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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Test Methods for Water Vapor Transmission of Shipping Containers— Constant and Cycle Methods¹

This standard is issued under the fixed designation D 4279; 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 These test methods cover the determination of water vapor transmission rates for bulk shipping containers, as follows:

1.1.1 Method A, for Reclosable Containers, and

1.1.2 Method B, for Containers Not Designed for Reclosing.

1.2 Within each procedure details are given for the constant and cycle methods of test atmosphere.

1.3 The test may be applied to the container as packed, or after one or more performance tests such as drum (Method D 782), vibration (Methods D 999), drop (Test Method D 5276), impact resistance (Test Methods D 880, D 4003, and D 5277), or performance tests (Practice D 4169), as required.

1.4 For small shipping containers requiring greater accuracy in weighing, the water vapor transmission may be determined in accordance with Test Method D 895 or Test Method D 1251.

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.*

2. Referenced Documents

2.1 ASTM Standards:

D 782 Method of Testing Shipping Containers in Revolving Hexagonal Drum²

D 880 Method of Incline Impact Test for Shipping Containers²

D 895 Test Method for Water Vapor Permeability of Packages²

D 996 Terminology of Packaging and Distribution Environments²

D 999 Methods for Vibration Testing of Shipping Containers²

D 1251 Test Method for Water Vapor Permeability of Packages by Cycle Method²

D 4003 Methods of Controlled Horizontal Impact Test for

Shipping Containers²

D 4169 Practice for Performance Testing of Shipping Containers and Systems²

D 5276 Test Method for Drop Test of Loaded Containers by Free Fall²

D 5277 Test Method for Performing Programmed Horizontal Impacts Using an Inclined Impact Tester²

3. Terminology

3.1 *Definitions*—General definitions for the packaging and distribution environments are found in Terminology D 996.

3.2 *Definitions of Terms Specific to This Standard: Descriptions of Terms Specific to This Standard:*

3.2.1 *water vapor transmission rate of a shipping container (constant atmosphere method)*—for the purpose of this test method, the rate at which water is transmitted into the container from the test atmosphere (normally of $90 \pm 2\%$ relative humidity and a temperature of $100^\circ \pm 2^\circ\text{F}$ ($37.8^\circ \pm 1.1^\circ\text{C}$)) surrounding it while a desiccant is sealed within.

3.2.2 *water vapor transmission into a container (cycle atmosphere method)*—for this test method, the amount of water transmitted into the container from the test atmosphere during one cycle while a desiccant is sealed within.

3.2.3 *cycle*—one series of test atmospheres to which the test specimens are exposed. Normally one cycle will consist of 1 week of exposure to a temperature of $0^\circ \pm 5^\circ\text{F}$ ($-17.8^\circ \pm 2.8^\circ\text{C}$) to be followed by 3 weeks of exposure at a temperature of $100^\circ \pm 2^\circ\text{F}$ ($37.8^\circ \pm 1.1^\circ\text{C}$) and a relative humidity of $90 \pm 2\%$.

4. Significance and Use

4.1 These test methods are normally used for the following purposes:

4.1.1 To evaluate materials and constructions for a specific type of container,

4.1.2 To compare performance of different types of containers,

4.1.3 To determine adequacy of protection for a specific product or application, and

4.1.4 To maintain quality control.

METHOD A—RECLOSABLE CONTAINERS

5. Apparatus

5.1 *Desiccant*—A desiccant shall be used that has a powerful affinity for water and a high drying efficiency, that is, a low

¹ These test methods are under the jurisdiction of ASTM Committee D-10 on Packaging and are the direct responsibility of Subcommittee D10.23 on Storage Test Methods.

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