Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जाने का अधिकार, जीने का अधिकार”
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

CERAMIC FIBRE BLANKET INSULATION — SPECIFICATION

ICS 27.220; 81.060.20
thermal Insulation Sectional Committee, CHD 27

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Thermal Insulation Sectional Committee had been approved by the Chemical Division Council.

The use of ceramic fibres as thermal insulation materials began in 1960's. However, their use has grown since early 1970's. The use of ceramic fibres products as high temperature insulation spread rapidly as a consequence of the energy crisis worldwide in the early seventies. These are extensively used as thermal insulation and fire resistant materials besides their core strength as low thermal mass soft refractory lining material.

The composition of the Committee responsible for 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 result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (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.
AMENDMENT NO. 1 DECEMBER 2011
TO
IS 15402 : 2003 CERAMIC FIBRE BLANKET
INSULATION — SPECIFICATION

(Page 2, Table 3, Note, line 2) — Substitute ‘once in a year’ for ‘once in three years’.

(CHD 27)

Reprography Unit, BIS, New Delhi, India
Indian Standard

CERAMIC FIBRE BLANKET INSULATION—SPECIFICATION

1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for high temperature ceramic fibre blanket comprising generally thermal insulation of alumina-silica system fibre and alumina-zirconia-silica system fibre.

When the installation or use of thermal insulation materials, accessories and system may pose safety or health problems, the manufacturers shall voluntarily provide the use with appropriate current information regarding any known problems associated with the recommended use of the company’s products and shall also recommend protective measures to be employed in their safe utilization. The use shall establish appropriate safety and health practices and determine the applicability of regulatory requirements prior to use.

2 REFERENCES

The standards listed below 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 revisions, 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>1335:1979</td>
<td>Methods for direct determination of alumina in refractory materials</td>
</tr>
<tr>
<td>1527:1972</td>
<td>Methods for chemical analysis of high silica refractory materials</td>
</tr>
<tr>
<td>3069:1994</td>
<td>Glossary of terms, symbols and units relating to thermal insulation</td>
</tr>
<tr>
<td>3144:1992</td>
<td>Mineral wool thermal insulation materials—Methods of test</td>
</tr>
<tr>
<td>3346:1980</td>
<td>Method for the determination of thermal conductivity of thermal</td>
</tr>
<tr>
<td></td>
<td>insulation materials (two slab guarded hot plate method)</td>
</tr>
<tr>
<td>9490:1980</td>
<td>Method for determination of thermal conductivity of insulation materials</td>
</tr>
</tbody>
</table>

3 TERMINOLOGY

For the purpose of this standard, the definitions of terms, symbols and units given in IS 3069, IS 14656 and the following shall apply.

3.1 Ceramic Fibre — A generic term used for alumino-silicate fibre. Other inorganic material like zirconia may be added for better properties. It is also termed as refractory ceramic fibre (RCF).

3.2 Classification Temperature — It is the highest temperature in °C at which the linear shrinkage is less than 4 percent.

4 CLASSIFICATION

4.1 Types

The product is of two types:

a) **Type I** — Zirconia or non-zirconia based material with a classification temperature of 1260 °C, and

b) **Type II** — Zirconia or non-zirconia based material with a classification temperature of 1430 °C.

4.2 Grade

The product is separated into following four grades for all types, based upon its bulk density:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Nominal Bulk Density, kg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>96</td>
<td>96</td>
</tr>
<tr>
<td>128</td>
<td>128</td>
</tr>
<tr>
<td>160</td>
<td>160</td>
</tr>
</tbody>
</table>

5 REQUIREMENTS

5.1 Description

The material shall be soft inorganic refractory fibres
made by melting alumina and silica followed by fibrisation either by blowing the melt or by drawing the melt over a set of spinning wheels. Zirconia (ZrO₂) shall be added along with alumina and silica to improve the properties in case of Type II and Type III materials.

5.1.1 The blankets shall be needled type with the same fibers.

5.2 Bulk Density

The bulk density of the material, when tested in accordance with the method prescribed in 11 of IS 14656, shall conform to the requirement of 4.2 with allowable tolerance of – 10 percent, + 30 percent on the manufacturer's declared value based on nominal thickness.

