INTERNATIONAL STANDARD

ISO 13520

Second edition
2015-10-01

Determination of ferrite content in austenitic stainless steel castings

Détermination du taux de ferrite des pièces moulées en acier inoxydable austénitique

Reference number
ISO 13520:2015(E)

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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Foreword

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The committee responsible for this document is ISO/TC 017, *TC Steel*, Subcommittee SC 11, *SC Steel castings*.

This second edition cancels and replaces the first edition (ISO 13520:2002), which has been technically revised.

Determination of ferrite content in austenitic stainless steel castings

1 Scope

Procedures are covered 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 within specified limits. Methods are described for estimating ferrite content by chemical, magnetic and metallographic means.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4990, *Steel castings — General technical delivery requirements*

ISO 9042, *Steels — Manual point counting method for statistically estimating the volume fraction of a constituent with a point grid*

ASTM A799, *Standard Practice for Steel Castings, Stainless, Instrument Calibration, for Estimating Ferrite Content*

BNIF 345, *Evaluation de la teneur en ferrite dans les aciers inoxydables moulés austénitiques*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
ferrite
ferromagnetic, body-centred cubic microstructural constituent of variable chemical composition in iron-chromium-nickel alloys

Note 1 to entry: Ferrite includes both delta and alpha species.

3.2
ferrite content
proportion of total volume of an iron-chromium-nickel alloy present as the ferrite phase

3.3
ferrite percentage
ferrite content expressed as a volume percent

4 Significance effects of ferrite content

The tensile and impact properties, the weldability, and the corrosion resistance of iron-chromium-nickel alloy castings may be influenced beneficially or detrimentally by the ratio of the amount of ferrite to the amount of austenite in the microstructure. The ferrite content may be limited by purchase order requirements or by the design construction codes governing the equipment in which castings will be used. The quantity of ferrite in the structure is fundamentally a function of the chemical composition of the alloy and its thermal history. Because of segregation, the chemical composition and, therefore, the ferrite content, may differ from point to point on a casting. Determination of the ferrite content by