इंटरनेट मानक

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Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

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IS 2095-3 (1996): gypsum plaster boards, Part 3: Reinforced Gypsum plaster boards [CED 4: Building Limes and Gypsum Products]

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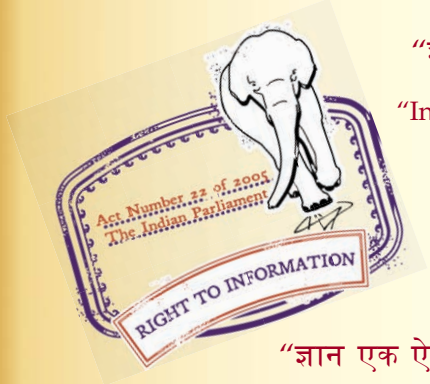

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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IS 2095 (Part 3) : 1996
REAFFIRMED 2009

भारतीय मानक

जिप्सम के प्लास्टर बोर्ड — विशिष्टि

भाग 3 प्रबलित जिप्सम के प्लास्टर बोर्ड

(द्वितीय पुनरीक्षण)

Indian Standard

GYPSUM PLASTER BOARDS — SPECIFICATION

PART 3 REINFORCED GYPSUM PLASTER BOARDS

(Second Revision)

ICS 91.100.10

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

March 1996 Price Group 3

AMENDMENT NO. 1 OCTOBER 2000
TO
IS 2095 (PART 3) : 1996 GYPSUM PLASTER BOARDS — SPECIFICATION
PART 3 REINFORCED GYPSUM PLASTER BOARDS

(Second Revision)

(*Foreword*) — Insert the following matter before last para:

'A scheme for labelling environment friendly products known as ECO Mark has been introduced at the instance of the Ministry of Environment and Forests (MEF), Government of India. The ECO Mark would be administered by the Bureau of Indian Standards (BIS) under the *BIS Act*, 1986 as per the Resolution No. 71 dated 21 February 1991 and No. 425 dated 28 October 1992 published in the Gazette of the Government of India. For a product to be eligible for marking with ECO logo, it shall also carry the ISI Mark of BIS besides meeting additional optional environment friendly requirements. For this purpose, the Standard Mark of BIS would be a single mark being a combination of the ISI Mark and the ECO logo. Requirements to be satisfied for a product to qualify for the BIS Standard Mark for ECO friendliness will be optional; manufacturing units will be free to opt for the ISI Mark alone also.

This amendment is based on the Gazette Notification No. 170 dated 18 May 1996 for wood substitutes as environment friendly products published in the Gazette of the Government of India. This amendment is, therefore, being issued to this standard to include environment friendly requirements for wood substitutes.'

(*Page* 2, *clause* 4.1) — Insert the following matter at the end of the clause:

'By-product gypsum conforming to the requirements of IS 12679:1987 shall be used for the preparation of plaster.'

(*Page* 4) — Insert the following matter after 9.4.1 and renumber the subsequent clauses:

'10 OPTIONAL REQUIREMENTS FOR ECO MARK

10.1 General Requirements

10.1.1 The product shall conform to the requirements for quality and performance as specified in the standard.

10.1.2 The product manufacturer must produce the consent clearance from the concerned State Pollution Control Board as per the provisions of *Water (Prevention and Control of Pollution) Act*, 1974 and *Air (Prevention and Control of Pollution) Act*, 1981 and *Water (Prevention and Control of Pollution) Cess Act*, 1977 along with the authorization, if required under *Environment (Protection) Act*, 1986 and the Rules made thereunder to BIS while applying for ECO Mark appropriate with enforced Rules and Regulations of the Forest Department.

10.1.3 The product or product packaging may display in brief the criteria based on which the product has been labelled environment friendly.

10.1.4 The material used for product packing shall be recyclable, reusable or biodegradable.

10.2 Specific Requirements

10.2.1 Building boards generally used as partitioning, panelling, cladding and false ceiling shall be made from industrial wastes such as phospho-gypsum.

NOTE — The manufacturer shall provide documentary evidence by way of certificate or declaration to this effect to BIS while applying for ECO Mark.'

