

Dimensional Changes of Garments after Home Laundering

Developed in 1977 by AATCC Committee RA42; editorially revised and reaffirmed 1979, 1984, 1992; editorially revised 1983, 1985, 1989, 1990, 1991, 1996, 1997, 2004, 2005, 2006; revised 1987, 1995, 2001, 2003 (with title change); reaffirmed 2000. Related to ISO 3759.

1. Purpose and Scope

1.1 This test method is for the determination of dimensional changes of garments when subjected to home laundering procedures used by consumers. Four washing temperatures, three agitation cycles, two rinse temperatures and four drying procedures cover the common home care options available to consumers using current laundering machines.

1.2 The dimensional changes of garments subjected to home laundering care procedures are measured using benchmarks placed on designated areas of the garments. Measured dimensional changes may be affected by garment construction, tensions, sewing threads or trims in addition to fabric dimensional change.

1.3 As an optional procedure, fabric dimensional changes may be determined by using benchmarks placed on the fabric in areas of the garment that contains no seams or sewing.

1.4 This method may not be applicable for garments made of certain stretch fabrics.

2. Principle

2.1 The dimensional changes of garment specimens subjected to home laundering care procedures are measured using benchmarks applied to the garment before laundering.

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 a specimen.

3.2 **garment**, *n.*—a shaped article of textile fabric, or other flexible material, intended to cover portions of the human body.

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

3.4 **laundering**, *n.*—of textile materi-

als, a process intended to remove soils and/or stains by treatment (washing) with an aqueous detergent solution and normally including rinsing, extraction and drying.

3.5 **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 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 Automatic washing machine (see 12.1).

5.2 Automatic tumble dryer (see 12.2).

5.3 Conditioning/drying racks with pullout screens or perforated shelves (see 12.3).

5.4 Facilities for drip drying and line drying.

5.5 1993 AATCC Standard Reference Detergent (see 12.8 and 12.9).

5.6 Ballast of 920 × 920 ± 30 mm (36 × 36 ± 1 in.) hemmed pieces of bleached cotton sheeting (Wash load ballast type 1), or 50/50 polyester/cotton bleached plain weave (Wash load ballast type 3) (see 12.4 and 12.9).

5.7 Indelible ink marking pen (see 12.5) for use with suitable rule, tape, marking template or other marking device (see 12.6). 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 (see 12.6).

5.9 Balance with at least 5.0 kg (10.0 lb) capacity.

6. Test Specimens

6.1 Sampling and Preparation.

6.1.1 Each garment will be considered a specimen. Garments used as specimens should be representative of the production lot. When possible, three specimens should be used. One or two specimens may be used when insufficient garments are available.

6.1.2 Garments that are distorted in their unlaunched state due to faulty fabric finishing, garment assembly, or packing may give deceptive dimensional change results when laundered by any procedure. In such cases, it is recommended that a garment not be tested or, if used, the results be considered as indicative only.

6.1.3 Prior to marking, condition test specimens as directed in ASTM D 1776, Standard Practice for Conditioning and Testing Textiles. Condition each garment for at least 4 h, in an atmosphere of 21 ± 1°C (70 ± 2°F) and 65 ± 2% RH by hanging it on an appropriate hanger. If the garment would not normally be hung on a hanger; i.e., t-shirts, boxer shorts, etc., lay each test specimen separately on a screen or perforated shelves of a conditioning rack.

6.2 Marking.

6.2.1 Using Table I as a guide for the selection of garment specimen areas to use as measurement sites, place benchmarks on the garment at the selected locations. Use at least three length and three width locations for marking benchmarks on each garment specimen. Location of benchmarks should be as agreed upon by the buyer and seller. If garment areas are sufficient, place 460 mm (18 in.) benchmarks on the garment. Benchmark distances used will depend on the size of the garment. For some garments, especially children's clothing, sufficient area may require shorter benchmarks such as 250 mm (10.0 in) or less. Benchmarks must be at least 25 mm (1 in.) from all edges or seams.

6.2.2 Benchmarks across garment panels are sometimes used such as, from side seam-to-side seam, the full length or width of a garment and in other selected garment locations. For these types of benchmarks, the measurement points should be clearly marked.

