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Indian Standard

FLUX GRADE LIMESTONE FOR USE IN IRON AND STEEL MAKING — SPECIFICATION

(Second Revision)

ICS 73.060.99
FOREWORD

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

This standard was first published in 1982 and subsequently revised in 1992. In this revision, the requirement of degradation index, alkali content for Grade 1 and SiO₂ content for Grade 2 have been included. Limits of other constituents as well as the size ranges have also been modified.

Limestone is used extensively in integrated steel plants as flux for the production of iron in blast furnace. Calcined limestone is also used in steel making processes. This standard would be helpful for procuring standard limestone(s) to be used in steel plants as flux.

For the purpose of deciding whether 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.
Indian Standard

FLUX GRADE LIMESTONE FOR USE IN IRON AND STEEL MAKING — SPECIFICATION
(Second Revision)

1 SCOPE

This standard covers the requirements of flux grade limestone for use in iron and steel making.

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:

<table>
<thead>
<tr>
<th>IS No.</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>460 (Part 1) : 1985</td>
<td>Specification of 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>(Part 2) : 1991</td>
<td>Determination of silica (first revision)</td>
</tr>
<tr>
<td>(Part 4) : 1991</td>
<td>Determination of carbon dioxide (first revision)</td>
</tr>
<tr>
<td>(Part 5) : 1991</td>
<td>Determination of chlorides (first revision)</td>
</tr>
<tr>
<td>2109 : 1982</td>
<td>Methods of sampling dolomite, limestone and other allied materials (first revision)</td>
</tr>
</tbody>
</table>

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 2109 shall apply.

4 SUPPLY OF MATERIAL

General requirements relating to the supply of different grades of limestone for use in steel plants shall be as laid down in IS 1387.

5 GRADE DESIGNATION

Flux grade limestone shall be of the following two grades as given in Table 1:

a) For steel making — Grade 1, and
b) For iron making — Grade 2.

Table 1 Chemical Composition and Size Requirements
(Clauses 5, 6.1.1 and 7)

<table>
<thead>
<tr>
<th>SI No.</th>
<th>Constituent</th>
<th>Grade 1</th>
<th>Grade 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Percent</td>
<td>Percent</td>
</tr>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>1) CaO</td>
<td></td>
<td>53, Min</td>
<td>44, Min</td>
</tr>
<tr>
<td>2) MgO</td>
<td></td>
<td>1.5, Max</td>
<td>4, Max</td>
</tr>
<tr>
<td>3) SiO₂</td>
<td></td>
<td>1.5, Max</td>
<td>6.0, Max</td>
</tr>
<tr>
<td>4) Total acid insolubles (TAl)</td>
<td>2, Max</td>
<td>10, Max</td>
<td></td>
</tr>
<tr>
<td>5) Alkali content</td>
<td>0.2, Max</td>
<td>0.2, Max</td>
<td></td>
</tr>
<tr>
<td>6) Size</td>
<td>Undersize and oversize</td>
<td>30 mm to 80 mm</td>
<td>15 mm to 75 mm</td>
</tr>
</tbody>
</table>

NOTE — The size ranges other than specified above shall be subject to agreement between the supplier and the purchaser.

6 CHEMICAL COMPOSITION

6.1 The material shall comply with the chemical requirements as given in Table 1.

6.1.1 The chemical composition, when analysed by the method specified in relevant parts of IS 1760 or any other established instrumental/chemical method shall conform to the requirements as given in Table 1. In case of dispute, the procedure given in relevant part of IS 1760 shall be the referee method. However, when the method is not given in its relevant parts of IS 1760, the referee method shall be as agreed to between the purchaser and the supplier.

7 SIZE

The size of the material, when determined in accordance with IS 460 (Part 1) shall comply with the size requirements as given in Table 1.
8 DECREPITATION/DEGRADATION INDEX

Decrepitation and degradation index of lime stone shall be 10 percent maximum, each. The method for determination of decrepitation and degradation index is given in Annex A for guidance.

9 SAMPLING

9.1 Representative samples for testing shall be drawn according to the method of sampling given in IS 2109.

9.2 Number of Tests

Test for determination of calcium oxide and acid insolubles including silica and alumina shall be carried out on each of the samples.

9.3 Test for size determination shall be performed on the composite samples.

10 CRITERIA FOR CONFORMITY

10.1 For individual samples.

The mean and the range of test results shall be computed as follows:

\[
\text{Mean } (\bar{X}) = \frac{\text{Sum of individual test results}}{\text{Number of test results}}
\]

\[
\text{Range } (R) = \text{Difference between the maximum and minimum values of test results}
\]

For declaring conformity of the lot:

a) \( \bar{X} + 0.6 R \), shall be less than or equal to the maximum specified requirements, and

b) \( \bar{X} - 0.6 R \), shall be greater than or equal to the minimum specified requirements.

10.2 For Composite Samples

For declaring the conformity of the lot of the requirements of characteristics tested on the composite sample, the test results shall satisfy the corresponding specified requirements.

ANNEX A

(Clause 8)

GUIDELINES FOR DETERMINATION OF DECREPITATION/DEGRADATION INDEX OF LIMESTONE

A-1 Limestone is crushed to 25-30 mm size.

A-2 About 3 kg sample is calcined in a furnace which has already attained a temperature of 1 000 °C. The sample is kept in the furnace for two and half hours. The lime thus obtained is cooled, weighed and then screened on a laboratory vibrating screen. The –10 mm fraction obtained is weighed. The percentage of –10 mm fraction with respect to the total weight of the lime screened shall be the decrepitation index.

A-3 Take 2 kg of +10 mm after screening and drop twice from a height of 2 m on a steel plate. Subject this material for screening at 10 mm. The proportion of –10 mm fraction expressed as percentage with respect to the material taken for the test shall be the degradation index.

A-4 Because of the heterogeneity of natural ores, the test shall be carried out five times and the mean value of the individual results should be reported.

A-5 The desirable limits for decrepitation and degradation indices as determined above shall be 10 percent maximum each.
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This Indian Standard has been developed from Doc No. MTD 13 (4335).

Amendments Issued Since Publication

<table>
<thead>
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<th>Amend No.</th>
<th>Date of Issue</th>
<th>Text Affected</th>
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