



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

This standard is issued under the fixed designation D3816/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:*²

[D996 Terminology of Packaging and Distribution Environments](#)

[D3715/D3715M Practice for Quality Assurance of Pressure-Sensitive Tapes](#)

[D4332 Practice for Conditioning Containers, Packages, or Packaging Components for Testing](#)

[E122 Practice for Calculating Sample Size to Estimate, With Specified Precision, the Average for a Characteristic of a Lot or Process](#)

3. Terminology

3.1 *Definitions*— General terms in this test method are defined in Terminology [D996](#).

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

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 For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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*,³ 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 ± 0.5 mm [2.0 by 6.0 ± 0.02 in.].

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

Body:

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

³ The sole source of supply of the apparatus known to the committee at this time is Chemsultants International, 9349 Hamilton Dr., Mentor, OH 44061-1118. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.