



Designation: D7052/D7052M – 17

Standard Test Method for Determining Impact Resistance of New Low Slope Roof Membranes Using Steel Balls (Z8295Z)¹

This standard is issued under the fixed designation D7052/D7052M; 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 impact resistance of new low slope roof membranes when applied directly over rigid insulation or cover board, or structural concrete, lightweight insulating concrete, gypsum, cementitious wood fiber or wood roof decks. The procedures were developed to determine the potential for puncture or fracture of the new roof membrane resulting from impacts by free falling steel balls resulting in specific impact energies when the new roof membrane is applied over its tested substrate within an assembly.

1.2 This test method is intended to verify that products as described will meet a specific stated condition of impact resistance performance. Testing of asphalt shingles is beyond the scope of this test method. The tests yield classification identified as Class 2 and Class 3.

1.3 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 non-conformance with the standard.

1.4 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

[A295/A295M Specification for High-Carbon Anti-Friction Bearing Steel](#)

¹ This test method is under the jurisdiction of ASTM Committee D08 on Roofing and Waterproofing and is the direct responsibility of Subcommittee D08.20 on Roofing Membrane Systems.

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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.

[D1079 Terminology Relating to Roofing and Waterproofing](#)
[G154 Practice for Operating Fluorescent Ultraviolet \(UV\) Lamp Apparatus for Exposure of Nonmetallic Materials](#)

3. Terminology

3.1 For definitions of terms used in this standard, see Terminology [D1079](#).

3.2 *Definitions:*

3.2.1 *adhered roof membrane*—a single ply or base ply (part of a multi-ply system) membrane that is adhered using an adhesive.

3.2.2 *field seam*—a splice made in the field of a roof membrane which joins two sheets together using an adhesive, splicing tape, heat or solvent-welding.

3.2.3 *mechanically fastened membranes*—a single ply or base ply (part of a multi-layer system) membrane which has been positively attached at intervals to the substrate, usually with fasteners and plates, or other mechanical devices such as battens, or both.

4. Classification

4.1 *Class 2*—A designation achieved when a roof membrane subjected to an impact energy of approximately 11.0 ± 0.3 J [8.1 ± 0.2 ft-lb] in accordance to this test method meets the results stated in Section 11.

4.2 *Class 3*—A designation achieved when a roof membrane subjected to an impact energy of approximately 19.4 ± 0.4 J [14.3 ± 0.3 ft-lb] in accordance to this test method meets the results stated in Section 11.

NOTE 1—Class 1 is beyond the scope of this test method.

5. Summary of Test Method

5.1 This test method subjects roof membranes to impacts by dropping a solid steel ball ten times from the appropriate apparatus ([Figs. 1 and 2](#)) onto test samples of the roof membrane being examined.

5.2 Roof membrane samples are conditioned in a fluorescent ultraviolet condensation type artificial weathering apparatus.

