



Standard Practice for Characterization of Coatings Using Conformable Eddy- Current Sensors without Coating Reference Standards¹

This standard is issued under the fixed designation E2338; 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 practice covers the use of conformable eddy-current sensors for nondestructive characterization of coatings without standardization on coated reference parts. It includes the following: (1) thickness measurement of a conductive coating on a conductive substrate, (2) detection and characterization of local regions of increased porosity of a conductive coating, and (3) measurement of thickness for nonconductive coatings on a conductive substrate or on a conductive coating. This practice includes only nonmagnetic coatings on either magnetic ($\mu \neq \mu_0$) or nonmagnetic ($\mu = \mu_0$) substrates. This practice can also be used to measure the effective thickness of a process-affected zone (for example, shot peened layer for aluminum alloys, alpha case for titanium alloys). For specific types of coated parts, the user may need a more specific procedure tailored to a specific application.

1.2 Specific uses of conventional eddy-current sensors are covered by Practices [D7091](#) and [E376](#) and the following test methods issued by ASTM: [B244](#), [E1004](#), and [G12](#).

1.3 The values stated in SI units are to be regarded as standard. The values given in parentheses are mathematical conversions to inch-pound units that are provided for information only and are not considered 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

¹ This practice is under the jurisdiction of ASTM Committee [E07](#) on Nondestructive Testing and is the direct responsibility of Subcommittee [E07.07](#) on Electromagnetic Method.

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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.

[B244](#) Test Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments

[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

[E376](#) Practice for Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Testing Methods

[E543](#) Specification for Agencies Performing Nondestructive Testing

[E1004](#) Test Method for Determining Electrical Conductivity Using the Electromagnetic (Eddy-Current) Method

[E1316](#) Terminology for Nondestructive Examinations

[G12](#) Test Method for Nondestructive Measurement of Film Thickness of Pipeline Coatings on Steel (Withdrawn 2013)³

2.2 ASNT Documents:⁴

[SNT-TC-1A](#) Recommended Practice for Personnel Qualification and Certification in Nondestructive Testing

[ANSI/ASNT-CP-189](#) Standard for Qualification and Certification of NDT Personnel

2.3 AIA Standard:

[NAS 410](#) Certification and Qualification of Nondestructive Testing Personnel⁵

NOTE 1—See [Appendix X1](#).

3. Terminology

3.1 *Definitions*—For definitions of terms relating to this practice, refer to Terminology [E1316](#). The following definitions are specific to the conformable sensors:

3.1.1 *conformable*—refers to an ability of sensors or sensor arrays to conform to nonplanar surfaces without any significant effects on the measurement results.

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from American Society for Nondestructive Testing (ASNT), P.O. Box 28518, 1711 Arlingate Ln., Columbus, OH 43228-0518, <http://www.asnt.org>.

⁵ Available from Aerospace Industries Association of America, Inc. (AIA), 1000 Wilson Blvd., Suite 1700, Arlington, VA 22209-3928, <http://www.aia-aerospace.org>. (Replacement standard for MIL-STD-410.)

*A Summary of Changes section appears at the end of this standard