

Test Method for Colorfastness to Flat Abrasion (Frosting): Screen Wire

Foreword

This test method was developed by an industry committee, and was known as the Industry Committee Test. It was first published as "A Proposed Test Method to Evaluate Frosting Potential Caused by Abrasive Wear" in 1965. This method approximates localized color change similar to that produced on some garments over relatively short periods of actual wear in which the garment is exposed to relatively mild abrasive action. To evaluate the effect of relatively severe abrasion action, refer to AATCC TM120.

1. Purpose and Scope

1.1 This test method is intended for evaluating the resistance of colored fabrics to change in shade caused by flat abrasion.

1.2 It can be used for all colored fabrics, but is especially sensitive to the color change of durable-press, cross-dyed blend fabrics, in which one fiber is abraded away faster than another.

2. Principle

2.1 The fabric specimen is mounted over a foam rubber cushion and rubbed multi-directionally against a wire screen mounted on a weighted head. After rinsing and conditioning, specimens are evaluated for color change. Color change is reported as a grade from 5 to 1, with 5 representing no color change and 1 representing the most color change.

3. Referenced Documents

NOTE: Use current versions of all publications unless otherwise specified.

3.1 AATCC EP1, Evaluation Procedure for Gray Scale for Color Change (see 14.1).

3.2 AATCC EP7, Evaluation Procedure for Instrumental Assessment of the Change in Color of a Test Specimen (see 14.1).

3.3 AATCC LP1, Laboratory Procedure for Home Laundering: Machine Washing (see 14.1).

3.4 AATCC TM120, Test Method for Colorfastness to Flat Abrasion (Frosting): Emery (see 14.1).

3.5 ASTM D1776, Standard Practice for Conditioning and Testing Textiles (see 14.2).

3.6 "A Proposed Test Method to Eval-

uate Frosting Potential Caused by Abrasive Wear," Gobeil, N.B. and D'Alessandro, P.L. *American Dyestuff Reporter*, November 22, 1965. 54(24), 42-49 (see 14.1).

4. Terminology

4.1 **abrasion**, n.—the wearing away of any part of a material by rubbing against another surface.

4.2 **frosting**, n.—in textiles, a change of fabric color caused by localized abrasive wear. (Syn: *differential wear*, *fibrillation*).

NOTE: Frosting may be the result of differential wear, as in multicomponent blends in which the fibers do not match in shade, or of the abrasion of single-fiber constructions in which there is a variation in or incomplete penetration of dye.

5. 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. Users MUST consult manufacturers for specific details such as safety data sheets and other manufacturer's recommendations. Consult and follow all applicable OSHA standards and rules.

5.1 Follow good laboratory practices. Wear safety glasses in all laboratory areas.

5.2 Follow manufacturer's safety recommendations when operating laboratory testing equipment.

6. Apparatus and Materials (see 14.3)

6.1 Conditioning facilities and racks with pull-out, perforated shelves for laying specimens flat (see 14.1).

6.2 Stoll—Universal Wear Tester (see 9.2, 9.3 and Fig. 1).

6.3 Frosting unit (see Fig. 2).

6.3.1 Circular frosting specimen holder (see 9.4).

6.3.2 Rubber O ring.

6.3.3 Conical mounting piece.

6.3.4 Side clamps.

6.4 Abradant, stainless steel wire screening, 16 mesh, 0.23 mm wire (see 9.5).

6.5 Towels, for blotting specimens af-



Fig. 1—Universal Wear Tester prepared for frosting test.

ter rinsing.

6.6 Cloth, white cotton, for ironing.

6.7 Hand iron.

6.8 Equipment and environment for evaluating color change.

6.8.1 For visual evaluation, use Gray Scale for Color Change (see 14.1). Refer to AATCC EP1 for additional materials and use of gray scale.

6.8.2 For instrumental evaluation, use a spectrophotometer as specified in AATCC EP7.

7. Specimens

7.1 Cut a minimum of 2 specimens 127 × 127 mm from each sample (see 14.4). Take no specimen from within one-tenth of the width of the fabric from either selvage. Cut specimens with sides parallel to fabric length and width.

7.2 Mark length direction on back side of specimen.

8. Conditioning

8.1 Prior to testing, condition test specimens as directed in ASTM D1776. (Use conditions indicated in Table 1 for Textiles, general. Estimate conditioning time as indicated in Table 2 for the appropriate fiber content.) Lay each swatch or prod-

