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# Test Method for Vertical Wicking Rate of Textiles: to Specified Times

## Foreword

Various versions of the vertical wicking test have been used to evaluate textiles for many years. In 2004, AATCC and ASTM International jointly published *Technical Supplement*, a collection of unofficial industry procedures. This test method is a more thorough and standardized version of the vertical wicking procedure published in the *Technical Supplement*. When it was first published, this test method included options for measuring wicking rate to specified distances and to specified times. In 2021, the rate to specified distance remained in AATCC TM197 while the rate to specified times option was transferred to this method.

## 1. Purpose and Scope

1.1 This test method is used to evaluate the ability of fabric specimens to transport liquid vertically when a cut edge is submerged.

1.2 This method is applicable to woven, knitted, or nonwoven fabrics.

## 2. Principle

2.1 The distance liquid travels vertically up a fabric specimen from a submerged cut edge is visually observed, manually timed and recorded at specified intervals.

2.2 The movement of liquid along a fabric may be influenced by fiber content, fabric construction, mechanical or chemical processing or a combination of these.

2.3 Results are reported as wicking rates (distance per unit of time) for a short period (120 s) and a long period (600 s).

## 3. Referenced Documents

NOTE: Use current versions of all publications unless otherwise specified.

3.1 AATCC LP1, Laboratory Procedure for Home Laundering: Machine Washing (see 16.1).

3.2 AATCC TM197, Test Method for Vertical Wicking Rate of Textiles: to Specified Distances (see 16.1).

3.3 ASTM D123, Standard Terminology Relating to Textiles.

3.4 ASTM D1331, Standard Test Methods for Surface and Interfacial Tension of Solutions of Paints, Solvents, So-

lutions of Surface-Active Agents, and Related Materials.

3.5 ASTM E1402, Standard Guide for Sampling Design.

3.6 ASTM D1776, Standard Practice for Conditioning and Testing Textiles.

## 4. Terminology

4.1 **absorption**, n.—a process in which one material (the absorbent) takes in another (the absorbate); as the absorption of moisture by fibers. (ASTM D123)

4.2 **capillary action**, n.—the process by which a liquid flows through narrow spaces via forces of adhesion, cohesion, and surface tension, and without the use of external forces, such as gravity.

4.3 **fabric**, n.—in *textiles*, a planar structure made from yarns or fibers (ASTM D123).

4.4 **vertical wicking**, n.—in *a textile held vertically*, the upward movement of liquid via absorption or capillary action.

4.5 **vertical wicking rate**, n.—the speed at which liquid travels along or through a textile

4.6 **wicking**, n.—in *textiles*, the movement of a liquid, by capillary action, along or through a material.

4.7 **wicking distance**, n.—the linear measurement that the liquid travels along or through a textile from starting point to a stopping point.

4.8 **wicking time**, n.—the measurable period during which liquid travels along or through a textile

## 5. Safety Precautions

5.1 The safety precautions specified in the method/procedure are ancillary to the testing procedures and are not intended to be all inclusive.

5.2 It is the user's responsibility to reference applicable safety data sheets, use safe and proper techniques, and wear appropriate personal protective equipment in handling materials in this standard.

5.3 Users MUST consult manufacturers for specific details such as equipment operating instructions and other recommendations. Consult and follow all applicable health and safety regulations (e.g., OSHA standards and rules).

## 6. Limitations

6.1 Liquids other than distilled or deionized water (tinted water, dye solutions, etc.) may be used in this test. Solu-

tions of different surface tensions may yield different results.

6.2 The procedure measures the time for water to move vertically upward from the submerged cut edge of a specimen, but does not duplicate an end-product's exposure during wear.

6.3 The results obtained by this test are not a measure of comfort which is beyond the scope of this method.

6.4 The relationship between results obtained by vertical and horizontal wicking tests is not known.

## 7. Apparatus, Reagents, Materials (see 16.2)

7.1 Distilled or deionized water at  $21 \pm 2^\circ\text{C}$  ( $70 \pm 4^\circ\text{F}$ ).

7.2 Marking pens, with fine point, permanent and soluble ink (see 16.3).

7.3 Stopwatch or digital timer.

7.4 Measuring tape or ruler, mm graduations.

7.5 Surface tensiometer, if using liquid other than distilled or deionized water (see 11.1).

7.6 Erlenmeyer flask, 500 mL; or rectangular pan, long enough to accommodate all specimens side-by-side

7.7 Scissor jack, if using Erlenmeyer flask.

7.8 Means of suspending specimen(s) into a flask or pan (see Fig. 2 and Fig. 3).

7.9 Small straight pins (optional, see 11.2).

7.10 Powder-free disposable gloves, e.g., latex or nitrile.

## 8. Sampling

8.1 Test results are valid only when the samples are statistically representative (see ASTM E1402).

8.2 Sampling must be random. Every unit of product must have a mathematically equal chance of becoming a sample; and every portion of each sample must be equally likely to become a test specimen.

8.3 All specimens must be alike within the variations due to pure chance. There must be no differences within samples assignable to known causes.

## 9. Specimens

9.1 Liquid may wick up front and back of fabric at different rates. Upon agreement among interested parties, determine whether both fabric sides are to be measured. If only one fabric side is to be