(CED 21)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 2 SEPTEMBER 2006
TO
IS 2095 (PART 3) : 1996 GYPSUM PLASTER BOARDS — SPECIFICATION

PART 3 REINFORCED GYPSUM PLASTER BOARDS

(Second Revision)

[*Page* 4, *clause* **10**, *Title* (*see also Amendment No.* 1)] — Substitute 'ADDITIONAL' *for* 'OPTIONAL'.

(CED 4)

Reprography Unit, BIS, New Delhi, India

FOREWORD

This Indian Standard (Part 3) (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Gypsum and Gypsum Based Products for Buildings Sectional Committee had been approved by the Civil Engineering Division Council.

The internal surfaces of walls and ceilings of most of the buildings are finished internally by applying plaster in one or more coats. In order to reduce the demand of site labour, the use of building board such as gypsum plaster board, fibre hard board, cement coir boards and asbestos cement building board as covering for walls and ceiling is increasing steadily. Gypsum boards have the specific advantage of being lighter than the boards of similar nature, such as fibre hard boards and asbestos cement building boards. Gypsum boards also possess better fire-resisting, thermal and sound insulating properties.

Sufficient quanitites of natural gypsum and by-product gypsum are available in India. Though natural gypsum has been mostly used in the manufacture of gypsum boards, by-product gypsum after suitable treatment if required is also equally suitable for manufacturing such boards.

Gypsum boards may be manufactured as plain, laminated and reinforced boards. Reinforcing materials generally used as glass, paper, vegetable fibres, etc.

The boards may be used to provide dry lining finishes to masonry walls, to ceilings, to steel or timber frame partitions, or as ceilings to structural steel columns and beams, or in the manufacture of prefabricated partition panels. Laminated gypsum boards are used for laying for concrete ceiling. With concrete it combines firmly and represents readymade interior plastering. Glass reinforced gypsum boards (GRG) are pseudo ductile materials having reasonably high flexural and impact strengths. GRG can be sawn, drilled, screwed or nailed like timber. It is resistant to white ant and termite and completely non-combustible. Being isotropic in character, thin GRG panels may be used compared to timber panels, hence cost effective. GRG composite can be used as substitute for timber for panel door, wall panelling, partitions, false ceiling, etc, and also as furniture components. The gypsum boards may be fixed by nailing, screwing, or sticking with gypsum based or other adhesives.

Gypsum boards specified in the standard have been covered in three parts. Part 1 covers plain boards, Part 2 covers laminated/coated boards, and Part 3 covers reinforced boards.

This part deals with different types of reinforced gypsum plaster boards, its manufacture, tests and sampling. This standard is based on existing IS 8273:1984. Once this part 3 of IS 2095 is printed, existing IS 8273 : 1984 shall be withdrawn.

For the purpose of dec ' 'ing 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 '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

GYPSUM PLASTER BOARDS – SPECIFICATION

PART 3 REINFORCED GYPSUM PLASTER BOARDS

(*Second Revision*)

1 SCOPE

1.1 This standard covers the method of manufacture, tests and sampling of fibrous gypsum plaster boards and glass fibre reinforced gypsum boards for use as a lining material for ceiling, dry surfacing material for walls door panels or for partitions.

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to the standard.

