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SPECIFICATION FOR BUILDING LIMES

(Third Revision)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Indian Standard

SPECIFICATION FOR BUILDING LIMES

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SPECIFICATION FOR BUILDING LIMES

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0. FOREWORD

0.1 This Indian Standard (Third Revision) was adopted by the Indian Standards Institution on 21 December 1984, after the draft finalized by the Building Limes Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Lime has been used in India as a material of construction from very ancient days. The manner in which lime structures about 2 000 years old have withstood the ravages of time bear irrefutable evidence to the durability of lime mortars.

0.3 The vastness of the country and its varied geological character has made available several types of limestones suitable for burning to obtain building limes. Due to the variability of limestone from place to place the resulting lime may be expected to vary in quality. While it has not been found possible to make strict comparison of characteristics of the many types of limes obtained, this aspect has been given full consideration in the preparation of this standard.

0.4 The method of manufacturing building limes and the manner in which they are used in construction work differ from one part of the country to another. For instance, in the south, lime mortar is generally prepared by grinding a mixture of slaked lime and sand in suitable proportions in a bullock mill while in Punjab, lime putty is mixed with sand and the mix used as mortar directly. Besides, defects caused by adulteration with undesirable admixtures, differences in the method of burning, slaking, storing and using have appreciably affected the quality of lime and in the absence of suitable standards for checking the quality, the use of lime in building construction has come to be discouraged to a large extent. At a time when necessity has been felt to make full use of our construction material resources, the formulation of a specification for building limes and its adoption are expected to bring about a more judicious use of limes for construction purposes.

0.5 This standard was first published in 1956 to bring out a long felt need for uniformity in the variety of practices being followed towards manufacture and use of lime in construction work. The standard was subsequently revised in 1964 and in 1973. This revision has been taken up to keep abreast with the developments and modifications found necessary with the usage of this standard. In this revision, requirements for dolomitic limes which are manufactured and used in large quantity in some parts of the country have been added, and the existing chemical requirements and fineness have been modified to recognise and utilize certain type of lime, which otherwise was not covered. The requirement for cementation value has been deleted as it is not directly relevant in case of lime.

0.6 This edition 4.1 incorporates Amendment No. 1 (January 1989). Side bar indicates modification of the text as the result of incorporation of the amendment.

0.7 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 covers the requirements for building limes used for construction purpose.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 6508-1972† shall apply.

3. CLASSIFICATION

3.1 Building limes shall be classified as follows:

Class A — Eminently hydraulic lime used for structural purposes.

Class B — Semi-hydraulic lime used for masonry mortars, lime concrete and plaster undercoat.

Class C — Fatlime used for finishing coat in plastering, whitewashing, composite mortars, etc, and with addition of pozzolanic materials for masonry mortar.

Class D — Magnesium/dolomitic lime used for finishing coat in plastering, white washing, etc.

*Rules for rounding off numerical values (*revised*).

†Glossary of terms relating to building lime.

Class E — *Kankar lime* used for masonry mortars.

Class F — Siliceous dolomitic lime used for undercoat and finishing coat of plaster.

NOTE 1 — Lime shall be available either in hydrated or quick form, except that of Classes A and E which shall be supplied in hydrated form.

NOTE 2 — Applications indicated are only suggestive.

4. CHEMICAL REQUIREMENTS

4.1 Building limes shall conform to the requirements given in Table 1.

5. PHYSICAL REQUIREMENTS

5.1 Building limes shall conform to the requirements given in Table 2.

6. PACKING

6.1 The hydrated lime shall be supplied, in suitable containers, such as jute bags lined with polythene or high density polythene woven bags lined with polythene or craft paper bags, preferably containing 50 kg of lime.

NOTE — If the hydrated lime can be used within 30 days, use of liner may be dispensed with.

6.2 The quicklime shall be supplied in containers like metal container or similar suitable containers preferably containing 50 kg of lime.

7. MARKING

7.1 The lime packages shall bear the type and class of lime, the brand name of manufacturer, date of manufacture and the net weight; in case of quicklime the slaking temperature shall be indicated.

7.1.1 Lime packages 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 bean 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.

