

**Test Method of Specified Requirements of
Wrinkle Free Textiles**

FTTS-FA-007

FTTS-FA-007 Wrinkle Free Textiles

Cotton fabrics are soft, comfortable, and readily absorb perspiration, but 100% cotton wrinkles very easily, especially after laundering, and so must be ironed. However, many cotton fabrics are now made with a wrinkle-free process that keeps them flat and smooth even after laundering – no more ironing required. Easy care is a high priority for busy working people, and these fabrics can be worn every day without losing their wrinkle-free, smooth look. Regulations for Wrinkle-Free Fabrics forbid the presence of formaldehyde in fabric resin because formaldehyde could cause cancer and negative stimulation to nose, eyes and skin.

Taiwan technology for Wrinkle Free Textiles sustains a grade of at least 3.5 on a 5-point rating. The test method used is AATCC 143.

1. Scope

This criterion is applicable to the evaluation and testing of the smoothness appearance of textile, apparel after repeated home laundering.

2. Terminology

2.1 SA: Smoothness Appearance

2.2 CR: Crease Retention

2.3 SS: Seam Smoothness

3. Performance specification

3.1 Smoothness Appearance after 5 washes

Grade	Classification
$4.0 \leq SA \leq 5.0$	Excellent
$3.5 \leq SA < 4.0$	Good
$3.0 \leq SA < 3.5$	Moderate

3.2 Crease Retention after 5 washes

Grade	Classification
$CR = 5.0$	Excellent
$4.0 \leq CR < 5.0$	Good
$3.0 \leq CR < 4.0$	Moderate

3.3 Smoothness Appearance after 5 washes

Grade	Classification
$SS = 5.0$	Excellent
$4.0 \leq SS < 5.0$	Good
$3.0 \leq SS < 4.0$	Moderate

3.4 Formaldehyde content

Grade	Formaldehyde content	Classification
1	ppm ≤ 45	Excellent
2	45 < ppm < 75	Good
3	75 < ppm ≤ 300	Moderate

4. Test Method

4.1 Smoothness Appearance after Laundering

4.1.1 Definition: To evaluate the smoothness appearance of fabric after repeated home laundering.

4.1.2 Application: Any washable textile.

4.1.3 Environment conditions for testing: The standard atmosphere for textile testing is as directed in ASTM D1776. The condition is 21±1°C, 65±25 RH.

4.1.4 Sample preparation: For fabric sample, cut 3 specimens in 15 in. x 15 in. For garment sample, select 3 pieces for testing.

4.1.5 Test procedure:

(1) Select the washing and drying conditions from the following table:

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

(2) Adjust the water temperature and fill the washer to the specified water level (18 gal, approximate to 68L)

(3) Add 66g of 1993 AATCC Standard Reference Detergent. Then add the specimens and enough ballast to make a 1.8 kg load.

(4) Prior to evaluation, the specimens should be hung on an appropriate hanger with fabric warp (length) in vertical direction. Condition the specimens at 21 ±1°C, 65±25 RH for a minimum of 4 hours

(5) Assess the specimens under the standard environment as illustrated in Fig. 1. Three trained observers should rate each specimen independently and assign the numerical grade of the replica (SA-1 to 5, see Fig 2) which most nearly matches the smoothness appearance of the specimen.

4.1.6 Results and report : Average the nine grades (three grades on each of three specimens) and report the SA average grade to the nearest tenth of a grade (An grade SA-5 represents the smoothest appearance, while an grade SA-1 represents the poorest appearance).

4.2 Crease Retention after Laundering

4.2.1 Definition: To evaluate the retention of pressed-in creases in textile products after repeated home laundering.

4.2.2 Application: Any washable textile.

4.2.3 Environment conditions for testing :The standard atmosphere for textile testing is as directed in ASTM D1776. The condition is $21\pm 1^{\circ}\text{C}$, 65 ± 25 RH.

