



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

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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 the following test methods issued by ASTM: Test Methods B 244, D 1186, D 1400, E 376, E 1004, and G 12.

1.3 The values stated in SI units are to be regarded as standard. The inch-pound units are provided for information.

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

B 244 Test Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments

D 1186 Test Methods for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base

D 1400 Test Method for Nondestructive Measurement of Dry Film Thickness of Nonconductive Coatings Applied to a Nonferrous Metal Base

E 376 Practice for Measuring Coating Thickness by Magnetic-Field or Eddy-Current Electromagnetic Methods

E 543 Practice for Agencies Performing Nondestructive Testing

E 1004 Test Method for Electromagnetic (Eddy-Current) Measurements of Electrical Conductivity

E 1316 Terminology for Nondestructive Examinations

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

2.2 ASNT Documents:³

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 Personnel⁴

NOTE 1—See Appendix X1.

3. Terminology

3.1 *Definitions*—Definitions of terms relating to electromagnetic examination are given in Terminology E 1316. 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.

3.1.2 *lift-off*—normal distance from the conformable sensor winding plane to the top of the first conducting layer of the part under examination.

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 Methods.

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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.

³ Available from The American Society for Nondestructive Testing 1711 Arlington Lane, PO Box 28518, Columbus, OH 43228-0518.

⁴ Available from Aerospace Industries Association of America, Inc., 1250 Eye St. NW, Washington, D.C. 20005. (Replacement standard for MIL-STD-410.)

