

Test Method for Appearance of Apparel and Other Textile End Products after Home Laundering

Developed in 1975 by AATCC Committee RA61; revised 1982, 1989, 1992, 1996, 2006, 2010, 2011, 2014, January 2018 (with title change), November 2018; editorially revised and reaffirmed 1984, 2001; editorially revised 1986, 1991, 1997, 2004, 2005, 2008, 2012, June 2018. Technically equivalent to ISO 15487.

Foreword

This test method and its accompanying evaluation tools were developed for evaluation of woven fabrics with a durable-press finish. It is common industry practice to use the method and scales for evaluation of other textile materials although some specimens may have different appearance characteristics due to different fabric constructions.

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 AATCC LP1, Laboratory Procedure for Home Laundering: Machine Washing (see 12.3) and ISO 6330, Textiles — Domestic washing and drying procedures for textile testing (see 12.7).

1. Purpose and Scope

1.1 This test method is intended to determine the smoothness appearance of fabric, seams, and pressed-in creases in garments and other textile products after being subjected to home laundering procedures.

1.2 Any washable textile end product may be evaluated for smoothness appearance, seam smoothness and crease retention using this method.

1.3 Textile end products containing fabrics of any construction, such as woven, knit and nonwoven, may be evaluated according to this method.

1.4 Techniques for seaming and creasing are not outlined since the purpose is to evaluate textile end products as they will be supplied from manufacturing or as ready for use.

2. Principle

2.1 Textile end product items are sub-

jected to standard home laundering practices. Appearance of specimens is evaluated in a standard viewing area by visually comparing the appearance of specimens with appropriate reference standards. Results may be reported as an overall percentile value from 0% to 100%, with 100% representing the most smoothness and crease retention. Results may also be reported as separate smoothness appearance (SA), seam smoothness (SS) and crease retention (CR) grades. All grades may range from 1 to 5, with 1 representing the least smoothness or crease retention and 5 representing the most smoothness or crease retention.

3. Terminology

3.1 **appearance of textile end products**, n.—the overall visual impression of a textile end product quantified by comparison of individual components with appropriate reference standards.

3.2 **ballast**, n.—*in procedures for processing or testing of textiles*, material that is used to bring the total weight or volume of the textiles to an amount specified in the procedure.

3.3 **crease retention**, n.—*in fabrics*, the visual impression of an inserted crease quantified by comparison with a set of reference standards.

3.4 **durable press**, adj.—having the ability to retain substantially the initial shape, flat seams, pressed-in creases and unwrinkled appearance during use and after laundering or drycleaning.

3.5 **grade**, n.—the number assigned to a test specimen resulting from comparison to a scale.

3.6 **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, extracting and drying.

3.7 **laundering creases**, n.—sharp folds or lines running in any direction in a washed or dried specimen. NOTE: Laundering creases are an unintended result of restricted movement of specimens in a washer or the dryer.

3.8 **seam smoothness**, n.—*in fabrics*, the visual impression of planarity of a seamed specimen quantified by comparison with a set of reference standards.

3.9 **smoothness appearance**, n.—*in fabrics*, the visual impression of planarity of a specimen quantified by comparison

with a set of reference standards.

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 All chemicals should be handled with care.

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

4.5 When evaluating crease retention, use of a light shield can aid in prevention of burns that could result from lamp heat.

5. Uses and Limitations

5.1 This test method is designed to be used for evaluating the appearance of apparel or other textile end products produced with washable fabric after home laundering. Although this method applies to laundering of garments, it is acknowledged that common industry practice is to also rate the product in its original state.

5.2 In general, it is preferable to conduct the test under relatively severe laundering conditions. It is recognized that special cycles or features are available on current washing machines and dryers to achieve improved performance on certain items; e.g., gentle cycles with reduced agitation to protect delicately constructed items, and durable press cycles, with cool-down or cold rinses and reduced spin speeds, to minimize wrinkling.

5.3 Prints and patterns may mask the mussiness present in textile end products. The evaluation process is, however, based on the visual appearance of specimens including such effects.

