International Standard 5446

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Ferromanganese — Specification and conditions of delivery

Ferro-manganèse — Spécifications et conditions de livraison

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Foreword

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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.

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It has been approved by the member bodies of the following countries :

Austria	India	South Africa, Rep. of
Brazil	Italy	Sweden
Canada	Japan	United Kingdom
China	Norway	USA
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France	Poland	Yugoslavia
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The member body of the following country expressed disapproval of the document on technical grounds :

Australia

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Ferromanganese — Specification and conditions of delivery

1 Scope and field of application

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

2 References

ISO 565, *Test sieves — Woven metal wire cloth and perforated plate — Nominal sizes of apertures.*

ISO 3713, *Ferroalloys — Sampling and preparation of samples — General rules.* [1)]

ISO 4159, *Ferromanganese and ferrosilicomanganese — Determination of manganese content — Potentiometric method.*

3 Definition

3.1 ferromanganese : A master alloy of iron and manganese with a minimum manganese content of 70,0 % by mass, and a maximum manganese content of 95,0 % by mass, obtained by reduction.

4 Information for ordering

Orders for ferromanganese shall include the following information.

a) Quantity.

b) Constitution of consignment.

c) Chemical composition in accordance with the designations given in tables 1 to 6.

d) Particle size ranges in accordance with the classes given in table 7.

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

5 Requirements

5.1 Constitution of consignment

Ferromanganese shall be delivered in consignments constituted by one of the following methods.

5.1.1 Tapped lot method

A consignment constituted by the tapped lot method consists of a ferromanganese mass of one melt (or one part of a continuous tap).

5.1.2 Graded lot method

A consignment constituted by the graded lot method consists of a number of melts (or parts of continuous taps) of one ferromanganese designation.

The manganese content of the melts (or parts of continuous taps) constituting the consignment shall not differ from each other by more than 3 % absolute.

5.1.3 Blended lot method

A consignment constituted by the blended lot method consists of a number of melts (or parts of continuous taps) of one ferromanganese designation, which have been crushed to a particle size less than x mm [2)] and thoroughly mixed.

The content of the main constituent of the melts (or parts of continuous taps) constituting the consignment may vary between the minimum and maximum limits specified for the appropriate ferromanganese designation.

5.2 Chemical composition

5.2.1 The chemical composition of ferromanganese shall be as specified in tables 1 to 6. The limits stated correspond to particle size ranges in classes 1 to 6 in accordance with table 7.

1) At present at the stage of draft.

2) To be defined after further investigation.

5.2.2 The chemical compositions given in tables 1 to 6 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 supplier and purchaser.

5.2.3 The chemical compositions given in tables 1 to 6 are subject to the precision of the methods of sampling and analysis for ferromanganese (see clause 6).

5.3 Particle size ranges

5.3.1 Ferromanganese is supplied in lumps or as crushed and screened particles. The particle size ranges and tolerances shall be in accordance with table 7. 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 7, these shall be agreed upon between supplier and purchaser.

5.4 Extraneous contamination

The material shall be as free as possible from extraneous contamination.

6 Testing

6.1 Sampling for chemical analysis and sieve analysis

6.1.1 Sampling for chemical analysis and sieve analysis[2)] shall preferably be carried out by the method specified in ISO 3713[3)], but other methods of sampling having similar precision may also be used.

6.1.2 Sampling is usually carried out at the supplier's stockyard, unless otherwise agreed. Wherever sampling is carried out, representatives of both supplier and purchaser may be present.

6.1.3 If required, arbitration sampling shall be carried out by an arbitrator chosen by mutual agreement between supplier and purchaser. Sampling shall be carried out by the method specified in ISO 3713[3)], but other methods of sampling having similar precision may be agreed upon between supplier, purchaser and arbitrator.

The sample obtained by arbitration shall be accepted by both parties.

6.2 Analysis

6.2.1 The chemical analysis of ferromanganese shall preferably be carried out by the method specified in ISO 4159, but other methods of chemical analysis having similar precision may also be used.

6.2.2 Ferromanganese shall be furnished with an analysis certificate, established by the supplier, for the manganese content and, if agreed, the contents of other elements either specified in tables 1 to 6 or additionally agreed and, upon request of the purchaser, with a sample representative of the consignment.

