Draft ***Indian Standard***

MANGANESE METAL — SPECIFICATION

(Third Revision)

1 SCOPE

This standard covers the requirements of metallic manganese used in ferrous and non-ferrous industry.

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 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 2017 : 2023	Chemical Analysis of Metallic Manganese — Methods (*first revision*)
IS 460 (Part 1) : 2020	Test sieves — Specifications: 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 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 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.

3.2 Consignments

3.2.1 *Tapped Lot Method* — A consignment constituted by the tapped lot method consists of a

manganese metal mass of the one melt (or one part of continuous tap).

3.2.2 *Graded Lot Method* — A consignment constituted by the graded lot method consists of a number of melts (or parts of continuous taps) of one manganese metal designation.

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

3.2.3 *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 6 grades of manganese metal, as specified in Table 1.

Table 1 Chemical Composition of manganese metal

Sl No.	Grade Designation	Percent									
		Mn	Si *Max*	Fe *Max*	C *Max*	S *Max*	P *Max*	Al *Max*	Heavy Metals *Max*	H *Max*	N
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
i)	M Mn 95	95 *Min*	1.0	2.5	0.2	0.05	0.05	—	—	—	—
ii)	M Mn 95 LC	95 *Min*	1.0	2.0	0.06	0.05	0.05	0.5	—	—	—
iii)	E Mn 99	~~99.9~~ 99.7*Min*	0.002	0.001	~~0.006~~ 0.04	0.02	~~0.001~~ 0.025	—	0.005	0.015	—
iv)	E Mn 99 LH	~~99.9~~ 99.7 *Min*	0.002	0.001	~~0.006~~ 0.04	0.03	~~0.001~~ 0.025	—	0.005	0.002	—
v)	E Mn 93 N	92 to 94	0.002	0.001	~~0.02~~ 0.06	0.03	~~0.002~~ 0.05	—	0.005	0.002	6 to 8
vi)	E Mn 95 N	94 to 96	0.002	0.001	~~0.02~~ 0.06	0.03	~~0.002~~ 0.05	—	0.005	0.002	4 to 6

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 designation;
e) size range;
f) necessary requirements for analysis and
g) 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

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

8 CHEMICAL COMPOSITION

8.1 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.

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

> NOTE — The material belonging to a Cast (Melt) which is out of specification, shall not be blended or mixed with the material of another cast/melt.

8.3 The chemical composition given Table 1 shows 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 non-specified elements, this shall be agreed to between the purchaser and the manufacturer.

8.4 The chemical composition of the material shall be determined either by the method specified in IS 2017 or any other established instrumental/chemical method. In case of dispute the procedure given in the latest version of IS 2017 shall be the referee method. However, where the method is not given in IS 2017 the referee method shall be agreed to between the purchaser and the manufacturer.

9 SIZE RANGE

9.1 Unless otherwise agreed 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 under size values

shall be valid at the point of delivery to the purchaser.

9.2 Electrolytic manganese and nitriding manganese shall be supplied in the form of flakes of minimum thickness of 1.5 mm and unless otherwise agreed to between the supplier and the purchaser, the bulk shall not contain flakes more than 10 percent of the size smaller than 25 mm x 25 mm.

9.3 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.

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

10 EXTRANEOUS CONTAMINATIONS

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

Table 2 Particle Size Range
(*Clause* 9.1)

Size Designation	**Size Range**, mm		**Undersize, Percent by Mass**, *Max*	**Oversize, Percent by Mass**, *Max*
	Over	Upto and Including		
(1)	(2)	(3)	(4)	(5)
1	15	50	5	10
2	5	15	5	10
3	2	5	5	10
4	—	2	—	10

11 SAMPLING

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

12 PACKING

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

13 MARKING

13.1 The packing containing the material shall be marked with the following:

a) supplier's name or trade-mark;
b) grade designation,
c) quantity;
d) date of manufacture; and
e) shelf life, if required.

13.2 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.