



Standard Test Method for Permeability of Thermoplastic Containers to Packaged Reagents or Proprietary Products¹

This standard is issued under the fixed designation D2684/D2684M; 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 procedures for determining the permeability of thermoplastic containers to packaged reagents or proprietary products under specified conditions of exposure. The exposures used are intended to simulate the normal and elevated temperature-storage conditions that might be encountered in end-use application.

1.2 This test method is applicable only to those types of containers designed to allow positive, leakproof closure.

1.3 Two procedures are provided:

1.3.1 *Procedure A* is specific to testing only with a standard design container. This procedure provides for determinations of rate of weight loss (or gain) and for calculation of a permeability factor.

1.3.2 *Procedure B* applies to tests of all other container designs. Permeability data by this procedure are expressed only in terms of rate of weight loss (or gain) for the particular container tested.

1.4 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

NOTE 1—There is no known ISO equivalent to this standard.

1.5 *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.*

¹ This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.19 on Film, Sheeting, and Molded Products.

Current edition approved Sept. 1, 2015. Published September 2015. Originally approved in 1968. Last previous edition approved in 2010 as D2684 - 10. DOI: 10.1520/D2684_D2684M-15.

2. Referenced Documents

2.1 *ASTM Standards*:²

D618 Practice for Conditioning Plastics for Testing

D4976 Specification for Polyethylene Plastics Molding and Extrusion Materials

D1505 Test Method for Density of Plastics by the Density-Gradient Technique

E145 Specification for Gravity-Convection and Forced-Ventilation Ovens

3. Terminology

3.1 *Definitions*:

3.1.1 *permeability factor*, P_t —the permeability of a given plastic to a given product at temperature t , in degrees Celsius, expressed in units of g·cm/day·m², as determined by Procedure A. The permeability factor under 23°C test conditions, for example, is signified by the notation P_{23} .

3.1.1.1 *Discussion*—Determination of P_t is based on an averaged wall thickness over the entire area of the container and an assumption that permeation rate is inversely proportional to the thickness. Precaution in the extent of allowable variations of these factors is recommended, and the user of P_t needs to recognize that wall thickness of the containers varies, that the estimate of average thickness from density, area, and weight is not exact, and that permeability of the product through the plastic material is, generally, not directly proportional to the thickness.

4. Summary of Test Method

4.1 Test bottles are filled with the test product and, after sealing, are exposed at 23°C [73.4°F] and 50°C [122°F] conditions for 28 days or longer. Measurements of weight are made at intervals to determine the average rate of weight change.

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.