TABLE 1 CHEMICAL REQUIREMENTS

(*Clause* 4.1)

SL NO.	CHARACTERISTICS	CLASS										METHOD OF TEST, REF TO
		A	B		C		D		E	F		
		Hydrated	Quick	Hyd	Quick	Hyd	Quick	Hyd	Hydrated	Quick	Hyd	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	Calcium and magnesium oxides, percent, *Min* (on ignited basis)	60	70	70	85	85	85	85	50	70	70	IS : 6932 (Part 1)-1973*
ii)	Magnesium oxides, percent (on ignited basis), *Max*	6	6	6	6	6	—	—	6	—	—	IS : 6932 (Part 1)-1973*
	Min		—	—	—	—	6	6	—	6	6	
iii)	Silica, alumina and ferric oxide, percent, *Min* (on ignited basis)	20	10	10	—	—	—	—	20	10	10	IS : 6932 (Part 1)-1973*
iv)	Unhydrated magnesium oxide, percent, *Max* (on ignited basis)	—	—	—	—	—	8	8	—	8	8	IS : 6932 (Part 5)-1973†
v)	Insoluble residue in dilute acid and alkali, percent, *Max* (on ignited basis)	15	10	10	2	2	2	2	25	10	10	IS : 6932 (Part 1)-1973*
vi)	Carbondioxide, percent, *Max* (on oven dry basis)	5	5	5	5	5	5	5	5	5	5	IS : 6932 (Part 2)-1973‡

(*Continued*)

vii)	Free moisture content, percent, *Max*	2	—	2	—	2	—	2	2	—	2	IS : 1514-1959§
viii)	Available lime as CaO, percent, minimum	—	—	—	75 (on dry basis)	75 (on ignited basis)	—	—	—	—	—	IS : 1514-1959§

NOTE — Requirements for insoluble residue including soluble silica are under investigation and this requirement is likely to be included at a later stage.

*Methods of tests for building limes: Part 1 Determination of insoluble residue, loss on ignition, insoluble matter, silicon dioxide, ferric and aluminium oxide, calcium oxide and magnesium oxide.

†Methods of tests for building limes: Part 5 Determination of unhydrated oxide.

‡Methods of tests for building limes: Part 2 Determination of carbon dioxide content.

§Methods of sampling and test for quick lime and hydrated lime (*Reaffirmed* 1978).

TABLE 2 PHYSICAL REQUIREMENTS

(*Clause* 5.1)

SL NO.	CHARACTERISTICS	CLASS										METHOD OF TEST, REF TO
		A	B		C		D		E	F		
		Hydera-ted	Quick	Hyd	Quick	Hyd	Quick	Hyd	Hydra-ted	Quick	Hyd	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	Fineness:											
	a) Residue on 2.36 mm IS Sieve, percent, *Max*	Nil	—	Nil	—	Nil	—	Nil	Nil	—	Nil	IS : 6932 (Part 4)-1973*
	b) Residue on 300 micron IS Sieve, percent, *Max*	5	—	5	—	Nil	—	Nil	5	—	5	
	c) Residue on 212 micron IS Sieve, percent, *Max*	—	—	—	—	10	—	10	—	—	Nil	
ii)	Residue on slaking:											
	a) Residue on 850 micron IS Sieve, percent, *Max*	—	10	—	5	—	5	—	—	10	—	IS : 6932 (Part 3)-1973†
	b) Residue on 300 micron IS Sieve, percent, *Max*	—	—	—	5	—	5	—	—	—	—	
iii)	Setting time:											
	a) Initial set, *Min*, h	2	—	—	—	—	—	—	2	—	—	IS : 6932 (Part 11)-1984‡
	b) Final set, *Max*, h	48	—	—	—	—	—	—	48	—	—	

(*Continued*)

iv)	Compressive strength, *Min*, N/mm^2:											
	a) at 14 days	1.75	1.25	1.25	—	—	—	—	1.0	1.25	1.25	IS : 6932 (Part 7)-1973§
	b) at 28 days	2.8	1.75	1.75	—	—	—	—	1.75	1.75	1.75	
v)	Transverse strength at 28 days, N/mm^2, *Min*	1.0	0.7	0.7	—	—	—	—	0.7	0.7	0.7	IS : 6932 (Part 7)-1973§
vi)	Workability bumps, *Max*	—	—	—	12	10	12	10	—	—	—	IS : 6932 (Part 8)-1973‖
vii)	Volume yield ml/g, *Min*	—	—	—	1.7	—	1.4	—	—	—	—	IS : 6932 (Part 6)-1973¶
viii)	Soundness, Le Chaterlier expansion, mm, *Max*	5	—	5	—	—	—	—	10	—	10	IS : 6932 (Part 9)-1973**
ix)	Popping & pitting	Free from pop and pits	—	Free from pop and pits	—	Free from pop and pits	—	Free from pop and pits	—	—	Free from pop and pits	IS : 6932 (Part 10)-1973††

*Methods of tests for building limes: Part 4 Determination of fineness of hydrated lime.
†Methods of tests for building limes: Part 3 Determination of residue on slaking of quicklime.
‡Methods of tests for building limes: Part 11 Determination of setting time of hydrated lime.
§Methods of tests for building limes: Part 7 Determination of compressive and transverse strengths.
‖Methods of tests for building limes: Part 8 Determination of workability.
¶Methods of tests for building limes: Part 6 Determination of volume yield of quicklime.
**Methods of tests for building limes: Part 9 Determination of soundness.
††Methods of tests for building limes: Part 10 Determination of popping and pitting of hydrated lime.

