



Designation: G13/G13M – 21

Standard Test Method for Impact Resistance of Pipeline Coatings (Limestone Drop Test)¹

This standard is issued under the fixed designation G13/G13M; 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 the relative resistance of pipeline coatings to impact by observing the effects of falling stones on coated pipe specimens.

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 are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

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

D7091 Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals

G62 Test Methods for Holiday Detection in Pipeline Coatings

¹ This test method is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.48 on Durability of Pipeline Coating and Linings.

Current edition approved June 1, 2021. Published July 2021. Originally approved in 1989. Last previous edition approved in 2013 as G13/G13M – 13. DOI: 10.1520/G0013_G0013M-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.

2.2 AASHTO Standard:³

M80–51 (No. 67) Specification for Coarse Aggregate for Portland Cement Concrete

3. Summary of Test Method

3.1 The impact resistance of pipeline coatings is determined by dropping weighed amounts of a specified type of limestone through a chute onto a coated pipe specimen. Results are reported as the number of drops required to pierce through the coating to bare metal, as determined visually and electrically.

4. Significance and Use

4.1 This test method is intended to simulate the effects of backfilling after pipe has been placed in the trench. The backfill is often rocky soil and, if it is unscreened and the coated pipe is unshielded by sand or other protective padding, the falling rocks may seriously damage the coating.

5. Apparatus

5.1 The impact apparatus shall be essentially as shown in Fig. 1 and shall include the following:

5.1.1 *Box with Chute*, providing a means of dropping stones from a height of 1830 mm [6.0 ft] measured to the top of a piece of coated pipe under test. Construction details are shown in Fig. 2.

NOTE 1—The box and chute described in Fig. 2 are designed for testing coatings on 100-mm [4-in.] and 150-mm [6-in.] pipe specimens. Smaller diameter pipe may be used by inserting wood V-blocks in the trough in the box below the chute.

5.1.2 *Stones*, hard, coarse, limestone aggregate, conforming to AASHTO Designation: M80-51 (No. 67) which is taken from American Association of State Highway and Transportation Officials "Standard Specifications for Coarse Aggregate for Portland Cement Concrete."

NOTE 2—These specifications cover the quality and size of coarse aggregate. No. 67 designates a 19-mm [$\frac{3}{4}$ -in.] to No. 4 size stone with the following sieve analysis:

³ Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001, <http://www.transportation.org>.

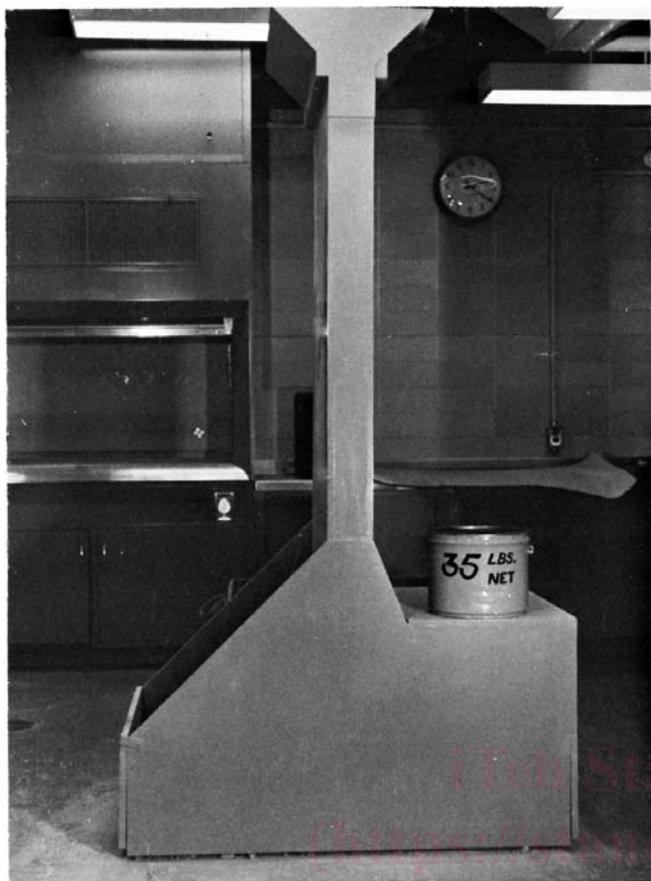
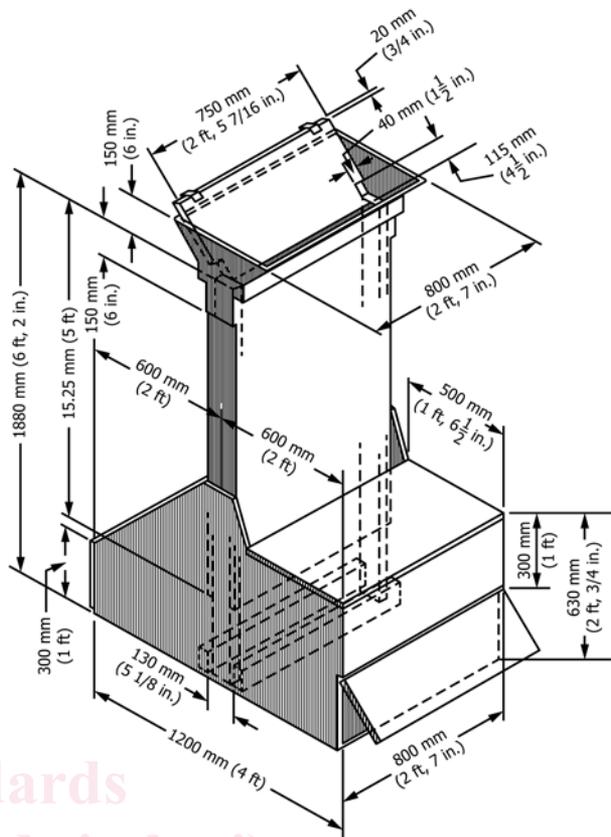


