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Indian Standard

SPECIFICATION FOR MINERAL GYPSUM

(Second Revision)

(Incorporating Amendment No. 1)

UDC 666.91

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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Indian Standard
SPECIFICATION FOR MINERAL GYPSUM
(Second Revision)

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0. FOREWORD

0.1 This Indian Standard (Second Revision) was adopted by the Indian Standards Institution on 10 October 1973, after the draft finalized by the Inorganic Chemicals (Miscellaneous) Sectional Committee had been approved by the Chemical Division Council.

0.2 This Indian Standard was first published in 1960 and covered mineral gypsum for use in ammonium sulphate and cement industries. It was revised in 1965 after including other grades of mineral gypsum, namely, those used for surgical plaster, pottery and reclamation of soil. The Committee responsible for the preparation of this standard decided to revise it again in the light of the changed pattern of consumption and production in the country. In this revision, the range for quality of gypsum for fertilizer industry has been specified. For cement industry, gypsum of 70 to 75 percent purity has been prescribed in place of 80 to 85 percent in view of the fast depleting reserves of good quality gypsum in the country. Additional requirement of whiteness has been prescribed for production of white cement. The grade of gypsum for soil reclamation has been deleted as a separate Indian Standard has been published for it (see IS : 6046-1971*).

0.3 India at present is almost self-sufficient in gypsum resources. During the last few years, the consumption of gypsum in the manufacture of cement, fertilizer, insecticide, plaster of paris, etc has increased steadily. The major source of supply is from Rajasthan. It is also mined in Madras, Uttar Pradesh and to a smaller extent in Gujarat, Jammu and Kashmir, and Maharashtra.

0.4 Fertilizer and cement are the two important industries in which gypsum finds abundant use. High purity gypsum is utilized in large quantities in the manufacture of ammonium sulphate fertilizer. Gypsum of less purity in crushed condition is utilized in portland cement manufacture, where it acts as a retarder, controlling the setting time of cement.

*Specification for gypsum for agricultural use.
0.5 The Sindri plant of the Fertilizer Corporation of India Ltd, is the only unit utilizing gypsum for the manufacture of ammonium sulphate fertilizer. Sindri rationalization project is expected to materialize in the near future. In this scheme, the production pattern does not envisage the requirement of mineral gypsum. The entire requirement of ammonium sulphate will be met, partly by gypsum produced as a by-product from the wet process phosphoric acid, and the rest by direct neutralization of sulphuric acid by ammonia. However, with the commencing of the new cement plants, the consumption of gypsum in the cement industry would increase in the next five to six years.

0.6 Calcined gypsum finds use in the plasters and manufacture of plaster of paris. It is also used in the manufacture of partition blocks, sheets and tiles, plaster and insulating boards, and for stucco and lattice works. Ground gypsum blocks are used as building stones. In pottery, gypsum is used for moulding purposes. Besides, gypsum rock is used as flux in the smelting of nickel ores and in tin plate industry for polishing plates.

0.7 Alabaster, a massive variety of gypsum is employed for statuary purpose while the silky fibrous variety known as satin spar is employed for making small ornamental articles. Selenite, a crystalline variety is used to a limited extent for gypsum plate in microscopes. Low grade gypsum finds use in the manufacture of gypsum wall boards.

0.8 The quality of mineral gypsum available in India is very inconsistent and the percentage of calcium sulphate varies even in one and the same deposit. The ratio between the high grade gypsum of above 80 percent calcium sulphate content and the rest is generally 1 : 3. Consequently, a huge amount of low grade gypsum for which economical benefication arrangements are not available at present, remains untapped causing considerable difficulty to the mining industry. To offset the national wastage involved, it is essential that a particular industry should derive its supply of the necessary quality of gypsum and not of a higher or a lower quality. This standard is intended to guide the trade in using the right quality of gypsum for use in the manufacture of surgical plaster, ammonium sulphate, pottery and cement.

0.9 This standard contains clauses 3.3.2, 3.3.3 and 4.1 which call for agreement between the purchaser and the supplier.

0.10 This edition 3.1 incorporates Amendment No. 1 (October 1978). Side bar indicates modification of the text as the result of incorporation of the amendment.

0.11 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*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for mineral gypsum. It also covers selenite, a colourless and transparent variety of gypsum which occurs as distinct monoclinic crystals, especially in clay rocks.

1.2 This standard does not cover marine gypsum obtained from marine brine which is covered under a separate Indian Standard (see IS:4256-1967†).

2. TYPES

2.1 The material shall be of the following four types:

   Type 1 — for surgical plaster industry,
   Type 2 — for ammonium sulphate industry,
   Type 3 — for pottery industry, and
   Type 4 — for cement industry.

3. REQUIREMENTS

3.1 The material shall be the natural mineral consisting essentially of hydrated calcium sulphate and free from added impurities.

3.2 The material shall comply with the requirements prescribed in Table 1, when tested according to the methods prescribed in IS : 1288-1973‡. Reference to the relevant clauses of IS : 1288-1973‡ is given in col 7 of the table.

3.3 Additional Requirements

3.3.1 Acidity and Alkalinity — Type 1 of the material shall also pass the test prescribed in Appendix A.

3.3.2 Sieve Analysis — Type 2 of the material shall conform to the sieve analysis as agreed to between the purchaser and the supplier.

3.3.3 For use in white cement, Type 4 of the material shall also be tested for whiteness and iron content. The limits and methods of test for these two characteristics shall be as agreed to between the purchaser and the supplier.

