

# ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

## ISO RECOMMENDATION

### R 1587

GYPSUM ROCK

FOR THE MANUFACTURE OF BINDERS

CLASSIFICATION, CHARACTERISTICS AND TEST METHODS

1st EDITION

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## BRIEF HISTORY

The ISO Recommendation R 1587, *Gypsum rock for the manufacture of binders – Classification, characteristics and test methods*, was drawn up by Technical Committee ISO/TC 74, *Hydraulic binders*, the Secretariat of which is held by the Institut Belge de Normalisation (IBN).

Work on this question led to the adoption of Draft ISO Recommendation No. 1587, which was circulated to all the ISO Member Bodies for enquiry in June 1968.

The Draft was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Ireland	South Africa, Rep. of
Austria	Israel	Spain
Brazil	Italy	Sweden
Czechoslovakia	Netherlands	Thailand
France	Norway	Turkey
Greece	Peru	U.A.R.
Hungary	Poland	United Kingdom
India	Portugal	
Iran	Romania	

The following Member Body opposed the approval of the Draft :

Germany

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided to accept it as an ISO RECOMMENDATION.

**GYPSUM ROCK**  
**FOR THE MANUFACTURE OF BINDERS**

**CLASSIFICATION, CHARACTERISTICS AND TEST METHODS**

**1. SCOPE**

This ISO Recommendation defines the classification and characteristics of gypsum rock used as raw material for the manufacture of calcium sulphate binders, or as an admixture in the manufacture of other kinds of binders.

It also specifies the relevant test methods.

**2. DEFINITION**

*Gypsum rock.* Sedimentary rock formation of crystalline structure with calcium sulphate dihydrate ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ) as the main component.

**3. CLASSIFICATION**

**3.1 According to the calcium sulphate content**

Four classes of gypsum rock are distinguished, according to the calcium sulphate dihydrate content,  $T_g$  :

<b>Class I</b>	$T_g \geq 90 \%$
<b>Class II</b>	$80 \% \leq T_g < 90 \%$
<b>Class III</b>	$70 \% \leq T_g < 80 \%$
<b>Class IV</b>	$55 \% \leq T_g < 70 \%$

**3.2 According to the particle sizes**

Five groups of gypsum rock are distinguished, according to the size of the particles :

<b>Group 1</b>	0 to 20 mm
<b>Group 2</b>	20 to 50 mm
<b>Group 3</b>	50 to 150 mm
<b>Group 4</b>	0 to 150 mm
<b>Group 5</b>	0 to 300 mm

Other groups of particle sizes may be adopted, as required by the user.

**4. TECHNICAL SPECIFICATIONS**

**4.1 Foreign bodies**

The content of foreign bodies, accidentally mixed with the gypsum rock, not originating from the mined deposit, should not exceed 0.1 %.

**4.2 Moisture**

The moisture content of gypsum rock should not exceed 4 %.

**4.3 Tolerances on particle sizes**

The content of particles of size larger than the upper limits given for the particular groups should not exceed 5 % of the mass of the batch for groups 1, 2, 3 and 4; the content of particles of size smaller than the limits given for groups 2 and 3 should not exceed 20 % of the mass of the batch.

**4.4 Chemical and mineralogical composition**

The chemical and mineralogical composition of the gypsum rock should comply with the specifications of Table 1 :

TABLE 1

Class	Mineralogical composition	Chemical composition
	Calcium sulphate content, Tg % (CaSO <sub>4</sub> ·2H <sub>2</sub> O)	Water of crystallisation, Tc %
I	Tg ≥ 90	Tc ≥ 18.83
II	80 ≤ Tg < 90	16.74 ≤ Tc < 18.83
III	70 ≤ Tg < 80	14.65 ≤ Tc < 16.74
IV	55 ≤ Tg < 70	11.51 ≤ Tc < 14.65

NOTE. – The content of different impurities may be limited, by agreement between both parties.

**5. ACCEPTANCE AND DELIVERY**

**5.1 Acceptance**

The order should specify whether the consignment is to be delivered with or without acceptance tests.

If acceptance tests are specified, they should be carried out at the place of supply.

