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**Buildings and civil engineering  
works — Sealants — Specifications for  
test substrates**

*Bâtiments et ouvrages de génie civil — Mastics — Prescriptions  
relatives aux supports d'essais*

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. [www.iso.org/directives](http://www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. [www.iso.org/patents](http://www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#).

The committee responsible for this document is ISO/TC 59, *Buildings and civil engineering works*, Subcommittee SC 8, *Sealants*.

This second edition cancels and replaces the first edition (ISO 13640:1999), which has been technically revised.

The main changes compared to the previous edition are as follows:

- modification of the ratio by mass of mortar composition;
- addition of the preparation of glass surface and immersion method;
- addition of the preparation of anodized aluminium surface and immersion method.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

# Buildings and civil engineering works — Sealants — Specifications for test substrates

## 1 Scope

This document specifies the procedures for producing substrates of mortar, glass and anodized aluminium used for testing sealants.

The purpose of these requirements is to ensure the reproducibility of the standardized tests conducted on sealants through the precise definition of both the composition and the method of preparation of the test substrates.

The substrates defined in this document are indicators of the sealant's performance and not substrates which reproduce the characteristics of the construction materials.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 209, *Aluminium and aluminium alloys — Chemical composition*

ISO 679:2009, *Cement — Test methods — Determination of strength*

ISO 2143, *Anodizing of aluminium and its alloys — Estimation of loss of absorptive power of anodic oxidation coatings after sealing — Dye-spot test with prior acid treatment*

ISO 2107:2007, *Aluminium and aluminium alloys — Wrought products — Temper designations*

ISO 6707-1, *Buildings and civil engineering works — Vocabulary — Part 1: General terms*

ISO 6927, *Buildings and civil engineering works — Sealants — Vocabulary*

ISO 7599, *Anodizing of aluminium and its alloys — General specifications for anodic oxide coatings on aluminium*

ISO 16293-1, *Glass in building — Basic soda lime silicate glass products — Part 1: Definitions and general physical and mechanical properties*

ISO 16293-2, *Glass in building — Basic soda lime silicate glass products — Part 2: Float glass*

EN 197-1, *Cement Composition, specifications and conformity criteria for common cements*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6927 and ISO 6707-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

## 4 Test substrates

### 4.1 Mortar substrates

#### 4.1.1 Dimensions

Typical substrate dimensions for mortar are 75 mm × 12 mm × 25 mm.

NOTE The preparation of mortar substrates can be influenced directly by the geometry of the substrate.

#### 4.1.2 Mortar composition

The mortar used for the preparation of the substrates shall be as defined in [Table 1](#).

**Table 1 — Mortar composition**

Components	Cement (C)	Sand (S)	Water (W)
Nature of components	Cement - CEM 1-42,5 <sup>a</sup>	Sand ISO 679 <sup>b</sup>	Distilled water
Ratio by mass	1	3	W/C = 0,3 ~ 0,5

<sup>a</sup> ENV Portland cement according to EN 197-1 belonging to strength class 42.5, having a high strength in green concrete. ACP or Z45 cements may also be used.

<sup>b</sup> The sand shall comply with the particle size distribution and the moisture content of ISO reference sand. Equivalent sand suitable for the preparation of mortar substrates can also be used, but its mass ratio of mortar composition should be adjusted properly.

#### 4.1.3 Preparation of substrates

##### 4.1.3.1 General

The surface of the mortar substrates shall have a sufficient cohesive strength in order to be able to withstand the stresses induced during the tests on the sealants.

The surface in contact with the sealant shall be free from laitance, free from loosely bound sand grains and free from release agent.

Method M1 ([4.1.3.3](#)) leads to smooth-surface substrates whereas M2 ([4.1.3.4](#)) leads to rough-surface substrates.

##### 4.1.3.2 Mixing of mortar

The mortar shall be mixed using equipment described in ISO 679:2009, 4.4, following the method described in ISO 679:2009, 6.3.

##### 4.1.3.3 Preparation of mortar substrates according to method M1

Fill the mould in two layers within 2 min with a vibration frequency of about 50 Hz for each layer (electric hammer or vibrating needle concrete). Level and smooth the surface using a trowel.

Condition the substrates at  $(20 \pm 1) ^\circ\text{C}$  and  $(90 \pm 5) \%$  relative humidity.

Remove the substrates from their moulds 24 h after filling the moulds, and store the substrates for 28 d under distilled water at  $(20 \pm 1) ^\circ\text{C}$ . Then wet grind the mortar blocks or saw them with a diamond saw under water. Dry them until constant mass.

The resulting surface shall be smooth but may contain a few holes.