IS No.	*Title*
2380	Methods of test for wood particle boards and boards from other lignocellulosic materials :
(Part 16) : 1977	Determination of water absorption
(Part 17) : 1977	Determination of swelling in water
2542	Method of test for gypsum plaster, concrete and products:
(Part 1) : 1978	Plaster and concrete (Section 1 to 12 in one volume),
(Part 1/Sec 1) : 1978	Normal consistency of gypsum plaster
(Part 1/Sec 2) : 1978	Normal consistency of gypsum concrete
(Part 1/Sec 3) : 1978	Setting time of plaster and concrete
(Part 1/Sec 4) : 1978	Transverse strength of gypsum plaster
(Part 1/Sec 5) : 1978	Compressive strength and dry set density of gypsum plaster
(Part 1/Sec 6) : 1978	Soundness of gypsum plaster
(Part 1/Sec 7) : 1978	Mechanical resistance of gypsum plaster by dropping ball test
(Part 1/Sec 8) : 1978	Freedom from coarse particles
(Part 1/Sec 9) : 1978	Expansion of plaster
(Part 1/Sec10) : 1978	Sand in set plaster
(Part 1/Sec11) : 1978	Wood fibre content in wood fibre gypsum plaster
(Part 1/Sec12) : 1978	Dry bulk density
(Part 2) : 1981	Gypsum products (Section 1 to 8 in one volume),
(Part 2/Sec 1) : 1981	Measurement of dimensions
(Part 2/Sec 2) : 1981	Determination of mass
(Part 2/Sec 3) : 1981	Determination of mass and thickness of paper surfacing
(Part 2/Sec 4) : 1981	Transverse strength
(Part 2/Sec 5) : 1981	C essive strength
(Part 2/Sec 6) : 1981	bsorption
(Part 2/Sec 7) : 198	content
(Part 2/Sec 8) : 1981	etention of precast reinforced gypsum slabs
4905 : 1968	Methods for random sampling
8272 : 1984	Specification for gypsum plaster for use in the manufacture of fibrous plaster boards (*first revision*)
12679 : 1987	Specification for by-product gypsum for use in plaster, blocks and boards

3 TERMINOLOGY

3.1 For the purpose of this standard, the following definitions shall apply.

3.2 Fibrous Gypsum Plaster Board

A composition of gypsum plaster and sisal, coconut.

jute or other fibre forming body of regular dimensions.

3.3 Glass Reinforced Gypsum Boards

A composition of gypsum plaster and glass fibre forming body of regular dimensions.

4 MATERIALS

4.1 Gypsum Plaster

For the ordinary fibrous and GRG gypsum plaster boards, the gypsum plaster shall comply with requirements of IS 8272:1984. For high strength GRG Boards, gypsum plaster of properties :

i) Fineness – Not more than 5 percent retained on BIS Sieve (75 Micron),

ii) Normal Consistency – *Min* 60 percent, and

iii) Compressive Strength – *Min* 16.0 MPa.

4.2 Fibre

The reinforcing fibre may be sisal or a mixture of such sisal fibre and coconut containing not more than 20 percent by mass of coconut fibre. It shall be of the approved quality, thoroughly teased and free from dust, grease, or other substances likely to affect strength of the fibrous plaster boards. For GRG Boards, the reinforcing fibre shall be of 'E-type' having good chopping characteristics and dispersibility.

4.3 Potable waters are generally considered satisfactory for mixing plaster.

4.4 Oil and Greases

The oil and greases used in the preparation of benches and moulds for casting shall be such as will leave the plaster surface of the product clean and unstained.

5 METHOD OF MANUFACTURE

5.1 Fibre Gypsum Plaster Board

The plaster board shall be manufactured by either of the methods described in **5.1.1** and **5.1.2**.

5.1.1 *Method* 1

The procedure for manufacture shall be as follows:

a) A steel mould 1 mm thinner than the thickness of the board required, shall be laid over a concrete casting table having smooth trowelled surface or polished stone surface.

b) The table shall be coated with a thin layer of oil to prevent ht plaster board sticking to the surface.

c) Gypsum plaster shall be gauged to an even consistency free from lumps. This shall be spread evenly to cover the entire surface of the casting table within the mould to an even thickness of 4 mm and allowed to set partially.

d) The requisite amount of fibre reinforcement shall be distributed evenly over the surface of the face gauge as to over hang the edges by 50 mm.

e) The requisite amount of body plaster shall then be poured over the fibre, and the fibre shall be pressed and rolled down until it is thoroughly incorporated in the body plaster.

f) The overhanging fibre shall be turned into the board to strengthen the edges and the whole board shall then be ruled to an even thickness.