FIG. 1 Box, Chute, and Bucket



NOTE 1—Framing lumber 40 by 90 mm [2 by 4 in.]; all other material 20 mm [3/4 in.].

FIG. 2 Construction Details of Box and Chute

Square Opening, mm [in.]	Weight % Passing
25 [1]	100
19 [3/4]	95 to 100
10 [3/8]	20 to 55
No. 4	0 to 10

7. Procedure

7.1 Condition the sample to a temperature of 21 to 25°C [70 to 77°F] unless otherwise specified. The test specimen may need to be conditioned at a higher or lower temperature so that it will reach the prescribed test temperature at the time of impact if the test temperature is different than the room temperature.

7.2 Measure the temperature of the specimen surface using a surface temperature thermometer immediately prior to testing.

7.3 Place the test specimen in the trough below the chute. Mark the upward facing surface of the test specimen so that the pipe can be positioned in the same manner in subsequent trials. Insert the retaining board in the top part of the chute and hold it in place across the chute opening with a suitable metal or wood clip. Weigh 16 ± 0.2 kg [35 ± 0.5 lb] of stones into the bucket. Lift the bucket to the top of the chute. Empty the stones into the trough formed by the hopper walls and the retaining board so that the stones are distributed evenly in the trough. Detach the holding clip from the retaining board and tilt the board forward to release the stones. Experience with this procedure has indicated that the stones are so constricted within the narrow confines of the chute that they fall in a uniform manner.

5.1.3 *Bucket*—Any suitable bucket that will hold 16 kg [35 lb] of stones.

5.1.4 *Holiday Detectors*—High or low voltage detector (as appropriate based on coating thickness) is needed as described in Test Methods G62.

NOTE 3—A holiday is defined as small faults or pinholes that permit current drainage through protective coatings on steel pipe.

5.1.5 *Coating Thickness Gage*—Any instrument suitable for use with Practice D7091 that is capable of measuring within the range of coating thickness of the test specimens.

5.1.6 *Surface Temperature Thermometer*—Any instrument capable of measuring surface temperature at the prescribed testing temperature.

5.1.7 *Conditioning Chamber*—Freezer or oven capable of storing the test specimens (only required if the test temperature is different from the room temperature).

6. Test Specimens

6.1 Test specimens shall be 600 mm [24 in.] long and shall be cut from a representative piece of coated pipe. Only holiday-free specimens shall be used in the test.