5.4 The evaluation replicas and scales were created from woven fabrics. It is understood that they do not duplicate other



Fig. 1—AATCC three-dimensional smoothness appearance replicas.

fabric possibilities (knits, nonwovens). The replicas and scales are to be used as guides that represent various levels of smoothness or crease retention.

5.5 The interlaboratory reproducibility of the results of this test method depends upon mutual agreement by users of the method on the washing and drying conditions as outlined in Tables I-IV and the weighting factors to use for individual components of the items as described in 9.7.3.

6. Apparatus and Materials (see 12.1)

6.1 Steam or dry iron with appropriate fabric temperature settings.

6.2 Standard washing machine (see Table I, 12.2), for machine washing.

6.3 Wash tub, 9.5-L, for hand washing.

6.4 White towels, large enough to accommodate test specimen, any weight, for hand washing.

6.5 Standard tumble dryer (see Table

IV, 12.2) or facilities for drip, screen or line drying.

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

6.7 Scale with at least 5 kg or 10 lb capacity.

6.8 AATCC 1993 Standard Reference Detergent (powder with brightener, see 12.3).

6.9 Laundering ballast, Type 1 or Type 3 (see Table V).

6.10 Evaluation area, as described in Appendix A.

6.11 AATCC Three-Dimensional Smoothness Appearance Replicas, set of six (see Fig. 1 and 12.3).

6.12 AATCC Photographic Seam Smoothness Scales, for single- and double-needle seams (see Fig. 2 and 12.3). The reproductions shown in Fig. 2 may not be used for rating.

6.13 AATCC Three-Dimensional Crease Replicas, set of five (see Fig. 3 and 12.3).

7. Test Specimens

7.1 For textile end product tests, select three items for testing.

7.1.1 If the fabric is wrinkled, it may be smoothed by appropriate ironing prior to laundering. See Table I, Safe Ironing Temperature Guide, in AATCC TM133, Test Method for Colorfastness to Heat: Hot Pressing (see 12.3).

8. Laundering Procedure

8.1 Machine Washing.

8.1.1 Select washing conditions for testing from Table I. Normal cycle is recommended. Set washing machine controls to generate the selected cycle pa-

rameters.

8.1.2 Load for laundering shall consist of all specimens, plus enough laundering ballast pieces to make a total load weight of 1.8 ± 0.1 kg (4.0 ± 0.2 lb). For very critical evaluation and in arbitration, limit the number of specimens per washer load to those from one sample.

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

8.1.4 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.

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

8.1.6 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.

8.1.7 After each washing cycle, separate tangled specimens and ballast pieces, taking care to minimize distortion.

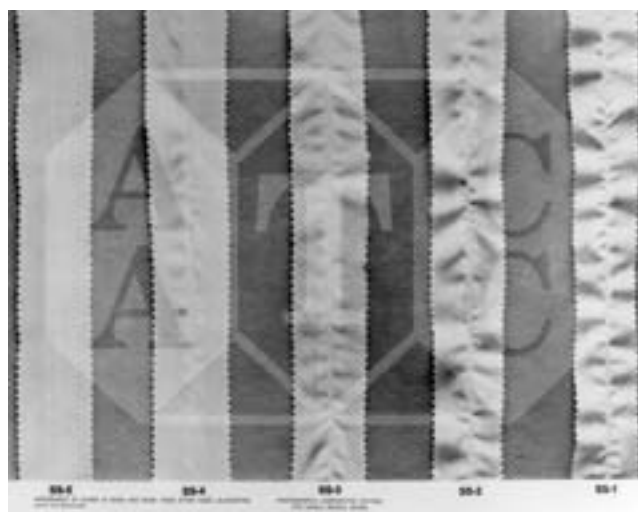
8.1.8 Washer creases. Specimens may be in a folded or creased state after washing. Such folds or creases should be removed by hand prior to drying.