5.3 Shot Content

The shot content of the material when sieved through 210 micron sieve, shall not be more than 30 percent when determined in accordance with the method prescribed in 7 of IS 14656.

5.4 Linear Shrinkage

When tested according to 9 of IS 14656, linear shrinkage of the material shall not be more than the values given in Table 1.

Table 1 Linear Shrinkage, Percent, Maximum
(Clause 5.4)

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Mean Temperature °C</th>
<th>Type I</th>
<th>Type II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>i)</td>
<td>1 000</td>
<td>1.5</td>
<td>1.0</td>
</tr>
<tr>
<td>ii)</td>
<td>1 200</td>
<td>3.5</td>
<td>3.0</td>
</tr>
<tr>
<td>iii)</td>
<td>1 400</td>
<td>–</td>
<td>4.0</td>
</tr>
</tbody>
</table>

5.5 Tensile Strength

When tested in accordance with 8 of IS 14656 the material shall have minimum tensile strength value given in Table 2.

Table 2 Tensile Strength
(Clause 5.5)

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Bulk Density kg/m³</th>
<th>Tensile Strength, Longitudinal Direction kPa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>i)</td>
<td>64</td>
<td>15</td>
</tr>
<tr>
<td>ii)</td>
<td>96</td>
<td>20</td>
</tr>
<tr>
<td>iii)</td>
<td>128</td>
<td>40</td>
</tr>
<tr>
<td>iv)</td>
<td>160</td>
<td>50</td>
</tr>
</tbody>
</table>

NOTE — For blown material 60 percent of the specified values shall be considered.

5.6 Fibre Diameter

The mean fibre diameter of the material when tested according to 6 of IS 14656 shall be 2.0 to 4.0 microns.

5.7 Thermal Conductivity

Thermal conductivity or K-value of the material shall not exceed the values given in Table 3 when tested in accordance with IS 3346 or IS 9490. Further in case of disputes the method shall be referred to IS 3346.

5.8 Chemical Composition

The material shall conform to the requirements given in Table 4 when tested in accordance with the methods given in col 5 of Table 4.

5.9 Dimensions

The blankets shall be supplied in rolls in width of
Table 4 Chemical Composition
(Clause 5.8)

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Characteristics</th>
<th>Type of Material</th>
<th>Methods of Test, Ref to IS No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I (3)</td>
<td>II (4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(5)</td>
</tr>
<tr>
<td>i)</td>
<td>Alumina content, as Al₂O₃, percent</td>
<td>41-48</td>
<td>29-37</td>
</tr>
<tr>
<td>ii)</td>
<td>Silica content, as SiO₂, percent</td>
<td>49-58</td>
<td>42-57</td>
</tr>
<tr>
<td>iii)</td>
<td>Zirconium oxide, as ZrO₂, percent</td>
<td>0.7</td>
<td>13-18</td>
</tr>
<tr>
<td>iv)</td>
<td>Iron oxide (as Fe₂O₃), percent, Max</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>v)</td>
<td>Titanium dioxide (as TiO₂), percent, Max</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>vi)</td>
<td>Others (by difference), percent, Max</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>vii)</td>
<td>Leachable chlorides (as Cl) percent, Max</td>
<td>0.0020</td>
<td>0.0020</td>
</tr>
</tbody>
</table>

305, 610, 1220 mm and length of 3650, 3810, 7300, 7320, 7620 mm and thickness of 6, 9, 12, 19, 25, 38, 50 mm or as agreed to between the purchaser and the supplier. However, the tolerance on dimensions shall be as per Tables 5, 6 and 7.

