



Standard Practice for Examination of Welds Using the Alternating Current Field Measurement Technique¹

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1. Scope*

1.1 This practice describes procedures to be followed during alternating current field measurement examination of welds for baseline and service-induced surface breaking discontinuities.

1.2 This practice is intended for use on welds in any metallic material.

1.3 This practice does not establish weld acceptance criteria.

1.4 *Units*—The values stated in either inch-pound units or SI units are to be regarded separately as standard. The values stated in each system might not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

1.5 *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

E543 Specification for Agencies Performing Nondestructive Testing

E1316 Terminology for Nondestructive Examinations

2.2 *ASNT Standard*:³

SNT-TC-1A Personnel Qualification and Certification in Nondestructive Testing

ANSI/ASNT-CP-189 Standard for Qualification and Certification of Nondestructive Testing Personnel

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.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

3. Terminology

3.1 *Definitions*—For definitions of terms relating to this practice refer to Terminology E1316, Section A, Common NDT terms, and Section C, Electromagnetic testing. The following definitions are specific to the alternating current field measurement technique:

3.2 *Definitions*:

3.2.1 *exciter*—a device that generates a time varying electromagnetic field, usually a coil energized with alternating current (AC); also known as a transmitter.

3.2.2 *detector*—one or more coils or elements used to sense or measure a magnetic field; also known as a receiver.

3.2.3 *uniform field*—as applied to nondestructive testing with magnetic fields, the area of uniform magnetic field over the surface of the material under examination produced by a parallel induced alternating current, which has been passed through the weld and is observable beyond the direct coupling of the exciting coil.

3.2.4 *graduated field*—as applied to nondestructive testing with magnetic fields, a magnetic field having a controlled gradient in its intensity.

3.3 *Definitions of Terms Specific to This Standard*:

3.3.1 *alternating current field measurement system*—the electronic instrumentation, software, probes, and all associated components and cables required for performing weld examination using the alternating current field measurement technique.

3.3.2 *operational reference standard*—a reference standard with specified artificial slots, used to confirm the operation of the system.

3.3.3 *B_x*—the x component of the magnetic field, parallel to the weld toe, the magnitude of which is proportional to the current density set up by the electric field.

3.3.4 *B_z*—the z component of the magnetic field normal to the inspected base metal/heat affected zone surface, the magnitude of which is proportional to the lateral deflection of the induced currents in the plane of that surface.

3.3.5 *X-Y Plot*—an X-Y graph with two orthogonal components of magnetic field plotted against each other.

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