

Colorfastness to Crocking: Textile Floor Coverings— AATCC Crockmeter Method

Developed in 1986 by AATCC Committee RA57; reaffirmed 1987, 1988; editorially revised and reaffirmed 1993; revised 1999 (with title change); editorially revised 1996, 2001, 2002, 2004. Partly equivalent to ISO 105-X12.

1. Purpose and Scope

1.1 This test method is designed to determine the degree of color transfer from the surface of textile floor coverings to other surfaces by rubbing. The intent is to reproduce as near as possible true-to-life situations in all constructions whether dyed, printed or otherwise colored.

1.2 Test procedures employing white test cloths, both dry and wet with water, are given.

1.3 As the use surface of a textile floor covering may be exposed to various conditions in true-to-life situations, such as soil, stains, cleaning, shampooing and application of chemical treatments such as antisoils, antistats, antimicrobials, etc., the test may be made before, after or before and after such situations.

2. Principle

2.1 A colored test specimen held on the base of a crockmeter is rubbed with a white test cloth under controlled conditions.

2.2 Color transferred to the white test cloth is rated by comparison with the AATCC Chromatic Transference Scale or Gray Scale for Staining and a grade is assigned.

3. Terminology

3.1 **carpet, n.**—all textile floor coverings not designated as rugs.

3.2 **colorfastness, n.**—the resistance of a material to change in any of its color characteristics, to transfer of its colorants(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.

3.3 **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.

3.4 **rug, n.**—a textile floor covering of limited area which is complete in itself and is intended for use as a partial covering of a floor or another floor covering.

3.5 **textile floor covering, n.**—an arti-

cle having a use-surface composed of textile material and generally used for covering floors.

3.6 **use-surface, n.**—*of textile floor covering*, the part of a textile floor covering directly exposed to foot traffic.

4. Safety Precautions

NOTE: These safety precautions are for information purposes only. These safety 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 AATCC Crockmeter (see 13.1, 13.2).

5.2 AATCC Crock Block (see 13.2).

5.3 Crockmeter Test Cloth (see 13.3).

5.4 AATCC Chromatic Transference Scale (see 13.4).

5.5 Gray Scale for Staining (see 13.4).

5.6 White AATCC Textile Blotting Paper (see 13.4).

6. Test Specimens

6.1 Two specimens are used, one each for the dry and the wet tests.

6.1.1 Additional specimens may be used to increase the precision of the average.

6.2 Floor covering material: pieces at least 50 × 150 mm. If the pile lay is distinguishable, cut the specimen with the pile lay pointing in the long direction.

6.2.1 Larger or full width lab samples may be used without cutting individual specimens, when multiple tests are needed and when using for production testing.

7. Verification

7.1 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.

7.2 Use an in-house poor crocking carpet or rug as a calibration specimen and conduct three dry crock tests.

7.2.1 A double, elongated image may indicate a loose sleeve.

7.2.2 A stretched and streaked crock image may be due to mounting the crock test cloth diagonally.

7.2.3 Arc shaped indentions in the crocked area of the test cloth may indicate the crock block is mounted improperly, most likely perpendicular to the specified placement (see 13.2).

7.3 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.

8. Conditioning

8.1 Prior to testing, condition the test specimens and the crock test cloth for dry crock testing as directed in ASTM D 1776, Standard Practice for Conditioning and Testing Textiles. Condition each specimen for at least 4 h in an atmosphere of $21 \pm 1^\circ\text{C}$ and $65 \pm 2\%$ RH by laying each test specimen or crock test cloth separately on a screen or perforated shelf of conditioning rack.

9. Procedures

9.1 Dry Crocking Test.

9.1.1 Place a test specimen on the base of the crockmeter so that it rests flat on the abrasive cloth with its long dimension in the direction of rubbing (see 13.5). The pile lay should point to the back of the crockmeter if direction of pile is distinguishable.

9.1.2 Mount a 25 × 100 mm swatch of white cotton test cloth over the rubbing surface of the crock block. The test cloth should be mounted so that the long dimension will be moving in the long direction during the test. This operation can be carried out with the crock block attached to the weighted arm of the crockmeter using an Allen socket cap screw (see 13.6) or with the crock block detached from the arm and inverted in a suitable crock block holder (see 13.2 and 13.7). Fasten the test cloth to the crock block by means of a rectangular sleeve that slips over the cotton fabric on the crock block. When ready for testing, the test cloth on the crock block projects downward from the

reciprocating arm of the crockmeter.
Caution: Do not drop the crock block. Nicks or dents on the rubbing surfaces might be irreparable. **Handle With Care.**

9.1.3 Lower the covered crock block gently onto the test specimen. While holding the specimen firmly with extended thumb and forefinger of the left hand, execute ten (10) complete turns of the crank at the rate of one (1) turn per s.

