

# INTERNATIONAL STANDARD

**ISO  
6873**

Second edition  
1998-03-01

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## Dental gypsum products

*Produits dentaires à base de gypse*

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[ISO 6873:1998](https://standards.iteh.ai/catalog/standards/sist/d977b2e1-cad0-4694-b184-8bad1c3ba863/iso-6873-1998)

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Reference number  
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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 6873 was prepared by Technical Committee ISO/TC 106, *Dentistry*, Subcommittee SC 2, *Prosthetic materials*.

This second edition cancels and replaces the first edition (ISO 6873:1983), which has been technically revised.

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# Dental gypsum products

## 1 Scope

This International Standard gives a classification of, and specifies requirements for, gypsum products used for dental purposes such as making oral impressions, moulds, casts or dies. It specifies the test methods to be employed to determine compliance with these requirements. It also includes requirements for the labelling of packaging and for adequate instructions to accompany each package.

## 2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

[ISO 6873:1998](#)

ISO 3696:1987, *Water for analytical laboratory use — Specification and test methods*, 4-8bad1c3ba863/iso-6873-1998

## 3 Definition

For the purposes of this International Standard, the following definition applies.

### 3.1

#### **dental gypsum product**

dental product composed essentially of hemihydrate of calcium sulfate and any necessary modifiers

NOTE Colouring matter and flavouring, if present, are regarded as necessary modifiers.

## 4 Classification and designation

The five types of gypsum product used in dentistry are classified in accordance with this International Standard as follows:

**Type 1:** Dental plaster, impression

**Type 2:** Dental plaster, model

**Type 3:** Dental stone, model

**Type 4:** Dental stone, die, high strength, low expansion

**Type 5:** Dental stone, die, high strength, high expansion

## 5 Requirements

### 5.1 Quality

The material shall be uniform and free from foreign matter and lumps, and when mixed according to the manufacturer's instructions shall produce a homogeneous mix.

### 5.2 Fluidity at pouring time (Type 1 materials only)

When tested according to 7.2 at a pouring time of 1,25 min, the fluidity of type 1 materials shall be equal to or greater than 70 mm.

### 5.3 Setting time

When tested according to 7.3, the setting time of type 1 materials shall be in the range of 2,5 min to 5,0 min and the setting time of all material types shall be within 20 % of the value claimed by the manufacturer in 8.3 c). If the manufacturer claims a range of setting time, then the midpoint of this range is taken as the value claimed by the manufacturer.

### 5.4 Linear setting expansion

When tested according to 7.4, the setting expansion shall be within the range listed in [table 1](#).

Table 1

Type	Setting expansion range %	Compressive strength MPa	
		min.	max.
1	0 to 0,15	4,0	8,0
2	0 to 0,30	9,0	—
3	0 to 0,20	20,0	—
4	0 to 0,15	35,0	—
5	0,16 to 0,30	35,0	—

### 5.5 Fracture (Type 1 materials only)

When broken in accordance with 7.5, Type 1 impression plaster shall break with a clean fracture and be readily reassembled to form the shape and size of the original unbroken specimen.

### 5.6 Compressive strength

When tested according to 7.6, the compressive strength shall meet the requirements of [table 1](#).

### 5.7 Reproduction of detail

Types 1 and 2 when tested according to 7.7, line (c) in [figure 3 a](#)) shall be reproduced.

Types 3, 4 and 5 when tested according to 7.7, line (a) in [figure 3 a](#)) shall be reproduced.

## 6 Sampling

### 6.1 Sampling

Material selected for testing shall be from one batch and shall not be tested beyond its "Use Before" date [8.2.1 g)]. Powder from broken or damaged containers shall not be used for testing.

### 6.2 Test conditions

All mixing and testing of the dental gypsum product shall be carried out at  $(23 \pm 2) ^\circ\text{C}$  and  $(50 \pm 10) \%$  relative humidity. All apparatus and instruments used in mixing and testing shall be clean, dry and free from particles of gypsum. Before testing begins, material and test apparatus shall be held for at least 15 h at the test temperature.

