



Standard Practice for Steel Casting, Austenitic Alloy, Estimating Ferrite Content Thereof¹

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1. Scope*

1.1 This practice covers procedures and definitions for estimating ferrite content in certain grades of austenitic iron-chromium-nickel alloy castings that have compositions balanced to create the formation of ferrite as a second phase in amounts controlled to be within specified limits. Methods are described for estimating ferrite content by chemical, magnetic, and metallographic means.

1.2 The grades covered by this practice are: CF-3, CF-3A, CF-8, CF-8A, CF-3M, CF-3MA, CF-8M, CF-8C, CG-8M, and CH-10.

1.3 The values stated in either inch-pound units or SI units are to be regarded separately as standard. 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 practice.

1.3.1 Within the text, the SI units are shown in brackets.

1.4 *This standard does not purport to address 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

[A351/A351M](#) Specification for Castings, Austenitic, for Pressure-Containing Parts

[A751](#) Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products

[A799/A799M](#) Practice for Steel Castings, Stainless, Instrument Calibration, for Estimating Ferrite Content

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.

[A941](#) Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys

[A1067/A1067M](#) Specification for Test Coupons for Steel Castings

[E353](#) Test Methods for Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

[E562](#) Test Method for Determining Volume Fraction by Systematic Manual Point Count

2.2 Constitution Diagrams:

[Schoefer Diagram for Estimating Ferrite Content of Stainless Steel Castings \(1980 revision\)](#)³

[Schaeffler Diagram for Estimating Ferrite Content of Stainless Steel Weld Metal](#)⁴

[DeLong Diagram for Estimating Ferrite Content of Stainless Steel Weld Metal](#)⁵

2.3 American Welding Society Specification:

[AWS A 4.2, Procedures for Calibrating Magnetic Instruments to Measure the Delta Ferrite Content of Austenitic Stainless Steel Weld Metal](#)⁶

3. Terminology

3.1 Definitions:

3.1.1 *ferrite*—the ferromagnetic, body-centered, cubic-microstructural constituent of variable chemical composition in iron-chromium-nickel alloys. This may be formed upon solidification from the molten metal (delta ferrite) or by transformation from austenite or sigma phase on cooling in the solid state (alpha ferrite).

3.1.2 *ferrite content*—the proportion of total volume of an iron-chromium-nickel alloy present as the ferrite phase.

3.1.3 *ferrite number*—the ferrite content expressed as an arbitrary number based on the magnetic response of the alloy in a weld deposit.

³ Appendix of this practice.

⁴ *Metal Progress Data Book*, American Society for Metals, Mid June 1977, p. 161.

⁵ *Welding Journal*, American Welding Society, Vol 38, No. 7, July 1973, p. 293–s.

⁶ Available from American Welding Society (AWS), 8669 NW 36 Street, #130, Miami, FL 33166-6672, <http://www.aws.org>.

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