#### 4.1.3.4 Preparation of substrates according to method M2

Fill the mould, in one layer, with a small surplus of mortar and shake the mortar using the jolting apparatus (30 jolts) according to ISO 679.

Store the substrates at  $(20 \pm 1)$  °C and  $(90 \pm 5)$  % relative humidity.

Level the mortar 2 h to 3 h after filling the mould to eliminate the laitance and smooth with a trowel. Condition the substrates at  $(20 \pm 1)$  °C and  $(90 \pm 5)$  % relative humidity.

About 20 h after filling the mould, brush the surfaces vigorously with a metal brush with repeated backward and forward movements, in the direction of the longest dimension, until the sand grains are exposed.

Remove the substrates from their moulds and store them for 28 d in distilled water at  $(20 \pm 1)$  °C. Dry until constant mass.

The resulting surface shall be rough and shall not contain any holes.

## 4.2 Glass substrates

### 4.2.1 General

The substrate dimensions shall be at the minimum 75 mm × 12 mm × 6 mm.

Make glass substrates from clear float glass having a light transmission factor of minimum 0,85 for a nominal thickness of  $(6,0 \pm 0,1)$  mm in accordance with ISO 16293-1 and ISO 16293-2.

For sealants of high modulus, provide adequate reinforcement of the flat glass substrates.

If optical transmission is not a factor in the test standard, then the nominal thickness of the glass may be higher, for example 8 mm.

### 4.2.2 Preparation of substrate surface.

#### 4.2.2.1 Method of application

Substrate must be clean, dry, and free of oil and grease. Visibly contaminated substrates will require pre-cleaning. Thoroughly remove all loose particles and residues. Clean the surface as noted below. Both methods can be used, method of wipe on or wipe off and method of immersion.

#### 4.2.2.2 Wipe on or wipe off method

Wipe bond face with a clean, lint free cotton cloth moistened with acetone or isopropanol apply sparingly, wiping once only. Wipe off with a clean cotton dry lint-free cloth.

#### 4.2.2.3 Immersion method

The substrate is immersed in acetone or isopropanol for a duration of 10 min.

After 10 min take out the substrate and let it dry for 10 min on a stainless tray. The substrate must be put on the "band side" or long edge. The bonded face has to be placed vertically for good draining.

See [Figure 1](#).

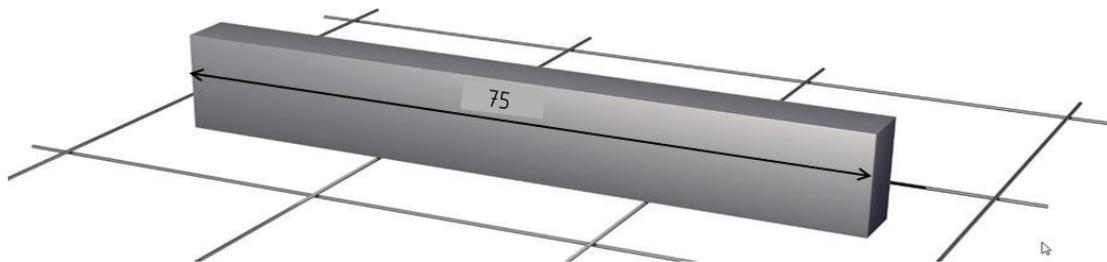


Figure 1 — Glass sample drying on the stainless steel grate

### 4.3 Anodized aluminium substrates

#### 4.3.1 Dimensions

Substrate dimensions shall be 75 mm × 12 mm × 5 mm.

#### 4.3.2 Aluminium alloys

The alloys shall have one of the following compositions, in accordance with ISO 209:

- Al MgSi (number 6060);
- Al Mg0,7Si (number 6063).

Use temper designations reference to T5 and T6 in ISO 2107:2007, Clause 7.

#### 4.3.3 Anodization

Carry out anodization in accordance with ISO 7599, with the following details:

- clear anodized aluminium;
- class AA 15 or AA 20;
- sealing index u 2 according to ISO 2143;
- sealing bath additives shall be checked, in accordance with ISO 7599.

#### 4.3.4 Preparation of substrate surface.

##### 4.3.4.1 Method of application

Substrate must be clean dry, free of oil and grease. Visibly contaminated substrates will require pre-cleaning. Thoroughly remove all loose particles and residues.

Two methods shall be used as method of wipe on or wipe off and method of immersion.

##### 4.3.4.2 Wipe on, wipe off method

Wipe bond face with a clean, lint free cotton cloth moistened with acetone or isopropanol. Apply sparingly, wiping once only. Wipe off with clean cottons of dry lint-free cloth.

##### 4.3.4.3 Immersion method

The substrate is immersed in acetone or isopropanol for a duration of 10 min.