8.1.9 Proceed to appropriate drying procedure.

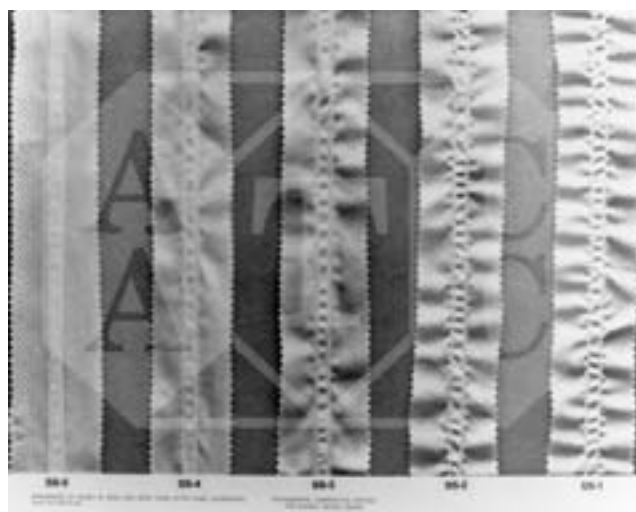
8.2 Hand Washing.

8.2.1 Select washing temperature from Table II. Add 7.6 ± 1.9 L (2.0 ± 0.5 gal) of water at this temperature to the wash tub.

8.2.2 Add 20 ± 1 g of AATCC 1993



A. For single needle seams.



B. For double needle seams.

Fig. 2—AATCC photographic seam smoothness replicas.

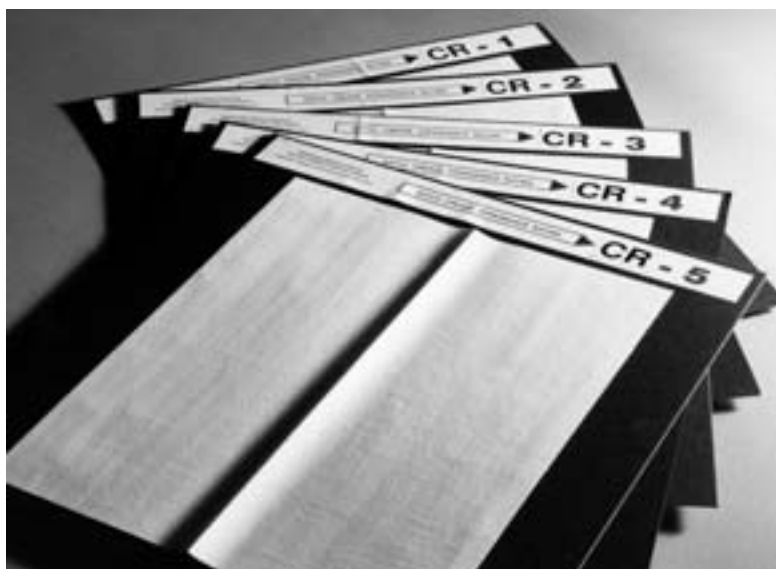


Fig. 3—AATCC three-dimensional crease replicas.

Standard Reference Detergent to wash tub.

8.2.3 Agitate by hand to dissolve detergent.

8.2.4 Add specimen(s) to water and gently squeeze to distribute detergent solution. Do not twist or wring.

8.2.5 Let specimen(s) soak for 2 min.

8.2.6 Gently squeeze specimen(s) in detergent solution for 1 min. Do not twist or wring.

8.2.7 Repeat 2-min. soak and 1-min. squeeze in detergent solution.

8.2.8 Remove specimen(s) from wash tub and gently squeeze to remove excess detergent solution. Do not twist or wring.

8.2.9 Place specimen(s) on clean white towel. Empty and rinse wash tub.

8.2.10 Add 7.6 ± 1.9 L (2.0 ± 0.5 gal) of clean water at the specified rinse temperature (see Table II) to the wash tub.

8.2.11 Place washed specimen(s) from towel in rinse water and gently squeeze to distribute. Do not twist or wring.

8.2.12 Let specimen(s) soak for 2 min.

8.2.13 Gently squeeze specimen(s) in rinse water for 1 min. Do not twist or wring.

8.2.14 Repeat 2-min. soak and 1-min. squeeze in rinse water.

8.2.15 Remove specimen(s) from wash tub and gently squeeze to remove excess water. Do not twist or wring.

8.2.16 Using clean white towels, blot water from washed specimen(s). Do not wring or twist.

8.2.17 Proceed to appropriate drying procedure.

8.3 Drying.

8.3.1 Select drying conditions from Table III.

8.3.2 (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 IV). Allow the dryer to run until the load is fully dry. Remove specimens immediately.

