



Standard Test Method for Water Penetration Rate of Pressure-Sensitive Tapes¹

This standard is issued under the fixed designation D 3816/D3816M; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This test method provides one procedure for measuring the water penetration rate of 2-in. or wider pressure-sensitive tape.

1.2 The values stated in either SI or inch-pound units are to be regarded separately as standard. The values stated in each system may not be equivalent; therefore, each system must be used independently, without combining values in any way.

1.3 *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 996 Terminology of Packaging and Distribution Environments²

D 3715/D3715M Practice for Quality Assurance of Pressure-Sensitive Tapes²

D 4332 Practice for Conditioning Containers, Packages, or Packaging Components for Testing²

E 122 Practice for Calculating Sample Size to Estimate, With a Specified Tolerable Error, the Average for a Characteristic of a Lot or Process³

3. Terminology

3.1 *Definitions*—General terms in this test method are defined in Terminology D 996.

4. Summary of Test Method

4.1 The pressure-sensitive tape to be tested is secured by its adhesive to a test cup containing a desiccant. The assembly is weighed, then reweighed following submersion under a specified head of water for a specified period of time. The gain in weight is used to calculate the water penetration rate.

5. Significance and Use

5.1 The results of this test method will indicate the relative permeability by water of the tape through its smallest dimension (generally normal to the tape's backing).

5.1.1 The pathway for the water parallel to the adhesive-cup interface is great compared to the tape's thickness and the latter is usually the nearly exclusive source of transmitted water.

5.1.2 Some tape types allow a relatively free path in a direction normal to the backing or along backing pathways parallel to the adhesive-cup interface, allowing the adhesive to become the principal barrier.

5.2 If the adhesive does not continue to adhere to the cup flange during the exposure periods, allowing unintended pathways for water to occur, the measurement should be considered as not having been made. Consequently, the tape might be considered as being inappropriate for use on surfaces like the cup flange under moisture conditions approximating those of the test.

NOTE 1—It may be that the interest is simply in the tape material as a water barrier. In this case how well the tape adheres to the cup flange may be of little consequence and steps to prevent any edge effects are in order. These are referred to in Section 10.

6. Apparatus

6.1 *Test Cups*,⁴ made from materials that are nonhygroscopic. The cup shall have a *zero* water vapor transmission rate (WVTR). The cups shall be rectangular with a flat, smooth, rigid flange and shall have the following dimensions:

Flange:

Outside—50.8 by 152.4 \pm 0.5 mm [2.0 by 6.0 \pm 0.02 in.].

Inside (opening)—25.4 by 101.6 \pm 0.5 mm [1.0 by 4.0 \pm 0.02 in.].

Body:

Inside—25.4 by 101.6 by 38.1 (depth) \pm 0.5 mm [1.0 by 4.0 by 1.5 (depth) \pm 0.02 in.].

The mass shall not exceed 80 % of the balance capacity used in weighing.

6.2 *Desiccant*, calcium chloride, anhydrous, passing a No. 8 [2.36-mm] sieve.

NOTE 2—Regenerate calcium chloride to a sufficiently anhydrous state by heating it for 2 h at approximately 392°F [200°C].

6.3 *Water Container*—Any vessel allowing for sufficient

¹ This test method is under the jurisdiction of ASTM Committee D10 on Packaging and is the direct responsibility of Subcommittee D10.14 on Tape and Labels.

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² *Annual Book of ASTM Standards*, Vol 15.09.

³ *Annual Book of ASTM Standards*, Vol 14.02.

⁴ Available from Chemsultants International, 9349 Hamilton Dr., Mentor, OH 44061-1118.