



Standard Practice for Electromagnetic (Eddy Current) Sorting of Ferrous Metals¹

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1. Scope*

1.1 This practice covers the procedure for sorting ferrous metals using the electromagnetic (eddy current) method. The procedure relates to instruments using absolute or comparator-type coils for distinguishing variations in mass, shape, conductivity, permeability, and other variables such as hardness and alloy that affect the electromagnetic or magnetic properties of the material. The selection of reference standards to determine sorting feasibility and to establish standards is also included.²

1.2 *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:³

E105 Practice for Probability Sampling of Materials

E122 Practice for Calculating Sample Size to Estimate, With Specified Precision, the Average for a Characteristic of a Lot or Process

E543 Specification for Agencies Performing Nondestructive Testing

E1316 Terminology for Nondestructive Examinations

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 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 General information can be found in the *Nondestructive Testing Handbook*, (Second Edition), Vol IV: Electromagnetic Testing, Society for Nondestructive Testing, 1986.

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>.

2.3 AIA Standard:⁵

NAS-410 Qualification and Certification of Nondestructive Testing Personnel

3. Terminology

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

4. Summary of Practice

4.1 The techniques that are primarily used in electromagnetic sorting employ the absolute (single-) and comparative (two-) coil methods. The decision of whether to use single-coil or two-coil operation is usually determined by empirical data. In the absolute-coil method, the equipment is standardized by placing standards of known properties in the test coil. The value of the tested parameter (for instance, hardness, alloy, or heat treatment) is read on the scale of an indicator. In the comparative-coil method, the test specimen is compared with a reference standard and the indication tells whether the test specimen is within or outside of the required limits.

4.1.1 *Absolute Coil Method*—A reference standard is inserted in the test coil, and the controls of the instrument are adjusted to obtain an indication. The method is then continued by inserting the test specimens to be sorted into the test coil, and observing the instrument indication.

4.1.2 *Comparative Coil Method*—Reference standards representing the minimum or maximum limits of acceptance, or both, are inserted in the reference coil and test coil. The instrument controls are adjusted for appropriate indications. The method is then continued by inserting the test specimens to be sorted in the test coil, leaving a reference standard in the reference coil, and observing the instrument indication.

4.2 The range of instrument indication must be so adjusted in the initial step that the anticipated deviations will be recognized within the range of readout according to whether two- or three-way sorts are to be accomplished.

4.3 Both absolute and comparative methods require comparing the test specimens with the reference standards. Two or more reference standards representing the limits of acceptance

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

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