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Drying Rate of Fabrics: Heated Plate Method

Developed in 2012 by AATCC Committee RA63; reaffirmed 2013, 2014.

Foreword

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

1. Purpose and Scope

1.1 This test method determines the drying rate of a fabric, exposed to a prescribed volume of water, while in contact with a heated plate set at 37°C (99°F), the skin surface temperature at which the human body starts to perspire.

1.2 This method is applicable to all types of fabrics, including knits, wovens, and non-wovens, as well as to fabrics taken from end product items.

2. Principle

2.1 This method determines the drying rate of a fabric based on the evaporative rate that occurs when the fabric is placed in contact with a prescribed amount of water at the interface of a heated metal plate, held to a constant temperature.

3. Terminology

3.1 **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 atmospheres in which the test is performed, and the volume challenge of the liquid.

3.2 **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 the amount of water is constant between tests. The testing conditions are controlled by the analyzer and the room.

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

3.4 **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. While the test may be performed at alternative conditions, for comparison of results, the same conditions must be used.

5.2 This test is performed with a set amount of water. While different amounts of water may be used, care should be taken to ensure that the water does not wick to the edge of the test specimen. If

water migrates to the edge of the sample, then it is necessary to increase the specimen size or reduce the volume and repeat the test with a new specimen. Further, when comparing results, tests must be conducted with the same amount of water.

5.3 The drying rates of fabrics with a membrane in its structure can be tested using this method as long as the moisture vapor transmission rate of the fabric is greater than 5,000 g/m²/day (see 14.1 of JIS L 1099, Method B1,) to allow for detection of water evaporation. Multi-layered composite fabrics can also be tested using this method.

5.4 When testing fabric in socks, the socks should be cut open and the inner portion of the sock placed in contact with the heated plate, to simulate contact of fabric with human skin.

6. Apparatus and Materials

6.1 Drying rate test apparatus (see Fig. 1).

6.2 Temperature recorder—with capabilities to take readings every 1 s, data storage, and transmittal to computer data file.

6.3 IR thermocouple probe—temperature range of 15.0-50.0 ± 0.1°C (59.0-122.0 ± 0.18°F).

6.4 Fan box—production of 1.5 ± 0.5 m/s air flow across the width of the hot plate, measured directly behind the IR thermocouple probe.

6.5 Metal plate—30.5 × 30.5 ± 0.5 cm.

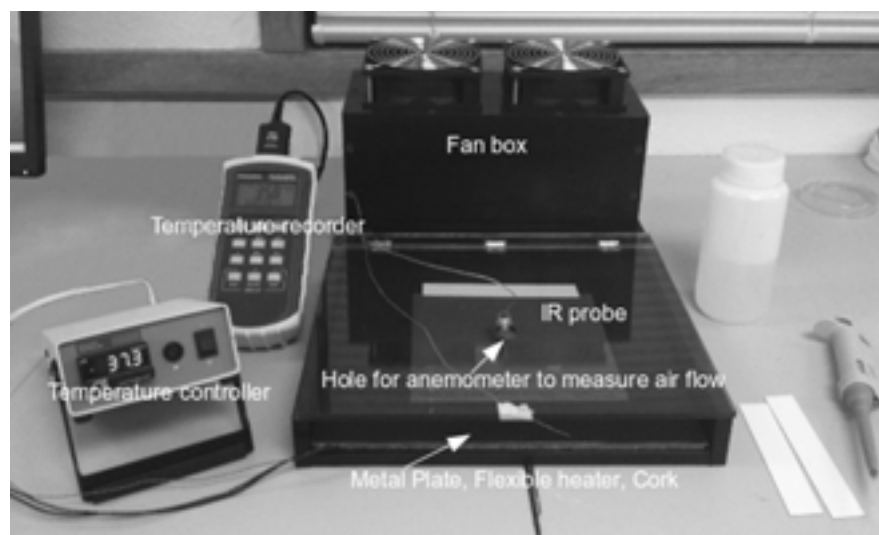


Fig. 1—Test apparatus.