IS 657 (1982): Materials for Use In The Manufacture of Magnesium Oxychloride Flooring Compositions [CED 5: Flooring, Wall Finishing and Roofing]

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SPECIFICATION FOR MATERIALS FOR USE IN THE MANUFACTURE OF MAGNESIUM OXYCHLORIDE FLOORING COMPOSITIONS

(Second Revision)

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Indian Standard

SPECIFICATION FOR MATERIALS FOR USE IN THE MANUFACTURE OF MAGNESIUM OXYCHLORIDE FLOORING COMPOSITIONS

(Second Revision)

0. FOREWORD

0.1 This Indian Standard (Second Revision) was adopted by the Indian Standards Institution on 26 February 1982, after the draft finalized by the Flooring and Plastering Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Magnesium oxychloride composition consisting of mixture of calcined magnesite filters and pigments provides a good floor if proper ingredients are mixed in correct proportions and skilled labour is employed in laying the floor. Too wet a mix with excess of magnesium chloride results in sweating of the floor surface. Mineral oils, greases or vegetable oils do not affect the floor. The flooring is not seriously effected by alkalis, but strong alkalis such as soda or harsh cleaning agents tend to attack the protective dressing and thus exposing the flooring to action of water. However, the finished floor needs to be protected from water or excessive moisture by periodic applications of wax polish or oil at regular intervals.

0.2.1 Magnesium oxychloride flooring should not be used in any situation where it would be exposed to damp conditions for long periods, unless other suitable protective measures are taken. The flooring should not also be used in places where it will be exposed to acids or salts continuously. Under normal conditions proper waxing or oiling of floors will provide adequate protection against the attack of moisture.

0.3 This standard was first published in 1956 and subsequently revised in 1962. It has been revised again to incorporate the improvements found necessary in the light of the usage of this standards and in view of the experience gained during the course of these years. In this revision, a number of changes have been made; the most prominent being the inclusion of the physical requirements of calcined magnesite which in the eariler version was left to agreement between the purchaser and

the vendor. The requirements of fillers like saw dust and wood flour have also been dealt in detail on the basis of actual invesigations. The limit of grading for fillers and aggregates other than saw dust and wood flour has also been added and only Grade 3 of magnesium chloride has been allowed. The methods of tests have been separated and covered in IS :10032-1982*.

NOTE — The code of practice for laying, etc are covered in IS : 658-1982†.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the results 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.

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1. SCOPE

1.1 This standard covers the requirements for the following materials used in the manufacture of magnesium oxychloride flooring compositions:

a) Calcined magnesite,
b) Magnesium chloride,
c) Fillers, and
d) Pigments.

2. CALCINED MAGNESITE

2.1 Description — The calcined magnesite shall consist essentially of magnesium oxide formed by burning natural magnesite (magnesium carbonate) which after being finely ground will react suitably with magnesium chloride solution.

2.2 Colour — The colour shall generally match with that of a sample, if any.

2.3 Chemical Requirements —The composition of calcined magnesite when tested in accordance with the method given in IS : 10032-1982* shall be as specified in Table 1.

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*Methods of test for materials for use in the preparation of magnesium oxychloride compositions.
†Code of practice for magnesium oxychloride composition floors (*second revision*).
‡Rules for rounding off numerical values (*revised*).

TABLE 1 CHEMICAL REQUIREMENTS OF CALCINED MAGNESITE

(*Clause* 2.3)

Sl No.	Characteristic	Requirement
(1)	(2)	(3)
i)	Magnesium oxide (MgO), percent by mass	87 *Min*
ii)	Calcium oxide (CaO), percent by mass	2·5 *Max*
iii)	Carbon dioxide (CO_2), percent by mass	2·5 *Max*
iv)	Loss on ignition (carbon dioxide and water), percent by mass	8 *Max*
v)	Total contents of MgO, CaO, Al_2O_3, SiO_2 and loss on ignition, percent by mass	99·5 *Min*

2.4 Physical Requirements — The physical requirements of calcined magnesite when tested in accordance with the method given in IS : 10032-1982* shall be as specified in Table 2.

TABLE 2 PHYSICAL REQUIREMENTS OF CALCINED MAGNESITE

Sl No.	Characteristic	Requirement
(1)	(2)	(3)
1.	Bulk density, kg/l	0·65 to 0·85
2.	Fineness	
	a) percent by mass passing through 150 micron IS Sieve*	97 *Min*
	b) percent by mass passing through 75 micron IS Sieve*	95 *Min*
3.	Setting time, hours	
	a) Initial	3 to 6
	b) Final	7 to 15
4.	Modulus of rupture N/m^2:	
	At 7 days	7 *Min*
	At 28 days	10·5 *Min*
5.	Linear change, percent:	
	The average change in length	
	During expansion	0·15 *Max*
	During contraction	0·25 *Max*

**See* IS : 460 (Part I)-1978 Specification of test sieves : Part I Wire cloth test sieves (*second revision*).

*Methods of test for materials for use in the preparation of magnesium oxychloride flooring compositions.

