



Standard Test Method for Rubber Property—Vapor Transmission of Volatile Liquids¹

This standard is issued under the fixed designation D 814; 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 measurement of the rate of vapor transmission of volatile liquids through a rubber sheet, disk, or diaphragm.

1.2 The values stated in SI units are to be regarded as the standard.

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 3767 Practice for Rubber—Measurement of Dimensions²

3. Significance and Use

3.1 The rate of transmission of a liquid through a rubber sheet, that acts as a barrier, is important in rubber diaphragm performance and other similar industrial applications. This transmission is referred to as vapor transmission since the liquid diffuses through the rubber in a molecular sense and escapes into free atmosphere in vapor form.

3.2 This test method is applicable only to the materials in sheet form of moderate thickness and is principally useful for comparing the relative vapor transmission of different liquids in the same rubber or of the same liquid through different rubbers. Comparisons should not be made in which both different rubbers and different liquids are used.

4. Apparatus

4.1 The test apparatus shall consist essentially of glass vapor transmission jars (4.2) for each liquid, on which the test specimens are mounted, and a suitable rack for supporting the jars in an inverted position in such a way as to allow free circulation of air over the surface of the specimen. The apparatus shall be kept in a constant temperature cabinet or room at $23 \pm 2^\circ\text{C}$ ($73.4 \pm 3.6^\circ\text{F}$).

4.2 *Vapor Transmission Jar*—A glass jar of approximately 236-cm³ (½-pt) capacity with an opening of 60.3 ± 0.4 mm

(2.375 ± 0.015 in.) in inside diameter and a wall 3.2 mm (0.125 in.) in thickness at the opening, which shall be ground flat without rounded edges to a smooth ground-glass finish at the contact surface. The opening shall be equipped with a metal screw ring clamp holding a smooth-edged, flat, sheet-metal ring 55.6 ± 0.4 mm (2.188 ± 0.015 in.) in inside diameter and approximately 68.3 mm (2.69 in.) in outside diameter. The ring clamp and ring serve as a clamping device for holding the specimen against the ground-glass-edge of the jar with a circular specimen area 55.6 mm (2.188 in.) in diameter exposed to the air while permitting the screw clamp to be tightened to form a leak-proof seal without subjecting the specimen to torsional strain. When testing extensible materials, a circular disk of 16 to 20-mesh screen shall be placed inside the screw ring clamp between it and the flat metal ring to prevent stretching of the specimen during the test. The screen disk may be soldered in place on top of the sheet metal ring if desired.

NOTE 1—A suitable vapor transmission jar may be prepared from a ½-pt Mason jar equipped with a Kerr-type screw cap, provided the edge of the jar is properly ground and finished with fine emery and the cap is cut with smooth, flattened edges to form the required circular opening.

4.3 *Dial Micrometer*—The dial micrometer shall conform to the requirements of Method A of Practice D 3767.

4.4 *Balance*—The balance shall be of suitable capacity capable of weighing to 0.005 g.

5. Test Specimen

5.1 The test specimens shall consist of circular disks 68 mm (2.69 in.) in diameter, cut with a sharp-edged die from a sheet of the material being tested. The thickness of the sheet, which shall not exceed 3.2 mm (0.125 in.), shall be measured using the dial micrometer described in 4.3.

5.2 For evaluating the vapor transmission of a particular liquid with respect to a given rubber, three specimens having the same nominal thickness within a tolerance of $\pm 3\%$ shall be tested. The vapor transmission of the liquid shall be taken as the average of the values obtained from the two rubber specimens giving the lowest results, providing these check within $\pm 20\%$ of the average so determined.

6. Procedure

6.1 With the vapor transmission jar in an upright position, place 200 cm³ of the test liquid in it, after which fit the test specimen over the mouth of the jar, place the ring and wire

¹ This test method is under the jurisdiction of ASTM Committee D11 on Rubber and is the direct responsibility of Subcommittee D11.10 on Physical Testing.

Current edition approved May 15, 1995. Published July 1995. Originally published as D 814 – 44 T. Last previous edition D 814 – 86 (1991)ε¹.

² *Annual Book of ASTM Standards*, Vol 09.01.