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Ferronickel
(English Translation)

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1 Scope

This document specifies the technical requirements, test methods, inspection rules, packaging, storage, transportation, marking, and quality certificates for ferronickel.

This document applies to the technical requirements for the delivery of ferronickel in various forms (ingots, pieces and shots) for steelmaking or casting.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document through the normative references in the text. In terms of dated references, only the version with the specified date applies to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

GB/T 3650 The General Rules for Inspection, Packing, Storing, Transportation, Marking and Certification of Ferroalloy

GB/T 6379.1 Accuracy (trueness and precision) of Measurement Methods and Results - Part 1.

General Principles and Definitions

GB/T 6379.2 Accuracy (trueness and precision) of Measurement Methods and Results - Part 2.

Basic Method for the Determination of Repeatability and Reproducibility of a Standard Measurement Method

GB/T 6682 Water for Analytical Laboratory Use - Specification and Test Methods

GB/T 12806 Laboratory Glassware - One-mark Volumetric Flasks

GB/T 12808 Laboratory Glassware - One-mark Pipettes

GB/T 13247 Methods for Sampling and Testing the Grain Size of Ferroalloys Products

GB/T 20066 Steel and Iron - Sampling and Preparation of Samples for the Determination of Chemical Composition

GB/T 21931.1 Nickel, Ferronickel and Nickel Alloys - Determination of Carbon Content - Infrared Absorption Method after Induction Furnace Combustion

GB/T 21931.2 Nickel, Ferronickel and Nickel Alloys - Determination of Sulfur Content - Infrared Absorption Method after Induction Furnace Combustion

GB/T 21931.3 Nickel, Ferronickel and Nickel Alloys - Determination of Phosphorus Content -

Phosphovanomolybdate Molecular Absorption Spectrometric Method

GB/T 21932 Nickel and Ferronickel - Determination of Sulphur Content - Barium Sulfate Gravimetric Method after Alumina Chromatographic Separation

GB/T 21933.1 Ferronickel - Determination of Nickel Content - The Dimethylglyoxime Gravimetric Method

GB/T 21933.2 Ferronickel - Determination of Silicon Content - Gravimetric Method

GB/T 21933.3 Ferronickel - Determination of Cobalt Content - Flame Atomic Absorption Spectrometric Method

GB/T 24198 Ferronickel - Determination of Nickel, Silicon, Phosphorus, Manganese, Cobalt,

Chromium, and Copper Contents - Wavelength Dispersive X-ray Fluorescence Spectrometry (routine method)

GB/T 24585 Ferronickel - Determination of Phosphorus, Manganese, Chromium, Copper, Cobalt and Silicon Contents - Inductively Coupled Plasma Atomic Emission Spectrometric Method

GB/T 25049 Ferronickel

GB/T 25050 Ferronickel Ingots or Pieces - Sampling for Analysis

GB/T 25051 Ferronickel Shot - Sampling for Analysis

GB/T 30072 Ferronickel - Determination of Nickel Content - EDTA Titrimetric Method

GB/T 42794 Ferronickel - Determination of Carbon, Sulfur, Silicon, Phosphorus, Nickel, Cobalt, Chromium and Copper Contents - Spark Atomic Emission Spectrometry

3 Terms and Definitions

The following terms and definitions are applicable to this document.

3.1

ferronickel

An alloy of iron and nickel obtained from oxide ore or other nickel-containing materials, with a nickel content greater than or equal to 15% (mass fraction) and less than 80% (mass fraction).

3.2

K

K is a numerical value that indicates the minimum nickel content of the batch to be delivered.

4 Names and Designations

The names of ferronickel products are composed of the nickel element and other elements listed in Table 1.

EXAMPLE. FeNi30 HC MP MS HSi, where H = High, M = Medium, L = Low.

The meanings of the symbols and figures in the ferronickel designations are as follows.

Appendix B provides other examples of element combinations listed in Table 1.

5.1 Chemical Composition

5.1.1

Table 1 specifies the chemical composition of various types of ferronickel.

5.1.2

Table 1 provides the content of nickel and other common elements. The contents of other elements may be agreed upon by the supply-side and the demand-side.

Table 1 -- Ferronickel Designations and Chemical Composition

5.1.3

If the demand-side has special requirements for the chemical composition, for example, requiring a narrower range of main element content, or the content of certain limited and

non- limited elements, or requiring the content of any element (As, Sn, Pb, Sb or Bi) to exceed the specifications in Table 1, these requirements may be negotiated separately by both the supply- side and the demand-side and specified accordingly.

5.1.4

The chemical composition given in Table 1 depends on the accuracy of the ferronickel sampling and analysis.

5.2.1 Overview

Ferronickel can be delivered in the shape agreed upon between the supply-side and the demand- side, such as ingots, pieces or shots.

5.2.2 Ferronickel ingots

Ingots can be notched or unnotched. The maximum mass of an ingot is 100 kg, with a thickness between 30 mm and 150 mm and a length not exceeding 1,100 mm.

Ferronickel ingots are batched in two modes.

---Ferronickel ingots smelted in a single furnace and separately stored;

---Mixed batches of ferronickel ingots from multiple furnaces; in this case, unless specifically agreed upon, for the mixed batches of ferronickel ingots from multiple furnaces, ferronickel with nickel content ranging from $K\%$ to $(K + 1)\%$ shall be selected, where K is an integer.

5.2.3 Ferronickel pieces

Ferronickel pieces are cast or cut from ferronickel ingots in pieces. A delivery batch of ferronickel pieces can only consist of one of the two batching modes described above. The maximum dimension of ferronickel pieces is between 25 mm and 100 mm, and the dimension of the pieces within the same batch shall be consistent.

Ferronickel pieces are batched in two modes.

---Ferronickel pieces smelted in a single furnace and separately stored;

---Mixed batches of ferronickel pieces from multiple furnaces; in this case, unless specifically agreed upon, for the mixed batches of ferronickel pieces from multiple furnaces, ferronickel with nickel content ranging from $K\%$ to $(K + 1)\%$ shall be selected, where K is an integer.

5.2.4 Ferronickel shots

Ferronickel shots produced by liquid granulation, with a particle size range of 2 mm to 50 mm.

Particle size inspection of ferronickel shots shall be conducted in accordance with GB/T