



Standard Test Method for Impact Resistance of Pipeline Coatings (Falling Weight Test)¹

This standard is issued under the fixed designation G 14; 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 (€) indicates an editorial change since the last revision or reapproval.

€¹ NOTE—Keywords were added editorially in June 1996.

1. Scope

1.1 This test method covers the determination of the energy required to rupture coatings applied to pipe under specified conditions of impact from a falling weight.

1.2 *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.*

1.3 The values stated in SI units to three significant decimals are to be regarded as the standard. The values given in parentheses are for information only.

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 SAE Standard:

Grade 52100 Steel³

3. Summary of Test Method

3.1 This test method uses a falling fixed weight having a specified diameter impact surface, *tup*, which is restrained vertically and dropped from varying heights to produce impact energies over the required range. Electrical inspection is used to detect resultant breaks in the coating. Impact resistance is determined as the amount of energy required to cause penetration of the coating film.

4. Significance and Use

4.1 The ability of a pipe coating to resist mechanical damage during shipping, handling, and installation will depend upon its impact resistance. This test method provides a systematic means for screening coating materials with regard to this property.

5. Apparatus

5.1 This test method can be successfully used with impact apparatus conforming to the following specifications:

5.1.1 *Tup*—The tup shall be made up from a tup body and a tup nose having a combined, fixed weight of 1.361 kg (3.00 lb) and shall be used over a drop range of 0.61 to 1.22 m (2 to 4 ft). With most coatings, a 1.361-kg (3.00-lb) tup dropped through a distance of 914 mm (3 ft) yields suitable results. The tup nose shall have a 15.875-mm ($\frac{5}{8}$ -in.) hemispherical head.

NOTE 1—Frequent replacement of the tup nose can be avoided if it is cut from steel capable of being hardened to a hardness of Rockwell C/45 while retaining an impact toughness of at least 15 ft·lb (20.34 J). Ball bearings conforming to SAE Grade 52100 have also been found suitable for this purpose.

5.1.2 *Drop Tube*—A tube 1.52 m (5 ft) long shall be used to contain the tup and guide it during free fall. The drop tube shall be constructed of steel, aluminum, or any other suitably rigid material and internally sized to provide a minimum of friction to the falling tup. A scale shall be attached for measuring the height of drop to the nearest 2.54 mm (0.10 in.).

5.1.3 *Specimen Holder*—The base plate of the apparatus shall include a device for positioning and holding the pipe specimen on line with the axis of the vertical drop tube.

NOTE 2—An arrangement using a V-notch vise made of metal with spring clamp is recommended for this purpose. Glancing blows, caused by an out-of-plumb condition between drop tube and pipe sample, will cause erratic test results.

5.1.4 *Apparatus Support*—Both the apparatus and sample shall be firmly supported and secured to a rigid base to optimize energy transfer from the tup to the specimen.

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.

Current edition approved May 27, 1988. Published July 1988. Originally published as G 14 – 69 T. Last previous edition G 14 – 83.

² *Annual Book of ASTM Standards*, Vol 06.02.

³ Available from Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.