6.2.3 Dimensional change results from different garment sizes, styles and/or

Table I—Examples of Bench Mark Locations

Type of Garment	Bench Mark Locations
Shirt	Collar Collar Band Body Lengths Sleeve Lengths Width at Chest Cuffs
Trousers	Front Rise Back Rise Inseams Outseams Waist Seat
Coveralls	Body Lengths Front Rise Back Rise Inseams Underarm Lengths Sleeve Lengths Shoulder Waist Chest Seat Width
Boxer Shorts	Overall Lengths Front Rise Back Rise Waist
Pajama Top	Lengths Sleeves Hem Chest
Pajama Bottom	Inseams Lengths Hip Waist
Shorts	Lengths Front Rise Back Rise Leg Width Inseam Width Seat Width Waist
Sweater	Lengths Sleeve Lengths Chest Waist Shoulders
Slip	Lengths Hem Waist Hip
Blouse	Lengths Sleeve Lengths Shoulders Chest Waist
Skirt	Lengths Hem Hip Waist
Uniform/Dress	Bodice Lengths Skirt Lengths Sleeve Lengths Shoulders Chest Waist Hip Hem
Overalls	Lengths Outseams Front Rise Back Rise Inseams Waist Seat Width

benchmark lengths may not be comparable.

6.2.4 Benchmark distances used should be indicated on the report.

6.3 Original Measurements.

6.3.1 To improve the accuracy and precision of the dimensional change calculations based on the benchmarks applied to the garment in 6.2, measure and record the distance between each pair of benchmarks with suitable tape or rule to nearest millimeter or eighth or tenth of an inch. This is measurement A.

7. Test Procedure

7.1 Tables II, III and IV summarize alternative washing, rinsing and drying conditions and settings. Additional information on the machine and laundering conditions may be found in the monograph, *Standardization of Home Laundry Test Conditions*, elsewhere in this TECHNICAL MANUAL.

7.2 Washing.

7.2.1 Weigh garment test specimens and enough ballast to make a 1.8 ± 0.1 kg (4.00 ± 0.25 lb) load. An alternative load size of 3.6 ± 0.1 kg (8.00 ± 0.25 lb) may be used. Dimensional change results obtained using a 1.8 kg (4 lb) load weight may not be equal to those obtained with a 3.6 kg (8 lb) load weight and should not be compared.

7.2.2 Select the specified water level, the desired 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 available rinse temperature. Fill the washing machine to the 18 ± 0.5 gal water level. For alternate load size, fill washing machine to the 22.0 ± 0.5 gal water level.

7.2.3 Add 66.0 ± 1 g of 1993 AATCC Standard Reference Detergent to an 18 ± 0.5 gal wash load. For alternative load size of 22.0 ± 0.5 gal, add 80 ± 1 g of 1993 AATCC Standard Reference Detergent. Agitate water briefly to dissolve detergent. Stop the machine agitation. It should be noted that in soft water areas, the amount of detergent used may be reduced to avoid excessive sudsing.

7.2.4 Add garment test specimens and ballast to machine. Set the washer for the selected washing cycle and time (see Tables II and III).

7.2.5 For garment specimens to be dried by procedures A, B or D, allow washing to proceed through the final spin cycle. Remove the garment specimens immediately after the final spin cycle, separate tangled garments, taking care to minimize distortion, and dry by procedure A, B or D (see Tables II and IV).

7.2.6 For garment specimens to be dried by procedure C, Drip Dry, allow washing to proceed through to the final rinse cycle. Remove the specimens from the washer just before the water begins to drain for the final rinse cycle. Remove specimens soaking wet.

Table II—Alternative Washing and Drying Conditions (see 7.1)

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

Table III—Washing Machine Setting Conditions Without Load (see 7.1)

	Normal	Delicate	Permanent Press
(A) Water Level	18 ± 1 gal	18 ± 1 gal	18 ± 1 gal
(B) Agitator Speed	179 ± 2 spm	119 ± 2 spm	179 ± 2 spm
(C) Washing Time	12 min	8 min	10 min
(D) Spin Speed	645 ± 15 rpm	430 ± 15 rpm	430 ± 15 rpm
(E) Final Spin Cycle	6 min	4 min	4 min

Table IV—Dryer Setting Conditions (see 7.1)

	Cotton Sturdy	Delicate	Permanent Press
Exhaust Temperature	High $66 \pm 5^{\circ}\text{C}$ ($150 \pm 10^{\circ}\text{F}$)	Low $< 60^{\circ}\text{C}$ (140°F)	High $66 \pm 5^{\circ}\text{C}$ ($150 \pm 10^{\circ}\text{F}$)
Cool Down Time	10 min	10 min	10 min