8.3.3 (B) Line/Hang Dry. Hang each specimen on an appropriate hanger, straightening and smoothing facings, seams, etc. Specimens should generally be oriented in the direction in which they are worn. Do not fold or stretch specimens over the hanger. 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.

8.3.4 (C) Drip Dry. Hang dripping wet

Table II—Standard Hand Washing and Rinsing Temperatures

Designation	Wash Temp, $^{\circ}\text{C}$ ($^{\circ}\text{F}$)	Rinse Temp, $^{\circ}\text{C}$ ($^{\circ}\text{F}$)
Very Cold	16 ± 3 (60 ± 5)	< 18 (< 65)
Cold	27 ± 3 (80 ± 5)	< 29 (< 85)
Warm	41 ± 3 (105 ± 5)	< 29 (< 85)
Hot ¹	49 ± 3 (120 ± 5)	< 29 (< 85)

¹ Hot water may not be a reasonable selection for hand washing or for the delicate items typically requiring hand washing.

Table III—Standard Drying Conditions

(A)	Tumble Dry
(Ai)	Tumble Dry Normal
(Aii)	Tumble Dry Delicate
(Aiii)	Tumble Dry Permanent Press
(B)	Line/Hang Dry
(C)	Drip Dry
(D)	Screen Dry/Dry Flat

specimen on an appropriate hanger, straightening and smoothing facings, seams, etc. Specimens should generally be oriented in the direction in which they are worn. Do not fold or stretch specimens over the hanger. 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.

8.3.5 (D) Screen/Flat Dry. Spread each specimen on a horizontal screen or perforated surface, removing wrinkles without distorting or stretching it. Allow specimens to rest 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.

8.3.6 For all drying methods, allow specimens to dry completely before washing again.

8.3.7 Laundering creases. If specimens are folded or creased after any drying cycle except the last, rewet and attempt to remove the creases by ironing with a hand iron at a temperature suitable for the fabric being tested (see 7.1.1), prior to additional laundering cycles. Do not attempt to remove wrinkles or creases by hand ironing after the final drying

Table I—Standard Washing Machine Parameters (see 12.2, 12.6)

Cycle	(1) Normal	(2) Delicate	(3) Permanent Press
Water Level, L (gal)	72 ± 4 (19 ± 1)	72 ± 4 (19 ± 1)	72 ± 4 (19 ± 1)
Agitation Speed, strokes/min.	86 ± 2	27 ± 2	86 ± 2
Washing Time, min.	16 ± 1	8.5 ± 1	12 ± 1
Final Spin Speed, rpm	660 ± 15	500 ± 15	500 ± 15
Final Spin Time, min.	5 ± 1	5 ± 1	5 ± 1
Wash Temp, $^{\circ}\text{C}$ ($^{\circ}\text{F}$) ¹	(II) Cold: 27 ± 3 (80 ± 5) (III) Warm: 41 ± 3 (105 ± 5) (IV) Hot: 49 ± 3 (120 ± 5) (V) Very Hot: 60 ± 3 (140 ± 5)	(II) Cold: 27 ± 3 (80 ± 5) (III) Warm: 41 ± 3 (105 ± 5) (IV) Hot: 49 ± 3 (120 ± 5) (V) Very Hot: 60 ± 3 (140 ± 5)	(II) Cold: 27 ± 3 (80 ± 5) (III) Warm: 41 ± 3 (105 ± 5) (IV) Hot: 49 ± 3 (120 ± 5) (V) Very Hot: 60 ± 3 (140 ± 5)

¹ Due to US Department of Energy requirements, many washing machines use cooler water. An external control box may be used to override the machine set temperatures.