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# Drying Rate of Textiles at their Absorbent Capacity: Air Flow Method

**Developed in 2012 by AATCC Committee RA63; reaffirmed 2013, 2014; revised 2015, 2017; editorially revised 2016.**

## Foreword

As moisture management products have entered the marketplace, measurement of the drying characteristics of textiles has gained additional importance. The 2008 AATCC-ASTM International *Moisture Management Technical Supplement: Applicable to Apparel, Linens, and Soft Goods* contains three techniques for the measurement of drying times of textiles. This test method is an additional approach to the drying test methods outlined in the *Technical Supplement*.

## 1. Purpose and Scope

1.1 This test method determines the drying rate of textiles at their absorbent capacity.

1.2 This method is not for testing the drying rate for textiles taken from socks or hosiery.

## 2. Principle

2.1 This method determines the drying rate of textiles based on the evaporation rate that occurs at their approximate absorbent capacity.

## 3. Terminology

3.1 **absorbent capacity,** n.—the maximum amount of liquid a material can hold; dependent on the specific test method used.

3.2 **drying rate,** n.—the change in volume per unit time a liquid evaporates from a textile.

NOTE: Drying rate is dependent upon textile construction, fiber content, apparel construction, finishes, the atmosphere in which the test is performed, and the volume challenge of the liquid.

3.3 **drying time,** n.—the time it takes for a specified amount of liquid to evaporate from a textile under controlled testing conditions.

NOTE: In this test method a series of different amounts of water are used to challenge the specimen. The testing conditions are controlled by the analyzer and room conditions.

3.4 **end time,** n.—the time at which the temperature goes through an inflection between the steepest slope and the flat sections of the temperature versus time plot (see Fig. 2 and 11.2).

3.5 **start time,** n.—the time at which the water challenge is added to the specimen.

## 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 materials 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.

4.2 The manufacturer's safety recommendations should be followed when operating laboratory testing equipment.

## 5. Uses and Limitations

5.1 This test is performed under controlled laboratory temperature and relative humidity conditions.

5.2 In order to provide consistent results, consistent air flow is needed. The apparatus used in this method uses 2.5 ± 0.5 m/s air flow through a 13 ± 0.1 cm diameter opening with no specimen present. The results will vary if other rates of air flow are used. While the test may be performed at alternative conditions, for comparison of results, the same conditions must be used.

5.3 This method is limited to textiles—tested on the non-face side—that exhibit a maximum absorbency time of 30 s as measured by AATCC Test Method (TM) 79, Absorbency of Textiles (see 14.1). It is not applicable to textiles that exhibit absorbency of more than 30 s.

## 6. Apparatus and Materials

6.1 Temperature recorder, with capabilities to take readings every 1 s, data storage and transmittal to computer data file (see Fig. 1).

6.2 Infrared thermocouple probe—temperature range of 15.0-50.0 ± 0.1°C (59.0-122.0 ± 0.18°F) (see Fig. 1).

6.3 Fan box (16.5 ± 0.1 × 16.5 ± 0.1 × 27.5 ± 0.1 cm) which generates 2.5 ± 0.5 m/s of air flow through a 13.0 ± 0.1 cm diameter opening (see Fig. 1).

6.4 Variable volume micropipette(s) (range from 0.050 to 1.000 ± 0.8% mL) (see Fig. 4) or a high precision pump.

6.5 Paper towels, 5 × 14 cm, a color that will exhibit a color change when wet (light blue preferred) (see Fig. 1).

6.6 Anemometer—hot wire-type, capable of measuring air flow from 0.1 to 5.0 ± 0.1 m/s (see Fig. 1).

6.7 Embroidery hoop (see 14.1).

6.8 Deionized or distilled water.

6.9 Rigid material (e.g., cardstock) for circular mounting template.

6.10 Water drop detection sensor, capable of detecting a water drop after it has passed through a test specimen (optional).

6.11 Commercially available tester (see 14.3).

## 7. Sampling

7.1 Take rolls representative of a lot sample. If testing a textile from end items, take three items from each lot.

## 8. Test Specimens

8.1 From each textile sample, cut three specimens (15.0 × 15.0 ± 0.5 cm) from right, center, and left locations across the sample width for each test.

8.2 If testing garments or end-products, take specimens from different sections of the garment; i.e., sleeve, back and front.

8.3 Construct a circular mounting template (see 6.9) the size of the tester opening (13 ± 0.1 cm diam). Trace the template on the back side of the specimen.

## 9. Conditioning

9.1 Prior to testing, condition test specimens as directed in ASTM D1776, Standard Practice for Conditioning and Testing Textiles (see 14.2). Condition the specimens for at least 4 h in an atmosphere of 21 ± 2°C (70 ± 4°F), 65 ± 5% RH, by laying each specimen separately on a screen or perforated shelf of a conditioning rack.

9.2 Perform all tests in the standard atmosphere for testing.

## 10. Procedure

10.1 Mount the textile face down with the traced circle at the rim of the hoop (see 6.7) to ensure even tension across the specimen. The specimen should not sag in the middle of the hoop before the fan is turned on.

10.2 Using TM79 (see 14.1), place a drop of water on the specimen and determine the absorbency. If the absorbency is less than or equal to 30 s then proceed with the test. If greater than



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