3.3.4 Filtrability — The material of Type 2 when tested by the method

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*Rules for rounding off numerical values (revised).
†Specification for hydrated calcium sulphate from marine brine.
‡Methods of test for mineral gypsum and gypsum products (first revision).
prescribed in 15 of IS : 1288-1973*, shall have filtrability time of 50 seconds maximum.

<table>
<thead>
<tr>
<th>SL No.</th>
<th>CHARACTERISTIC</th>
<th>REQUIREMENT FOR</th>
<th>METHOD OF TEST (REF TO CL NO. IN IS : 1288-1973*)</th>
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<tbody>
<tr>
<td>(1)</td>
<td></td>
<td>Type 1</td>
<td>Type 2</td>
</tr>
<tr>
<td>(2)</td>
<td></td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>I)</td>
<td>Free water, percent by mass, $Max$</td>
<td>1.0</td>
<td>—</td>
</tr>
<tr>
<td>ii)</td>
<td>Carbon dioxide (as CO$_2$), percent by mass, $Max$</td>
<td>1.0</td>
<td>3.0</td>
</tr>
<tr>
<td>iii)</td>
<td>Silica and other insoluble matter, percent by mass, $Max$</td>
<td>0.7</td>
<td>6.0</td>
</tr>
<tr>
<td>iv)</td>
<td>Iron and aluminium (as oxides), percent by mass, $Max$</td>
<td>0.1</td>
<td>1.5</td>
</tr>
<tr>
<td>v)</td>
<td>Magnesium oxide (as MgO), percent by mass, $Max$</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>vi)</td>
<td>Calcium sulphate (as CaSO$_4$.2H$_2$O), percent by mass</td>
<td>96.0, 85-90</td>
<td>85.0, 70-75†</td>
</tr>
<tr>
<td>vii)</td>
<td>Chlorides (as NaCl), percent by mass, $Max$</td>
<td>0.01</td>
<td>0.003</td>
</tr>
</tbody>
</table>

*Methods of test for mineral gypsum and gypsum products (first revision).
†For export quality cement, gypsum of 80 to 85 percent purity may be used.

4. PACKING AND MARKING

4.1 Packing — The material shall be supplied in bulk or in packages as agreed to between the purchaser and the supplier.

4.2 Marking — When supplied in packages, each package shall be securely closed and marked indelibly with the following information:
   a) Name and type of the material;
   b) Mass of the material in the package;
   c) Manufacturer's name and/or recognized trade-mark, if any; and
   d) Lot number.

4.2.1 When supplied in bulk, a good sized metallic or cardboard label bearing the above information with suitable paint or ink shall be conspicuously displayed on the carrier and also placed inside.

*Methods of test for mineral gypsum and gypsum products (first revision).
4.2.2 The material may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

5. SAMPLING

5.1 Preparation of Test Samples — Representative samples of the material shall be drawn as prescribed in IS : 1289-1960*.

5.2 Number of Tests — Tests for the determination of calcium sulphate content and silica and other insoluble matter shall be performed on each of the individual sample.

5.3 Criteria for Conformity

5.3.1 For Individual Samples — For each of the characteristics tested on the individual samples, the mean ( $\bar{X}$ ) and range ( $R$ ) of test results shall be computed separately (range being defined as the difference between the maximum and the minimum of the test results).

5.3.1.1 The lot shall be declared as conforming to the requirements for the characteristics tested on the individual samples if the conditions given below are satisfied:

   a) For silica and other insoluble matter:
      \[ \bar{X} + 0.6 R \leq \text{the maximum value specified against Sl No. (iii) of Table 1.} \]

   b) For calcium sulphate:
      \[ \bar{X} - 0.6 R \geq \text{the minimum value specified against Sl No. (vi) of Table 1.} \]

5.3.2 For Composite Sample — For declaring the conformity of the lot to the requirements of the characteristics tested on the composite sample the test result for each characteristic shall satisfy the corresponding requirements specified in Table 1.

5.3.3 The lot shall be considered to be conforming to all the requirements of this specification if it satisfies the conditions in 5.3.1 and 5.3.2, otherwise not.

*Methods for sampling of mineral gypsum.
6. TEST METHODS

6.1 Test shall be conducted according to the methods prescribed in IS: 1288-1973* and Appendix A of this standard. References to relevant clauses of IS: 1288-1973* and Appendix A are given in 3.2 and 3.3.

6.2 Quality of Reagents — Unless specified otherwise, pure chemicals and distilled water (see IS: 1070-1960†) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

A P P E N D I X  A

(Clause 3.3.1)

TEST FOR ACIDITY AND ALKALINITY

A-1. REAGENTS

A-1.1 Methyl Orange Indicator Solution — Dissolve 0.1 g of methyl orange in 100 ml of water.

A-1.2 Phenolphthalein Indicator Solution — Dissolve 0.01 g of phenolphthalein in 100 ml of 60 percent rectified spirit.

A-2. PROCEDURE

A-2.1 Shake 5 g of the prepared sample (see 5 of IS: 1288-1973*) with 20 ml of water. Warm the mixture to about 40°C and then filter. Test the clear filtrate with methyl orange and phenolphthalein indicator solutions.

A-2.2 The material shall be considered as having passed the test if the filtrate is neither acidic to methyl orange nor alkaline to phenolphthalein.

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*Methods of test for mineral gypsum and gypsum products (first revision).
†Specification for water, distilled quality (revised).
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This Indian Standard has been developed by Technical Committee CDC 3.

Amendments Issued Since Publication

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