Draft ***Indian Standard***

FERROMANGANESE — SPECIFICATION

(Sixth Revision)

1 SCOPE

This standard covers the requirements and condition of delivery for ferromanganese used by iron and steel industry and foundries.

2 REFERENCES

The following standards contain provisions which through reference in the text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
IS 460	Test sieves — Specifications:
(Part 1) : 2020	Wire cloth test sieve (*fourth revision*)
(Part 2) : 2020	Perforated plate test sieve (*fourth revision*)
(Part 3) : 2020	Methods of examination of apertures of test sieves (*fourth revision*)
IS 1387 : 1993	General requirements for the supply of metallurgical materials (*second revision*)
IS 1472 : 1977	Methods for sampling ferro alloys for determination of chemical composition (*first revision*)
IS 1559 : 1961	Methods of chemical analysis of ferro alloys
IS 15765 : 2008	Method of sampling ferro alloys for sieve analysis and size determination
IS 2085	Code for designation of ferro-alloys

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

3.1 Ferromanganese — A master alloy of iron and manganese with a minimum manganese content of 65 percent by mass, and maximum manganese content of 95 percent by mass, obtained by reduction from the corresponding raw materials.

3.1.1 *Ferromanganese Low Carbon* — Ferromanganese having a mass fraction of carbon up to 0.5 percent.

3.1.2 *Ferromanganese Medium Carbon* — Ferromanganese having a mass fraction of carbon in the range from 0.5 percent to 3.0 percent.

3.1.3 *Ferromanganese High Carbon* — Ferromanganese having a mass fraction of carbon upto

8.0 percent.

3.2 Cast (Melt) — The product of any of the following:

a) One furnace heat; or
b) One tap of continuous furnace; or
c) A number of furnace or crucible heats of similar composition mixed in a ladle or holding furnace and used for making a cast.

3.3 Consignment

3.3.1 *Tapped Lot Method* **—** A consignment constituted by the tapped lot method consists of a ferromanganese mass of the one melt (or one part of continuous tap).

3.3.2 *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 part of continuous taps) constituting the consignment shall not differ from each other by more than 3 percent absolute.

3.3.3 *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 50 mm 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 the maximum limit specified for the appropriate ferromanganese designation.

4 GRADES

This standard covers 15 grades of ferromanganese as specified in Table 1.

5 PARTICULARS TO BE SPECIFIED WHILE ORDERING

For the benefit of the purchaser, particulars to be specified while ordering for the material to this specification shall be as follows:

a) Quantity of the material;
b) Constitution of consignment;
c) Name of the material;
d) Grade;
e) Size range; and
f) Necessary requirements for analysis reports, packing, etc, as appropriate.

6 SUPPLY OF MATERIALS

General requirements relating to supply of the material to this specification shall be as laid down in IS 1387.

7 REQUIREMENTS

7.1 Constitution of Consignment

Ferromanganese shall be delivered in consignment constituted by one of the methods defined in **3.2.**

7.2 Chemical Composition

7.2.1 Each consignment of the material shall conform to the requirements of the chemical composition specified in Table 1 and if so specified by the purchaser at the time of enquiry and order, shall supply a test certificate of chemical analysis of the sample of material for each melt.

7.2.2 If specified by the purchaser at the time of enquiry and order that each lump of the consignment should conform to the chemical composition specified in Table 1, this shall be as agreed to between the purchaser and the manufacturer.

7.2.3 The chemical composition given in Table 1 shows only the main constituent elements and the usual impurities. If the purchaser requires closer ranges for the main element contents and/or different limits for specified elements and/or non-specified elements this shall be as agreed to between the purchaser and the manufacturer.

