INTERNATIONAL STANDARD

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Ferroboron — Specification and conditions of delivery

Ferro-bore — 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 voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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Ferroboron — Specification and conditions of delivery

1 Scope

This International Standard specifies requirements and conditions of delivery for ferroboron usually supplied for steelmaking and foundry use.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 565:1990, *Test sieves — Metal wire cloth, perforated metal plate and electroformed sheet — Nominal sizes of openings.*

ISO 3713:1987, *Ferroalloys — Sampling and preparation of samples — General rules.*

ISO 4551:1987, *Ferroalloys — Sampling and sieve analysis.*

ISO 8954-1:1990, *Ferroalloys — Vocabulary — Part 1: Materials.*

3 Definitions

For the purposes of this International Standard, the following definition and those in ISO 8954-1 apply.

3.1 ferroboron: A master alloy of iron and boron with a minimum boron content of 9 % by mass, and a maximum content of 23 % by mass, obtained by reduction.

4 Information for ordering

Orders for ferroboron shall include the following information:

a) quantity;

b) constitution of consignment;

c) chemical composition, in accordance with the designations given in table 1;

d) particle size ranges in accordance with the classes given in table 2;

e) necessary requirements for analysis reports, packing, etc., as appropriate.

Table 1 — Chemical composition

Designation	Chemical composition, % (*m/m*)				
	B		Al	Si	C
	over	up to and including	max.	max.	max.
FeB12Al	9	14	8,0	2,0	0,10
FeB12C	9	14	0,5	4,0	2,0
FeB17Al	14	19	8,0	2,0	0,10
FeB17C	14	19	0,6	4,0	2,0
FeB22Al	19	23	8,0	2,0	0,10
FeB22C	19	23	0,5	4,0	2,0

Table 2 — Particle size range

Class	Particle size range	Undersize	Oversize
	mm	% (*m/m*) max.	% (*m/m*) max.
1	25 to 100	5	10
2	10 to 50	5	No piece to exceed 1,15 times the maximum limit of the size range specified in two or three directions
3	3,15 to 100	4	
4	3,15 to 25	4	
5	3,15 to 10	4	
6	max. 3,15	—	

5 Requirements

5.1 Constitution of consignment

Ferroboron shall be delivered in consignments constituted according to one of the following three methods.

5.1.1 Tapped lot method

A consignment constituted according to the tapped lot method consists of a mass of ferroboron from one melt.

5.1.2 Graded lot method

A consignment constituted according to the graded lot method consists of a number of melts with the same ferroboron designation, produced under the same conditions using the same batches of raw materials.

The boron content of the melts constituting the consignment shall not differ from each other by more than 2 % absolute.

5.1.3 Blended lot method

A consignment constituted according to the blended lot method consists of a number of melts with the same ferroboron designation, crushed to a particle size not less than "x" mm (to be defined after further investigation) and thoroughly mixed.

The boron content of the melts constituting the consignment may vary between the minimum and maximum limits specified for the appropriate ferroboron designation.

5.2 Chemical composition

5.2.1 The chemical composition of ferroboron shall be as specified in table 1.

5.2.2 The chemical compositions given in table 1 show only the main constituent elements and usual impurities. 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, this shall be agreed upon between the supplier and purchaser.

5.2.3 The chemical compositions given in table 1 depend on the precision of the methods of sampling and analysis for ferroboron (see clause 6).

5.3 Particle size ranges

5.3.1 Ferroboron shall be supplied in lumps or as crushed and screened particles. The particle size ranges and tolerances shall be in accordance with table 2. The undersize values shall be valid at the point of delivery to the purchaser[1].

The particle sizes specified refer to screening on a steel sieve with square openings (see ISO 565).

5.3.2 If the purchaser requires particle size ranges and/or tolerances other than those given in table 2, these shall be agreed upon between the supplier and purchaser.

