Colorfastness to Crocking: Rotary Vertical Crockmeter Method

Developed in 1966 by AATCC Committee RA38; revised 1969, 1972, 1994, 1996; reaffirmed 1974, 1977, 1983, 1988, 1989; editorially revised 1981, 1985, 1986; editorially revised and reaffirmed 2001.

1. Purpose and Scope

1.1 This test method is used to determine the amount of color transferred from the surface of colored textile materials to other surfaces by rubbing. It is applicable to textiles made from all fibers in the form of yarn or fabric, whether dyed, printed or otherwise colored and especially to prints where the singling out of areas smaller than possible to test with the standard AATCC Crockmeter (AATCC Method 8) is required (see 13.1 and 13.9).

1.2 Test procedures employing test squares either dry or wet with water or other liquids are within the scope of this method.

1.3 Since washing, drycleaning, shrinkage, ironing, finishing, etc., may affect the degree of color transfer from a material, the test may be made before or after, or before and after, any such treatment, depending upon the information desired.

2. Principle

2.1 A test specimen held at the base of the Rotary Vertical Crockmeter is rubbed with standard test squares under controlled conditions (see 13.1).

2.2 Color transferred to the test squares is assessed by a comparison with the Gray Scale for Staining or AATCC Chromatic Transference Scale (see 13.2).

3. Terminology

3.1 **colorfastness,** n.—the resistance of a material to change in any of its color characteristics, to transfer of its colorant(s) to adjacent materials or both, as a result of the exposure of the material to any environment that might be encountered during the processing, testing, storage or use of the material.

3.2 **crocking,** n.—a transfer of colorant from the surface of a colored yarn or fabric to another surface or to an adjacent area of the same fabric principally by rubbing.

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.

5. Apparatus and Materials

5.1 Rotary Vertical Crockmeter (see Fig. 1, 13.1 and 13.3).

5.2 Crockmeter Cloth—standard 51 × 51 mm (2 × 2 in.) test squares (see 13.3, 13.4).

5.3 AATCC Chromatic Transference Scale (see 13.5).

5.4 Gray Scale for Staining (see 13.5).

5.5 White AATCC Blotting Paper (see 13.5).

6. Verification

6.1 Verification checks on the operation of the test and the apparatus should be made routinely and the results kept in a log. The following observations and corrective actions are extremely important to avoid incorrect test results where abnormal crock images can result and influence the rating process.

6.2 Use an in-house poor crocking fabric as a calibration specimen and conduct three dry crock tests.

Fig. 1—Rotary vertical crockmeter.

6.2.1 A poor circular image with uneven dye pick-up may indicate the crocking finger needs resurfacing (see 13.6).

6.2.2 A double image may indicate a loose clip (see 13.6).

6.2.3 Scuff marks to the sides of the specimen indicate the loops to the wire clips are positioned downwards and are not high enough to prevent rubbing the specimen surface.

6.2.4 Confirm the wet pick-up techniques (see 9.2).

6.2.5 Replace the abrasive paper on the tester base if it is smooth to the touch in the crocking area compared to the adjacent area, or if slippage of the specimen is noticed (see 13.7).

7. Test Specimens

7.1 Materials of nearly any construction presenting a surface area of approximately 25 mm (1 in.) square or more can be tested.

8. Conditioning

8.1 Prior to testing, pre-condition and condition the test specimens and the crock squares for dry crock testing as directed in ASTM D 1776, Conditioning Textiles for Testing. Condition each specimen for at least 4 h in an atmosphere of 21 ± 1°C (70 ± 2°F) and 65 ± 2% RH by laying each test specimen or crock square separately on a screen or perforated shelf of conditioning rack.

9. Procedure

9.1 Dry Crocking Test.

9.1.1 Tilt the upper half of the machine away to allow access to the base of the machine. Place a test square on the end of the vertical rod and fasten it with spring clip.

9.1.2 Hold the test specimen on the machine base at the point the vertical rod contacts the base. Tilt the upper half of the machine back to the operating position with the test square at the end of the shaft in contact with the test specimen. Place the weight supplied with the Crockmeter on the vertical shaft to give the rubbing finger a downward force of 11.1N ± 10% (40 oz ± 10%).

