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Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

Indian Standard
HIGH SILICA SAND FOR USE IN FOUNDRIES — SPECIFICATION
(Second Revision)

ICS 73.060.01 : 81.080
Foundry Sectional Committee, MTD 14

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Foundry Sectional Committee had been approved by the Metallurgical Engineering Division Council.

High silica sand for use in foundries is different from that used in glass and refractory industries. Sand for foundry purpose should have well defined grading, preferred shape and size, besides meeting the requirements of chemical composition. Sand should be essentially free from mica content. The grain size, shape and its distribution ultimately affect the moulding characteristics of the sand mixture.

This standard was initially published in 1962 and subsequently revised in 1974. During this revision of the standard, committee felt that the grain fineness of high silica sand for Grades A, B and C should be indicated separately and as such a new Table as Table 3 has been incorporated. The clay content for all the grades has also been modified.

For determining the fineness of washed silica sand, the aperture sizes are based on IS 460 (Part 3) : 1985 'Methods of examination of apertures of test sieves (third revision)'. Where IS sieves are not available, other equivalent standard sieves may be used. For the purpose of comparison the corresponding BS and ASTM test sieve numbers are given in Annex A.

The composition of the Committee responsible for the formulation of this standard is given in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the results of the test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical value (revised)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.
Indian Standard

HIGH SILICA SAND FOR USE IN FOUNDRIES — SPECIFICATION
(Second Revision)

1 SCOPE

This standard covers the requirements for high silica sand for use in foundries.

2 REFERENCES

The following Indian 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:

<table>
<thead>
<tr>
<th>IS No.</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>460 (Part 1): 1985</td>
<td>Test sieves: Part 1 Wire cloth test sieves (third revision)</td>
</tr>
<tr>
<td>1387:1993</td>
<td>General requirements for the supply of metallurgical materials (second revision)</td>
</tr>
<tr>
<td>1811:1984</td>
<td>Methods of sampling foundry sands (first revision)</td>
</tr>
<tr>
<td>1917</td>
<td>Methods for chemical analysis of quartzite and high silica sand:</td>
</tr>
<tr>
<td>(Part 3): 1992</td>
<td>Determination of silica (first revision)</td>
</tr>
<tr>
<td>(Part 4): 1991</td>
<td>Determination of aluminium by AAS method (first revision)</td>
</tr>
<tr>
<td>(Part 5): 1992</td>
<td>Determination of iron by AAS method (first revision)</td>
</tr>
<tr>
<td>(Part 6): 1992</td>
<td>Determination of calcium and magnesium by AAS method (first revision)</td>
</tr>
<tr>
<td>1918:1966</td>
<td>Methods of physical tests for foundry sands</td>
</tr>
</tbody>
</table>

3 SUPPLY OF MATERIAL

General requirements relating to supply of high silica sand for use in foundries shall conform to IS 1387.

4 SAMPLING

Representative samples shall be drawn according to the scheme of sampling given in IS 1811.

5 MANUFACTURE

5.1 Natural Sand

It occurs as loose or poorly consolidated deposit of sedimentary origin or as dune blown inland from the coast or as accumulated deposit in estuaries and rivers along the coast. Sands from these sources shall require a degree of processing depending on their source and specified foundry requirements.

5.2 Crushed Sand

It is produced by crushing quartizitic sand stones of open texture, washing and grading it to yield sand grade of requisite shape and grain distribution.

6 GRADING

High silica sand for use in foundries shall be of three grades, namely Grades A, B and C with respect to silica content of the sand and of size grades, namely Grades 850/425, 600/300, 425/212, 300/150, 212/106 and 150/75 based on distribution of sand grains. High silica sand shall be designated with a symbol which shall be a combination of gradation according to silica content and grain distribution. For example, high silica sand falling under Grade A with respect to silica content and Grade 425/212 according to its grain distribution shall be designated as A 425/212.