Table 5 Width of Blanket Rolls
(Clause 5.9)

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Width, mm</th>
<th>Tolerance, Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3)</td>
</tr>
<tr>
<td>i)</td>
<td>305</td>
<td>-2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+10</td>
</tr>
<tr>
<td>ii)</td>
<td>610</td>
<td>-2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+10</td>
</tr>
<tr>
<td>iii)</td>
<td>1220</td>
<td>-2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+10</td>
</tr>
</tbody>
</table>

Table 6 Length of Blanket Rolls
(Clause 5.9)

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Length, mm</th>
<th>Tolerance, Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3)</td>
</tr>
<tr>
<td>i)</td>
<td>3650</td>
<td>-0</td>
</tr>
<tr>
<td>ii)</td>
<td>3810</td>
<td>-0</td>
</tr>
<tr>
<td>iii)</td>
<td>7300</td>
<td>-0</td>
</tr>
<tr>
<td>iv)</td>
<td>7320</td>
<td>-0</td>
</tr>
<tr>
<td>v)</td>
<td>7620</td>
<td>-0</td>
</tr>
</tbody>
</table>

Table 7 Thickness of Blanket Rolls
(Clause 5.9)

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Thickness, mm</th>
<th>Tolerance, mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3)</td>
</tr>
<tr>
<td>i)</td>
<td>6.0</td>
<td>+6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-3</td>
</tr>
<tr>
<td>ii)</td>
<td>9.0</td>
<td>+9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-3</td>
</tr>
<tr>
<td>iii)</td>
<td>12.0</td>
<td>+12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-3</td>
</tr>
<tr>
<td>iv)</td>
<td>19.0</td>
<td>+19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-3</td>
</tr>
<tr>
<td>v)</td>
<td>25.0</td>
<td>+19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-3</td>
</tr>
<tr>
<td>vi)</td>
<td>38.0</td>
<td>+19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-3</td>
</tr>
<tr>
<td>vii)</td>
<td>50.0</td>
<td>+19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-6</td>
</tr>
</tbody>
</table>

6 PACKING AND MARKING

6.1 Packing
The material shall be packed in waterproof polythene bags which shall be further encased in card board cartons or as specified/agreed to between the supplier and the purchaser.

6.2 Marking
The packages shall be legibly and indelibly marked with the following information:

a) Name of material;
b) Indication of the source of manufacture;
c) Apparent density of the material;
d) Length, width and thickness of material; and
e) Batch number.

6.3 BIS Certification Marking
6.3.1 The product may also be marked with the Standard Mark
6.3.1.1 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.

7 SAMPLING
Representative samples of the material shall be drawn and their conformity determined in accordance with the method prescribed in Annex A.

ANNEX A
(Clause 7)
SAMPLING OF CERAMIC FIBRE BLANKET

A-1 SAMPLING
A-1.1 Lot
All the material of the same density produced under essentially the same conditions of manufacture shall be grouped and each such group shall constitute a separate lot.

NOTE — The purchaser and the supplier may mutually agree to term the material manufactured during a certain period as a lot. It is recommended that an 8 h production under essentially same conditions may be termed as a lot.

A-2 DETERMINATION OF SAMPLE SIZE
A-2.1 Tests for the conformity to the requirements of the specification shall be done on each lot separately. The material to be selected from a lot shall be in accordance with Table 8.
A-2.2 These rolls shall be selected at random from the lot and to ensure randomness of selection, random number tables shall be used. In case such a table is not available, the following procedure may be adopted:

Starting from any roll in the lot, count them as 1, 2, 3, ..., up to $r$ and so on, where $r$ is the integral part of $N/n$ ($N$ being the lot size and $n$ being the number of roll to be selected). Every $r$th roll thus counted shall be withdrawn from the lot to give samples for tests.

A-3 NUMBER OF TESTS
A-3.1 From each of roll selected according to A-2.2 test specimens necessary for carrying out the various tests specified in this standard shall be taken, care being exercised to exclude some amount of wool from the top of the roll.
A-3.2 Tests for the determination of all characteristics specified in this standard shall be conducted on each of the test specimens drawn from the roll as obtained under A-3.1.
A-3.3 Criteria for Conformity
The lot shall be declared as conforming to the requirements of this specification, if the different test results obtained under A-3.2 meet the corresponding requirements given in the standard individually.
### Table 8 Number of Rolls to be Selected for Sampling