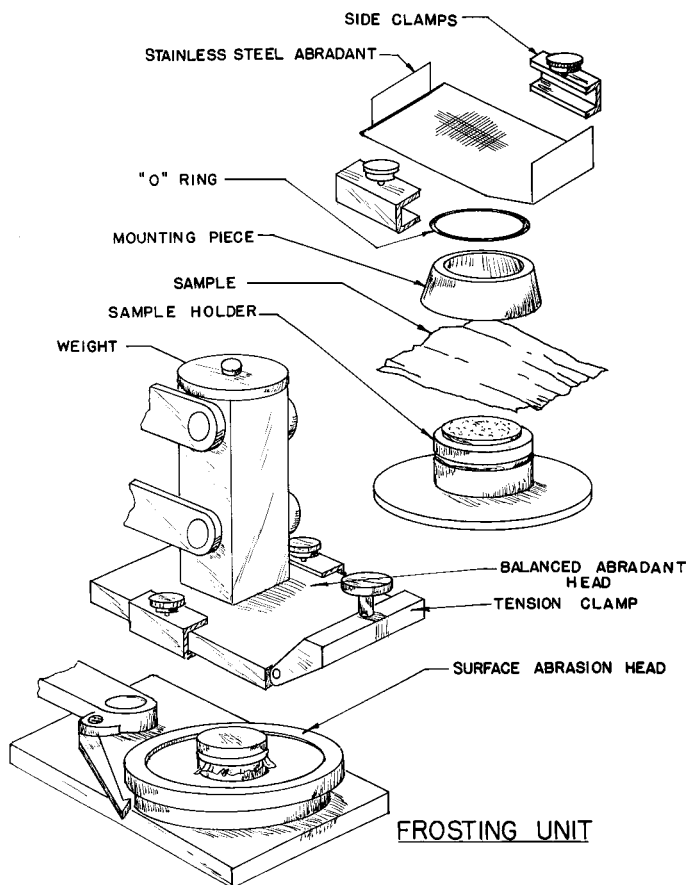


Fig. 2—Schematic drawing of frosting unit.

uct, separately, on a screen or perforated shelf of a conditioning/drying rack.

9. Preparation of Specimens and Apparatus

9.1 To obtain information pertinent to the behavior of the fabric in actual use, it may sometimes be desirable to pretreat test specimens, as by laundering, before subjecting them to the frosting test. See AATCC LP1 for standard home laundering procedures.

9.2 At regular intervals, check the operation of the frosting tester with one or more standard fabrics of known frosting properties.

9.3 Verify that instrument head will neither fall forward nor tilt backward when not loaded with weights. If the head is not balanced, the abrasion pressure between screen and fabric will be altered.

9.4 When the specimen holder with the foam rubber cushion is first received, or after it has been used extensively, the plane of the surface of the rubber head may not be in perfect alignment with the abrasant plate. This may lead to poor or uneven wear pattern. Even by abrading the rubber surface (without specimen) on the tester with "0" emery cloth under a 1134-g head weight.

9.5 It is imperative that the warp of the abrasant screen be parallel to the reciprocating motion of the upper head. Wash new screens to remove oil. After each test, clean the screen of detritus with a compressed air gun with a safety nozzle. Wash the screen periodically in a mild detergent to remove possible build-up of matter which cannot be blown off with an air gun. Replace worn or defective screens promptly.

10. Procedure

10.1 Conduct the test in the standard atmosphere for testing textiles: $65 \pm 5\%$ relative humidity and $21 \pm 2^\circ\text{C}$ ($70 \pm 4^\circ\text{F}$).

10.2 Remove the circular surface abrasion head from the reciprocating table of the abrasion tester by removing the circular locking stud in the center. Use the special two-pronged wrench supplied with the frosting unit.

10.3 Insert the circular frosting specimen holder in the surface abrasion head, place the metal O ring over specimen holder, and lock in place with screw collar.

10.4 Place the first test specimen face up and centrally over the specimen holder, and then place the conical mount-

ing piece over the specimen. (This mounting piece holds the specimen over the foam rubber cushion and facilitates the insertion of the rubber O ring over the test specimen into the groove. The rubber O ring holds the sample firmly in place without distortion during the test.) Insert the rubber O ring over the specimen and into the groove. Remove the mounting piece.

10.5 Return the surface abrasion head (with the test specimen) to the reciprocating table.

10.6 Attach the abrasant screen to the abrasant head. Apply necessary tension by means of the front tension clamp. Secure sides with side clamps.

10.7 Apply head weights totaling 1134 g to the balanced abrasant head.

10.8 Adjust rotary motor pawl to rotate the surface abrasion head approximately one revolution per 100 cycles.

10.9 Gently lower the head until it contacts the test specimen and push the "start" button.

10.10 Abrade for 1200 cycles and stop the machine.

10.11 Remove abrasion head with the abraded specimen and remove the test specimen.

10.12 Hand rinse the test specimen in clear lukewarm water at 38°C (100°F) to remove detritus; blot between towels to remove excess water.

10.13 Place specimen face down between two pieces of clean white cotton cloth and press with a hand iron set at approximately 149°C (300°F) until dry.

10.14 Repeat the procedure for all remaining specimens.

10.15 Recondition specimens as described in Section 8 before evaluating.

11. Evaluation

11.1 For visual evaluation, evaluate color change of each abraded specimen as directed in AATCC EP1, with modified viewing angles.

11.1.1 Place the specimen flat on the viewing table with the illumination overhead. The light should be sufficiently diffused so that shadows are not caused by viewing the specimen from overhead. Align the specimen with machine (warp or wale) direction in the line of sight.

11.1.2 Keep the specimen stationary while the viewer moves to adjust viewing angle. Scan the specimen at $0.2\text{--}1.57$ rad ($15^\circ\text{--}90^\circ$) overhead.

11.1.3 Turn the specimen to align the cross (filling or course) direction with the line of sight. Scan at $0.2\text{--}1.57$ rad ($15^\circ\text{--}90^\circ$) overhead.

11.2 For instrumental evaluation, evaluate color change of each abraded specimen as directed in AATCC EP7.