
Feronikelj - Specifikacija in zahteve pri dobavi (ISO/DIS 6501:2019)

Ferronickel - Specification and delivery requirements (ISO/DIS 6501:2019)

Ferronickel - Spezifikation und Lieferbedingungen (ISO/DIS 6501:2019)

Ferro-nickel - Spécifications et conditions de livraison (ISO/DIS 6501:2019)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 155, *Nickel and nickel alloys*.

This second edition cancels and replaces the first edition (ISO 6501:1988), which has been technically revised.

The main changes compared to the previous edition are as follows:

- Format as per ISO Directives;
- Reduction or elimination of expressions such as “agreement between parties” on ISO 6501 as recommended by ISO (If a standard or part of it is to be agreed, there is no need for that international standard) ;
- Updated Ferronickel delivery market requirements;
- FeNi classification according chemical composition and combination of Ni content ([table 1](#)) and impurities ([table 2](#))
- Cross references

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.

Ferronickel — Specification and delivery requirements

1 Scope

This document specifies the technical delivery requirements for the various forms of ferronickel (ingots, pieces and shot) usually supplied for steel making and foundry use.

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 8049, *Ferronickel shot — Sampling for analysis*

ISO 8050, *Ferronickel ingots or pieces — Sampling for analysis*

ISO 14284, *Steel and iron — Sampling and preparation of samples for the determination of chemical composition*

ISO 6352, *Ferronickel — Determination of nickel content — Dimethylglyoxime gravimetric method*

3 Terms and definitions

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

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

ferronickel

a master alloy of iron and nickel having a nickel content equal to or greater than 15 % (*m/m*), and less than 80 % (*m/m*), obtained from oxide ores or other nickel-bearing materials

3.2

K

number that represents the lowest nickel content that will be part of the lot to be delivered

3.3

splitting limit

maximum acceptable difference between analytical results of nickel or other element agreed by two parties (buyer and seller)

3.4

lot

discrete and defined quantity of ferronickel ingots, pieces or shots answering to the same quality specification (chemical composition and physical characteristics)

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4 Information for ordering

Orders for ferronickel shall include the following information:

- a) Quantity;
- b) Chemical composition, according to the designations in [Table 1](#) and [Table 2](#);
- c) Form of delivery, according to [5.2](#);
- d) Delivery requirements;
- e) Size distribution;
- f) Requirements for analysis report, packing, etc., as appropriate.
- g) Transportation and storage requirements.

5 Requirements

5.1 Chemical composition

5.1.1 The Chemical compositions of the various types of ferronickel are specified in [Table 1](#) and [Table 2](#).

5.1.2 In [Table 1](#), only the Nickel content is given.

Table 1 — Ni content in ferronickel

Designation	Chemical composition, % (m/m)		Other elements
	Ni		
	From	Up to	
	(incl.)	(not incl.)	
FE Ni 20	15	25	See Table 2
FE Ni 30	25	35	
FE Ni 40	35	45	
FE Ni 50	45	60	
FE Ni 70	60	80	

5.1.3 In [Table 2](#), the main constituent elements and usual impurities are given. Other elements may be decided between the parties.

If the purchaser requires closer ranges for the main element contents and/or different limits for specified elements, and/or limits for non-specified elements, and/or if the contents of elements such as arsenic, bismuth, lead, antimony and tin each exceed 0,010 % (m/m), this shall be indicated and agreed upon between supplier and purchaser.

Table 2 — Chemical composition of main constituent elements of ferronickel and usual impurities of ferronickel

Designation	Chemical composition, % (m/m)											
	C		Si		P		S		Cr	Co	Cu	Other ele- ments
	From	Up to	From	Up to	From	Up to	From	Up to	Max.	1)	2)	See 5.1.3
	(incl.)	(not incl.)	(incl.)	(not incl.)	(incl.)	(not incl.)	(incl.)	(not incl.)				
Low	-	0,030	-	0,20	-	0,010	-	0,030	0,10			
Medium	0,030	1,000	0,20	1,00	0,010	0,020	0,030	0,100	0,50			
High	1,000	2,500	1,00	4,00	0,020	0,030	0,100	0,400	2,0			
1) $\frac{Co}{Ni} = \frac{1}{20}$ to $\frac{1}{40}$, <i>for information only</i>												
2) Cu max 0,20%												

5.1.4 The designation of Ferronickel product is given with the combination of elements of [Table 1](#) and [Table 2](#). Example: FE Ni 30 HC MP MS HSi, where L = Low, M = Medium and H = High. Other examples of combination of [Table 1](#) and [Table 2](#) are given in Annex A.