6.2.3 In case of dispute, one of the following two procedures may be used.

6.2.3.1 Contradictory analysis

The chemical analysis shall be carried out on the same sample and preferably by the method specified in ISO 4159. Other methods of chemical analysis having similar precision may be used, but shall be agreed upon between supplier and purchaser.

If the difference between the results of the two analyses is within x %[4)], the mean value shall apply. If the difference exceeds x %, then, provided that no other agreement is reached, arbitration analysis shall be carried out by an arbitrator chosen by mutual agreement between supplier and purchaser.

1) The point of delivery is defined as that point where the responsibility for the consignment passes from supplier to 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) Sieve analysis of ferroalloys will form the subject of ISO 4551.

3) A method of sampling specific to ferromanganese will form the subject of ISO 4553.

4) The value of x will be specified later. In the meantime, the value should be agreed upon between purchaser and supplier.

6.2.3.2 Arbitration analysis

Arbitration analysis shall preferably be carried out by the method specified in ISO 4159. Other methods of chemical analysis having similar precision may be used, but shall be agreed upon between supplier, purchaser and arbitrator.

The arbitrator's result is final, provided it is within the two disputed values or not more than y %[1] outside one of these values.

7 Despatch and storage

Ferromanganese shall be packed, stored and transported according to international regulations.[2]

Table 1 — High carbon FeMn

Designation	Chemical composition, %				
	Mn	C max.	Si max.	P max.	S max.
FeMn75C80VHP	From 70,0 up to and including 82,0	8,0	2,0	0,50	0,030
FeMn75C80HP				0,35	
FeMn75C80MP				0,25	
FeMn75C80LP				0,15	
FeMn75C80VLP				0,10	

Table 2 — Medium carbon FeMn

Designation	Chemical composition, %					
	Mn	C over	C up to and including	Si max.	P max.	S max.
FeMn80C20	From 75,0 up to and including 85,0	1,5	2,0	2,0	0,35	0,030
FeMn80C20LP					0,20	
FeMn80C15		1,0	1,5	2,0	0,35	
FeMn80C15LP					0,20	
FeMn80C10		0,5	1,0	2,0	0,35	
FeMn80C10LP					0,20	

Table 3 — Medium carbon FeMn

Designation	Chemical composition, %					
	Mn	C over	C up to and including	Si max.	P max.	S max.
FeMn90C20	Over 85,0 up to and including 95,0	1,5	2,0	2,0	0,35	0,030
FeMn90C20LP					0,20	
FeMn90C15		1,0	1,5	2,0	0,35	
FeMn90C15LP					0,20	
FeMn90C10		0,5	1,0	2,0	0,35	
FeMn90C10LP					0,20	

1) This value, as an overall precision, will be specified as β_{SDM}.

2) 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.

Table 4 — Low carbon FeMn

Designation	Chemical composition, %					
	Mn	C over	C up to and including	Si max.	P max.	S max.
FeMn80C05	From 75,0 up to and including 85,0	0,10	0,50	2,0	0,30	0,030
FeMn80C05LP					0,15	
FeMn80C01			0,10	2,0	0,30	
FeMn80C01LP					0,15	

Table 5 — Low carbon FeMn

Designation	Chemical composition, %					
	Mn	C over	C up to and including	Si max.	P max.	S max.
FeMn90C05	Over 85,0 up to and including 95,0	0,10	0,50	2,0	0,30	0,030
FeMn90C05LP					0,15	
FeMn90C01			0,10	2,0	0,30	
FeMn90C01LP					0,15	

Table 6 — FeMn, nitrogen-containing

Designation		Chemical composition, %							
		Mn min.	C over	C up to and including	Si max.	P max.	S max.	N over	N up to and including
Smelted	FeMn80C05N2	80,0	0,1	0,5	2	0,15	0,030	1,5	2,5
Sintered	FeMn70C05N5	69,0	0,1	0,5	2	0,30 0,15	0,030	4,0	8,0
Sintered	FeMn70C10N5		0,5	2,0	2	0,35 0,20	0,030		

Table 7 — Particle size

Class	Particle size range mm	Undersize, max. % by mass total	Undersize, max. % by mass below 3,15 mm	Oversize, max. % by mass
1	100 to 315	15	5[1]	10 No piece to exceed 1,15 × the maximum limit of the size range specified in two or three directions.
2	25 to 200	15	7[1]	
3	10 to 100	15	7[1]	
4	3,15 to 50	7		
5	3,15 to 25	7		
6	up to 3,15	—		

1) If not otherwise specified, these values are for information only.