Draft *Indian Standard*

CODE FOR DESIGNATION OF FERRO-ALLOYS

(First Revision)

ICS

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FOREWORD

This Indian Standard (first revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Ores and Feed Stock for Iron and Steel Industry Sectional Committee had been approved by the Metallurgical Engineering Division Council.

The Standard was originally published in 1962. The first revision of this standard has been undertaken to align with the latest version to harmonize it with the latest developments that have taken place at international level.

Leaded bronze alloy powder is used for the manufacture of steel backed metal powder bearings and bushings made by combination of sintering and rolling processes.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (Second Revision)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

CODE FOR DESIGNATION OF FERRO-ALLOYS

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1 SCOPE

This standard specifies the symbols which shall be used for designating ferro-alloys on the basis of chemical composition. It is intended that only the minimum number of symbols essential for identifying ferro-alloys shall be used.

2 REFERENCES

The following standards contain provisions, which through reference in this 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 agreements 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IS 1111	Spiegeleisen (Revised) (Withdrawn)
IS 1468: 2000	Ferrotitanium - Specification (*Fourth Revision*)
IS 1469: 1993	Ferromolybdenum - Specification (*Fourth Revision*)
IS 1470: 2013	Silicomanganese - Specification (*Fourth Revision*)
IS 1471: 1988	Specification for ferrophosphorus (*Second Revision*)

3 GENERAL

3.1 Ferro-alloys may be designated by a group of symbols indicating the important chemical constituents in the following order:

a) Carbon content (see 4),

b) Alloy content (see 5),

c) Other major constituents (see 6) and

d) Phosphorus content (see 7).

3.2 It is emphasized that for designating a particular grade of ferro-alloy, it may not be necessary to include the symbols for all the characteristics given in **3.1** and as far as possible, for the sake of brevity, only those symbols, which are important and essential should be used.

4 SYMBOL FOR CARBON CONTENT (CARBON INDEX)

4.1 It shall consist of the average carbon content in percentage without prefixing the chemical symbol ‘C’.

4.1.1 Where only a maximum limit is specified, the carbon index shall not ordinarily be used. If, however, to differentiate two alloys of the same family, it is found necessary to indicate the carbon percentage, the range of carbon content may be taken as ten points (0.10 percent) and the average carbon content shall be expressed in tenths of a percentage.

5 SYMBOL FOR ALLOY CONTENT (ALLOY INDEX)

5.1 In the case of iron base ferro-alloys the symbol 'Fe' shall be followed by the chemical symbol of the alloying element and the alloy content which shall be indicated by its average percentage content expressed as follows:

VALUES	INDEX NUMBER
Terminating in 0.5 and over	Rounded up to the nearest whole number
Terminating below 0.5	Rounded down to the nearest whole number

5.1.1 In case only the maximum or minimum limit of the alloy element is specified, the range may be assumed as 10 percent less than the maximum limit specified or 10 percent more than the minimum limit specified.

5.2 In the case of ferro-alloys, such as calcium silicon, silica manganese, etc, the chemical symbol of each significant alloying element shall be arranged in the descending order of percentage content. The average percentage content of each alloying element shall follow the respective chemical symbol and shall be indicated by an index number as given in **5.1** and **5.1.1**. The symbol 'Fe' shall not be included in such cases.

5.2.1 The base alloy shall be designated by its chemical symbol only and the percentage content shall not be included.

5.3 Where two or more significant alloying elements have the same alloy index in a ferro-alloy, the chemical symbols shall be grouped together followed by their alloy index.

6 SYMBOL FOR OTHER MAJOR CONSTITUENTS

6.1 Where necessary, the major constituents shall be designated by the chemical symbols followed by the average content expressed as follows:

VALUES	INDEX NUMBER
Terminating in 0.5 and over	Rounded up to the nearest whole number
Terminating below 0.5	Rounded down to the nearest whole number

6.1.1 In case only the maximum or minimum limit of the major constituent is specified, the range may be assumed as 10 percent less than the maximum limit specified or 10 percent more than the minimum limit specified.

7 SYMBOL FOR PHOSPHORUS CONTENT

7.1 Phosphorus content up to and including 0.3 percent shall not be indicated.

7.2 Phosphorus content more than 0.3 percent shall be indicated by the symbol 'P' followed by the average content in tenths of a percentage.

7.3 Where phosphorus appears as the major alloying element, for example, ferro phosphorus, it is to be coded as in **5.1**.

8 EXAMPLES

8.1 In order to illustrate the method of designating ferro-alloys, examples of code designations, in accordance with this code, are given below:

a) Ferro Phosphorus (IS 1471)

	PERCENT	DESIGNATION
Carbon	1.0 *Max*	FeP23
Phosphorus	20 to 26	

b) Ferro Molybdenum (IS 1469)

	PERCENT	DESIGNATION
Carbon	0.50 *Max*	
Molybdenum	70.0 *Min*	FeMo75
Silicon	1.5 *Max*	
Sulphur	0.06 *Max*	
Phosphorus	0.10 *Max*	

c) Low Carbon Ferro Titanium (IS 1468 Specification for Ferro Titanium)

	PERCENT	DESIGNATION
Carbon	0.10 *Max*	
Titanium	40 *Min*	OlFeTi45A125
Aluminium	20 to 30	
Silicon	2 to 3	

d) Medium Carbon, High Silicon Ferro Titanium (IS 1468 Specification for Ferro Titanium)

	PERCENT	DESIGNATION
Carbon	1.0 *Max*	
Titanium	25 *Min*	1FeTi30Si23
Aluminium	1.0 *Max*	
Silicon	20 to 25	

e) High Carbon Ferro Titanium (IS 1468 Specification for Ferro, Titanium)

	PERCENT	DESIGNATION
Carbon	6 to 8	
Titanium	30 to 40	
Aluminium	1 to 2	7FeTi35
Silicon	2 to 3	

f) Silica Manganese (IS 1470)

	PERCENT	DESIGNATION
Manganese	65 to 75	
Silicon	16 to 20	
Carbon	2.0 *Max*	MnSi18
Phosphorus	0.30 *Max*	
Sulphur	0.03 *Max*	

g) Spiegeleisen (Commercial) (IS 1111 Specification for Spiegeleisen)

	PERCENT	DESIGNATION
Carbon	6.5 *Max*	
Manganese	15 to 25	
Silicon	1.5*Max*	Mn20P6
Sulphur	0.05 *Max*	
Phosphorus	0.60 *Max*	

NOTE-In order to avoid confusion between the letter ‘l’ and numeral ‘1’ the chemical symbol ‘Al’ for aluminium in **8.1** face (Al).