen.

3.3 **laundering,** n.—*of textile materials*, a process intended to remove soils and/or stains by treatment (washing) with an aqueous detergent solution and normally including rinsing, extraction and drying.

3.4 **shrinkage,** n.—a dimensional change resulting in a decrease in the length or width of a specimen.

## 4. Safety Precautions

NOTE: These safety precautions are for information purposes only. The precautions are ancillary to the testing procedures and are not intended to be all inclusive. It is the user's responsibility to use safe and proper techniques in handling materials in this test method. Manufacturers MUST be consulted for specific details such as material safety data sheets and other manufacturer's recommendations. All OSHA standards and rules must also be consulted and followed.

4.1 Good laboratory practices should be followed. Wear safety glasses in all laboratory areas.

4.2 Detergent may cause irritation. Care should be taken to prevent exposure to skin and eyes.

4.3 Manufacturer's safety recommendations should be followed when operating laboratory testing equipment.

## 5. Apparatus and Materials (see 12.1)

5.1 Standard washing machine (see Table I, 12.2).

5.2 Standard tumble dryer (see Table III, 12.2) or facilities for drip/line drying.

5.3 Conditioning facilities and conditioning/drying racks with pull-out, perforated shelves (see 12.3).

5.4 Balance with at least 5.0-kg or 10.0-lb capacity.

5.5 AATCC 1993 Standard Reference Detergent (see 12.3).

5.6 Laundering ballast, Type 1 or Type 3 (see Table IV).

5.7 Indelible ink marking pen (see 12.3) for use with suitable rule, tape, marking template or other marking device (see 12.3). Sewing thread may be used for making benchmarks.

5.8 Measuring devices.

5.8.1 Tape or rule marked in millimeters, eighths or tenths of an inch.

5.8.2 Tape or ruled template marked directly in percent dimensional change to 0.5% or smaller increment (see 12.3).

5.8.3 Digital Imaging System (see 12.4).

## 6. Test Specimens

6.1 Sampling and Preparation.

6.1.1 Samples from which dimensional change specimens are to be taken should be representative of the fabric processing stage, finishing treatment, research lab trial, pallet, lot or end-product stage.

6.1.2 Fabrics that are distorted in their unlaundered state may give deceptive dimensional change results when laundered by any procedure. In such cases, it is recommended that specimens not be taken from any distorted area of a fabric sample.

6.1.3 Tubular knitted samples should be slit and handled flat in a single layer. Only circular knitted fabrics produced on body-width machines are to be used as specimens in their tubular form. Circular knitted fabrics made on body-width machines are ones to be used in garments with no side seams. Body-width tubular circular knitted garments and seamless garments (knit-to-wear) should be tested according to AATCC Test Method (TM) 150, Dimensional Changes of Garments after Home Laundering (see 12.3).

6.1.4 Specimens tested in accordance with TM135 may also be used for testing for skewness change in accordance with Options 1 or 2 in TM179, Skew Change in Fabrics After Home Laundering (see 12.3).

6.1.5 If fraying of specimens is expected in laundering, refer to 12.6.

6.1.6 Prior to marking, condition test specimens as directed in ASTM D1776, Standard Practice for Conditioning and Testing Textiles (see 12.5). (Use conditions indicated in Table 1 for Textiles, general. Estimate conditioning time as indicated in Table 2 for the appropriate fiber content.) Lay each test specimen flat, separately, on a screen or perforated shelf of a conditioning rack.

6.1.7 Lay the sample on a flat surface. Do not allow any section of the sample to hang over the edge of the work table. Using a template for the selected test size, mark specimens parallel to the selvage or fabric length direction. Avoid use of the sample area within ten percent of the sample width. Specimens should be taken from areas with different lengthwise and widthwise yarns (see Fig. 1). Identify the length direction of the specimens before cutting them out of the sample. When possible, three specimens from each fabric should be used. One or two specimens may be used when insufficient fabric sample is available.

6.2 Marking.

6.2.1 Option 1: *250-mm (10.0-in.) benchmarks*. Mark each 380 × 380 mm

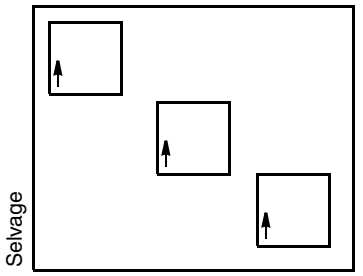


**Fig. 1—Diagram for cutting fabric specimens.**

(15 × 15 in.) test specimen with three 250-mm (10-in.) pairs of benchmarks parallel to the test specimen length and three 250 mm (10 in.) pairs of benchmarks parallel to the test specimen width. Each benchmark must be at least 50 mm (2 in.) from all test specimen edges. Pairs of benchmarks in the same direction must be spaced approximately 120 mm (5 in.) apart (see Fig. 2 and 12.7).

6.2.2 Option 2: *460-mm (18.0-in.) benchmarks*. Mark each 610 × 610 mm (24.0 × 24.0 in.) test specimen with three 460-mm (18.0-in.) pairs of benchmarks parallel to the test specimen length and three 460-mm (18.0-in.) pairs of benchmarks parallel to the test specimen width. Each benchmark must be at least 50 mm (2.0 in.) from all test specimen edges. Pairs of benchmarks in the same directions must be spaced approximately 250 mm (10 in.) apart.

6.2.3 Narrow Fabrics.

6.2.3.1 For test specimens greater than 125 mm (5 in.) and less than 380 mm (15 in.) wide, take full width of test fabrics and cut each specimen 380 mm (15 in.) long. Mark the length as in 6.2.1. Measurement of the width is optional.