5.1.2 *Method* 2

The procedure for manufacture shall be as follows:

a) A steel mould, 1 mm thinner than the thickness of the board required, shall be laid over a concrete casting table having surface trowelled to a high gloss or table surfaced with polyester resin.

b) The table shall be coated with a thin layer of oil to prevent the plaster board sticking to the surface.

c) Gypsum plaster shall be gauged to an even consistency free from lumps at water-plaster ratio of 0.5 to 0.6. This shall be spread evenly to cover the entire surface of the casting table within the mould to an even thickness of 1.5 to 2.0 mm and allowed to set partially.

d) A plaster of thinner consistency at water-plaster ratio of 0.7 to 0.8 shall be prepared and poured on the bench to cover it to about the depth of the bench bars.

e) When the plaster has spread evenly, teased fibre at the rate of not less than 250 g/m^2 of board shall be spread over the table. This shall be incorporated into the plaster by running a fluted roller over the table.

f) The overhanging edge of fibre shall be next turned back to strengthen the edges and the plaster ruled off with a screeding bar to an even thickness.

g) When the sheet has hardened sufficiently, it shall be lifted and placed in racks to dry.

5.2 Glass Reinforced Gypsum Boards

5.2.1 The GRG Board may be manufactured either by spray suction technique or premixing method. The main objectives of these methods is to ensure thorough dispersal of the glass fibre in the plaster slurry.

6 DIMENSIONS AND TOLERANCES

6.1 Shape

The boards shall be square or rectangular in shape.

6.2 Dimensions

Length, width and thickness of the board shall be as specified in Table 1.

6.3 Mass of Plaster

The minimum mass of plaster per square metre of board shall be as given in Table 1.

6.4 Density

The minimum density of board shall be as per the value specified in Table 1.

6.5 Tolerances

Tolerances shall be as given below:

a)	Length	+ 0 mm − 6
b)	Width	+ 0 mm − 5
c)	Thickness	± 1.0 mm

7 FINISH

7.1 The surface of the boards shall be true and free from imperfection that would render the board unfit for uses. The edge shall be straight and the corners shall be square.

8 TESTS

8.1 Visual Inspection

All boards shall be sound, free from cracks, broken-edges and such other imperfections that would render them unfit for use.

8.2 Thickness

The mean thickness of the board shall be determined as described in IS 2542 (Part 2/Sec 1 to 8) : 1981.

8.3 Transverse/Flexural Strength

The test shall be carried out as described in IS 2542(Part 2/Sec 1 to 8):1981. When subjected to a load of 340 N, the deflection of the specimen shall not exceed 19 mm. Should the deflection under proof load be less than 6 mm, the load shall be increased until failure occurs. The specimen shall then deflect not less than 6 mm before failure occurs.

8.3.1 *Flexural Strength*

GRG boards when tested as per IS 2542 (Part 2/Sec 4) : 1981. Shall have flexural strength as per the value specified in Table 2.

8.3.2 *Impact Strength*

The boards when tested as per Charpy test shall have flexural strength as per the value specified in Table 2.

8.4 Jolting Test

The boards shall be tested in the manner described in Annex A. None of the sample should show crack or chipping off from the surface before 80 cycles of jolting.

8.5 Free Moisture

Average free moisture of the samples shall not exceed 2 percent when tested as per IS 2542 (Part 2) : 1981.

8.6 Surface Hardness Test

The test shall be carried out as given at Annex B. The diameter of any impression shall not exceed 8 mm for both materials.

8.7 Water Absorption

For GRG Boards as per IS 2380 (Part 16) : 1971, the value shall not exceed 15 percent in 24 hour.

8.8 Swelling

GRG when tested as per IS 2380 (Part 17) : 1977, the value shall not exceed 0.5 percent in 24 hours.