3. MAGNESIUM CHLORIDE

3.1 The magnesium chloride used in the manufacture of such floor shall conform to Grade 3 of IS : 254-1973*.

4. FILLERS

4.1 Wood Flour — The material shall consist of a product of timber and in any one consignment all the material shall preferably be produced from the same species of timber.

4.1.1 *Moisture Content* — The moisture content of wood flour when tested in accordance with the method given in IS : 10032-1982† shall not exceed 12 percent by mass.

4.1.2 *Resin* — When tested in accordance with the method described in IS : 10032-1982† the material shall not contain more than 5 percent of resinous matter.

4.1.3 *Fineness* — The fineness of the material shall be such that not more than 1 percent by mass is retained on 300 micron IS Sieve [*see* IS : 460 (Part I)-1978 ‡].

4.1.4 *Grading* — The grading shall conform to Table 3.

4.2 Saw Dust — The material shall be the product of timber and in any one consignment all the material shall preferably be produced from the same species of timber.

4.2.1 *Moisture Content* — When tested in accordance with the method described in IS : 10032-1982† the moisture content of the material shall not exceed 12 percent by mass.

4.2.2 *Resin* — When tested in accordance with the method described in IS : 10032-1982† the material shall not contain more than 7 percent of resinous matter.

4.2.3 *Fineness* — The fineness of the material shall be such that not more than 5 percent by mass is retained on a 212 micron IS Sieve [*see* IS : 460 (Part I)-1978‡].

4.2.4 *Grading* — The grading shall conform to Table 3.

4.3 Other Fillers and Aggregates — The material shall consist of marble powder, talc, ground silica/sand/crushed stone/quartz, emery or fused abrasives, chips made of marble/granite, asbestos and their suitable combinations depending on the type of floor to be laid.

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*Specification for magnesium chloride (*second revision*).

†Method of test for materials for use in the preparation of magnesium oxychloride flooring compositions.

‡Specification for test sieves : Part I Wire cloth test sieves (*second revision*).

NOTE — The fillers and aggregates used shall not contain any ingredients that shall react chemically with other materials used in the flooring composition and affect its physical properties adversely.

4.3.1 *Grading* — The grading of the materials shall conform to Table 3.

5. PIGMENTS

5.1 The pigments used shall conform to one of the following or their combinations:

Pigment	*Relevant Indian Standard*
i) Black, red or brown	IS : 44-1969*
ii) Green	IS : 54-1950†
iii) Yellow	IS : 50-1967‡
	IS : 3574 (Part II)-1966§
iv) Blue	IS : 55-1970‖
	IS : 56-1975¶
	IS : 3574 (Part II)-1966§
v) White	IS : 411-1968**

6. PACKING OF CALCINED MAGNESITE

6.1 Packing — The calcined magnesite shall be packed in suitable containers, such as jute bags suitably lined with bitumen and polythene film so that the material is not affected by atmospheric agencies during the course of transhipment and storage. Each bag shall contain preferably 50 kg of the material.

7. SAMPLING AND CRITERION FOR CONFORMITY (APPLICABLE TO CALCINED MAGNESITE AND FILLER)

7.1 The sample shall be taken to a dry and clean air-tight container so that the material fill set completely. The container shall be sealed and labelled, and the sample shall be tested within four weeks of delivery.

*Specification for iron oxide pigments for paints (*first revision*).
†Specification for green oxide of chromium for paints (*first revision*).
‡Specification for lead and scarlet chromes (*second revision*).
§Specification for organic pigments for paints : Part II Phthalocyanines.
‖Specification for ultramarine blue for paints (*first revision*).
¶Specification for prussian blue (iron blue) for paints (*first revision*).
**Specification for titanium dioxide for paints (*first revision*).

7.2 Selection of Samples

7.2.1 Each sample for testing shall weigh at least:

a) for calcined magnesite — 0·5 kg,
b) for wood flour or saw dust — 3 kg,
c) for other fillers — 7 kg.