**5.2 Delivery**

Gypsum rock is usually delivered in bulk, i.e. without packing. If requested by the user, it may be packed in sacks, barrels, casks, containers, etc.

**5.3 Transport documents**

Deliveries of gypsum rock should be accompanied by transport documents currently used in the various countries. If the order is made with acceptance tests, these documents will also include the report of these tests.

## 6. SAMPLING

### 6.1 Mass of a batch

The consignment should be divided into batches, each having a maximum mass of 100 t. Each delivery or fraction of a batch having a mass of less than 100 t is considered as a single batch.

### 6.2 Mass of a gross sample

From each batch take increments to make up a gross sample, the mass of which is determined as a function of the maximum particle size of the gypsum rock, as shown in Table 2 :

TABLE 2

Maximum size of particles	Minimum mass of the gross sample
mm	kg
50	50
150	100
300	300

### 6.3 Increments

6.3.1 *Number and size of increments.* The number and size of increments depend on the way the delivery is carried out.

6.3.1.1 **DELIVERY IN BULK.** The gross sample is obtained by taking 10 increments, about equal in mass, from each batch.

6.3.1.2 **DELIVERY IN CONTAINERS.** The gross sample is obtained by taking 20 increments, about equal in mass, from each batch.

#### 6.3.2 Procedure

6.3.2.1 **DELIVERY IN BULK.** Sampling should take place during the loading of the transport vehicles (lorries, railway trucks, barges or ships), before leaving the producer's works.

The time of sampling should be fixed in advance by agreement between both parties, according to the nature and capacity of the vehicles. When the consignment is already loaded, it should be divided into 10 approximately equal parts and the respective increments in the same lot should be taken at different depths.

6.3.2.2 **DELIVERY IN CONTAINERS.** Increments should be taken at different depths from 20 packed units chosen at random.

### 6.4 Reduced sample

6.4.1 *Procedure.* The gross sample made up of increments taken as described in clause 6.3 should be mixed carefully, reduced by quartering, which is to be performed once only, and finally divided into two equal parts, one of which will be used for the tests and the other hermetically packed and preserved for at least 3 months to be used for independent tests, if these are required.

6.4.2 *Reduced sample for the determination of foreign bodies and of particle size group.* The mass of the reduced sample used for these determinations should be equal to that shown in Table 3.

6.4.3 *Reduced sample for determination of moisture content and of water of crystallisation.* The reduced sample intended for these determinations should have a mass of about 5 kg for all classes of particle sizes.

For particle sizes up to 150 mm, take the reduced sample by the method of quartering.

For particle sizes up to 300 mm, crush lumps exceeding 150 mm with a hammer, mix the whole sample and reduce twice by quartering.

## 7. TEST METHODS

### 7.1 Determination of the foreign body content

7.1.1 *Test sample.* From the reduced sample (see clause 6.4) weigh a test sample, the mass of which should be as given in Table 3 :

TABLE 3

Maximum size of particles	Minimum mass of the test sample
mm	kg
50	5
150	20
300	100

7.1.2 *Procedure.* Spread the test sample carefully on a clean, hard slab. Remove and weigh foreign bodies. Express the content of foreign bodies as a percentage of the total mass of the test sample.

### 7.2 Determination of the particle size group

7.2.1 *Test sample.* Use the test sample which has served for the determination of foreign body content, after having removed the latter.

7.2.2 *Procedure.* The determination of the particle size group should be carried out by means of a test sieve for particles smaller than or equal to 50 mm, and with a gauge having circular holes for particles smaller than or equal to 150 mm.

Weigh the residue for all particle size groups and the sieve material for groups 2 and 3 and express the value as a percentage of the total mass of the test sample.

### 7.3 Determination of moisture content

7.3.1 *Crushing of the reduced sample.* Having prepared the reduced sample according to clause 6.4.2, and after the elimination of foreign bodies, crush it into lumps about 10 mm in size.

7.3.2 *Test sample.* From the prepared sample (see clause 7.3.1) weigh a test sample of about 100 g. Let  $m_0$  be the mass obtained.