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Indian Standard

SPECIFICATION FOR GYPSUM BUILDING PLASTER

PART 1 EXCLUDING PREMIXED LIGHTWEIGHT PLASTERS

(First Revision)

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BUREAU OF INDIAN STANDARDS
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Indian Standard

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(First Revision)

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SPECIFICATION FOR GYPSUM BUILDING PLASTER

PART I EXCLUDING PREMIXED LIGHTWEIGHT PLASTERS

(First Revision)

0. FOREWORD

0.1 This Indian Standard (Part I) (First Revision) was adopted by the Indian Standards Institution on 20 February 1976, after the draft finalized by the Gypsum Building Materials Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 This standard was first published in 1963. It has now been revised in two parts: Part I deals with gypsum plaster excluding premixed lightweight plaster and Part II deals with premixed lightweight plasters. Gypsum plaster has been reclassified according to the latest method of classification and anhydrous plaster which was previously recommended as undercoat plaster and finishing plaster has now been recommended for only finishing purposes. Based on the changes in classification, changes in the requirements of plaster have also been made.

0.3 Gypsum building plasters are used extensively in many countries of the world including Australia, Canada, United Kingdom, United States of America and USSR, for general building operations and for the manufacture of preformed gypsum building products which have the specific advantages of lightness and high fire resistance.

0.4 The various resources for gypsum in this country, when developed, will yield in addition to high grade gypsum, large quantities of gypsum of purity 70 percent or less. The latter according to present knowledge, have also prospects of economic use mainly as building materials, namely, in the form of gypsum plaster, gypsum plaster boards, and gypsum blocks and tiles. This standard on gypsum plaster, which is one in the series, covers the various categories of gypsum plaster used in normal building construction.

0.5 Gypsum building plasters may vary widely in their properties partly because manufacturing processes differ and partly because adjustments are made to suit users requirements. Thus the properties required of plasters for undercoat work differ to some extent from those required for finishing coats; a further variation is sometimes necessary in the latter class in order to control the hardness of finish or surfaces intended for specific purposes.

Keeping these points in view it has been attempted in this standard to classify gypsum plasters on the basis of partially dehydrated gypsum and anhydrous gypsum.

0.6 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 (Part I) covers the classification and chemical and physical requirements for gypsum building plasters which possess a definite set due to hydration of calcium sulphate, anhydrous or hemihydrate, to form gypsum and are used in the manufacture of gypsum building products.

1.2 Premixed lightweight building plasters are not included in this standard.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 2469-1976† shall apply.

3. CLASSIFICATION

3.1 Gypsum plaster shall be classified as follows:

a) Plaster of paris,

b) Retarded hemihydrate gypsum plaster:

Type I — Under coat:

a) Browning plaster,

b) Metal lathing plaster,

Type II — Final coat plaster:

a) Finish plaster,

b) Board finish plaster,

c) Anhydrous gypsum plasters are for finishing only, and

d) Keene's plaster is for finishing only.

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

†Glossary of terms relating to gypsum (*first revision*).

NOTE — Keene's plaster is of the anhydrous type. It is characterized by being more easily brought to a smooth and clean finish associated with gradual set. In this standard Keene's plaster is differentiated from a anhydrous gypsum plaster by a higher standard of purity ($CaSO_4$ not less than 80 percent) and hardness. The special qualities traditionally associated with this type of plaster cannot be dealt with at present by any convenient direct test.

4. CHEMICAL REQUIREMENTS

4.1 The chemical composition of the plasters shall be given in Table 1.

TABLE 1 CHEMICAL COMPOSITION

SL No.	PARTICULARS	REQUIREMENT				METHOD OF TEST
		Plaster of Paris	Retarded Hemihydrate Gypsum Plaster	Anhydrous Gypsum Plaster	Keene's Plaster	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	SO_3, percent by mass, *Min*	35	35	40	47	*see* IS : 1288-1973*
ii)	CaO, percent by mass, *Min*	2/3 of SO_3 content	2/3 of SO_3 content	2/3 of SO_3 content	2/3 of SO_3 content	*see* IS : 1288-1973*
iii)	Soluble magnesium salts, expressed as percentage of MgO, *Max*	0·3	0·3	0·3	0·3	*see* Appendix A
iv)	Soluble sodium salts, expressed as percentage of Na_2O, *Max*	0·3	0·3	0·3	0·3	*see* Appendix A
v)	Loss of ignition, percent by mass	Not greater than 9 and less than 4	Not greater than 9 and less than 4	3·0 *Max*	2·0 *Max*	*see* Appendix B
vi)	Free lime, *Min* percent	—	3†	—	—	*see* Appendix C

*Method of test for mineral gypsum and gypsum products (*first revision*).
†Applicable to metal lathing plaster.

5. PHYSICAL REQUIREMENTS

5.1 Purity — No material shall be added to gypsum plasters except those which are necessary to control the setting, such as sodium citrate, breakdrown products of keratin, potassium sulphate, alum and zinc sulphate; or working characteristics; or to impart anti-corrosion or fungicidal properties.

5.2 Gypsum plaster shall also satisfy the requirements given in Table 2, when tested according to the procedures given in IS : 2542 (Part I)-1964*.

