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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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Replacing GB/T 4008-2008

Ferromanganese-silicon

锰硅合金

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1 Scope

The document fixes the classification, the method of designating grades, the technical requirements, the test methods, the inspection rules, and the provisions on packaging, storage and transport, marking and the quality certificate for ferromanganese-silicon.

It applies to ferromanganese-silicon used in steelmaking and in foundry work as an alloying agent, as a combined deoxidising agent and as a desulphurising agent, and used as the reducing agent in the smelting of medium-carbon ferromanganese, low-carbon ferromanganese and micro-carbon ferromanganese.

2 Normative references

The clause states that the content of the listed documents constitutes indispensable provisions of this document through normative reference in the text; for dated references only the edition cited applies, and for undated references the latest edition, including all amendments, applies.

The documents listed are GB/T 3650, GB/T 4010, GB/T 5686.1, GB/T 5686.2, GB/T 5686.4, GB/T 5686.5, GB/T 5686.7, GB/T 8170, GB/T 8654.1, GB/T 13247, YB/T 4801, YB/T 4907, YB/T 4935, YB/T 4936, YB/T 6027 and YB/T 6028.

3 Terms and definitions

No terms or definitions need to be defined for this document.

4 Classification and grade designation

According to carbon content, ferromanganese-silicon is divided into three classes: micro-carbon ferromanganese-silicon, low-carbon ferromanganese-silicon and ordinary-carbon ferromanganese-silicon.

Thirteen grades are established: five micro-carbon grades, three low-carbon grades and five ordinary-carbon grades.

The grade designation of ferromanganese-silicon is expressed by the lower limits of the manganese mass fraction and of the silicon mass fraction. The designation has the form FeMn followed by a number and Si followed by a number, the first number giving the controlled lower limit of the manganese content as a mass fraction and the second giving the controlled lower limit of the silicon content as a mass fraction.

5 Technical requirements

Chemical composition. The chemical composition of ferromanganese-silicon has to conform to Table 1. Table 1 is laid out by class and grade and fixes, as mass fractions in per cent, the manganese and silicon contents (as minima) and the upper limits for carbon, phosphorus and sulphur, with the carbon and phosphorus columns each split into grades I, II and III. On the scanned page the digitiser watermark covers the column headings and part of the first rows, so the individual figures of Table 1 are not reported here.

Where the purchaser has special requirements for the chemical composition given in Table 1, these are agreed separately between supplier and purchaser. The same applies to special requirements for other elements such as iron, aluminium, calcium, magnesium, copper, nickel, boron, arsenic, antimony and lead.

Physical condition. Ferromanganese-silicon is delivered in lump or granular form, and its

size ranges and permissible deviations have to conform to Table 2. Where the purchaser has special requirements for size, these are agreed separately between supplier and purchaser.

Table 2 sets five size classes. Class 1 covers 10 mm to 50 mm, class 2 covers 10 mm to 70 mm, class 3 covers 10 mm to 100 mm, class 4 covers 10 mm to 150 mm and class 5 covers 10 mm to 300 mm. For each class the table gives, as a mass fraction in per cent and as a maximum, the permitted undersize passing the sieve and the permitted oversize retained on the sieve, the latter being material whose length on two or three sides exceeds 1.15 times the upper size limit. The undersize limit is 7 for classes 1, 2 and 3 and 5 for classes 4 and 5; the oversize limit is 5 for all five classes.

6 Test methods

The methods of analysis for ferromanganese-silicon have to conform to Table 3, or are agreed separately between supplier and purchaser.

Table 3 assigns an analytical method to each of fifteen elements: manganese to GB/T 5686.1 and YB/T 4907; silicon to GB/T 5686.2 and YB/T 4907; carbon to GB/T 5686.5; phosphorus to GB/T 5686.4 and YB/T 4907; sulphur to GB/T 5686.7; iron to GB/T 8654.1 and YB/T 4907; aluminium to YB/T 4801 and YB/T 4935; calcium to YB/T 4801 and YB/T 6027; magnesium to YB/T 4801 and YB/T 6028; copper to YB/T 4801 and YB/T 4936; nickel, arsenic, titanium and lead to YB/T 4801; and boron to Annex C.

The size of ferromanganese-silicon is determined in accordance with GB/T 13247.

7 Inspection rules

Taking and preparation of test samples. Samples for the chemical analysis of ferromanganese-silicon are taken and prepared in accordance with GB/T 4010.

Quality inspection and acceptance. The quality inspection and acceptance of ferromanganese-silicon conform to GB/T 3650.

Sampling and acceptance for size. Sampling and acceptance for the size of ferromanganese-silicon follow GB/T 13247.

Subclause 7.1, on batching, is covered by the digitiser watermark on the scanned page and its text could not be read.

8 Determination and re-inspection

The quality of ferromanganese-silicon products is inspected by the quality and technical department of the supplier, and the inspection results are judged against the technical requirements.

If the purchaser disputes the product quality, the objection is raised with the supplier within 20 working days from the date of receipt of the goods, and both parties jointly take fresh samples for re-inspection; quality is then judged on the re-inspection results.

If arbitration is needed, supplier and purchaser jointly select an arbitration body by agreement and hand the re-inspection sample to it; quality is judged on the arbitration body's result.

9 Packaging, storage and transport, marking and quality certificate

Ferromanganese-silicon is normally supplied in bulk, in bags or in containers. Where it is supplied in bags or containers, a clear marking has to appear on the outside of the package.

The storage and transport, marking and quality certificate of ferromanganese-silicon conform to GB/T 3650.

Annex A Comparison of the clause numbering with ISO 5447:1980

Annex A is informative and gives, in Table A.1, a clause-by-clause comparison between the numbering of this document and the numbering of ISO 5447:1980. The table pairs clauses 1, 2 and 3 of the two documents one to one, shows that clause 4 of ISO 5447:1980 has no counterpart here and that clause 4 of this document has no counterpart there, and then maps clause 5 and its subclauses, clause 6 and its subclauses, the subclauses of clause 7, and clauses 8 and 9 onto the corresponding ISO provisions. Annexes A, B and C of this document have no counterpart in ISO 5447:1980.

Annex C Inductively coupled plasma atomic emission spectrometry

Spectral lines. No particular analytical line is prescribed; the boron lines at 208.955 nm and 208.893 nm are recommended, and interference, background and ionisation effects are to be evaluated carefully when they are used.

Resolution of the spectrometer. The resolution takes account of the effect of the wavelength scan across the line, and the bandwidth to be used for each line, including the internal standard line, has to be smaller than 0.030 nm.

Short-term stability. The absolute intensity or intensity ratio of the calibration solution with the highest boron concentration is measured ten times and its standard deviation calculated; the relative standard deviation has to be less than 1.0 per cent.

Long-term stability. The mean of three measurements of the absolute intensity or intensity ratio of the calibration solution with the highest boron concentration is taken, and the standard deviation of seven such means is calculated; for the absolute-intensity method the relative standard deviation has to be less than 1.8 per cent.