



Designation: D1975 – 21

Standard Test Method for Environmental Stress Crack Resistance of Plastic Injection Molded Open Head Pails¹

This standard is issued under the fixed designation D1975; 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 provides procedures for an indication of the environmental stress crack resistance of plastic injection molded open head pails, covers, and components as a summation of the effects of container design, resin, manufacturing conditions, field performance, and other factors.

1.2 This test method may be used to evaluate a container's resistance to mechanical failure by cracking when in the presence of chemical and physical stresses.

1.3 Two procedures are provided as follows:

1.3.1 *Procedure A, Specified Stress-Crack Resistance Test Method*—This procedure is particularly useful for quality control since the conditions of the test are specified.

1.3.2 *Procedure B, User Selected Stress-Crack Resistance Test Method*—This procedure allows individual selection of test levels and is particularly useful as a design and development tool.

1.4 These procedures are not designed to test the ability of the cover gasketing material or closure to retain the test reagent. Loss or leakage of the reagent through these openings does not constitute container failure. However, this may indicate an internal pressure loss that might affect test results.

1.5 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.6 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* Specific warning statements are given in [6.2](#), [10.2.3](#), [10.2.4](#), [10.2.6](#), and [10.2.8](#).

1.7 *This international standard was developed in accordance with internationally recognized principles on standard-*

ization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 *ASTM Standards:*²

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

[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*—Reference Terminology [D996](#) for definitions applicable to this test method.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *environmental stress crack*—an external or internal crack that develops when a container is exposed to chemical or physical stresses, or both.

3.2.2 *stress crack failure*—any environmental stress crack that causes a loss or leakage of the test reagent shall be interpreted as container failure.

4. Summary of Test Method

4.1 The environmental stress-crack resistance is determined by subjecting an injection molded open head pail and cover that is filled and sealed with a stress-crack reagent to a mechanical top load at elevated temperatures. The recommended minimum test duration shall be 14 days, or as specified by the user. The time to stress-crack failure is observed.

4.1.1 Procedure A exposes a minimum of three containers to specified levels of chemical and physical stresses.

4.1.2 Procedure B exposes containers to varying chemical and physical stresses based on the user's knowledge and objectives.

¹ This test method is under the jurisdiction of ASTM Committee [D10](#) on Packaging and is the direct responsibility of Subcommittee [D10.21](#) on Shipping Containers and Systems - Application of Performance Test Methods.

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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.

*A Summary of Changes section appears at the end of this standard