

Colorfastness to Heat: Dry (Excluding Pressing)

Developed in 1966 by AATCC Committee RR54; revised 1967, 1971, 1973; editorially revised 1981, 1983, 1985, 1988, 2001, 2002; reaffirmed 1976, 1979, 1984, 1989; editorially revised and reaffirmed 1994, 1999, 2004. Technically equivalent to ISO 105-P01.

1. Purpose and Scope

1.1 This test method is intended for assessing the resistance of color of textiles of all kinds and in all forms to the action of dry heat, excluding pressing.

1.2 Several tests differing in temperature are provided; one or more of them may be used, depending on the requirements and the stability of the fibers.

1.3 When this test method is used for assessing color changes and staining in dyeing, printing and finishing processes it must be recognized that other chemicals and physical factors may influence the results.

2. Principle

2.1 A specimen of the textile in contact with specified undyed fabrics is exposed to dry heat by close contact with a medium which is heated to the required temperature. The change in color of the specimen and the staining of the undyed fabrics are assessed with standard gray scales.

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.

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 Heating device providing even heat transfer at controlled temperatures by close contact to both sides of the specimen (see 12.1).

5.2 Two undyed fabrics, each of a size adapted to that of the heating device. One piece to be of the same kind of fiber as that of the textile to be tested or that predominating in the case of blends. The second piece shall be the second component of the blend or Multifiber Test Fabric No. 10A or FAA (see 12.5) or any other fabric of particular interest as specified in the test report.

5.3 Gray Scales for assessing change in color and staining (see 12.2).

5.4 AATCC Chromatic Transference Scale (see 12.2).

6. Test Specimen

6.1 If the textile to be tested is fabric, place a test specimen of a size adapted to that of the heating device between the two pieces of undyed fabric (see 5.2), and sew along one side to form a composite test specimen.

6.2 If the textile to be tested is yarn, knit it into fabric and treat it as in 6.1 or form a uniform layer of parallel lengths of it between the two pieces of undyed fabric (see 5.2), the amount of yarn taken being approximately equal to half the combined mass of the undyed fabrics. Sew along one side to hold the yarn in place and to form a composite test specimen.

6.3 If the textile to be tested is loose fiber, comb and compress an amount approximately equal to half the combined mass of the undyed fabrics into a uniform sheet of the required size, place the sheet between the two undyed fabrics and sew along one side to form a composite test specimen.

7. Procedure

7.1 Place the composite test specimen in the heating device and leave it there for 30 s at one of the following temperatures:

I	150 ± 2°C
II	180 ± 2°C
III	210 ± 2°C

The temperature(s) must be specified in the report (see 10.1). The pressure on the specimen should amount to 4 ± 1 kPa.

7.2 Remove the composite specimen and leave it for 4 h in air at the standard

temperature and atmosphere for testing; i.e., a temperature of 20 ± 2°C and relative humidity of 65 ± 2%.

7.3 Assess the change in color of the test specimen and the staining of the undyed fabrics (see 12.3).

8. Evaluation Method for Alteration in Color (Shade and Strength)

8.1 Rate the effect on the color of the test specimens by reference to the Gray Scale for Color Change:

Grade 5—negligible or no change as shown in Gray Scale Step 5.

Grade 4.5—change in color equivalent to Gray Scale Step 4-5.

Grade 4—change in color equivalent to Gray Scale Step 4.

Grade 3.5—change in color equivalent to Gray Scale Step 3-4.

Grade 3—change in color equivalent to Gray Scale Step 3.

Grade 2.5—change in color equivalent to Gray Scale Step 2-3.

Grade 2—change in color equivalent to Gray Scale Step 2.

Grade 1.5—change in color equivalent to Gray Scale Step 1-2.

Grade 1—change in color equivalent to Gray Scale Step 1.

9. Evaluation Method for Staining

9.1 Rate staining by the AATCC Chromatic Transference Scale or the Gray Scale for Staining (see 12.5):

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.

10. Report

10.1 Temperature of test.

10.2 Numerical rating of the change in color of the test specimen.

10.3 Numerical rating of the staining of each type of undyed fabric used.

10.4 Indicate whether Gray Scale for Staining or AATCC Chromatic Transference Scale was used for evaluating staining (see 12.4).

11. Precision and Bias

11.1 *Precision.* Precision for this test method has not been established. Until a precision statement is generated for this test method, use standard statistical techniques in making any comparisons of test results for either *within-laboratory* or

between-laboratory averages.

11.2 *Bias.* The colorfastness to dry heat (excluding pressing) 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.

12. Notes

12.1 Heating device. One of the following devices may be used:

(a) A pair of electrically heated hot plates whose temperature is accurately controllable at temperatures over the specified range and which can be adjusted to provide a pressure on the specimen of 4 ± 1 kPa; e.g., Scorch Tester available from SDL Atlas L.L.C., 1813A Associate Lane, Charlotte NC 28217; tel: 704/329-0911; fax: 704/329-0914; e-mail: info@sdlatlas.com. In order to obtain the pressure specified in 7.1, the total area of the composite specimen should be at a suitable relationship to that of the plates so that the four spring loaded pins acting against the housing of the upper plate is utilized. This is accomplished by using a small diameter rod—e.g., a small allen wrench—to push the upper protruding end of each pin down through the plastic plate and then moving it slightly to one side so that the pin remains engaged against the underside of the plate. These spring loaded pins, when in

their normal up position, provide a counter balance to the weight of the upper plate and its housing so that the pressure between the plates is 8.8 g/cm^2 as called for in AATCC Method 92. Other similar devices providing identical test conditions and results may be used.

(b) Molten metal bath, in which a holder containing the composite specimen is immersed (see *The Journal of the Society of Dyers and Colourists*, 76, March 1960, p. 158).

12.2 Available from AATCC, P.O. Box 12215, Research Triangle Park NC 27709; tel: 919/549-8141; fax: 919/549-8933; e-mail: orders@aatcc.org.

12.3 A shade change for the undyed fabric may be caused by factors other than the dye. To determine this, pieces of the undyed fabric similarly treated shall be given the same test by itself.

12.4 For very critical evaluations and in the cases of arbitration, ratings must be based on the geometric Gray Scale for Staining.

12.5 Multifiber test fabric No. 10A is available from Testfabrics Inc., P.O. Box 26, 415 Delaware St., W. Pittston PA 18643; tel: 570/603-0432; fax: 570/603-0433; e-mail: testfabric@aol.com. Multifiber test fabric FAA is available from Textile Innovators Corp., div. of SDL Atlas L.L.C., P.O. Box 8, 101 Forest St., Windsor NC; tel: 252/794-9703; fax: 252/794-9704; e-mail: tic@sdlatlas.com.