

Skewness Change in Fabric and Garment Twist Resulting from Automatic Home Laundering

Developed in 1994 by AATCC Committee RA42; revised 1995, 2004; reaffirmed 1996; editorially revised and reaffirmed 2001; editorially revised 2005.

1. Purpose and Scope

1.1 This test method determines change in skewness in woven and knitted fabrics or twist in garments when subjected to repeated automatic laundering procedures commonly used in the home. Washing and drying procedures used for shrinkage tests and other home laundering tests are specified for this method.

1.2 For some fabrics the degree of twist of fabric in garments is not solely dependent on its behavior in the unsewn state; it also may be dependent on the manner of garment assembly.

2. Principle

2.1 Change in skewness in fabric or twist in garment specimens resulting from procedures typical of home laundering practices is measured using bench marks applied to the specimens before laundering.

3. Terminology

3.1 **garment twist**, *n.*—a rotation, usually lateral, between different panels of a garment resulting from the release of latent stresses during laundering of the woven or knitted fabric forming the garment. Twist may also be referred to as torque or spirality.

3.2 **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.

3.3 **skewness**, *n.*—a fabric condition resulting when filling yarns or knitted courses are angularly displaced from a line perpendicular to the edge or side of the fabric (see ASTM Terminology D 123-92).

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. Manufac-

turers 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 The 1993 AATCC Standard Reference 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

5.1 Indelible ink marking pen (see 12.6).

5.2 Right triangle, L-square (see 12.7), or marking template (see 12.8).

5.3 Tape or rule marked in millimeters, tenths of an inch or smaller increments.

5.4 Conditioning/drying racks with pull-out screens or perforated shelves (see 12.3).

5.5 Automatic washing machine (see 12.1).

5.6 1993 AATCC Standard Reference Detergent (see 12.4 and 12.14).

5.7 Scale with at least 5 kg (10 lb) capacity.

5.8 Ballast of $920 \times 920 \pm 30$ mm ($36 \times 36 \pm 1$ in.) hemmed pieces of bleached cotton sheeting (Wash load ballast type 1) or 50/50 polyester/cotton bleached mercerized plain weave (Wash load ballast type 3) (see 12.5 and 12.14).

5.9 Automatic tumble dryer (see 12.2).

5.10 Facilities for drip drying and line drying.

5.11 Digital Imaging System (see 12.15).

6. Test Specimens

6.1 Sampling and Preparation.

6.1.1 Prior to marking, pre-condition and then condition test specimens as directed in ASTM Practice D 1776, Standard Practice for Conditioning and Testing Textiles. Condition each specimen for at least 4 h in an atmosphere of $21 \pm 1^\circ\text{C}$ ($70 \pm 2^\circ\text{F}$) and $65 \pm 2\%$ RH by laying each test specimen separately on a screen or perforated shelf of a conditioning rack. If garments would normally be hung on a hanger, they should be conditioned on a hanger.

6.1.2 Fabrics or garments that are distorted in their unlaundered state due to

faulty finishing of the fabric or faulty assembly of garments may give deceptive results when laundered by any procedure. In such cases, it is recommended that specimens not be used, or if used, the results be considered as indicative of these specimens only.

6.2 Test Specimens from Fabric Samples.

6.2.1 Test three specimens of each sample to **increase** precision of the average.

6.2.2 Where possible, cut specimens from different areas of the fabric so that each specimen will contain different groups of lengthwise and widthwise yarns. Identify fabric face; mark lengthwise direction on each specimen.

6.2.3 If it is of interest to determine whether the direction of the change in skewness is different from one side of the fabric to the other, prepare three sets of specimens from each area of interest. Identify area from which each set of specimens was taken; i.e., left-side, center or right-side.

6.2.4 Test specimens prepared for AATCC Method 124, Appearance of Fabrics after Repeated Home Laundering, and AATCC Method 135, Dimensional Changes of Fabrics after Home Laundering, may be used for this test method when marking by Method 1 (see 12.9).

6.3 Test Specimens from Garment Samples.

6.3.1 Test three garment specimens or a total of three areas of two garments to **increase** precision of the average. Use the largest panels in the garments.

6.3.2 Test specimens prepared for AATCC Method 143, Appearance of Apparel and Other Textile End Products after Repeated Home Laundering, and AATCC Method 150, Dimensional Changes of Garments after Home Laundering, may be used for this test method when marking by Method 1.

6.4 Marking of Specimens.

6.4.1 Marking Method 1 (see 12.10).

6.4.1.1 On each 380×380 mm (15 $\times$ 15 in.) fabric test specimen or garment panel, mark two 250 mm (10 in.) pairs of bench marks parallel to the length of the specimen and two 250 mm (10 in.) pairs of bench marks perpendicular to the length of the specimen. Draw a line through each of the four sets of adjacent bench marks so that a square is formed. Label corners as A, B, C and D in clockwise direction starting with lower left

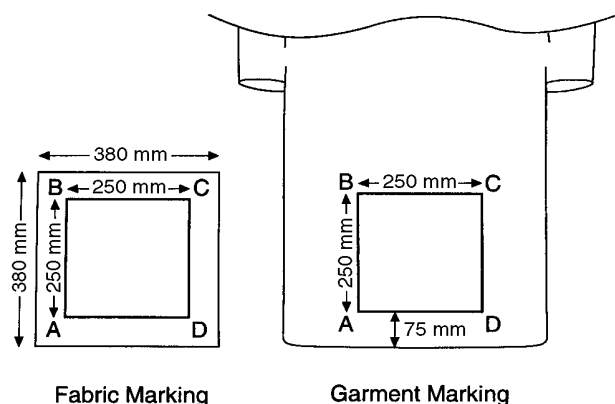


Fig. 1—Method 1: square marking.

