

Test Method for Colorfastness to Water

1. Purpose and Scope

1.1 This test method is designed to measure the resistance to water of dyed, printed, or otherwise colored textile yarns and fabrics.

1.2 Distilled water or deionized water is used in this test method because natural (tap) water is variable in composition.

2. Principle

2.1 The specimen, backed by multifiber test fabric, is immersed in water and then subjected to specified conditions of pressure, temperature and time. After conditioning, the change in color of the specimen and the staining of the attached multifiber test fabric are observed.

2.2 Results are reported as a Gray Scale for Change and Staining of grade 5 to 1. A grade of 5 represents no color change and a grade of 1 represents the most color change.

3. Referenced Documents

3.1 ASTM D1776, Standard Practice for Conditioning and Testing Textiles (see 12.1).

4. Terminology

4.1 **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.

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. 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.

5.1 Good laboratory practices should be followed. Wear safety glasses in all laboratory areas.

5.2 Manufacturer's safety recommendations should be followed when operating laboratory testing equipment.

5.3 See 9.1 for safety precautions related to using a wringer

6. Apparatus and Materials (see 12.2)

6.1 Perspiration tester (with acrylic plates) (see Figs. 1 and 2).

6.2 Drying oven—convection.

6.3 Cold cut multifiber test fabrics (8 mm [0.33 in.] bands) containing acetate, cotton, nylon, silk, viscose rayon and wool shall be used for specimens containing silk, or (8mm [0.33 in.] bands) containing acetate, cotton, nylon, polyester, acrylic and wool shall be used for specimens with no silk present (see 12.3).

6.4 Gray Scale for Staining (AATCC EP2 or EP12) or AATCC 9-Step Chromatic Transference Scale (AATCC EP8) (see 11.4).

6.5 Gray Scale for Color Change (AATCC EP1 or EP7) (see 12.4).

6.6 Wringer.

6.7 Petri dish with a depth greater than 1.5cm and capable of containing a $6 \times 6 \pm 0.2$ cm test specimen

6.8 Un-dyed adjacent fabric

6.9 White AATCC Textile Blotting Paper (see 12.4).

6.10 Balance with a weighing accuracy of ± 0.001 g.

7. Test Solution

7.1 Distilled water or deionized water from an ion-exchange device.

8. Test Specimens

8.1 Number and size of specimens

8.1.1 For fabric testing, one specimen, $6 \times 6 \pm 0.2$ cm, is needed. Attach a $5 \times 5 \pm 0.2$ cm multifiber test fabric swatch to the face of the fabric by sewing a single seam stitch along one edge of the fabric.

8.1.2 For yarn or loose fiber testing, weigh a $5 \times 5 \pm 0.2$ cm piece of multifiber fabric and a $6 \times 6 \pm 0.2$ cm piece of the un-dyed adjacent fabric together. Then take a mass of the yarn or loose fiber approximately equal to one half of the combined mass of the adjacent fabrics. Place it between a $5 \times 5 \pm 0.2$ cm piece of multifiber fabric and a $6 \times 6 \pm 0.2$ cm piece of the un-dyed adjacent fabric, and sew a single seam stitch along all four sides.

9. Procedure

9.1 Weigh each test specimen (as prepared in 8.1) to the nearest 0.1g. Immerse the test specimen in a petri dish in the test solution which is at room temperature with occasional agitation to ensure thorough wetting out (approximately 15 min

generally required for average fabrics). For fabrics hard to wet out, immerse the test specimen in the test solution at room temperature, pass through squeeze rolls (wringer) and re-immerses. Repeat, if necessary, to attain thorough wetting out. When using the wringer, ensure adequate guard at the nip point. Normal safeguards on pad should not be removed.

9.2 Remove the test specimen from the test solution and pass each test specimen assembly through the wringer with the multifiber stripes perpendicular to the length of the wringer rolls (all stripes go through the wringer at the same time). Weigh each test specimen to be sure it weighs greater than or equal to 2.5 times its original weight. Whenever possible, the wet weight should be 2.5-3.0 times the original weight. Because certain fabrics may not be able to retain this amount of solution when passing through a wringer, such fabrics may be tested after blotting to the required wet pickup with White AATCC Textile Blotting Paper (see 12.4).

9.3 Place the test specimen assembly between acrylic plates and insert in the specimen unit of the perspiration tester with the multifiber stripes running perpendicular to the long dimension of the plate (see Fig. 3).

9.4 Depending upon equipment available, use the following alternates:

9.4.1 Horizontal Perspiration Tester (see Fig. 1): Place the plates in the perspiration tester with the specimen assem-



Fig. 1—Horizontal perspiration tester.

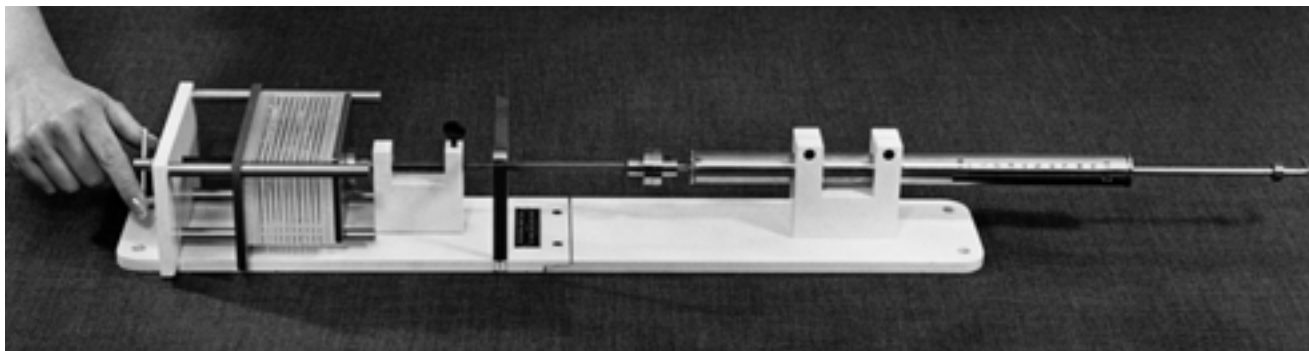


Fig. 2—Vertical perspiration tester.

