INTERNATIONAL STANDARD 1587

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Gypsum rock for the manufacture of binders — Specifications

Pierre à plâtre pour la fabrication des liants — Spécifications

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 152 has reviewed ISO Recommendation R 1587 and found it technically suitable for transformation. International Standard ISO 1587 therefore replaces ISO Recommendation R 1587-1972 to which it is technically identical.

ISO Recommendation R 1587 was approved by the Member Bodies of the following countries :

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

The Member Body of the following country expressed disapproval of the Recommendation on technical grounds :

Germany

The Member Bodies of the following countries disapproved the transformation of ISO/R 1587 into an International Standard :

France
Germany

Printed in Switzerland

Gypsum rock for the manufacture of binders – Specifications

1 SCOPE AND FIELD OF APPLICATION

This International Standard gives the specifications for 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.

2 DEFINITION

gypsum rock : A sedimentary rock formation of crystalline structure with calcium sulphate dihydrate ($CaSO_4 \cdot 2H_2O$) 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, Tg :

Class I $Tg \geqslant 90$ %
Class II $80\ \% \leqslant Tg < 90$ %
Class III $70\ \% \leqslant Tg < 80$ %
Class IV $55\ \% \leqslant Tg < 70$ %

3.2 According to the particle sizes

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

Group 1 0 to 20 mm
Group 2 20 to 50 mm
Group 3 50 to 150 mm
Group 4 0 to 150 mm
Group 5 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, shall not exceed 0,1 %.

4.2 Moisture

The moisture content of gypsum rock shall 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 shall 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 shall not exceed 20 % of the mass of the batch.

4.4 Chemical and mineralogical composition

The chemical and mineralogical composition of the gypsum rock shall comply with the specifications of table 1.

TABLE 1

Class	Mineralogical composition	Chemical composition
	$CaSO_4 \cdot 2H_2O$ content, Tg %	Water of crystallization, Tc %
I	$Tg \geqslant 90$	$Tc \geqslant 18{,}83$
II	$80 \leqslant Tg < 90$	$16{,}74 \leqslant Tc < 18{,}83$
III	$70 \leqslant Tg < 80$	$14{,}65 \leqslant Tc < 16{,}74$
IV	$55 \leqslant Tg < 70$	$11{,}51 \leqslant Tc < 14{,}65$

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

5 ACCEPTANCE AND DELIVERY

5.1 Acceptance

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

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

5.2 Delivery

Gypsym 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 shall be accompanied by transport documents currently used in the various countries. If the order is made with acceptance tests, these documents shall also include the report of these tests.

6 SAMPLING

6.1 Mass of a batch

The consignment shall 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, increments shall be taken 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, of about equal mass, from each batch.

6.3.1.2 Delivery in containers

The gross sample is obtained by taking 20 increments, of about equal mass, from each batch.

6.3.2 *Procedure*

6.3.2.1 Delivery in bulk

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

6.3.2.2 Delivery in containers

Increments shall 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 specified in 6.3 shall 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 shall be equal to that shown in table 3.

6.4.3 *Reduced sample for determination of moisture content and of water of crystallization*

The reduced sample intended for these determinations shall 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 6.4) weigh a test sample, the mass of which shall 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 shall 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 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 7.3.1), weigh a test sample of about 100 g. Let m_0 be the mass obtained.

7.3.3 *Procedure*

Dry the test sample in an oven at a temperature of 40 ± 4 °C to constant mass, m_1.

7.3.4 *Expression of results*

The moisture content of the sample, H, expressed as a percentage of the initial mass of the test sample, is given by the formula :

$$H = \frac{m_0 - m_1}{m_0} \times 100$$

7.4 Determination of water of crystallization

7.4.1 *Preparation of the sample*

Grind the sample which served for the determination of moisture content in a porcelain mortar so that it is capable of passing through a sieve with 0,2 mm square meshes.

Grinding and sieving of the sample shall be carried out without interruption.

Preserve the ground sample in a glass vessel provided with a tight stopper.

7.4.2 *Principle*

Dehydratation, at a temperature of 230 °C, to constant mass, of the previously dried test sample.

7.4.3 *Apparatus*

7.4.3.1 Crucibles made of material resistant to thermal shock.

7.4.3.2 Container provided with a tight cover and capable of containing a crucible (7.4.3.1).

7.4.3.3 Furnace capable of being controlled at a temperature of 230 ± 5 °C.

7.4.4 *Procedure*

Dry and weigh the container together with its cover and a crucible. Quickly enclose in the container the crucible containing about 2 g of the ground sample, prepared according to 7.4.1. Weigh the whole. Let m_2 be the precise mass of the test sample.

Place the crucible in the furnace; remove it after 30 min; allow it to cool in the hermetically sealed container. Weigh. Let m_3 be the final mass of the test sample.

7.4.5 *Expression of results*

The water of crystallization of the sample, expressed as a percentage of the initial mass of the test sample, is given by the formula :

$$\mathrm{Tc} = \frac{m_2 - m_3}{m_2} \times 100$$

Carry out duplicate determinations. Take as the result the arithmetical average of the results obtained, provided that the difference between them is not greater than 0,15.

7.4.6 *Calculation of calcium sulphate dihydrate content*

The content of calcium sulphate dihydrate ($CaSO_4.2H_2O$) is obtained, as a percentage by mass, by multiplying the water of crystallization by the coefficient 4,778 5 :

$$\mathrm{Tg} = 4{,}778\,5 \times \mathrm{Tc}$$

7.5 Determination of other constituents

The chemical analysis of gypsum rock will be the subject of a separate International Standard.

8 BATCHES WHICH DO NOT MEET SPECIFICATIONS

When a batch of gypsum rock does not meet the specifications of this International Standard, one of the following procedures is to be observed :

a) the batch is transferred to another class;

b) the batch is submitted to additional processing (for example, a new grinding);

c) the batch is rejected.

The rejection of a batch shall be notified in writing by the purchaser within 14 days following the date of delivery.

9 INDEPENDENT TESTS

When the consignment of gypsum rock is rejected by the purchaser, the supplier has the right to require independent tests to be carried out. A request of this kind shall be transmitted within 20 days following the receipt of the notification of rejection. The institution chosen to arbitrate and to seek a settlement shall be agreed upon between the interested parties. The result of these tests will be considered final and binding.

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