7 CLAY CONTENT

The clay content for Grades A, B and C shall not exceed 0.2, 0.50 and 2.0 percent respectively.

8 CHEMICAL COMPOSITION

High silica sand after washing off the clay matter, when analyzed in accordance with IS 1917 and its relevant parts shall conform to the requirements given in Table 1.

9 SINTERING TEMPERATURE

Sintering temperature range for Grade A of high silica sand shall be 1685°C to 1710°C.

10 GRAIN SHAPE

Washed sand grains shall be mostly of sub-angular to rounded shape (see IS 1918).
Table 1 Chemical Composition of High Silica Sand

(Clause 8)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Silica</th>
<th>Requirement, Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Alumine, Max</td>
</tr>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>A</td>
<td>Over 98</td>
<td>1.0</td>
</tr>
<tr>
<td>B</td>
<td>Over 95 up to 98</td>
<td>1.5</td>
</tr>
<tr>
<td>C</td>
<td>Over 90 up to 95</td>
<td>5.0</td>
</tr>
</tbody>
</table>

11 GRAIN FINENESS

11.1 High silica sand for foundry purposes shall have a well defined grading (see 8.4 of IS 1918) with 85 percent and above of the sand grains retained by three adjacent sieves.

11.2 Sorting coefficient for washed and graded sands shall range from 1.14 to 1.40 while for naturally bonded sands, it should be between 1.40 to 2.50.

11.3 The fineness (grain distribution) of Grade A high silica sand shall conform to the requirements as specified in Table 2. For Grades B and C the requirements as specified in Table 3 shall be applicable.

12 PACKING

Unless otherwise specified, the material shall be supplied in bags, each containing 50 kg.

13 MARKING

13.1 The bags shall be clearly marked with the manufacturer’s name or trade-mark and grade of the material.

13.2 BIS Certification Marking

The material may also be marked with the Standard Mark.

13.2.1 The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Table 2 Grain Fineness of High Silica Sand of Grade A

(Clause 11.3)

<table>
<thead>
<tr>
<th>Size Fineness</th>
<th>Main Fraction Retained on</th>
<th>Coarse Fraction Retained on</th>
<th>Fine Fraction Retained on</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS Sieve</td>
<td>Percent, Min</td>
<td>IS Sieve</td>
<td>Percent, Max</td>
</tr>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>850/425</td>
<td>850-600 and 425 micron</td>
<td>70</td>
<td>3.35 mm</td>
</tr>
<tr>
<td>600/300</td>
<td>600-425 and 300 micron</td>
<td>70</td>
<td>3.35 mm 1.70 mm</td>
</tr>
<tr>
<td>425/212</td>
<td>425-300 and 212 micron</td>
<td>70</td>
<td>3.35 mm 1.0 mm</td>
</tr>
<tr>
<td>300/150</td>
<td>300-212 and 150 micron</td>
<td>70</td>
<td>850 micron 1.0 mm</td>
</tr>
<tr>
<td>212/106</td>
<td>212-150 and 106 micron</td>
<td>70</td>
<td>600 micron 2.5 mm</td>
</tr>
<tr>
<td>150/75</td>
<td>150-106 and 75 micron</td>
<td>70</td>
<td>425-300 micron 2.5 mm</td>
</tr>
</tbody>
</table>

NOTE — For IS Sieve size, see IS 460 (Part 1).
### Table 3 Grain Fineness of High Silica Sand of Grades B and C

