



Designation: D3746/D3746M – 85 (Reapproved 2022)

# Standard Test Method for Impact Resistance of Bituminous Roofing Systems<sup>1</sup>

This standard is issued under the fixed designation D3746/D3746M; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This test method covers the determination of the resistance of bituminous roofing systems to impact loads at any desired temperature, with a missile of the weight, size, and shape specified herein.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the 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.* For specific precautionary statements, see Section 6.

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:*<sup>2</sup>

[D2829/D2829M Practice for Sampling and Analysis of Existing Built-Up Roof Systems](#)

## 3. Summary of Test Method

3.1 This test method subjects 305 by 305-mm [12 by 12-in.] specimens of a roofing system (insulation and membrane complete with top surfacing) to a series of four impacts, one in

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

each quadrant, from a standard missile falling freely from a predetermined height with an impact energy of 30.0 J [22 lbf·ft]. Damage to the membrane is assessed by visual examination of the felts after solvent extraction of the bitumen.

3.2 The effect of specimen temperature on impact resistance can be studied by running the test in an environmental chamber at any desired temperature.

## 4. Significance and Use

4.1 This test method provides a means of evaluating roofing systems for resistance to impact loads of many kinds. It should also be useful in developing performance criteria for roofing systems.

## 5. Apparatus

5.1 *Vertical Guide Tube*, 1.22 m [4.0 ft] long by 60 mm [ $2\frac{3}{8}$  in.] in inside diameter, suitably positioned over a 610-mm [24-in.] square, horizontal test table constructed of wood 2 by 4s on edge, through-bolted and fitted with a centering jig to ensure proper alignment of the specimen beneath the guide tube (see Fig. 1). The guide tube is adjustable in height to accommodate differing specimen thicknesses and maintain constant missile impact energy. Provision is made at the top of the guide tube to support the missile during alignment of the specimen, and for instantaneous release of the missile to free-fall within the guide tube until contact is made with the specimen. Gravel screens are attached to the edges of the test table to retain any loose gravel that might fly from the impact area.

5.2 *Missile* (see Fig. 2), consisting of a steel cylinder 50 mm [2 in.] in diameter by 150 mm [6 in.] long, with a case-hardened hemispherical head. The mass of the missile is adjusted to 2.27 kg [5.0 lb] by the addition of lead shot to a cavity machined into the cylindrical portion and sealed with a screw cap.

## 6. Safety Precautions

6.1 Employ suitable devices for eye protection when carrying out steps in 10.1 – 10.7.3.

6.2 Use a fume hood when extracting specimens with 1,1,1 trichloroethane or xylene in 10.7.3. Trichloroethane and xylene are toxic and good ventilation should be provided.