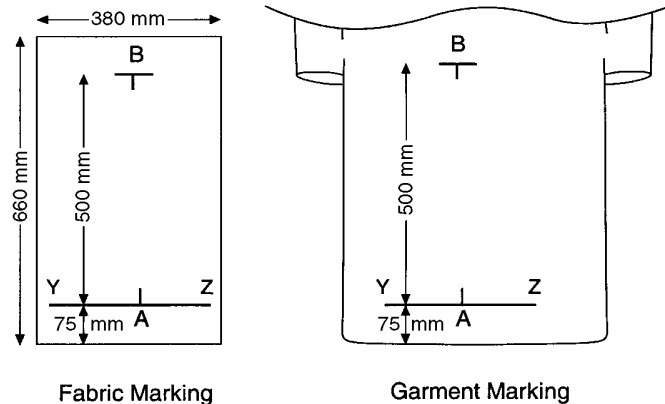


Fig. 2—Method 2: inverted T marking.

corner (see Fig. 1). Any alternate size specimens and bench marks used must be indicated in report (see 12.11 and 12.12).

6.4.1.2 Flat and circular knit fabrics: Tubular finished knit fabric samples representing goods used in the tubular state; i.e., underwear, sweat shirts, polo shirts, etc., are to be tested in the tubular state. Tubular finished knit fabric samples representing goods used in the slit open width state; i.e., for dresses, slacks, suits, etc., are to be slit and handled flat.

6.4.2 Marking Method 2.

6.4.2.1 On a 380 × 660 mm (15 × 26 in.) fabric specimen or garment panel, use a suitable marking device to draw reference line YZ across the width of the specimen panel (see Fig. 2). Line YZ should be approximately 75 mm (3 in.) above the bottom edge (or hem of garment). If the bottom edge or hem is not straight, draw the reference line perpendicular to the vertical axis of symmetry of the specimen. Place bench mark A perpendicular to and midway on Line YZ. Place one leg of a right angle marking device along Line YZ so that the second leg is on a perpendicular upward from Point A. Draw a bench mark parallel to Line YZ 500 mm (20 in.) directly above Point A. Draw another bench mark 480 mm (19 in.) from Point A perpendicular to Line YZ to intersect previous bench mark. Label the intersection of the bench marks as Point B. If the specimen size is insufficient to mark a 500 mm (20 in.) length, mark the longest available length which is at least 75 mm (3 in.) below the upper edge of the test specimen. Any alternate size specimen or dimensions of bench marks must be indicated in the report.

7. Procedure

7.1 Tables I, II and III summarize alternative washing and drying conditions and settings.

7.2 Washing.

7.2.1 Use specified water level and fill

Table I—Alternative Washing and Drying Conditions

Machine Cycle	Washing Temperatures	Drying Procedures
(1) Normal/Cotton Sturdy	(II) 27 ± 3°C (80 ± 5°F)	(A) Tumble:
(2) Delicate	(III) 41 ± 3°C (105 ± 5°F)	i. Cotton Sturdy
(3) Permanent Press	(IV) 49 ± 3°C (120 ± 5°F)	ii. Delicate
	(V) 60 ± 3°C (140 ± 5°F)	iii. Permanent Press
		(B) Line
		(C) Drip
		(D) Screen

Table II—Washing Machine Setting Conditions without Load

Cycle ¹	X	Y	Z
Water Level	18 ± 1 gal	18 ± 1 gal	18 ± 1 gal
Agitator Speed	179 ± 2 spm ²	119 ± 2 spm	119 ± 2 spm
Washing Time	12 min	8 min	10 min
Spin Speed	645 ± 15 rpm ³	645 ± 15 rpm	430 ± 15 rpm
Final Spin Cycle	6 min	6 min	4 min

¹ Cycle names vary with machine model. "X" generally corresponds to "Heavy Duty." "Y" generally corresponds to "Delicate." "Z" generally corresponds to "Permanent Press."

² spm = strokes per minute.

³ rpm = revolutions per minute.

Table III—Tumble Dry Conditions

Designation	Cycle	Maximum Exhaust Stack Temperature with Loaded Dryer
a	Normal or Permanent Press	67 ± 6°C (154 ± 10°F) after 1983 [65 ± 6°C (150 ± 10°F) before 1983]
b	Delicate, Synthetic, Low	< 62°C (144°F) after 1983 [< 60°C (140°F) before 1983]
Cool down time	Normal and Delicate Permanent Press [All]	5 min 10 min 10 min after 1983]

machine, the selected water temperature for the washing cycle and a rinse temperature of less than 29°C (85°F). If this rinse temperature is not attainable, record actual rinse temperature.

7.2.2 Add 66 ± 1 g of 1993 AATCC Standard Reference Detergent. In soft water areas the weight may be reduced to

avoid excessive sudsing.

7.2.3 Add test specimens and enough ballast to make a 1.8 ± 0.1 kg (4.00 ± 0.25 lb) load. A 3.6 ± 0.1 kg (8.00 ± 0.25 lb) load may be used (see 12.13). Set the washer for the selected washing cycle and time (see Tables I and II).

7.2.4 For specimens to be dried by Pro-