



Designation: D1822 – 21

Standard Test Method for Determining the Tensile-Impact Resistance of Plastics¹

This standard is issued under the fixed designation D1822; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope*

1.1 This test method covers the determination of the energy required to rupture standard tension-impact specimens of plastic materials. Rigid materials are suitable for testing by this method as well as specimens that are too flexible or thin to be tested in accordance with other impact test methods.

1.2 The values stated in SI units are to be regarded as standard. The values given in parentheses are for information only.

NOTE 1—This test method and [ISO 8256](#) address the same subject matter, but differ in technical content.

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

- [D256](#) Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics
- [D618](#) Practice for Conditioning Plastics for Testing
- [D638](#) Test Method for Tensile Properties of Plastics
- [D883](#) Terminology Relating to Plastics
- [D4000](#) Classification System for Specifying Plastic Materials
- [D5947](#) Test Methods for Physical Dimensions of Solid Plastics Specimens

¹ This test method is under the jurisdiction of ASTM Committee [D20](#) on Plastics and is the direct responsibility of Subcommittee [D20.10](#) on Mechanical Properties. Current edition approved Oct. 1, 2021. Published November 2021. Originally approved in 1961. Last previous edition approved in 2013 as D1822-13. DOI:10.1520/D1822-21.

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. DOI: 10.1520/D1822-06.

[D6988](#) Guide for Determination of Thickness of Plastic Film Test Specimens

[E177](#) Practice for Use of the Terms Precision and Bias in ASTM Test Methods

[E456](#) Terminology Relating to Quality and Statistics

[E691](#) Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

2.2 ISO Standards:

[ISO 8256](#) Plastics—Determination of Tensile-Impact Strength

3. Terminology

3.1 *Definitions*—Terms used in this standard are defined in accordance with Terminology [D883](#), unless otherwise specified. For terms relating to precision and bias and associated issues, the terms used in this standard are defined in accordance with Terminology [E456](#).

4. Summary of Test Method

4.1 The energy utilized in this test method is delivered by a single swing of a calibrated pendulum of a standardized tension-impact machine. The energy to fracture a specimen, by shock in tension, is determined by the kinetic energy extracted from the pendulum of the impact machine in the process of breaking the specimen. One end of the specimen is mounted in the pendulum. The other end of the specimen is gripped by a crosshead which travels with the pendulum until the instant of impact (and instant of maximum pendulum kinetic energy), when the crosshead is arrested.

5. Significance and Use

5.1 Tensile-impact energy is the energy required to break a standard tension-impact specimen in tension by a single swing of a standard calibrated pendulum under a set of standard conditions (see [Note 2](#)). To compensate for the minor differences in cross-sectional area of the specimens, the energy to break is normalized to units of kilojoules per square metre (or foot-pounds-force per square inch) of minimum cross-sectional area. An alternative approach to normalizing the impact energy that compensates for these minor differences and still retains the test unit as joules (foot-pounds) is shown in [Section 10](#). For a perfectly elastic material, the impact energy is usually reported per unit volume of material undergoing deformation. However, since much of the energy to break the plastic

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