Absorbency of Textiles

Developed in 1954 by AATCC Committee RA34; jurisdiction transferred in 2003 to AATCC Committee RA63; reaffirmed 1968, 1972, 1975, 1979, 1992, 2000; editorially revised and reaffirmed (with title change) 1986; revised 1995, 2007 (with title change).

1. Purpose and Scope

1.1 Absorbency is one of several factors that influence textile processing such as fabric preparation, dyeing, and the application of finishes. Often interchanged with the term wettability, the absorbency characteristics of a fabric can influence the uniformity and completeness of bleaching and dyeing by the ability to take in water into the fiber, yarn, or fabric construction. The suitability of a fabric for a particular use, as in the case of gauze or toweling, is also dependent upon a fabric's ability and propensity to take up water. The absorbency of yarns or textile fabrics can be determined by this test method. This test method was originally entitled as "Absorbency of Bleached Textiles" but it has now been broadened to include the evaluation of other forms of textiles.

2. Principle

2.1 A drop of water is allowed to fall from a fixed height onto the taut surface of a test specimen. The time required for the specular reflection of the water drop to disappear is measured and recorded as wetting time.

3. Terminology

3.1 **absorbency,** n.—the propensity of a material to take in and retain a liquid, usually water, in the pores and interstices of the material.

3.2 **specular reflection,** n.—the reflection without diffusion, in accordance with the laws of optical reflection, as in a mirror.

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

5.1 Embroidery hoop with a 152.4 mm (6.0 in.) or more in diameter.

5.2 Burette, delivering 15-25 drops of water per milliliter.

5.3 Stopwatch.

5.4 Burette stand.

5.5 Distilled or deionized water, 21 ± 3°C (70 ± 5°F).

6. Test Specimen

6.1 A swatch or skein of a textile can be used for this test, as long as the specimen can be spread tightly over an embroidery hoop.

6.2 Specimens should be brought to moisture equilibrium in a standard atmosphere having a relative humidity of 65 ± 2% at 21 ± 1°C (70 ± 2°F). If absorbency of a fabric from a wet processing stage is required, such as after bleaching, specimens for testing should be air dried before conditioning prior to testing (see 10.1).

6.3 It is suggested that when sufficient fabric is available, five specimens from different locations of a sample be prepared for each water drop test site. Otherwise, five water drop tests may be performed on one specimen if the test sites are at least 1 in. away from the hoop edge and no closer together than 1 in. in from the previous site's outside edge.

7. Procedure

7.1 Select a location in the conditioned laboratory area that has overhead lighting to facilitate the judgment of the test end point; i.e. the time it takes for the specular reflection of a drop of water to disappear.

7.2 Determine the burette's stopcock position that will deliver the specified number of water drops (see 5.2).

7.3 Mount a specimen in an embroidery hoop so that the surface is taut, and free of wrinkles but without distorting the structure of the specimen. The side to be evaluated shall be stated.

7.4 Place the hoop 9.5 ± 1.0 mm (0.375 ± 0.04 in.) below the tip of the burette and allow one drop of distilled or deionized water to fall on the cloth. Start the stopwatch immediately.

7.5 Measure the time required for the drop of water to lose its specular reflectance. If the water drop does not immediately disappear, observe the water drop from other positions until it finally vanishes. The end point will be the time, in seconds less than 60, which it takes the water drop to no longer reflect light and appear only as a dull wet spot.

7.6 Record the elapsed time. If the water drop disappears immediately, record as "zero." When the wetting time exceeds 60 s, record the time as "60 + s."

7.7 Repeat steps 7.4-7.6 for the additional four test locations.

8. Calculation and Evaluation

8.1 Average the five time readings. The shorter the average time, the more absorbent the fabric.

9. Precision and Bias

9.1 *Interlaboratory Study.* Tests for absorbency of textiles were conducted in 1992, with five laboratories evaluating seven fabrics. Participating laboratories were presumed to be performing the test method under statistical control, without verification.

9.1.1 The analysis of variance technique was applied to the data set. The analysis is being retained for reference at the AATCC Technical Center.

9.2 *Precision.*

9.2.1 When two or more laboratories wish to compare test results, it is recommended that laboratory level be established between them prior to beginning test comparisons.

9.2.2 Critical differences for single fabric comparisons and for multiple fabric comparisons are given in Tables I and II, respectively.

Table I—Critical Difference for Single Fabric Comparisons (seconds) (95% probability)

Det/ Avg	Single Operator	Within Laboratory	Between Laboratory
2	2.5	2.5	4.1
4	1.8	1.8	3.7
5	1.6	1.6	3.6
10	1.1	1.1	3.5

Table II—Critical Difference for Multiple Fabric Comparisons (seconds) (95% probability)

Det/ Avg	Single Operator	Within Laboratory	Between Laboratory
2	4.0	4.0	7.1
4	3.6	3.6	6.8
5	3.5	3.5	6.8
10	3.3	3.3	6.7

9.2.3 If difference comparisons are made on a single fabric, critical differences in Table I are used, with units of seconds.

9.2.4 If difference comparisons are made on multiple fabrics, critical differences in Table II are used, with units in seconds.

9.2.5 The number of determinations in an average (Det/Avg) is a factor in determining the magnitude of critical differences.

9.2.6 If two laboratories are shown to be in statistical control and operating at comparable levels, the magnitude of applicable critical differences may be less than those given in these tables, and may be determined by data from comparison trials between them.

9.3 *Bias.* The true value of absorbency of bleached fabrics can be defined only in terms of a test method. There is no independent method for determining the true value. In estimating this property, the test method has no known bias.

10. Note

10.1 It has been observed that if specimens collected at drying cans are not brought to moisture equilibrium, the wetting times could falsely indicate poor absorbency for that fabric.