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Determination of ferrite content in austenitic stainless steel castings

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

Reference number
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Foreword

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This document was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 11, *Steel castings,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 459/SC 11, *Steel castings and forgings,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 13520:2015), of which it constitutes a minor revision. The changes are as follows:

— ASTM A799 and BNIF 345 where moved to the bibliography as they are not cited normatively;

— editorial revision.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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 are referred to in the text in such a way that some or all of their content constitutes requirements of this document. 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*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

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,