Table 1 Dimensions and Other Particulars of Fibrous Gypsum Plaster Board and GRG Board

(*Clauses* 6.2, 6.3 *and* 6.4)

Board	Thickness (*T*)	Length (*L*)	Width (*W*)	Mass of Plaster per m² of Board	Density kg/m³
	mm	mm	mm	kg *Min*	*Min*
(1)	(2)	(3)	(4)	(5)	(6)
Fibrous Gypsum Plaster Board	12	1 200 1 500 1 800	400 600 900 1 200	10	834
GRG Board	4, 6 8, 10 12	2 000 and 3 000	1 000 1 200	4 - 10 6 - 15 8 - 20 10 - 25 12 - 30	2 500

Table 2 Flexural and Impact Strength of GRG Boards

(Clause 8.3.2)

Average Flexural Strength Mpa	Minimum Flexural Strength on Either Side MPa	Average Impact Strength Nmm/mm²	Minimum Impact Strength on Either Side Nmm/mm²
18	15	17	14

8.9 Test for Determining Fibre Contents

The test as specified in IS 2542 (Part 1/Sec 1 to 12):1978 for wood fibre content in wood fibre gypsum plaster shall be used for determining the mass of fibre in the board.

9 SAMPLING

9.1 Lot

All the gypsum plaster boards manufactured from similar materials under essentially similar conditions of production shall be grouped together to constitute a lot.

9.1.1 Samples shall be selected and inspected separately from each lot for determining its conformity or otherwise to the requirements of this standard.

9.2 The number of boards 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.

9.2.1 The boards 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 followed.

9.3 All the boards selected under **9.2** shall be inspected for visual defects (**8.1**), shape (**6.1**), dimensions (**6.2**) and mass of plaster (**6.3**). A board which is found not conforming to any one or more of the requirements inspected for shall be considered as defective.

9.3.1 A lot shall be considered as having found conforming to the requirements of visual inspection, shape, dimensions, and mass of plaster if the number of defectives as observed in **9.3** does not exceed the corresponding permissible number of defectives given in col 3 of Table 3.

9.4 A lot having found conforming to visual inspection, shape, dimensions and mass of plaster shall then be tested for transverse bending test and surface hardness tests. For each test a number of boards in accordance with col 4 of Table 3 shall be selected at random from those inspected under **9.3** and found conforming to the requirements inspected for under that clause. These boards shall then be tested for transverse bending and surface hardness in accordance with the methods described in IS 2542 (Part 2/Sec 1 to 8):1981 and Annex B respectively.

9.4.1 A lot shall be declared as having found satisfactory for the requirements of transverse bending and surface hardness if only all the boards tested for these tests under **9.4** pass the test indivisually.

10 PACKING AND MARKING

10.1 Reinforced gypsum plaster boards shall be transported so as to be kept dry, free from moisture and any kind of damage.

10.2 The product shall be packed in such packages which are made from recyclable/reusable for biodegradable materials as declared by the

Table 3 Scale of Sampling and Permissible Number of Defectives

(*Clauses* 9.2, 9.3.1 *and* 9.4)

No. of Boards in the Lot	No. of Boards to be Selected	Permissible Number of Defectives	Sub-Sample Size
(1)	(2)	(3)	(4)
Up to 100	6	0	3
101 to 150	8	0	3
151 to 300	13	1	4
301 to 500	20	2	5
501 to 1 000	32	3	7
1 001 and above	50	5	10

manufacturer and may be accompanied with detailed instructions for proper use.

10.3 Each board shall be clearly and permanently marked with the following information:

a) Manufacturer's name or trade-mark;
b) Size of boards;
c) Year of manufacture; and
d) List of identified critical ingredients in descending orders of quantity, percent by mass.

10.4 BIS Certification Marking

The board may also be marked with the BIS Certification Marks.

10.4.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and 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.

ANNEX A
(*Clause* 8.4)

JOLTING TEST

A-1 Three test pieces 250 x 250 mm shall be cut out from different places of each of the boards selected for flexural and impact strength tests and each of them shall be subjected to the 'Jolting Test' performed in the following manner:

The sample piece is to be held in a horizontal position 75 cm above a hard wooden table top and then dropped on the table horizontally. Care should be taken so that the test piece does not land on its edges of corners.

ANNEX B
(*Clause* 8.6)

SURFACE HARDNESS TEST

B-1 PROCEDURE

B-1.1 This test shall be carried out on the surface of an undamaged sheet and at three points. A steel ball 10 mm in diameter and with a load of 150 N is placed gently on the surface of the test specimen and kept in position for 5 minutes. At the end of the specified period, the ball along with the load shall be removed and the diameter of impression measured.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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