9.1.4 Remove the white test cloth, condition (see 8.1) and evaluate as directed in Section 10. In the case of napped, brushed or sheared material when loose fiber might interfere with the ratings, remove the extraneous fibrous material by pressing lightly on the crock area with the sticky side of cellophane tape before evaluating.

9.2 Wet Crocking Test.

9.2.1 Thoroughly wet the white test cloth in distilled water.

9.2.2 By any convenient means, such as squeezing between filter papers through a hand wringer, bring the wet pickup to $65 \pm 5\%$ based on the conditioned weight of the dry test cloth under standard conditions ($21 \pm 1^\circ\text{C}$ and $65 \pm 2\%$ RH) before testing (see 13.8).

9.2.3 Take care to prevent evaporation which would reduce the moisture content below the specified level before the actual crock test is run.

9.2.4 Continue testing as directed in 9.1.

9.2.5 Air-dry the test cloth before evaluating. In the case of napped, brushed or sheared material when loose fiber might interfere with the rating, remove the extraneous fibrous material by pressing lightly on the test cloth with the sticky side of cellophane tape before evaluating.

10. Evaluation

10.1 Evaluate the amount of color transferred from the specimen to the white test cloth under examination by means of the AATCC Chromatic Transference Scale or the Gray Scale for Staining (see 13.4).

10.2 Place the test cloth on three layers of clean white cloth for the evaluation.

10.3 Classify dry and wet fastness to crocking. Different ratings may result depending upon whether the Gray Scale for Staining or AATCC Chromatic Transference Scale is used for the evaluation. It is, therefore, important to report which scale was used. For very critical evaluations and in cases of arbitration, ratings must be based on the Gray Scale for Staining:

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 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 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 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 9-step AATCC Chromatic Transference Scale.

11. Report

11.1 Identify the sample tested.

11.2 Report the grade determined in

10.3.

11.3 Indicate whether dry or wet crocking was performed.

11.4 Indicate whether Gray Scale for Staining or AATCC Chromatic Transference Scale was used for evaluating crocking (see 10.3).

11.5 If the carpet or rug was subjected to the conditions in 1.3 state this in the report.

12. Precision and Bias

12.1 *Precision.* An interlaboratory test was conducted in 1997 to establish the precision of the test method. Testing was conducted under the normal atmospheric conditions of each laboratory and not necessarily under ASTM standard conditions. Two operators at each of four laboratories tested and rated six fabrics on two consecutive days, both wet and dry crock. Rating was performed using the Gray Scale for Staining and the AATCC Chromatic Transference Scale.

12.1.1 The results for one operator chosen from each laboratory were evaluated in an ANOVA two factor with replication analysis. The components of variance are given in Table I.

12.1.2 Critical differences are given in Table II.

Table I—Components of Variance

	Dry		Wet	
	Gray	Chromatic	Gray	Chromatic
Within-Laboratory	0.0312	0.0417	0.125	0.0938
Interaction	0.0135	0.0403	-0.0201	-0.0031
Between-Laboratory	0.0264	0.0101	0.0028	0.0031

Table II—Critical Differences

For the components of variance in Table I, two averages of observed values should be considered significantly different at the 95% probability level if the difference equals or exceeds the following critical differences.

Single Fabric					
	No. of Observation	Dry		Wet	
		Gray	Chromatic	Gray	Chromatic
Within-Laboratory	1	0.49	0.56	0.98	0.85
	3	0.28	0.33	0.68	0.49
	5	0.22	0.25	0.44	0.38
Between-Laboratory	1	0.66	0.63	0.99	0.86
	3	0.53	0.43	0.58	0.51
	5	0.50	0.38	0.46	0.41

Multiple Fabric					
	No. of Observation	Dry		Wet	
		Gray	Chromatic	Gray	Chromatic
Within-Laboratory	1	0.59	0.79	0.98	0.85
	3	0.43	0.64	0.68	0.49
	5	0.39	0.61	0.44	0.38
Between-Laboratory	1	0.74	0.84	0.99	0.86
	3	0.62	0.70	0.58	0.51
	5	0.60	0.67	0.46	0.41