5.1.5 The chemical compositions given in [Table 1](#) and [Table 2](#) are subject to the precision of the methods of sampling and analysis for ferronickel.

5.2 Form of delivery and formation of lots

5.2.1 General

Ferronickel may be delivered as agreed between the supplier and the purchaser in various forms, e.g. ingots, pieces or shot. The delivered lots, except by special agreement, shall have a minimum tonnage of 5 t.

5.2.2 Ferronickel in ingots

Ingots may be supplied notched or unnotched. Their maximum mass is 100 kg; their thickness may be within a range of 30 to 150 mm and their length shall not exceed 1100 mm.

Lots may be formed in two different ways:

- from material stocked individually from each tapping operation;
- by blending several heats; in this case, except by special agreement, heats shall be selected in a nickel content range from K to $(K + 1)$ %, K being a whole number.

5.2.3 Ferronickel in pieces

Pieces are either cast or cut from ingots. A lot is formed from only one of these two categories of pieces. The maximum dimension is between 25 and 100 mm. Within a lot, the sizes of pieces shall be uniform.

Lots may be formed in two different ways;

- from material stocked individually from each tapping operation;
- by blending several heats; in this case, except by special agreement, heats shall be selected in a nickel content range from K to $(K + 1)$ %, K being a whole number.

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5.2.4 Ferronickel in the form of shot

The size of the shot obtained by shotting of liquid material should be within a range of 2 to 50 mm.

The ferronickel shot shall be delivered after drying.

Lots generally delivered in bulk may be formed in three different ways:

- from material stocked individually from each tapping operation;
- by reclaiming from blended storage; in this case, the K to $(K + n)$ % range of the nickel content of the blended material may be selected with values of n up to 5;
- by reclaiming from unblended storage; in this case n shall not exceed 1.

5.3 Contamination

The material shall be as free as possible from surface contaminants such as slag, sand etc.

6 Control

6.1 General

Sampling and analysis procedures shall be carried out in accordance with relevant International Standards, in particular ISO 8049 for the sampling of ferronickel shot, ISO 8050 for sampling of ferronickel ingot or pieces, ISO 14284 for sampling and preparation of samples for analysis of steel and iron applicable for ferronickel in molten stage, and ISO 6352 for the determination of nickel content. Other procedures giving the same accuracy may be agreed upon between supplier and purchaser, and arbitrator in the case of an arbitration procedure.

6.2 Sampling for analysis

6.2.1 During sampling procedures, representatives of both parties may be present, wherever sampling is carried out.

6.2.2 In case of dispute, one of the procedures described in [6.4](#) may be adopted.

6.3 Analysis

6.3.1 Ferronickel furnished with analysis certificate

The certificate, established by the supplier, gives the nickel content as specified in [Table 1](#) and, if agreed, the content of other elements specified either in [Table 2](#) or additionally agreed.

In case of dispute, the two parties may use the procedures described in [6.4](#) either for analysis only or for sampling and analysis.

6.3.2 Ferronickel settled with exchange analysis

When an exchange of analysis is decided on by the two parties, the values resulting from analysis of the samples obtained under [6.2.1](#) for nickel content, and possibly for the content of other elements, shall be exchanged.

If the differences between the results of the analyses of the two parties do not exceed the agreed splitting limits, the mean value shall be accepted.

If the differences exceed splitting limits, the two parties may use the procedures described in [6.4](#) either for analysis only or for sampling and analysis.