



Standard Test Method for Penetration of Liquids into Submerged Loaded Shipping Containers¹

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1. Scope

1.1 This test method covers the determination of the amount or extent of penetration of liquids into finished packages or containers when closed and sealed for shipment. The test may be applied to small or shelf-size packages or to bulk-size containers, as required.

1.2 This test method may be used in conjunction with other tests made prior to or after compression, drop, impact resistance, drum, vibration, or actual shipping tests.

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 whoever uses this standard to consult and 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

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology D 996.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *penetration of liquid into submerged container*—for the purposes of this test, the amount or extent of penetration of liquid through (as distinguished from amount, if any, absorbed by the container itself) (1) the sealed closure, (2) the seams or joints included in the structure of the container, or (3) the body or walls of the container.

4. Significance and Use

4.1 This test method is frequently used in conjunction with other tests made prior to or after the liquid penetration test, such as the Drop Test, Impact Resistance Test, Compression Test, Vibration Test, and Drum Test, 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 of application, and

4.1.4 To maintain quality control.

NOTE 1—Since this test is broad in scope and may involve wide varieties of materials and containers, considerable judgment and discretion will be necessary in applying the test procedure, in examining, evaluating, and interpreting the results.

5. Apparatus and Materials

5.1 *Liquid*—The liquid used shall be water unless the special nature of the test shall require the use of some other liquid. All liquids used shall be at a temperature of $73.4 \pm 3.6^\circ\text{F}$ ($23 \pm 2^\circ\text{C}$) for the duration of the test.

5.2 *Submerging Tank*—A suitable watertight tank or vessel of sufficient size to submerge one or more of the test containers, as specified in 7.2, shall be used. The tank shall be equipped with means of suspending or supporting the test containers at varying or predetermined positions as specified in Section 7 and shall be constructed to provide well-distributed, even support for the test containers so that stresses due to weight or to buoyancy when immersed are not concentrated and excessive. Panels made of narrow slats with rounded bearing edges and spaced as closely as required should prove satisfactory.

5.3 *Weighing Equipment*—Submersion tests may or may not include mass observations during the progress of the test, as specified or required. When mass observations are required, scales shall be provided capable of weighing accurately to 0.1 % of the combined mass of container and contents and shall be so arranged that masses may be observed without disturbing the container unduly during the test.

6. Test Specimens

6.1 Test specimens shall be representative of the packages under test and shall be closed and sealed in the normal manner. If material used in filling containers differs from that normally packed, it shall have similar physical characteristics of mass per unit of volume, absorptive characteristics, flow, granular structure, etc. The container and contents shall be allowed to reach a temperature of $73.4 \pm 3.6^\circ\text{F}$ ($23 \pm 2^\circ\text{C}$) before testing.

¹ This test method is under the jurisdiction of ASTM Committee D-10 on Packaging and is the direct responsibility of Subcommittee D10.23 on Natural Environment Test Methods.

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