9.1.3 With the left hand, hold the test specimen in position on the base. Turn the crank 20 turns with the right hand. This produces about 40 reciprocal turns of the vertical shaft.

9.1.4 Tilt the upper part of the machine back and remove the test specimen and the test square, condition and evaluate.

9.2 Wet Crocking Test.

9.2.1 Establish technique (see 13.8) for preparing wet crock cloth squares by weighing a conditioned square, then thoroughly wet out white testing square in distilled water. Prepare only one square at a time.

9.2.2 Bring the wet pick-up to 65 ± 5% by squeezing the wet testing square between white AATCC blotting paper through a hand wringer or similar convenient means.

9.2.3 Avoid evaporative reduction of the moisture content below the specified level before the actual crock test is run.

9.2.4 Continue as directed in 9.1.

9.2.5 Air dry the white test square, then condition (see 8.1) before evaluating. In the case of napped, brushed or sanded material when loose fiber might interfere with the rating, remove the extraneous fibrous material by pressing lightly on the crock circle with the sticky side of cellophane tape before evaluating.

10. Evaluation

10.1 Rate the amount of color transferred from the specimen under examination by means of the AATCC Chromatic Transference Scale or the Gray Scale for Staining (see 13.2, 13.5).

10.2 Back the test square with three layers of test cloth while evaluating.

10.3 It will be noted that the color transfer is usually greater near the edge of the tested circle than the center.

10.4 Rate the color transfer at the edge of the tested circle.

10.5 Rate dry and wet crocking fastness as follows:

Grade 5—negligible or no color transfer.

Grade 4.5—color transfer equivalent to Step 4-5 on the Gray Scale for Staining or Row 4.5 on the 9-step AATCC Chromatic Transference Scale.

Grade 4—color transfer equivalent to Step 4 on the Gray Scale for Staining or Row 4 on the 5-step or 9-step AATCC Chromatic Transference Scale.

Grade 3.5—color transfer equivalent to Step 3-4 on the Gray Scale for Staining or Row 3.5 on the 9-step AATCC Chromatic Transference Scale.

Grade 3—color transfer equivalent to Step 3 on the Gray Scale for Staining or Row 3 on the 5-step or 9-step AATCC Chromatic Transference Scale.

Grade 2.5—color transfer equivalent to Step 2-3 on the Gray Scale for Staining or Row 2.5 on the 9-step AATCC Chromatic Transference Scale.

Grade 2—color transfer equivalent to Step 2 on the Gray Scale for Staining or Row 2 on the 5-step or 9-step AATCC Chromatic Transference Scale.

Grade 1.5—color transfer equivalent to Step 1-2 on the Gray Scale for Staining or Row 1.5 on the 9-step AATCC Chromatic Transference Scale.

Grade 1—color transfer equivalent to Step 1 on the Gray Scale for Staining or Row 1 on the 5-step or 9-step AATCC Chromatic Transference Scale.

10.6 Average individual results to the nearest 0.1 grade when multiple specimens are tested or when a panel of evaluators rate color transfer.

11. Report

11.1 Report the grade determined in 10.5.

11.2 Indicate whether dry or wet test.

11.3 Indicate whether Gray Scale for Staining or AATCC Chromatic Transference Scale was used (see 13.2).

12. Precision and Bias

12.1 *Precision.* Precision for this test method has not been established. There is no contemplated activity to establish precision for this method. Users of the method should use standard statistical techniques in making any comparisons of test results for either *within-laboratory* or *between-laboratory* averages.

12.2 *Bias.* The true value of colorfastness to crocking can be defined only in terms of a test method. There is no independent method for determining the true value. As a means of estimating this property, the method has no known bias.

13. Notes

13.1 The Rotary Vertical Crockmeter provides a reciprocating rotary motion to the test finger and a selected pressure on the test finger.

13.2 It has been noted that different grades may result depending upon whether the Gray Staining Scale or AATCC Chromatic Transference Scale is used for the evaluation. It is, therefore, important to report which scale was used (see 11.3).