Each sample shall be truely representative of the consignment, or part of a consignment sampled. The sample shall consist of a mixtute of at least 10 equal sub-samples taken from places evenly spaced throughout the consignment, or part of a consignment sampled. Sub-samples of bulk material shall be taken from the bulk container or containers, during filling or emptying. For material in bags, drums of other packages, not more that one sub-sample shall be taken from any one bag, drum or other package. The number of bags, drum or other packages to be sampled shall be as follows:

Number of Bags, Drums, or other Packages in Consignment	*Percentage of Bags, Drums or other Packages to be Sampled*	*Minimum Number of Bags, Drums or other Packages to be Sampled*
10 to 100	10	10
101 to 200	7	10
201 to 500	5	15
501 to 1 000	4	25
Exceeding 1 000	3	40

7.2.2 Where there are less than 10 bags, drums or other packages to be sampled, one sub-sample shall be taken from each.

7.2.3 The bags, drums or other packages from which samples have been drawn shall be effectively resealed after sampling and suitably labelled to indicate that samples have been taken from them.

7.3 Non-compliance with Tests — The test sample prepared for each lot shall be subjected to various tests specified in this standard. The lot shall be declared conforming to the specification only if the sample passes all the prescribed tests.

7.4 The sampling and criterion for conformity for magnesium chloride and pigments shall be as per relevant Indian Standards.

TABLE 3 GRADING OF FILLERS AND AGGREGATES

(*Clauses* 4.1.4, 4.2.4, *and* 4.3.1)

Sl No.	Filler or Aggregate	General Purpose		Heavy Duty		Non-Spark Static Discharging		Non-Slip		Mosaic or Terrazo		Industrial Granolithic		Base Coat	
		IS Sieve*	Percent Passing Through	IS Sieve*	Percent Passing Through	IS Sieve*	Percent Passing Through	IS Sieve*	Percent Passing Through	IS Sieve*	Percent Passing Through	IS Sieve*	Percent Passing Through	IS Sieve*	Percent Passing Through
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
i)	Wood Flour, Saw Dust	850 micron 300 micron	100 80 *Max*	850 micron 300 micron	100 80 *Max*	850 micron 300 micron	100 *Max* 80 *Max*	850 micron 300 micron	100 80 *Max*	— —	— —	850 micron 300 micron	100 80 *Max*	3·35 mm 300 micron	100 80 *Max*
ii)	Asbestos (Fibrous Aggregate)	2·00 mm 300 micron	100 80 *Max*	2·00 mm 300 micron	100 80 *Max*	2·00 mm 300 micron	100 80 *Max*	2·00 mm 300 micron	100 80 *Max*	2·00 mm 300 micron	100 80 *Max*	2·00 mm 300 micron	100 80 *Max*	2·00 mm 300 micron	100 80 *Max*
iii)	Sand, Crushed Stone, Ground Silica, Quartz	1·18 mm 600 micron 300 micron 75 micron	100 94 *Max* 20 *Max* 2 *Max*	3·35 mm 600 micron 150 micron —	100 80 *Max* 7 *Max* —	— — — —	— — — —	3·35 mm 300 micron 150 micron —	100 30 *Max* 7 *Max* —	— — — —	— — — —	3·35 mm 600 micron 150 micron —	100 80 *Max* 7 *Max* —	600 micron 300 micron — —	100 20 *Max* — —
iv)	Talc, Marble Powder	150 micron 75 micron	100 95 *Max*	150 micron 75 micron	100 95 *Max*	150 micron 75 micron	100 95 *Max*	150 micron 75 micron	100 95 *Max*	150 micron 75 micron	100 95 *Max*	150 micron 75 micron	100 95 *Max*	150 micron 75 micron	100 95 *Max*
v)	Emery or Fused Abrasives	— —	— —	— —	— —	— —	— —	3·35 mm 600 micron	100 5 *Max*	— —	— —	— —	— —	— —	— —
vi)	Granite Marble Chips	— —	— —	— —	— —	These shall be graded from a minimum of 3·35 mm to a maximum which shall not exceed 1/3 of the average thickness of the finished floor		— —	— —	3·35 mm 850 micron	100 5 *Max*	These shall be graded from a minimum of 3·35 mm to a maximum which shall not exceed 1/3 of the average thickness of the finished floor		— —	— —

**See* IS : 460 (Part I)-1978 Specification for test sieves: Part I Wire cloth test sieves (*second revision*).

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8. MARKING

8.1 Each bag shall be clearly marked with the following:

a) Brand name of the manufacturer,
b) Name of material,
c) Net weight, and
d) Batch No.

8.2 BIS Certification Marking

The product may also be marked with Standard Mark.

8.2.1 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.

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