5.4 Contamination

The material shall be free from external extraneous contamination. A quantity of slag and anti-burning materials shall be specified by mutual agreement between the supplier and purchaser.

6 Testing

6.1 Routine testing

6.1.1 Ferroboron shall be furnished with an analysis certificate, established by the supplier for the chemical composition and size distribution of a consignment in accordance with the order. Upon request of the purchaser, a consignment of ferroboron shall be supplied with a sample taken by the supplier.

6.1.2 Sampling for chemical analysis shall be carried out using the methods specified in ISO 3713 and ISO 12698[2], but other methods of sampling with a similar precision may also be used.

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1) The point of delivery is defined as that point where the responsibility for the consignment passes from a supplier to a purchaser. If neither the supplier nor the purchaser is responsible for the transportation, then the point at which the values become valid shall be agreed upon.

2) ISO 12698: *Ferroboron — Sampling and sample preparation for chemical analysis* (at the stage of a working draft).

6.1.3 Sampling for sieve analysis shall be carried out using the methods specified in ISO 4551, but other methods of sampling with a similar precision may also be used.

6.1.4 Sampling is usually carried out at the supplier's stockyard, unless otherwise agreed. Wherever sampling is carried out, representatives of both the supplier and purchaser may be present, provided this is agreed upon at the time the material is ordered.

6.1.5 The determination of ferroboron content shall preferably be carried out by a method chosen by mutual agreement between supplier and purchaser.

6.1.6 The sieve analysis of ferroboron shall be carried out using the methods specified in ISO 4551, but other methods with a similar precision may also be used.

6.2 Check testing

6.2.1 If desired, check testing of chemical composition and size distribution shall be carried out by the purchaser using one of the following methods.

a) The analysis of a sample taken by the supplier and sent together with the consignment shall be carried out by the purchaser.

b) Sampling and sample analysis shall be repeated by the purchaser in accordance with 6.1.

6.2.2 When using the first method of check testing, the following condition shall be observed:

$$|x_1 - x_2| \leqslant 2{,}8\sigma_M \quad \ldots (1)$$

where

x_1 is the value of the quality characteristic according to the supplier's data;

x_2 is the result of check testing by the purchaser;

σ_M is the standard deviation for characterizing the reproducibility of the method of sample material analysis.

6.2.3 When using the second method of check testing, the following condition shall be observed.

$$|x_1 - x_2| \leqslant 1{,}4\beta_{SDM} \quad \ldots (2)$$

where

β_{SDM} is the overall precision of quality control given in the relevant International Standards for the sampling methods of ferroalloys.

6.2.4 If either of the conditions (1) or (2) is met for the results of the check analysis, the quality of the consignment is considered to be in agreement with the accompanying document established by the supplier.

The numeral value of the quality characteristic, X, may be established by using the equation

$$X = \frac{x_1 + x_2}{2} \quad \ldots (3)$$

6.2.5 If neither of condition (1) or (2) is met for the results of the check analysis, the repeated check of arbitration testing shall be carried out by the purchaser in the absence of any other agreement.

6.3 Arbitration testing

6.3.1 Arbitration testing shall be carried out by an arbitrator chosen by mutual agreement between supplier and purchaser.

6.3.2 Sampling and sample analysis shall be carried out in accordance with the relevant International Standards (see 6.1.2), or by other methods chosen by mutual agreement between supplier, purchaser and arbitrator.

6.3.3 The arbitrator's test results shall be final, in the absence of any other agreement.

7 Dispatch and storage

Ferroboron shall be packed, stored and transported according to international regulations.

Examples of appropriate international regulations are:

a) RID: Règlement international concernant le transport des marchandises dangereuses par chemin de fer, annexe C.

b) International maritime dangerous goods code.

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ICS 77.100.00

Descriptors: alloys, ferroalloys, boron alloys, ferroboron, specifications, chemical composition, particle size, delivery condition, tests.

Price based on 3 pages