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भारतीय मानक मसौदा

मृदा सुधार के लिए कृषि चूना सामग्री: भाग 1 हाइड्रेटेड चूना और जला हुआ चूना - विशिष्टि

(आइ एस 5409 (भाग 1) का दूसरा पुनरीक्षण)

Draft Indian Standard

AGRICULTURAL LIMING MATERIALS AS SOIL AMENDMENTS: PART 1 HYDRATED LIME AND BURNT LIME – SPECIFICATION

[*Second Revision of IS 5409* (*Part 1*)]

ICS No. 65.080

Soil Quality and Fertilizers Sectional Committee, FAD 07

Last Date of Comments: **8 August 2024**

FOREWORD

(*Formal clauses would be added later*)

Hydrated lime and burnt lime, apart from being important raw materials for various chemical industries, are also used for correcting soil acidity to create optimal plant growth conditions in acidic soils. These amendments are among the few liming materials known for their high calcium carbonate equivalent (CCE) percent and usually have rapid neutralizing effect on acidic soils.

This standard was published in 1969 and the liming materials such as limestone, dolomite, basic slag, sea shell, pressmud, calcium carbonate and by-product hydrated lime were included. Since the neutralizing value and physical characteristics of liming materials vary to a great extent, it was considered desirable to prepare separate specifications for different liming materials used as soil amendments. Hence, in the first revision issued in 1985, this standard was divided into two parts. Limestone and dolomite were covered under Part 2. This part (Part 1) covers the specification for hydrated lime and burnt lime.

In this revision, the standard has been brought out in the latest style and format of the Indian Standards and references to Indian Standards have been updated. It also incorporates two amendments issued to the previous version of this standard.

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: 2022 ‘Rules for rounding off numerical values (*second revision*)’. 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

This standard prescribes the requirements and methods of sampling and test for hydrated lime and burnt lime used as soil amendments.

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 revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below:

IS No.	*Title*
IS 323 : 2009	Rectified spirit for industrial use – Specification (*second revision*)
IS 1070 : 2023	Reagent Grade Water Specification (*fourth revision*)
IS 1514 : 1990	Methods of sampling and test for quicklime and hydrated lime (*first revision*)

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply:

3.1 Agricultural Liming Material

A product containing calcium and magnesium compounds capable of neutralizing soil acidity.

3.2 Calcium Carbonate Equivalent (CCE) Percent

It is the acid neutralizing capacity or the agricultural liming material and is defined as the number of parts by mass of pure calcium carbonate which has the same acid neutralizing capacity as 100 parts by mass of the agricultural liming material

3.3 Hydrated Lime

A powder obtained by treating quick lime with water adequate to satisfy its chemical affinity for water under the conditions of hydration.

3.4 Burnt Lime or Quick Lime

A calcined material, the major part of which is CaO or CaO in natural association with lesser amount of MgO, capable of slaking with water.

3.5 Active Lime (Available)

The proportion of the liming material which enters into desired reaction under the conditions of a specified method.

3.6 Dead, Burnt or Over-Burnt Lime

Lime which is not made available in any chemical reaction.

4 GRADES

There shall be two grades of liming materials, namely, Grade I and Grade II.

5 REQUIREMENTS

5.1 Fineness

90 percent of the material shall pass through 2 mm sieve and 25 percent shall pass through 0.15 mm sieve, when tested by the method prescribed in IS 1514.

5.2 The material shall also comply with the requirements specified in Table 1.

Table 1 Requirements for Hydrated Lime and Burnt Lime as Soil Amendments

(*Clause* 5.2)

Sl. No.	Characteristic	Requirement		Method of Test (Ref to)
(1)	(2)	Grade I (3)	Grade II (4)	(5)
i)	Neutralizing value expressed as calcium carbonate equivalent (CCE), percent, *Min*	100	80	Annex A
ii)	Active lime (available) (as CaO), percent by mass, *Min*	80	70	IS 1514
iii)	Magnesium (as MgO), percent by mass, *Max*	2.0	3.0	IS 1514
iv)	Moisture content, percent by mass, *Max*	10	12	Annex B
v)	Dead burnt lime (as CaO), percent by mass, *Max*	3.0	4.0	IS 1514

6 PACKING

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

7 MARKING

7.1 When supplied in packages, each package shall securely be closed and marked with the following information:

a) Name and grade of the material;
b) Quantity of the material in the package;
c) Neutralizing value and active CaO content of the material;
d) Supplier's name and recognized trade-mark, if any;
e) Lot number to enable the consignment to be traced back to the record; and
f) Any other information required under the *Legal Metrology* (*Packaged Commodities*) *Rules*, 2011.

7.2 When supplied in bulk, a good sized metallic label bearing the above information shall be conspicuously displayed on the bulk carrier and also placed inside.

7.3 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*,

2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

8 SAMPLING

The procedure for drawing representative samples of the material and the criteria for finding out the conformity of the material to the requirements of this specification shall be as prescribed in IS 1514.

9 TESTS

Tests shall be carried out by the appropriate methods referred to in col (5) of Table 1.

10 QUALITY OF REAGENTS

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070) shall be employed in tests.

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

ANNEX A
[*Table* 1, *Sl. No.* (i)]
DETERMINATION OF NEUTRALIZING VALUE

A-1 PRINCIPLE

The ground sample is heated with an excess of standard acid and the excess acid is back-titrated.

A-2 REAGENTS

A-2.1 Standard Hydrochloric Acid – 0.5 N.

A-2.2 Standard Sodium Hydroxide Solution – 0.5 N.

A-2.3 Phenolphthalein Indicator Solution

Dissolve 0.1 g of phenolphthalein in 60 ml of rectified spirit (conforming to IS 323) and dilute with water to 100 ml.

A-3 PROCEDURE

Weigh accurately about 0.5 g of the previously ground sample to pass through 250 µm IS sieve, in a 250 ml stoppered conical flask. Add 40 ml of standard hydrochloric acid, with swirling. Heat to gentle boiling, agitating continuously. Boil for 5 min and then cool to room temperature. Titrate against standard sodium hydroxide solution using 2 to 3 drops of phenolphthalein indicator.

Carry out a blank test using the same quantities of all reagents but without adding the sample.

A-4 CALCULATION

$$\text{Neutralizing value (as } CaCO_3\text{), percent by mass } = \frac{5\,(B-A)\,N}{M}$$

where,

B = volume, in ml, of standard sodium hydroxide solution used in the blank determination;

A = volume, in ml, of standard sodium hydroxide solution used with the sample;

N = normality of standard sodium hydroxide solution; and

M = mass, in g, of the sample taken for the test.

ANNEX B

[*Table* 1, *Sl. No.* (iv)]

DETERMINATION OF MOISTURE CONTENT

B-1 PROCEDURE

Weigh accurately 2 g of the powdered sample in a platinum or silica dish. Place it in an oven maintained at (105 ± 2) °C, until on cooling in a desiccator and weighing, constant mass (± 2 mg) is obtained. Calculate the percent moisture in the sample.

B-2 CALCULATION

Moisture, percent by mass = $\frac{100\ (M_1 - M_2)}{M_1 - M}$

where,

M_1 = mass, in g, of the moisture dish with the material before drying;

M_2 = mass, in g, of the moisture dish with the material after drying; and

M = mass, in g, of the empty moisture dish.