



Standard Test Method for Determining The Rate of Sorption and Sorptive Capacity Of Nonwoven Fabrics¹

This standard is issued under the fixed designation D 6651; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers the quantifying of the rate of sorption of textile fabrics.

1.2 This test method applies to all textile fabrics used as wiping materials for spill removal. For additional literature see the *International Nonwovens Journal*^{2,3}.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as the standard. Within the text, the inch-pound units are shown in parentheses. The values stated in each system are not exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the specification.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

- 2.1 *ASTM Standards*:
D 123 Terminology Relating to Textiles⁴

3. Terminology

3.1 Definitions:

3.1.1 *extrinsic rate of sorption, n*—in textile fabrics, the rate at which a specified liquid is sorbed by a fabric on a per-unit-area basis under specified conditions.

3.1.1.1 *Discussion*—While extrinsic sorptive capacity is expressed in terms of volume per unit area, intrinsic capacity (below) has been used to describe capacity in terms of volume per unit mass. By way of example, if a fabric exhibited an intrinsic capacity of 5 mL/g, that mass of fabric would hold 5 mL whether it was part of a 50 g/m² or a 200 g/m² fabric. The extrinsic sorptive capacity would, however, be four (4) times

higher for the 200 g/m² fabric than for the lighter weight material.

3.1.2 *intrinsic rate of sorption, n*—in textile fabrics, the rate at which a specified liquid is sorbed by a fabric on a per-unit-mass basis under specified conditions.

3.1.3 *sorption, n*—in textile fabrics, a process in which liquid molecules are taken up either by absorption or adsorption, or both.

3.1.4 *sorptive capacity, n*—in textile fabrics, the maximum amount of liquid absorbed and adsorbed under specified conditions.

3.1.5 *wiper, n*—in textile fabrics, fabric swatches used for housekeeping, cleaning, polishing, spill clean-up or removal.

3.2 For definitions of terms used in this test method refer to Terminology D 123.

4. Summary of Test Method

4.1 A stack of wiping material squares of known mass and dimensions is placed on the surface of a thermostatically controlled tank of liquid. The time required for the stack to wet out is recorded. From these measurements and from the mass of the wetted stack of wipers, a rate of sorption through the plane of the wiper can be calculated.

5. Significance and Use

5.1 This test method can be used for acceptance testing of commercial shipments, but comparisons should be made with caution because information on estimates of between-laboratory precision is limited as noted in the precision and bias section of this test method.

5.1.1 If there are differences of practical significance between reported test results for two laboratories (or more), comparative tests should be performed to determine if there is a statistical bias between them, using competent statistical assistance. As a minimum, samples used for such comparative tests should be as homogeneous as possible, drawn from the same lot of material as the samples that resulted in disparate results during initial testing, and randomly assigned in equal numbers to each laboratory. Other fabrics with established test values may also be used for these comparative tests. The test results from the laboratories involved should be compared using a statistical test for unpaired data, at a probability level chosen prior to the testing series. If bias is found, either its cause must be found and corrected, or future test results must

¹ This test method is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.64 on Nonwovens.

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² C. F. Mattina and J. M. Oathout, "A New Method for Determining the Rate of Sorption of Wiping Materials," *Cleanrooms*, 8 (4), 18–24 (1994) and *International Nonwovens Journal*, 7(1), 48 (1995).

³ J. M. Oathout and C. F. Mattina, "A Comparison of Selected Industrial and Household Wiping Materials for Rate of Sorption, Sorptive Capacity and Strength," *International Nonwovens Journal*, 7(1), 58 (1995).

⁴ *Annual Book of ASTM Standards*, Vol. 07.01.