Designation: G12 – 07

StandardTest Method for Nondestructive Measurement of Film Thickness of Pipeline Coatings on Steel[1]

This standard is issued under the fixed designation G12; 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 describes the nondestructive measurement of the thickness of a dry, nonmagnetic coating applied to the external surface of steel pipe. The method is recommended for coating thicknesses up to 6 mm (0.240 in.) and for any diameter pipe, but not smaller than 10 mm (0.5 in.). It does not apply to excessively soft films.

1.2 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.

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. Summary of Test Method

2.1 The coating thickness is determined by an instrument that measures thickness by nondestructive techniques, based on variations in magnetic flux or magnetic attraction between its detection unit and the magnetic base material.

3. Significance and Use

3.1 Measurements of film thickness are an essential part of most ASTM test methods related to coatings on steel pipe. Adequate thickness is important for a coating to fulfill its function of preventing or mitigating corrosion of steel pipelines.

3.2 The accuracy of the thickness measurements may be influenced by the deformability of the coating. This test method is not applicable to coatings that would be readily deformable under the force exerted by the probe of the measuring instrument.

4. Apparatus

4.1 The apparatus shall be a nondestructive-type thickness gage capable of being standardized over its range of intended use. It shall be designed so that variations in magnetic flux or magnetic attraction between its detection unit and the steel base can be calibrated to indicate the thickness of the coating material.

4.2 It shall be suitable for measuring thicknesses of dry, nonmagnetic coatings on either a flat or a circular base.

5. Standardization of Instruments

5.1 The instrument shall be standardized in accordance with the manufacturer's instructions before use by employing suitable thickness standards. The standardization shall be checked at frequent intervals during use.

5.2 Nonmagnetic standards of uniform thickness are available in either of two types, foil or coated substrate, as supplied or recommended by the manufacturer of the instrument.

5.2.1 *Foils (Shims)*—The thickness of the foil should be as close as possible to the expected thickness of the coating to be measured. The foil should be placed on a smooth, clean, low-carbon, steel plate, making certain that there is intimate contact between the foil and the substrate. It is recommended that single foils of proper thickness be used and that foils be replaced frequently, since they are subject to indentation. Foils are advantageous for standardizing on curved surfaces and are often more readily available than coated standards.

NOTE 1—For some instruments there is an effective depth of penetration of the field created by the instrument probe. This is the critical depth of thickness at which the instrument will no longer be affected by increases of substrate thickness. Since it depends on the instrument and substrate, it should be determined experimentally.

5.2.2 *Coated Substrate Standards*[2]—These standards consist of nonmagnetic coatings of known thickness permanently bonded to a low-carbon steel (1010 grade) substrate, 8 mm (0.30 in.) thick. The thickness standard should be as close as possible to the expected thickness of the coating to be measured.

[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.

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[2] Coated substrate standards may be obtained from the U. S. Department of Commerce, National Bureau of Standards, Standard Materials Unit, Washington, DC 20234.