



Designation: D2659 – 16 (Reapproved 2023)

Standard Test Method for Column Crush Properties of Blown Thermoplastic Containers¹

This standard is issued under the fixed designation D2659; 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 determination of mechanical properties of blown thermoplastic containers, whether blown commercially or in the laboratory, loaded under columnar crush conditions at a constant rate of compressive deflection.

NOTE 1—Although this test method was developed specifically for blow-molded containers, the general procedure can also be applied to containers of suitable geometries produced by other means, for example, thermoforming, injection molding, etc.

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

NOTE 2—There is no known ISO equivalent to this 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization 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

D618 Practice for Conditioning Plastics for Testing

D883 Terminology Relating to Plastics

D4976 Specification for Polyethylene Plastics Molding and Extrusion Materials

E4 Practices for Force Calibration and Verification of Testing Machines

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.

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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.

E83 Practice for Verification and Classification of Extensometer Systems

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method and associated with plastics issues refer to the terminology contained in ASTM D883.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *apparent crushing stiffness*—the ratio of the crushing load to the corresponding deflection at a point on the linear portion of the crushing load deflection curve (expressed in newtons per metre (or pounds per inch)).

3.2.2 *column*—a compression member that is axially loaded.

3.2.3 *crushing load at failure*—the crushing load applied to a blown thermoplastic container that produces a failure by fracture or parting of the material in any portion of said container (expressed in kilograms (or pounds)).

3.2.4 *crushing yield load*—the first load at which an increase of deflection occurs with no increase in load in a compressive crushing test (expressed in units of kilograms (or pounds) of load).

NOTE 3—In some cases, usually as a result of design or styling features, or both, of a specific container, multiple values of the crushing yield load are observed, that is, a small deflection occurs with no increase or with a decrease in the crush load, followed by resumption of the normal crush load change with deflection. This phenomenon cannot be ignored in the evaluation of the column crush properties of a blown thermoplastic container, since it can be a very useful designated failure point for the application under consideration. The load at which this abrupt change occurs can be chosen as a crushing yield load for study. In such a case, the report of results should be accompanied by a proper description of the crushing yield load selected.

3.2.5 *deflection at crushing yield load*—the decrease in length of the container specimen produced at the crushing yield load along the center line of testing (axis of crushing, see Fig. 1) (expressed in millimetres (or inches)).

3.2.6 *gage length*—the original length of that portion of the specimen over which strain or change in length is determined.

4. Significance and Use

4.1 Column crush tests only provide information about the crush properties of blown thermoplastic containers when