### 6.3 Mixing method

Mix by one of the methods (hand or mechanical) specified by the manufacturer in the instructions [8.3 b)], using water which meets the requirements of ISO 3696.

## 7 Test methods

### 7.1 Inspection

Determine compliance with the requirements given in 5.1, 5.5 and 5.7 by visual inspection (without magnification, unless as stated in 7.7).

### 7.2 Fluidity at pouring time for Type 1 materials

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#### 7.2.1 Apparatus

**7.2.1.1 Cylindrical mould**, clean and dry, having a length of  $(50,0 \pm 0,1)$  mm and an inside diameter of  $(35,0 \pm 0,1)$  mm constructed from a corrosion-resistant, non-absorbent material.

**7.2.1.2 Glass plate**, clean, dry and smooth, with sides of length at least 100 mm.

**7.2.1.3 Means of measuring** the major and minor diameters of the slumped mix to the nearest millimetre, such as a micrometer caliper.

#### 7.2.2 Procedure

Rest the glass plate (7.2.1.2) on a surface that is free of vibration. Place the mould (7.2.1.1) upright on the centre of the plate. Add  $(100 \pm 0,1)$  g of the sample to the manufacturer's recommended quantity of water and mix as described in 6.3. Completely fill the mould and level off the mixed material so that it is flush with the top of the mould. At 1,25 min after the start of mixing, lift the mould vertically from the plate at a rate of approximately 10 mm/s and allow the mix to slump or spread over the plate. One minute after the mould is lifted, measure the major and minor axes of the slumped material to the nearest millimetre. Record the average of these two diameters as the fluidity at pouring time.

#### 7.2.3 Evaluation

Carry out the test two times. If both average values meet the requirements for fluidity at pouring time listed in 5.2, then the material meets the requirement for fluidity of this International Standard. If neither meets the requirement listed in table 1, then the material fails to meet the requirement. If one average value meets the requirement for

fluidity and the other fails, carry out three more tests. If all three of these average values meet the requirement for fluidity (5.2), then the material meets the requirement for fluidity of this International Standard. Otherwise it fails.

### 7.3 Setting time

#### 7.3.1 Apparatus

**7.3.1.1 Vicat needle apparatus**, an example of which is shown in [figure 1](#), meeting the following requirements:

- a) Vicat needle (C), 50 mm long, of circular cross-section and with a diameter of  $(1 \pm 0,05)$  mm.
- b) Rod (B), of approximate dimensions 270 mm long and 10 mm in diameter.
- c) Total mass of the rod and needle (A, B and C in [figure 1](#)) shall be  $(300 \pm 1)$  g.
- d) Scale (D), graduated in millimetres.
- e) Baseplate (H) of plate glass, measuring about 100 mm × 100 mm.

**7.3.1.2 Clean, dry conical ring mould**, constructed from a corrosion-resistant, nonabsorbent material, having an inside diameter of 70 mm at the top and 60 mm at the base, and a height of 40 mm.