TABLE 2 PHYSICAL REQUIREMENTS

Sl No.	Particulars	Requirement			
		Plaster of Paris	Retarded Hemihydrate Gypsum Plaster	Anhydrous Gypsum Plaster	Keene's Plaster
(1)	(2)	(3)	(4)	(5)	(6)
i)	Setting time, minutes:	—	—	—	—
	a) Plaster sand mixture	120-900	120-900	—	—
	b) Neat plaster	20-40	60-180	20-360	20-360
ii)	Transverse strength, kg/cm², *Min*	5	14*	—	—
iii)	Soundness	Set plaster pats shall not show any sign of disintegration, popping or pitting	Set plaster pats shall not show any sign of disintegration, popping or pitting	Set plaster pats shall not show any sign of disintegration, popping or pitting	Set plaster pats shall not show any sign of disintegration, popping or pitting
iv)	Mechanical resistance of set neat plaster	—	†Diameter of the indentation shall not be less than 3 mm and not more than 4·5 mm	Diameter of the indentation shall not be more than 4 mm	Diameter of the indentation shall not be more than 3·5 mm
v)	Residue on 1·18-mm IS Sieve percentage, *Max*	5·0	1·0†	1·0	1·0
vi)	Expansion on setting percentage, *Max*	—	0·20 at 24 h‡	—	0·5 at 96 h

*Applicable to undercoat plasters only.

†Applicable to final coat plasters.

‡Applicable to board finish plasters only.

*Methods of test for gypsum plaster, concrete and products: Part I Plaster and concrete.

5.3 Notwithstanding the requirements specified in **5.1**, additives for the purpose of colouring may be added to Keene's plaster.

6. SAMPLING

6.1 Lot — In any consignment, all the packages of the gypsum plaster of the same class and type and from the same batch of manufacture shall be grouped together to constitute a lot.

6.1.1 Samples shall be selected and tested separately from each lot to determine its conformity or otherwise to the requirements of the specification.

6.2 The number of packages to be selected for the sample from a lot shall depend upon the size of the lot and shall be in accordance with col 1 and 2 of Table 3.

TABLE 3 NUMBER OF PACKAGES TO BE SELECTED FOR THE SAMPLE

LOT SIZE (NO. OF PACKAGES IN THE LOT)	SAMPLE SIZE (NO. OF PACKAGES TO BE SELECTED FOR THE SAMPLE)
(1)	(2)
Up to 100	3
101 ,, 150	4
151 ,, 300	5
301 ,, 500	7
501 and above	10

6.2.1 The packages for the sample shall be selected at random from the lot and in order to ensure the randomness of selection the procedures given in IS:4905-1968* may be adopted.

6.3 Number of Tests

6.3.1 The contents of each package in the sample shall be thoroughly homogenized by mixing separately and sufficient quantity of gypsum plaster shall then be drawn from each package separately for carrying out the tests for setting time, transverse strength and residue on 1·18-mm IS Sieve. These samples of gypsum plaster drawn from each package shall be kept separately and tested individually for each of the tests mentioned above. The samples should be placed immediately in clean, dry, airtight containers for delivering to the laboratory.

*Methods for random sampling.

6.3.2 The test for the remaining physical requirements and the chemical requirements shall be carried out on a composite sample prepared by thoroughly mixing equal quantities of gypsum plaster taken from each of the packages selected in the sample.

6.4 Criteria for Conformity — A lot shall be considered as conforming to the requirements of this standard if the conditions mentioned in **6.4.1** and **6.4.2** are satisfied.

6.4.1 For test results on setting time, transverse strength and residue on 1·18-mm IS Sieve, the average ($\bar{X}$) and the range (R) shall be calculated. From the corresponding average and range value for each characteristic the value of the expressions $\bar{X} \pm 0{\cdot}4R$ shall be calculated. The value of the expression $\bar{X} - 0{\cdot}4R$ as calculated above should be greater than or equal to the minimum limits specified, and the value of the expression $\bar{X} + 0{\cdot}4R$ shall be less than or equal to the maximum limit specified.

6.4.2 All the test results for various physical and chemical requirements tested on the composite sample shall satisfy the corresponding specification requirements.

7. PACKING AND MARKING

7.1 Gypsum plasters shall be dry and free from lumps and shall be suitably packed in watertight bags or containers. The following information shall be marked legibly on each package:

a) Name of the manufacturer;

b) Class and type of plaster;

c) Date of manufacture, batch number, if any; and

d) Net mass.

7.2 BIS Certification Marking

The product may also be marked with Standard Mark.

7.2.1 The use of the Standard Mark is governed by the provisions of 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 Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

APPENDIX A

(*Table* 1)

A-1. DETERMINATION OF SOLUBLE SODIUM AND MAGNESIUM SALTS

A-1.1 Weigh 1 g of the plaster, ground to pass a 212-micron IS Sieve complying with the requirements of IS:460-1962* into a polyethylene bottle, add 100 ml of water to room temperature and 1 g of salt free gypsum. Shake the bottle occasionally during the next hour to prevent caking and then allow it to stand until a clear supernatant liquid is obtained.