8. STORAGE

8.1 The lime shall be stored in such a manner as to permit easy access for proper inspection and in a suitable building to protect the lime from the dampness and to minimize warehouse deterioration.

NOTE — Quicklime deteriorates rapidly and, therefore, should be used as quickly as possible.

9. SAMPLING AND CRITERION FOR CONFORMITY

9.1 The procedure of sampling and criterion for conformity shall be as given in Appendix A.

APPENDIX A

(*Clause* 9.1)

SAMPLING AND CRITERION FOR CONFORMITY

A-1. SAMPLES FOR TESTING

A-1.1 The samples for testing shall be taken by the purchaser or his representative at the manufacturer's works.

A-2. PROCEDURES FOR SAMPLING

A-2.1 General — Sampling shall be carried out as quickly as possible so that the material does not deteriorate. The total time occupied in mixing and quartering down the composite samples, and the preparation of the final test samples from this shall not exceed two hours. The final samples shall be three in number and shall be placed immediately in clean, dry and air-tight containers. When testing is not to be carried out at once, the samples shall be enclosed, marked and sealed to the satisfaction of all concerned, paying special attention to the air-tightness of the containers. Tools and containers shall be of material free from rust and shall be alkali resistant.

A-2.2 Sampling — From each lot, three final test samples shall be taken as provided under **A-2.2.1** for quicklime and under **A-2.2.2** for hydrated lime.

A-2.2.1 *Quicklime* — The size of the gross sample for lump quicklime and powdered quicklime from each lot depends on the size of the lot and shall be as given in Table 3 and in **A-2.2.1.1** and **A-2.2.1.2**.

TABLE 3 SAMPLE SIZE

LOT SIZE	GROSS SAMPLE SIZE FOR LUMP QUICKLIME	GROSS SAMPLE SIZE FOR POWDERED QUICKLIME
(1)	(2)	(3)
Tonnes	kg	kg
Up to 100	500	250
101 to 300	1 000	500
301 to 500	1 500	750
501 to 1 000	2 000	1 000

A-2.2.1.1 When the lump quicklime or powdered quicklime is available in bulk, the gross sample shall be made up of at least 50 equal portions taken from the lot at equal intervals of loading or unloading to make up the prescribed gross sample size. For stationary lots, the gross sample shall be collected from different parts of the stock pile in not less than 50 equal portions. The gross sample collected in the above manner shall be thoroughly mixed on a clean dry surface to about 20 kg for lump quicklime and 10 kg for powdered quicklime by coning and quartering method.

A-2.2.1.2 When the lump quicklime or powdered quicklime is presented for sampling in packages, at least 25 percent of the packages shall be opened and equal portions of the material shall be collected from different parts of the packages to make up the prescribed gross sample size. The gross sample collected in the above manner shall be thoroughly mixed on a clean dry surface to about 20 kg for lump quicklime and 10 kg for powdered quicklime by coning and quartering method.

A-2.2.2 *Hydrated Lime* — The final samples, each of not less than 5 kg, shall be taken direct in the same manner as described under **A-2.2.1.1** and **A-2.2.1.2** for powdered quicklime.

A-2.3 Material for Physical and Chemical Tests — Subsequently, at the time and place at which the tests and chemical analysis are to be carried out, the sample taken as described under **A-2.2.1** and **A-2.2.2** shall be crushed to pass through 2.36 mm IS Sieve and thoroughly mixed. Slightly more quantity of lime than is sufficient for conducting the tests shall be taken. For chemical tests only, from the material finally chosen, a small quantity from the sample shall be ground and rejected in order to ensure absence of contamination in the grinding equipment; and then

about 100 g of the sample shall be rapidly ground with as little exposure to the air and water vapour as possible to pass through 300 micron IS Sieve and placed in a small air-tight container. The remaining quantity shall be used for physical tests.

A-3. CRITERION FOR CONFORMITY

A-3.1 The test sample prepared for each lot shall be subjected to various physical and chemical tests. The lot shall be declared conforming to this specification only if the sample passes all the prescribed tests.

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Review of Indian Standards

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