



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 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.

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:

E 543 Practice for Agencies Performing Nondestructive Testing²

E 1316 Terminology for Nondestructive Examinations²

2.2 ASNT Standard:³

SNT-TC-1A Personnel Qualification in Nondestructive Testing

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

3. Terminology

3.1 General definitions of terms used in this practice can be found in Terminology E 1316, Section A, Common NDT terms, and Section C, Electromagnetic testing.

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, 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. The field is uniform on the surface but the strength decays exponentially with depth.

3.2.4 *alternating current field measurement*—a nondestructive examination technique that measures changes in an applied AC uniform magnetic field to detect and characterize discontinuities.

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 standardization block*—a reference standard with specified artificial slots, used to confirm the operational parameters and to indicate discontinuity detection sensitivity.

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 weld toe, the magnitude of which is proportional to the curvature of the current in the x-y plane.

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

3.3.6 *time base plots*—these plot the relationship between B_x or B_z values with time.

3.3.7 *surface plot*—for use with array probes. These plot one component of magnetic field over an area, typically as a color contour plot or 3-D wire frame plot.

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 *Annual Book of ASTM Standards*, Vol 03.03.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.