



Standard Practice for Steel Castings, Stainless, Instrument Calibration, for Estimating Ferrite Content¹

This standard is issued under the fixed designation A 799/A799M; 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 practice covers the procedure for calibration of instruments to be used for estimating the ferrite content of the microstructure of cast stainless steels by magnetic response or measurement of permeability. This procedure covers both primary and secondary instruments.

1.1.1 A primary instrument is one that has been calibrated using National Institute of Standards and Technology-Standard Reference Material (NIST-SRM) thickness coating standards. It is a laboratory tool to be used with test specimens. Some primary instruments may be used to directly measure the ferrite content of castings.

1.1.2 A secondary instrument is one that has been calibrated by the use of secondary standards that have been measured by a calibrated primary instrument. Secondary instruments are to be used to directly measure the ferrite content of castings.

1.2 The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with the specification.

1.3 *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

A 941 Terminology Relating to Steel, Stainless Steel, Re-

lated Alloys, and Ferroalloys

B 499 Test Method for Measurement of Coating Thicknesses by the Magnetic Method: Nonmagnetic Coatings on Magnetic Basis Metals

E 562 Practice for Determining Volume Fraction by Systematic Manual Point Count

2.2 NIST Standard:
NIST-SRM Coating Thickness Standards

NOTE 1—The specific coating thickness standards previously referenced in this practice are no longer available. Similar ones are now available from NIST.

3. Terminology

3.1 *Definitions:* The definitions in Terminology A 941 are applicable to this standard.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *ferrite, n*—the body-centered cubic microconstituent in stainless steel.

3.2.2 *ferrite percentage, n*—a value designating the ferrite content of stainless steels.

3.2.2.1 *Discussion*—The Steel Founders' Society of America (SFSA) has assigned ferrite percentages to the series of NIST coating thickness standards³. This assignment was based on the magnetic attraction for a standard magnet by the coating standards when compared with the magnetic attraction of the same magnet by a series of cast stainless steels whose ferrite content had been determined by an accurate metallographic point count. A similar assignment based on magnetic permeability was also established. Algebraic equations have now been derived from a plot of the thickness of these standards and the assigned ferrite percentages. By the use of these equations, any primary instrument will have its calibration traceable to the SFSA's instruments or any other calibrated instrument and thus afford comparable reproducible ferrite percentages. It also allows traceability to NIST.

3.2.3 *secondary standards, n*—a piece of cast stainless steel whose ferrite percentage has been determined by a calibrated primary instrument.

¹ This practice is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.18 on Castings.

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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 Aubrey, L.S., Weiser, P.F., Pollard, W.J., and Schoefer, E.A., "Ferrite Measurement and Control in Cast Duplex Stainless Steels," *Stainless Steel Castings*, ASTM STP 756, ASTM, 1982, p 126.

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