



Designation: E571 – 19

Standard Practice for Electromagnetic (Eddy-Current) Examination of Nickel and Nickel Alloy Tubular Products¹

This standard is issued under the fixed designation E571; 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 practice² covers the procedures for eddy-current examination of nickel and nickel alloy tubes. These procedures are applicable for tubes with outside diameters up to 2 in. (50.8 mm), incl, and wall thicknesses from 0.035 to 0.120 in. (0.889 to 3.04 mm), incl. This standard applies to procedures where the sensor is placed on the outside surface of the tube. These procedures may be used for tubes beyond the size range recommended, by contractual agreement between the purchaser and the producer.

1.2 The procedures described in this practice make use of fixed encircling test coils or probe systems.

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

NOTE 1—For convenience, the term “tube” or “tubular product” will hereinafter be used to refer to both pipe and tubing.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

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 ASME Boiler and Pressure Vessel Code applications see related Practice SE-571 in Section II of that Code.

2. Referenced Documents

2.1 *ASTM Standards*:³

E309 Practice for Eddy Current Examination of Steel Tubular Products Using Magnetic Saturation

E1316 Terminology for Nondestructive Examinations

2.2 *Other Documents*:

SNT-TC-1A Recommended Practice for Personnel Qualification and Certification in Nondestructive Testing⁴

ANSI/ASNT-CP-189 ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel⁴

NAS-410 Certification and Qualification of Nondestructive Personnel (Quality Assurance Committee)⁵

ISO-9712 Non-destructive testing -- Qualification and certification of NDT personnel⁶

3. Terminology

3.1 Standard terminology relating to electromagnetic testing may be found in Terminology E1316, Section C, Electromagnetic Testing.

4. Summary of Practice

4.1 Examination is usually performed by the use of one of two general techniques:

4.1.1 *Encircling Coil Technique*—Examination is performed by passing the tube lengthwise through a coil energized with alternating current at one or more frequencies. See Fig. 1. The electrical impedance of the coil is modified by the proximity of the tube, the tube dimensions, electrical conductivity, saturating magnetic field, magnetic permeability, and metallurgical or

³ 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.

⁴ Available from American Society for Nondestructive Testing (ASNT), P.O. Box 28518, 1711 Arlington 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>.

⁶ Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, <http://www.iso.org>.

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