5.2.1 Impact testing is performed on samples which are conditioned and not conditioned.

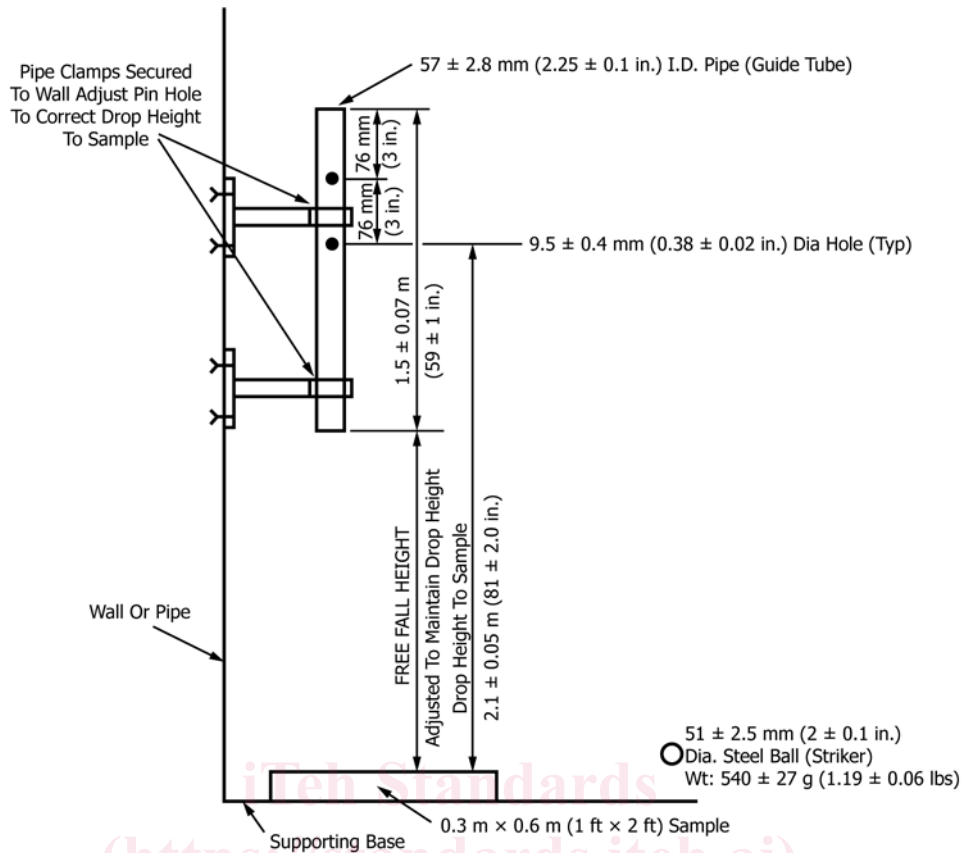


FIG. 1 Class 2 Test Setup

6. Significance and Use

6.1 This test method provides a means of evaluating new roof membranes for resistance to specific impact energies. The method evaluates new roof membranes when first applied and also after simulated deterioration caused by the ultraviolet radiation and moisture.

6.2 Use Class 2 for an impact resistance of 11.0 ± 0.3 J [8.1 ± 0.2 ft-lb] and Class 3 for an impact resistance of 19.4 ± 0.4 J [14.3 ± 0.3 ft-lb].

7. Apparatus

7.1 *Guide Tube*—The test apparatus consists of a section of a PVC pipe 57 ± 2.8 mm [2.25 ± 0.1 in.] I.D. supported above and perpendicular to the sample. This tube has two holes below the top of the tube, which allow a pin to be inserted through both sides of the tube. The pin acts as a stop for the steel ball. Adjustment is provided to maintain the drop height of the ball to accommodate different sample thicknesses (see Figs. 1 and 2).

7.2 *Striker*—A steel ball 51 ± 2.5 mm [2 ± 0.1 in.] diameter weighing 540 ± 27 g [1.19 ± 0.06 lb] meeting Specification A295/A295M-46T.

7.3 *Supporting Base*—Unless otherwise specified, the membrane-substrate assembly shall be placed directly on a flat solid concrete support such as a concrete floor (with or without tile) during impact test. The back surface of the substrate shall

be in contact with the support. If a specimen support other than flat concrete is used, it shall be indicated on the test report.

7.4 *Class 2* (Fig. 1)—A steel ball meeting Specification A295/A295M-46T, Type A is dropped from a height of 2.1 ± 0.05 m [81 ± 2 in.] onto the sample by removing the pin from the tube. This procedure generates an impact energy of approximately 11.0 ± 0.3 J [8.1 ± 0.2 ft-lb] over the impact area.

7.5 *Class 3* (Fig. 2)—A steel ball meeting Specification A295/A295M-46T, Type A is dropped from a height of 3.6 ± 0.1 m [141.2 ± 4.3 in.] onto the sample by removing the pin from the tube. This procedure generates an impact energy of approximately 19.4 ± 0.4 J [14.3 ± 0.3 ft-lb] over the impact area.

8. Sampling, Test Specimens, and Test Units

8.1 Enough material for two representative roof membrane samples, minimum 0.3 by 0.6 m [1 by 2 ft] are selected for the material to be tested.

8.1.1 For materials supplied as sheets or rolls, the sample shall incorporate a field seam constructed in accordance with the manufacturer's instructions within the assembly, in the center and parallel to the long side of the sample.

8.1.2 One new roof membrane sample, cut to the appropriate size for the apparatus being used and having an exposure area not less than 305 by 457 mm [12 by 18 in.], is conditioned