4.2.4 Sample preparation: Select 3 pieces of garment sample for testing.

4.2.5 Test method: Select the washing and drying conditions according to diagram 4.1.5 (1) and perform the testing according to paragraph 4.1.5(2)-(5). Asses the specimens under the standard environment as illustrated in Fig. 1. Mount he specimens on the viewing board with the crease in vertical direction. Assign the most nearly matches numerical grade of the CR replica to the specimens.

4.2.6 Results and report : Average the nine grades (three grades on each of three specimens) and report the CR average grade to the nearest tenth of a grade (An grade CR-5 represents the best retention, while an grade CR-1 represents the poorest retention).

4.3 Appearance of Seam after Laundering

Assign the most nearly matches numerical grade of the SS replica to the

4.3.1 Definition: To evaluate the smoothness appearance of fabric after repeated home laundering.

4.3.2 Application: Any washable textile.

4.3.3 Environment conditions for testing: The standard atmosphere for textile testing is as directed in ASTM D1776. The condition is $21\pm 1^{\circ}\text{C}$, 65 ± 25 RH

4.3.4 Sample preparation: Select 3 pieces of garment sample for testing.

4.3.5 Test method: Select the washing and drying conditions according to diagram 4.1.5 (1) and perform the testing according to paragraph 4.1.5(2)-(5). Asses the specimens under the standard environment as illustrated in Fig. 1. Mount he specimens on the viewing board with the seam in vertical direction. specimens.

4.3.6 Results and report : Average the nine grades (three grades on each of three specimens) and report the SS average grade to the nearest tenth of a grade (An grade SS-5 represents the best level of seam appearance, while an grade SS-1 represents the poorest level of seam appearance).

4.4 Formaldehyde test

4.4.1 Definition: Resin finished textile may release the free formaldehyde which is harmful to people. This standard is established to specify the limitation of formaldehyde.

4.4.2 Application: Any resin-finished textile such as dimensional stabilization finish.

4.4.3 Environment conditions for testing: Not specified.

4.4.4 Sampling and sample preparation:

(1) Sample preparation: weigh approximate 1g of sample pieces accurately.

(2) Preparation of Acetyl acetone Reagent solution:

(a) Dissolve 150g of guaranteed grade ammonium acetate in 800 ml of distilled water.

(b) add 3 ml of guaranteed grade acetic acid and 2 ml of guaranteed acetylacetone

(c) mix all reagents thoroughly and add water to make 1000 ml. Leave the mixed solution still for 24 hours.

4.4.5 Test procedures:

(1) Cut the sample to small pieces and put them in a 200 ml or 250 ml flask. Add 100 ml distilled water and stopper the flask tightly. Extract it in a water bath at $40 \pm 2^\circ\text{C}$ for 1 hour while stirring the flask at times. Then filtrate the liquid through filter paper into another flask to obtain the extract.

(2) Test solution preparation: Prepare the following solution in individual test tubes with stopper.

(a) 5 ml extract + acetyl acetone reagent solution

(b) 5 ml distilled water + acetyl acetone reagent solution

(c) 5 ml extract + 5 ml distilled water

(d) 5 ml distilled water + 5 ml distilled water

(3) Warm all prepared solutions in a water bath at $40 \pm 2^\circ\text{C}$ for 30 minutes then leave them still and cool for 30 minutes.

(4) Measure the absorbency with a spectrophotometer at the maximum absorption wavelength 415 nm

(5) $A - A_0$: Compare (a) and (b) to obtain the absorbency A .

Compare (c) and (d) to obtain the absorbency A_0 .

$$ppm = K \times \frac{A - A_0}{A_s} \times 100 \times \frac{1}{w}$$

K : concentration of standard solution of formaldehyde ($\mu\text{ g/ml}$)

W : mass of sample (g)

A_s : absorbency of standard solution of formaldehyde

(It is also acceptable to calculate the concentration of formaldehyde contained in the sample from the calibration curves obtained on the basis of

formaldehyde solutions of known concentrations.)

4.4.6 Results and report:

- (1) test results in integral
- (2) test method and remark.