Table 1 Chemical Composition of Ferromanganese
(*Clauses* 4, 7.2.1, 7.2.2 *and* 7.2.3)

Sl No.	**Grade Designation** (as per IS 2085)	**Percent**				
		Mn	C	Si *Max*	S *Max*	P *Max*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	High carbon ferromanganese:					
	a) 80FeMn 82	78-85	8 *Max*	3	0.050	[1]
	b) 80FeMn 76	74-78	8 *Max*	3	0.050	[1]
	c) 80FeMn 74	72-76	8 *Max*	3	0.050	[1]
	d) 80FeMn 72	70-74	8 *Max*	3	0.050	[1]
	e) 80FeMn 68	65-70	8 *Max*	3	0.050	[1]
ii)	Medium carbon ferromanganese:					
	a) 18 FeMn 92	88-95	0.5-3.0	2.5	0.050	0.35
	b) 18 FeMn 86	83-88	0.5-3.0	2.5	0.050	0.35
	c) 18 FeMn 80	78-82	0.5-3.0	2.5	0.050	0.35
	d) 18 FeMn 76	74-78	0.5-3.0	2.5	0.050	0.35
	e) 18 FeMn 72	70-74	0.5-3.0	2.5	0.050	0.35
iii)	Low carbon ferromanganese[2]:					
	a) 5 FeMn 92	88-95	0.50 *Max*	2	0.050	0.30

	b) 5 FeMn 87	85-88	0.50 *Max*	2	0.050	0.30
	c) 5 FeMn 83	80-85	0.50 *Max*	2	0.050	0.30
	d) 5 FeMn 78	75-80	0.50 *Max*	2	0.050	0.30
	e) 5 FeMn 72	70-74	0.50 *Max*	2	0.050	0.30

[1)] Phosphorus (P) content shall have any of the 3 limits: 0.25 percent *Max*; or 0.35 percent, *Max*; or 0.45 percent, *Max*.
[2)] Aluminium content shall be 0.5 percent, *Max* when produced by alumino thermic process.
Note: Unless otherwise agreed upon between the purchaser and the manufacturer, residual elements, percent, *Max*. B-0.01, Ti- 0.25, Al-0.25

7.2.4 The chemical composition of the material shall be determined either by the method specified in IS 1559 or any other established instrumental chemical method. In case of dispute, the procedure given in IS 1559 shall be the referee method. However, where the method is not given in IS 1559 the referee method shall be as agreed to between the purchaser and the manufacturer.

8 SIZE RANGE

8.1 Unless otherwise specified the material shall be supplied in lumps or as crushed and screened particles. The particle size ranges and tolerances shall be as given in Table 2. The undersize values shall be valid at the point of delivery to the purchaser.

8.2 In size designation 1, 2 and 3, the -3 mm fraction shall not exceed 5 percent.

8.3 The undersize and oversize values shall be valid at the point of delivery to the purchaser. The test sieves used shall be in accordance with sizes specified in IS 460 (Part 1) and IS 460 (Part 2). As the standard test sieve will become less accurate after period of time, the sieve shall therefore be periodically checked according to IS 460 (Part 3) and the correction factor shall be determined and applied to the result.

8.4 For conducting the sieve analysis and size determination, the methods specified in IS 15765 shall be applied.

Table 2 Particle Size Range
(*Clause* 8.1)

Sl No.	**Class**	**Particle Size Range**	**Undersize, *Max*, Percent by Mass**		**Oversize, *Max*, Percent by Mass**
			Total	Below 3.15 mm	
(1)	(2)	(3)	(4)	(5)	(6)
i)	1	100-315	15	5[1)]	10
ii)	2	25-200	15	7[1)]	No piece to exceed 1.15 ×
iii)	3	10-100	15	7[1)]	the maximum limit of the
iv)	4	3.15-50	—	7 —	size range specified in

v)	5	3.15-25	—	7	—	two or three directions
vi)	6	Up to 3.15	—	—	—	

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

9 EXTRANEOUS CONTAMINATIONS

The material shall be reasonably free from extraneous contaminations like slag and non-metallic inclusion.

10 SAMPLING

Each consignment of the material shall be sampled in accordance with IS 1472.

11 PACKING

The material shall be packed in suitable containers, or shipped in bulk, or as mutually agreed to between the supplier and the purchaser.

12 MARKING

12.1 The packing containing the material shall be marked legibly and indelibly with the following:

a) Supplier’s name or trade-mark;
b) Grade designation. and size;
c) Quantity;
d) Date of manufacture; and
e) Shelf life, if needed.

12.2 BIS Certification Marking

The products(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provision of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product may be marked with the Standard Mark.