**(Clause 11.3)**

<table>
<thead>
<tr>
<th>Size Fineness</th>
<th>Main Fraction Retained on IS Sieve Percent, Min</th>
<th>Coarse Fraction Retained on IS Sieve Percent, Max</th>
<th>Fine Fraction Retained on IS Sieve Percent, Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>850/425</td>
<td>850-600 and 425 micron</td>
<td>3.35 mm</td>
<td>212 micron and finer</td>
</tr>
<tr>
<td>600/300</td>
<td>600-425 and 300 micron</td>
<td>3.35 and 1.70 mm</td>
<td>150 micron and finer</td>
</tr>
<tr>
<td>425/212</td>
<td>425-300 and 212 micron</td>
<td>1.70 mm and 850 micron</td>
<td>106 micron and finer</td>
</tr>
<tr>
<td>300/150</td>
<td>300-212 and 150 micron</td>
<td>850 and 600 micron</td>
<td>75 micron and finer</td>
</tr>
<tr>
<td>212/106</td>
<td>212-150 and 106 micron</td>
<td>850-600 and 425 micron</td>
<td>53 micron and finer</td>
</tr>
<tr>
<td>150/75</td>
<td>150-106 and 75 micron</td>
<td>600-425 and 300 micron</td>
<td>53 micron and finer</td>
</tr>
</tbody>
</table>

**NOTE** — For IS Sieve, see IS 460 (Part 1).

### ANNEX A

**(Foreword)**

**COMPARATIVE SIEVE DESIGNATIONS OF IS, BS AND ASTM TEST SIEVES**

<table>
<thead>
<tr>
<th>IS Sieve</th>
<th>BS Test Sieve</th>
<th>ASTM Test Sieve</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.35 mm</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>1.70 mm</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>850 micron</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>600 micron</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>425 micron</td>
<td>36</td>
<td>40</td>
</tr>
<tr>
<td>300 micron</td>
<td>52</td>
<td>50</td>
</tr>
<tr>
<td>212 micron</td>
<td>72</td>
<td>70</td>
</tr>
<tr>
<td>150 micron</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>106 micron</td>
<td>150</td>
<td>140</td>
</tr>
<tr>
<td>75 micron</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>53 micron</td>
<td>300</td>
<td>270</td>
</tr>
</tbody>
</table>
ANNEX B

(FOREWORD)

COMMITTEE COMPOSITION

Foundry Sectional Committee, MTD 14

Organization

Bhagwati Spherocast Ltd, Ahmedabad
Bharat Heavy Electricals, Haridwar
Directorate General of Supplies and Disposals (DGS & D), New Delhi
Federation of Engineering Industries of India, New Delhi
HMT Ltd, Bangalore
Indian Institute of Science, Bangalore
Indian Institute of Technology, Kharagpur
Indian Iron and Steel Co Ltd, Kulti
Institute of Indian Foundrymen, Delhi
Kirloskar Oil Engines Ltd, Sholapur
Ministry of Science and Technology, New Delhi
National Institute of Foundry and Forge Tech, Ranchi
National Metallurgical Laboratory, Jamshedpur
Research Design and Standards Organization, Lucknow
Tata Engineering and Locomotive Co Ltd, Pune
Versatile Equipment Pvt Ltd, Kolhapur
Virgo Services Pvt Ltd, Jodhpur
Walchandnagar Industries Ltd, Satara
BIS Directorate General

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SHRI M. A. KHAN (Alternate)
SHRI V. N. UPADHYAYA
SHRI H. L. BHARDWAJ (Alternate)
SHRI M. N. LINGARAJ
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SHRI P. L. JAIN
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SHRI A. B. KHAKATI (Alternate)
SHRI JAGMOHAN SINGH, Director & Head (MTD)
[Representing Director General (Ex-officio)]

Member Secretary

SHRI JAGMOHAN SINGH
Director & Head (MTD), BIS

Foundry Equipments Subcommittee, MTD 14 : 1

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Foseco India Ltd, Pune
Gargi Industries, Mumbai
IVP Ltd, Thane
Indian Core Oils Pvt Ltd, Faridabad
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This Indian Standard has been developed from Doc : No. MTD 14 ( 3603 ).

Amendments Issued Since Publication

<table>
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<th>Amend No.</th>
<th>Date of Issue</th>
<th>Text Affected</th>
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Printed at New India Printing Press, Khurja, India