6.2.3.2 For test specimens 25-125 mm (1-5 in.) wide, take full width of test fabrics and cut each specimen 380 mm (15 in.) long. Use only two pairs of benchmarks parallel to the length. Measurement of the width is optional.

6.2.3.3 For test specimens less than 25 mm (1 in.) in width, take full width of test fabrics and cut each specimen 380 mm (15 in.) long. Use only one pair of benchmarks parallel to the length. Measurement of the width is optional.

6.3 Original Measurements and Specimen Size.

6.3.1 Specimen size and benchmarks distances used must be indicated in the report.

6.3.2 Dimensional change results may not be comparable when different specimen sizes, different benchmark lengths, different number of specimens, or different number of benchmarks are used.

6.3.3 To improve the accuracy and precision of the dimensional change calculations based on the benchmarks applied to the fabrics as instructed in 6.2, measure and record the distance between each pair of benchmarks with suitable tape or rule to nearest millimeter, eight or tenth of an inch. This is measurement A. In case of narrow fabrics less than 380 mm (15 in.) wide, measure and record width if width measurement will be used. If using a calibrated template for marking and measuring in percent dimensional change directly, an initial measurement is not needed.

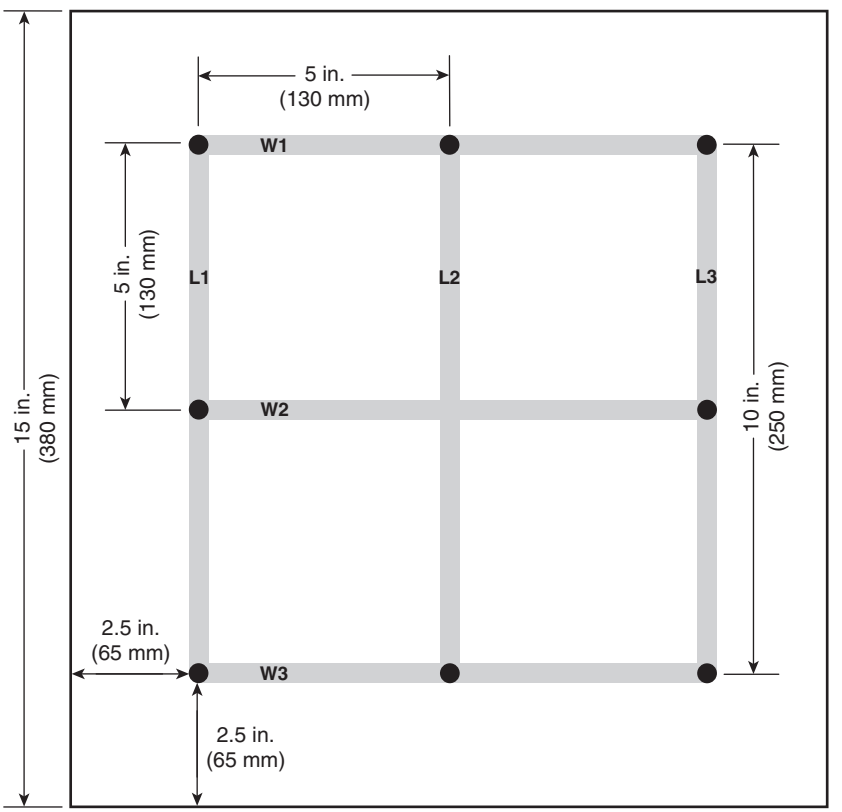


**Fig. 2—Diagram for placing benchmarks on fabric specimens.**

## 7. Laundering Procedure

7.1 Washing.

7.1.1 Select washing conditions for testing from Table I. Set washing machine controls to generate the selected cycle parameters.

7.1.2 Load for laundering shall consist of all specimens in the sample, plus enough laundering ballast pieces to make a total load weight of 1.8 ± 0.1 kg (4.0 ± 0.2 lb).

7.1.3 Begin selected wash cycle. Allow machine to fill to specified water level.

7.1.4 Add 66 ± 1 g of AATCC 1993 Standard Reference Detergent to washing machine as directed by washing machine manufacturer's instructions. If detergent is added directly to wash water, agitate briefly to dissolve completely. Stop agitation before adding wash load.

7.1.5 Add wash load (test specimens and ballast), distributing evenly around center agitator. Restart wash cycle.

7.1.6 For specimens to be drip dried (drying procedure C), stop wash cycle before the water begins to drain from the final rinse cycle. Remove specimens soaking wet. For specimens to be tumble (A), line (B), or screen/flat (D) dried, allow washing to proceed through the final spin cycle.

7.1.7 After each washing cycle, separate tangled specimens and ballast pieces, taking care to minimize distortion. Proceed to appropriate drying procedure.

7.2 Drying.

7.2.1 Select drying conditions from Table II.

7.2.2 (A) Tumble Dry. Place the washed load (test specimens and ballast) in the tumble dryer, and set the temperature control to generate the selected cycle exhaust temperature (see Table III). Allow the dryer to run until the load is fully dry. Remove specimens immediately.

7.2.3 (B) Line/Hang Dry. Hang each specimen by two corners, with the fabric length in the vertical direction. Allow specimens to hang in still air at room temperature not greater than 26°C (78°F) until dry. Do not blow air directly on specimens as it may cause distortion.

7.2.4 (C) Drip Dry. Hang each dripping wet specimen by two corners, with the fabric length in the vertical direction. Allow specimens to hang in still air at