A-1.2 Determine the contents of soluble sodium salts and magnesium salts in portions of the clear supernatant liquid. Express the results as Na_2O and MgO.

APPENDIX B

(*Table* 1)

B-1. DETERMINATION OF LOSS ON IGNITION

B-1.1 Weigh 2 g of the plaster into a squat weighing bottle, previously weighed complete with cover. Distribute the plaster evenly over the bottle to constant mass at a temperature between 280°C and 300°C. Cover the weighing bottle and reweigh immediately it is cool.

APPENDIX C

(*Table* 1)

DETERMINATION OF FREE LIME

C-1. PROCEDURE

C-1.1 Suspend 5 g of the sample in approximately 100 ml of water. Add several drops of phenolphthalein indicator solution (0·5 percent in 50 percent aqueous ethanol) and titrate with 0·5 N hydrochloric acid until the pink colour of the indicator just disappears. Continue the titration until the pink colour does not return after standing for 2 to 3 minutes.

With 5 g sample, 1 ml 0·5 N hydrochloric acid $\equiv$ 0·37 percent $Ca(OH)_2$.

*Specification for test sieves (*revised*).

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TO

IS 2547 (Part 1) : 1976 SPECIFICATION FOR GYPSUM BUILDING PLASTER

PART 1 EXCLUDING PREMIXED LIGHTWEIGHT PLASTERS

(First Revision)

[*Page* 6, Table 2, *Sl No.* (v), *Col* 5 *and* 6] — Delete the existing matter. Insert the following at Sl No. (vi) and renumber the existing Sl No. (vi) as (vii):

(1)	(2)	(3)	(4)	(5)	(6)
vi)	Residue on 90 µm IS Sieve, percentage, *Max*	—	—	2.0	2.0

(CED 21)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 2 DECEMBER 1995
TO
IS 2547 (Part 1) : 1976 SPECIFICATION FOR GYPSUM BUILDING PLASTER
PART 1 EXCLUDING PREMIXED LIGHTWEIGHT PLASTERS

(First Revision)

(*Page* 5, *clause* 4.1, *Table* 1) — Insert 'β-hemihydrate' in col 3 under Plaster of Paris.

(*Page* 5, *Table* 1) — Substitute '1982' for the existing year '1973' in col 7.

(*Page* 5, *clause* 5.1, *line* 3) — Insert 'sodium sulphate' after 'potassium sulphate'.

(*Page* 5, *clause* 5.1, *line* 4) — Insert 'such as Alkyl-Aryl sulphonate' after 'working characteristics' and 'such as nitrates and nitrites of alkali metals' after 'anti-corrosion'.

(*Page* 6, *clause* 5.2, *line* 2) — Substitute '1978' for the existing year '1964'.

(*Page* 6, *Table* 2) — Substitute the following for the existing table:

TABLE 2 PHYSICAL REQUIREMENTS

Sl No.	Particulars	Requirement			
		Plaster of Paris		Anhydrous Gypsum Plaster	Keene's Plaster
		Type A (short time setting)	Type B (long time setting)		
(1)	(2)	(3)	(4)	(5)	(6)
i)	Setting time minutes:	—	—	—	—
	a) Plaster sand mixture	45-120	120-900	—	—
	b) Neat plaster	20-40	60-180	20-360	20-360

TABLE 2 (*Concluded*)

Sl No.	Particulars	Requirement			
		Plaster of Paris		Anhydrous Gypsum Plaster	Keene's Plaster
		Type A (short time setting)	Type B (long time setting)		
(1)	(2)	(3)	(4)	(5)	(6)
ii)	Transverse strength, kg/cm^2, *Min*	5	4*	—	—
iii)	Soundness	Set plaster pats shall not show any sign of disintegration, popping or pitting	Set plaster pats shall not show any sign of disintegration, popping or pitting	Set plaster pats shall not show any sign of disintegration, popping or pitting	Set plaster pats shall not show any sign of disintegration, popping or pitting
iv)	Mechanical resistance of set neat plaster	—	†Diameter of the indentation shall not be less than 3 mm and not more than 4.5 mm	Diameter of the indentation shall not be more than 4 mm	Diameter of the indentation shall not be more than 3.5 mm
v)	Residue on 90 µm sieve percentage, *Max*	5.0	5.0* (1.0)†	2.0	2.0
vi)	Expansion on setting percentage, *Max*	—	0.20 at 24 h‡	—	0.5 at 96 h

*Applicable to undercoat plasters only.

†Applicable to final coat plasters.

‡Applicable to board finish plasters only.

(*Page* 7, *clause* **6.3.1**, *line* 4) — Substitute '90 µm' *for* '1.18 - mm IS' before 'sieve'.

(*Page* 9, *clause* **A-1-1**, *line* 2) — Substitute 'IS 460 (Part 1) : 1985' *for* 'IS : 460 - 1962'.

(*Page* 9, *foot-note with* '*' *mark*) — Substitute '*Specification for test sieves : Part 1 Wire cloth test sieves (*third revision*)' for the existing.

(CED 21)

Reprography Unit, BIS, New Delhi, India