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Ferronickel — Specification and delivery requirements

Ferro-nickel — Spécifications et conditions de livraison

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 6501 was prepared by Technical Committee ISO/TC 155, *Nickel and nickel alloys*.

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Ferronickel — Specification and delivery requirements

1 Scope

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

2 Definition

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 Information for ordering

Orders for ferronickel shall include the following information:

- a) quantity;
- b) chemical composition, according to the designations in the table;
- c) form of delivery, according to 4.2;
- d) requirements for analysis reports, packing, etc., as appropriate.

4 Requirements

4.1 Chemical composition

4.1.1 The chemical compositions of the various types of ferronickel are specified in table 1.

4.1.2 In table 1, only the main constituent elements and usual impurities are given.

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.

4.1.3 The chemical compositions given in table 1 are subject to the precision of the methods of sampling and analysis for ferronickel.

4.2 Form of delivery and formation of lots

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.

4.2.1 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 1 100 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.

4.2.2 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.

4.2.3 Ferronickel in the form of shot

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

If so agreed between supplier and purchaser, the ferronickel shot may be delivered after drying.

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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.

Deliveries may be made in drums, generally of 250 kg capacity, but capacities as small as 50 kg are acceptable.

4.3 Contamination

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

5 Control

Sampling and analysis procedures shall preferably be carried out in accordance with relevant International Standards. Other procedures giving the same accuracy may be agreed upon between supplier and purchaser, and arbitrator in the case of an arbitration procedure.

5.1 Sampling for analysis

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

5.1.2 In case of dispute, one of the procedures described in 5.3 may be adopted.

5.2 Analysis

5.2.1 Ferronickel furnished with analysis certificate

The certificate, established by the supplier, gives the nickel content and, if agreed, the content of other elements, either specified in the table or additionally agreed.

In case of dispute, the two parties may use the procedures described in 5.3 either for analysis only or for sampling and analysis.

5.2.2 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 5.1.1 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 these splitting limits, the two parties may use the procedures described in 5.3 either for analysis only or for sampling and analysis.

5.3 Procedures in case of dispute

The two cases below are applicable for both sampling and analytical problems and may be used either independently or successively.

In both cases, the acceptable analytical result shall be within a range with the following limits:

- the lower contested value minus splitting limit (in accordance with 5.2.2);
- the higher contested value plus the splitting limit.

5.3.1 Contradictory procedure

The procedure is carried out at a place chosen by agreement between the two parties. The operations are performed by one of the two parties in the presence of the other or of an agreed representative.

If analysis is carried out and if the value obtained is within the range defined at the beginning of 5.3, it is adopted as the final result. If the value found is outside this range, a new check shall be decided upon, in conformity either with 5.3.1 by organizing another contradictory procedure, or with 5.3.2.

5.3.2 Arbitration procedure

An arbitrator is chosen by agreement between the two parties.

The sample obtained by an arbitration sampling is final.

If the arbitrator has the sole responsibility for testing a sample, his result is final.

If a sample is analysed by the two parties and then by the arbitrator, and if the arbitration result is within the range defined at the beginning of 5.3, it forms the basis for the final settlement. If the value found is outside this range, a new check shall be decided upon, in conformity either with 5.3.1 or with 5.3.2 by selecting another arbitrator.

6 Dispatch and storage

Ferronickel shall be transported and stored according to current international regulations or according to agreement between supplier and purchaser.

Table 1 – Chemical composition of ferronickel

Designation	Chemical composition, % (m/m)										
	Ni		C		Si	P	S	Co	Cu	Cr	Other elements
	From (incl.)	Up to (not incl.)	Over	Up to (incl.)	max.	max.	max.		max.	max.	
Fe Ni 20 LC Fe Ni 30 LC Fe Ni 40 LC Fe Ni 50 LC Fe Ni 70 LC	15 25 35 45 60	25 35 45 60 80	—	0,030	0,20	0,030	0,030)	0,20	0,10	See 4.1.2
Fe Ni 20 LC LP Fe Ni 30 LC LP Fe Ni 40 LC LP Fe Ni 50 LC LP Fe Ni 70 LC LP	15 25 35 45 60	25 35 45 60 80	—	0,030	0,20	0,020	0,030)	0,20	0,10	
Fe Ni 20 MC Fe Ni 30 MC Fe Ni 40 MC Fe Ni 50 MC Fe Ni 70 MC	15 25 35 45 60	25 35 45 60 80	0,030	1,0	1,0	0,030	0,10)	0,20	0,50	
Fe Ni 20 MC LP Fe Ni 30 MC LP Fe Ni 40 MC LP Fe Ni 50 MC LP Fe Ni 70 MC LP	15 25 35 45 60	25 35 45 60 80	0,030	1,0	1,0	0,020	0,10)	0,20	0,50	
Fe Ni 20 HC Fe Ni 30 HC Fe Ni 40 HC Fe Ni 50 HC Fe Ni 70 HC	15 25 35 45 60	25 35 45 60 80	1,0	2,5	4,0	0,030	0,40)	0,20	2,0	

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1) $\frac{Co}{Ni} = \frac{1}{20}$ to $\frac{1}{40}$, for information only.

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