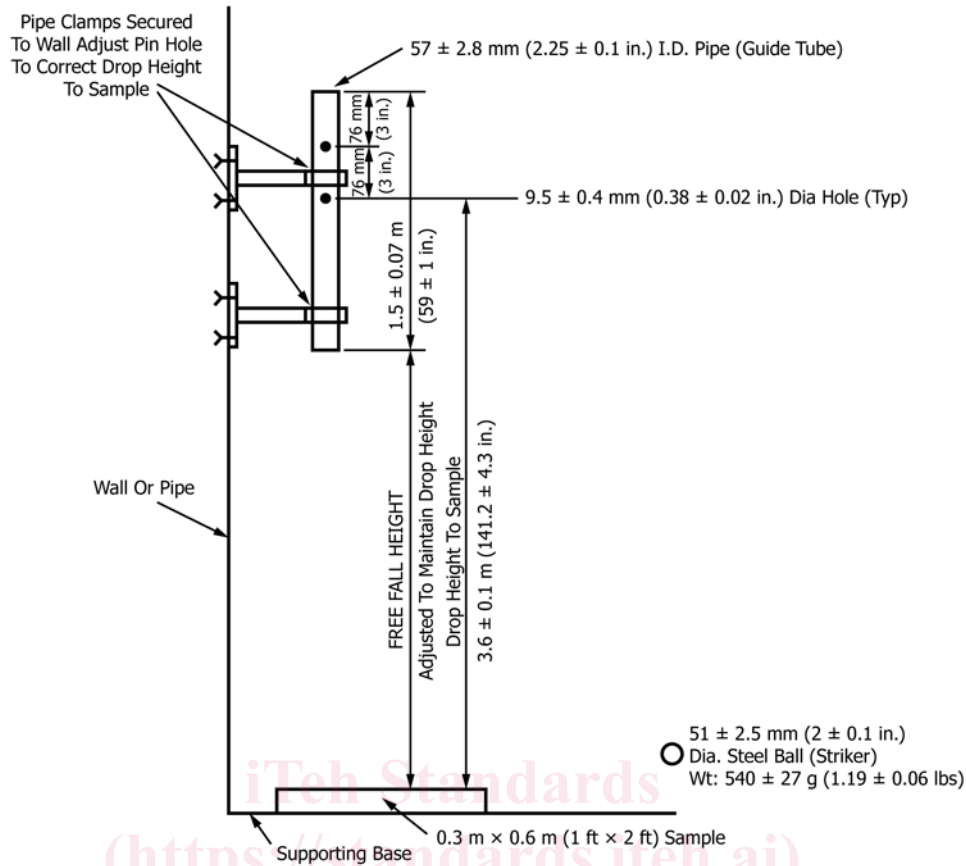


FIG. 2 Class 3 Test Setup

in a fluorescent ultraviolet condensation type artificial weathering apparatus as described in 9.1.

8.2 Adhered roof materials are installed in accordance with the manufacturer's instructions to the same substrate to be used in the field prior to conditioning (see Appendix X1). After impact testing the samples are examined for damage.

8.3 The mechanically attached roof membrane is secured in accordance with the manufacturer's instructions to the substrate to be used in the field. After impact testing, the sample is examined for damage.

8.4 For samples that incorporate fasteners and plates to secure the substrate, the substrate is applied over 3/4 in. [19 mm] thick plywood and secured to the plywood with the fastener and plate agreed to by the sponsor and test laboratory.

8.5 For roof covers that are mechanically attached, the substrate is applied over 3/4 in. [19 mm] thick plywood and the roof cover is applied over the substrate and mechanically attached to the plywood with the fastener and plate agreed to by the sponsor and test laboratory.

9. Conditioning

9.1 One roof membrane shall be conditioned for 1000 h in a fluorescent ultraviolet condensation device operated in accordance with Practice G154.

9.1.1 Use UVA 340 lamps conforming to the requirements of Practice G154.

9.1.2 Operate the device according to the following exposure cycle.

Cycle description and time	Set points	Operational fluctuation ⁴
Light – 8 hours	Uninsulated black panel temperature: 63 °C [145 °F] Irradiance (if controlled): 0.89 W/m ² at 340 nm	±3 °C [±5 °F] ±0.02 W/m ²
Dark with condensation – 8 hours	Uninsulated black panel temperature: 50 °C [122 °F]	±3 °C [± °F]
Repeat the 16 hour cycle described above continuously until the desired exposure time is reached.		

⁴The operational fluctuation is the allowed deviation from the set point of the controlled parameter indicated by the device during equilibrium conditions. If the reading indicated by the device is outside the limits defined by the operational fluctuation, discontinue the test and correct the cause of the problem before continuing.

9.2 Prior to conditioning, roof membranes fully or partially adhered to the substrate are allowed to set, that is, adhesive cure, at standard room temperatures for 28 days, if required.

9.3 Subsequent to conditioning, roof membranes are inspected for damage (see 11.1). If no damage is present, the conditioned roof membrane is subjected to impact per Section 10.

10. Procedure

10.1 Inspect the roof membrane to determine the normal condition of the membrane prior to impacting.