*(Clause A-2.1)*

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Clause No. of this Standard</th>
<th>Lot Size (N)</th>
<th>No. of rolls to be selected (n)</th>
<th>One for each density for all lot size</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Up to 200</td>
<td>201 to 500</td>
<td>501 to 1 000</td>
</tr>
<tr>
<td>i)</td>
<td>5.2</td>
<td>5</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>ii)</td>
<td>5.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii)</td>
<td>5.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv)</td>
<td>5.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v)</td>
<td>5.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vi)</td>
<td>5.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vii)</td>
<td>5.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>viii)</td>
<td>5.9</td>
<td>5</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

1) Type test once in three year (see Note under Table 3).
ANNEX B

(Foreword)

COMMITTEE COMPOSITION

Thermal Insulation Sectional Committee, CHD 27

Organization

In personal capacity (B-138, Sarita Vihar, New Delhi)
BASF India Limited, Mumbai
Bakelite Hylam Limited, Mumbai
Beardscull Limited, Chennai
BHEL, Hyderabad
Central Building Research Institute, Roorkee
Department of Coal (Ministry of Industries), New Delhi
Department of Industrial Policy & Promotion, New Delhi
Engineers India Limited, New Delhi
Hyderabad Industries Limited, Ballabgarh
Indian Oil Corporation Limited (R&P Division), New Delhi
Lloyd Insulation (India) Limited, New Delhi
Metallurgical and Engineering Consultants (India) Limited, Ranchi
Minwool Rock Fibres, Mumbai
National Physical Laboratory, New Delhi
NTPC, New Delhi
Newkem Products Corporation, Mumbai
Nuclear Power Corporation, Mumbai
Petroleum Conservation and Research Association, Dehra Dun
PBICO Limited, New Delhi
Projects & Development (India) Limited, Sindri
Punj Sons Pvt Limited, New Delhi
RDSO, Lucknow
Steel Authority of India Limited, Ranchi
TCE Consulting Engineers Ltd, Chennai
U.P. Twiga Fibreglass Limited, New Delhi
BIS Directorate General

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SHRI J. P. KADUM
SHRI D. K. GILLOTIA (Alternate)
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SHRI AMURAG SHARMA (Alternate)
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SHRI D. P. CHANDAN (Alternate)
SHRI ASAV GUPTA
SHRI RAJEEV SOOD (Alternate)
SHRI S. K. CHAUDHURI, Director and Head (CHD)
[Representing Director General (Ex-officio)]

Member Secretary
SHRI N. K. PAL
Director (CHD), BIS

(Continued on page 7)
Codes of Practice for Application of Thermal Insulation Materials Sub-committee, CHD 27:5

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Bharat Heavy Electrical Limited, Hyderabad
Bakelite Hylan Limited, Hyderabad
Engineers India Limited, New Delhi
Hyderabad Industries Limited, Ballabhgarh
Indian Oil Corporation, Limited (R&P Division), New Delhi
Lloyd Insulation (India) Limited, New Delhi
Lloyd Projects Pvt Limited, New Delhi
Ministry of Power, New Delhi
Minwool Rock Fibres Limited, Hyderabad
National Fire Service College, Nagpur
Newkem Products Corporation, Mumbai
PDL, Sindri
Punj Sons Pvt Limited, New Delhi
Reliance Industries Limited, Mumbai
Sona Fibres, Ballabhgarh
Super Urethane Products Pvt Ltd, New Delhi
Tata Consulting Engineers, Mumbai
U. P. Twiga Fibreglass Limited, New Delhi

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SRI RAVINDRA PRAKASH
SRI A. V. NARASINGARAO (Alternate)
SRI P. P. KAVERIPPA
SRI H. SITARAM (Alternate I)
SRI P. ROY (Alternate II)
SRI S. RAINA (Alternate III)
SRI B. K. ROUT
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SRI AJAY GUPTA
SRI S. BANSAL (Alternate)
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This Indian Standard has been developed from Doc: No.CHD 27 (858).

Amendments Issued Since Publication

<table>
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<th>Amend No.</th>
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