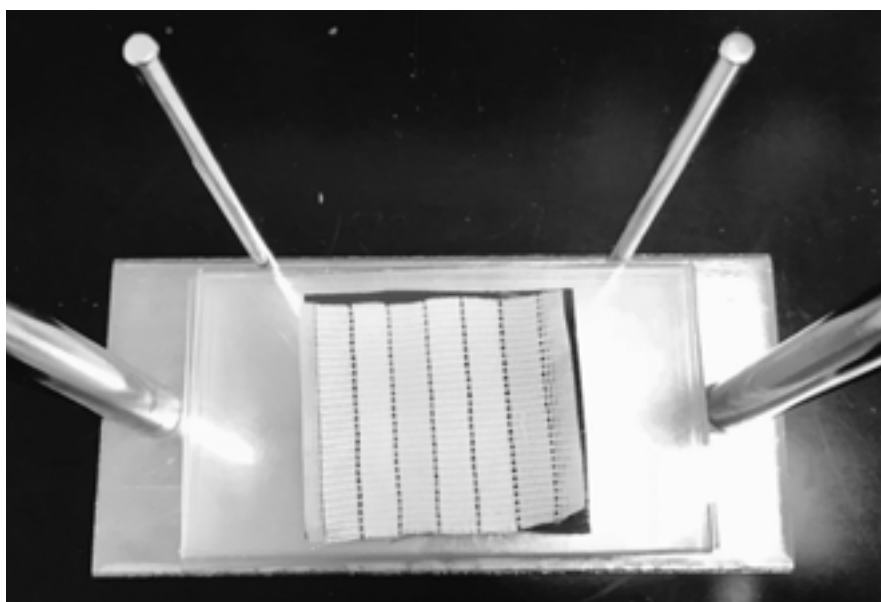


Fig. 3—Specimen in holder.

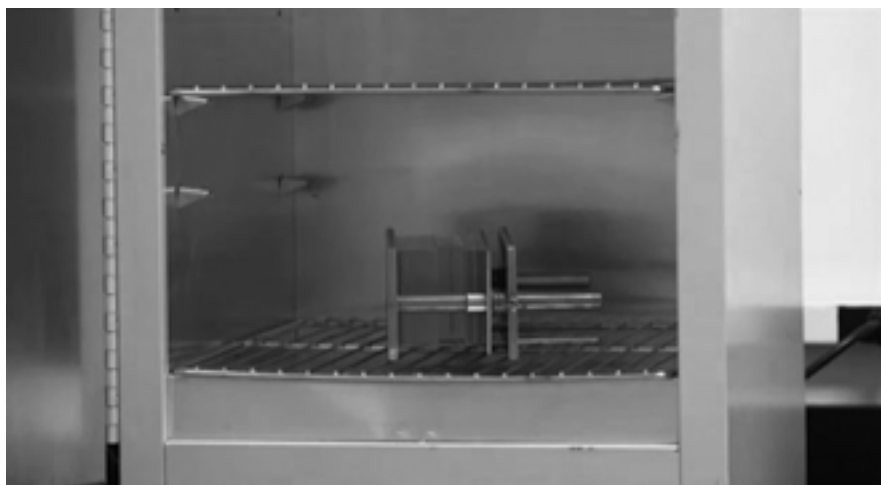


Fig. 4—Horizontal perspiration tester placement in oven.

blies evenly distributed between the 21 plates. Place all 21 plates into the unit regardless of the number of specimens. After placing the final plate in position (on top) set the dual plates with compensating springs in position, place the 3.63 kg (8.0 lb) weight on top making a total of 4.54 kg (10.0 lb) under the pressure plate, and lock the pressure plate in position by turning the thumb screws. Remove the weight and place the unit lying on its side in the oven so that the sides of the perspiration tester are parallel to the oven walls (see Fig. 4).

9.4.2 Vertical Perspiration Tester (see Fig. 2): Assemble the plates in the perspiration tester with the specimens evenly distributed between the 21 plates. Place all 21 plates into the unit regardless of the number of specimens. The plates are held in a vertical position between an indicating scale with a fixed metal plate at one end and an adjustable metal plate at the other end. Use the adjusting screw to exert a 4.54 kg (10.0 lb) force against the plates. Lock the specimen unit containing the test specimens with a set screw. Remove the pressure gauge unit from the specimen unit and place the specimen unit in the oven such that the side of the perspiration tester is to the oven walls. Another specimen unit may be added to the pressure gauge unit and the loading procedure repeated.

9.5 Heat the loaded specimen unit in an oven at $38 \pm 1^\circ\text{C}$ ($100 \pm 2^\circ\text{F}$) for $18 \text{ h} \pm 5 \text{ min}$.

9.6 Remove the tester from the oven and for each test specimen assembly, separate the multifiber fabric and, if used, the adjacent fabric from the test fabric. Place the multifiber fabric and test fabric specimens separately on a wire screen in accordance with ASTM D1776 overnight.

10. Evaluation

10.1 Color Change.