



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

This standard is issued under the fixed designation G 13; 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.

^{ε1} NOTE—Keywords were added editorially in June 1996.

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

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

2. Referenced Documents

2.1 ASTM Standards:

G 12 Test Method for Nondestructive Measurement of Film Thickness of Pipeline Coatings on Steel²

G 62 Test Methods for Holiday Detection in Pipeline Coatings²

2.2 AASHTO Standard:

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 or 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 (¾-in.) to No. 4 size stone with the following sieve analysis:

Square Opening, mm (in.)	Weight % Passing
25 (1)	100
19 (¾)	95 to 100
10 (⅝)	20 to 55
No. 4	0 to 10

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

5.1.4 *Holiday Detectors*—Two types are needed as described in Test Methods G 62.

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

5.1.5 *Thickness Gages*—Any instruments suitable for use with Test Method G 12.

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.

7. Procedure

7.1 Perform the test at a room temperature of 21 to 25°C (70 to 77°F).

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

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² Annual Book of ASTM Standards, Vol 06.02.

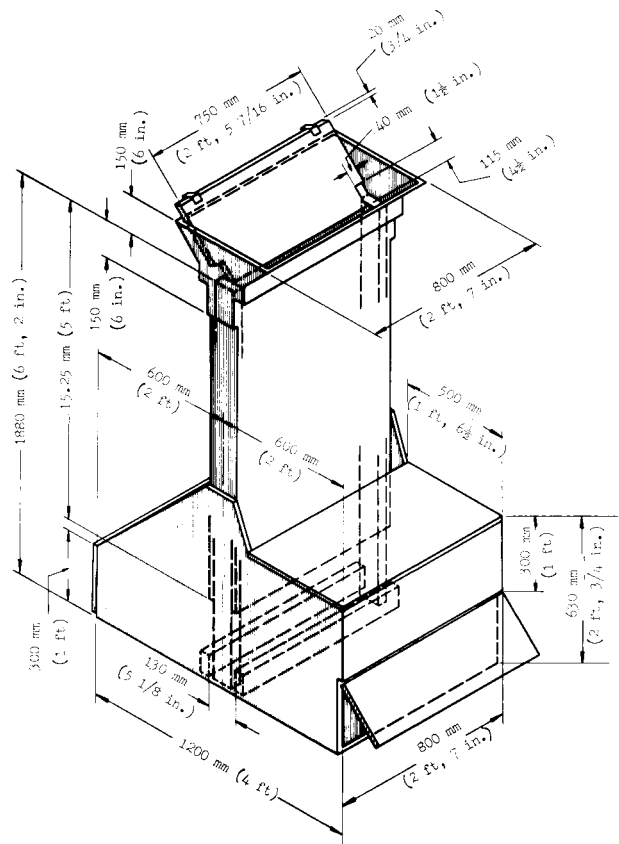


FIG. 1 Box, Chute, and Bucket

7.2 The procedure consists of dropping up to 10 buckets of stones on coated specimens. The number of buckets of stones required represents the resistance of the coating to this type of impact.

7.3 Place the test specimen in the trough below the chute. 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.

7.4 After each drop, remove the specimen. Examine the specimen visually for breaks in the coating. If there are no visual breaks, check with the holiday detector appropriate for the coating thickness for holidays in the coating. If there is no visual or electrical evidence of holidays, repeat the test until the first holiday is detected and record the number of drops and the number of holidays detected. In repeating the test, replace



NOTE 1—Framing lumber 40 by 90 mm (2 by 4 in.); all other material 20 mm ($\frac{3}{4}$ in.).

FIG. 2 Construction Details of Box and Chute

the specimen in the trough so that the same portion of the coated surface is always subjected to the falling stones. After the same stones have been used five times, replace them.

7.5 If no failure has occurred after 10 buckets, terminate the test.

NOTE 4—As indicated in 7.4, the same charge of stones may be used five times. Experiments in which the same charges of stones were dropped more than five times have shown relatively little attrition of the stones.

8. Report

8.1 Report the following information:

8.1.1 Complete identification of the specimen including: name and code number of the coating, pipe diameter, coating thickness, source, production data, and production-run number,

8.1.2 Approximate pipe temperature at the beginning and at the end of the test, and

8.1.3 Number of buckets of stone to produce the first holiday and the number of holidays produced during this drop.

NOTE 5—If there is a large number of holidays after a given number of drops, the report should state this by the term “too numerous to count.”

9. Keywords

9.1 impact resistance; limestone drop; pipeline coatings

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