#### 7.3.2 Procedure

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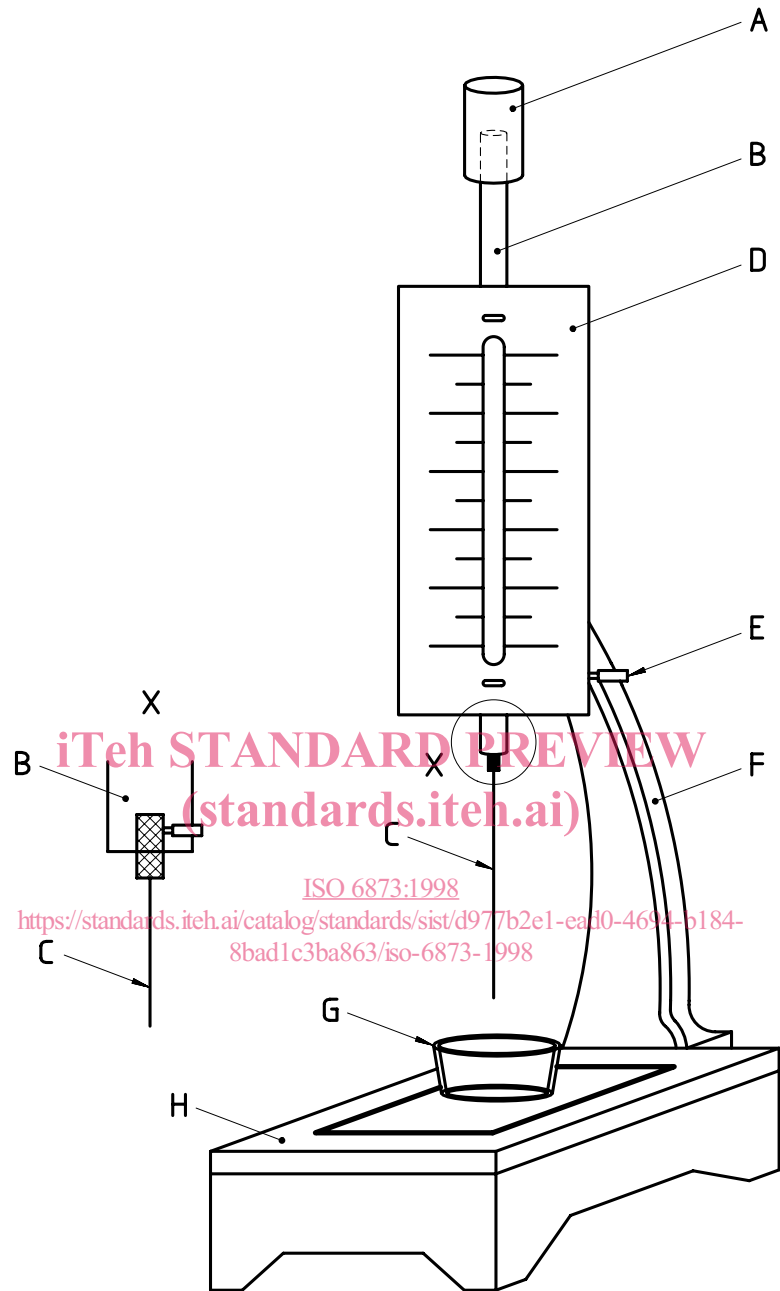
Add 400 g of the sample to the manufacturer's recommended quantity of distilled water and mix as described in 6.3. Fill the mould (7.3.1.2) completely and level the specimen flush with the top of the mould. Using the Vicat needle apparatus (7.3.1.1) and beginning 1 min or 2 min prior to the anticipated setting time (usually at the loss of gloss or excess water), allow the needle to penetrate the mix at  $(15 \pm 1)$  s intervals as follows.

- a) Move the mould to allow the next penetration to be in a new area which is at least 5 mm from the mould wall and from any other penetration mark.
- b) Wipe the needle clean and then bring its tip into contact with the surface of the mix and lock the rod in position with the lock screw.
- c) Read the scale and, at the appropriate time, release the rod. Note the new position of the scale and calculate the depth of penetration.
- d) Record the setting time as the total time from the start of mixing to the time when the needle first fails to penetrate the specimen to a depth of at least 2 mm.

#### 7.3.3 Evaluation

Carry out the test two times. If both measurements meet the requirement for setting time (5.3), then the material meets the requirement for setting time of this International Standard. If neither meets the requirement for setting time, then the material fails to meet the requirements for setting time of this International Standard. If one measurement meets the requirement for setting time and the other fails, carry out three more tests. If all three of these measurements meet the requirement for setting time, then the material meets the requirement for setting time of this International Standard. Otherwise the material fails.





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**Key**

- A Additional weight
- B Rod
- C Vicat needle
- D Scale
- E Lock screw
- F Support bracket
- G Conical ring mould
- H Baseplate

**Figure 1 — Typical Vicat needle apparatus (see 7.3.1.1)**