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Building and civil engineering sealants — Determination of resistance to compression

*Mastics pour bâtiments et ouvrages de génie civil — Détermination
de la résistance à la compression*

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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 (see www.iso.org/directives).

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For an explanation of 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 World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 59, *Buildings and civil engineering works*, Subcommittee SC 8, *Sealants*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/SS B02, *Structures*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This 3rd edition cancels and replaces the 2nd edition (ISO 11432:2005), which has been technically revised.

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

- the title of the document has been modified;
- the range of variation of extension rate has been changed to $(5,5 \pm 0,5)$ mm/min;
- the range of variation of relative humidity has been changed to (50 ± 10) %.

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.

Building and civil engineering sealants — Determination of resistance to compression

1 Scope

This document specifies a method for the determination of the resistance to compression of sealants used in joints in buildings and civil engineering works.

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 6927, *Building and civil engineering sealants — Vocabulary*

ISO 13640, *Buildings and civil engineering works — Sealants — Specifications for test substrates*

3 Terms and definitions

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

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

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

4 Principle

Test specimens, in which the sealant to be tested is adhered to two parallel substrate surfaces, are compressed by a defined percentage of the original width and the force recorded.

5 Apparatus

5.1 Substrate material, used for the preparation of test specimens, which shall be as defined in ISO 13640. The materials shall be selected from mortar and/or anodized aluminium and/or glass. Other substrate materials may be used as agreed by the parties concerned.

For each test specimen, two substrate pieces of the same material are required; with dimensions as shown in [Figures 1](#) and [2](#). Test substrates of other dimensions may be used, but then the dimensions of the sealant bead and the area of adhesion shall be the same as those shown in [Figures 1](#) and [2](#).

5.2 Spacers, for the preparation of the test specimens, of cross-sections (12 mm × 12 mm) with anti-adherent surface.

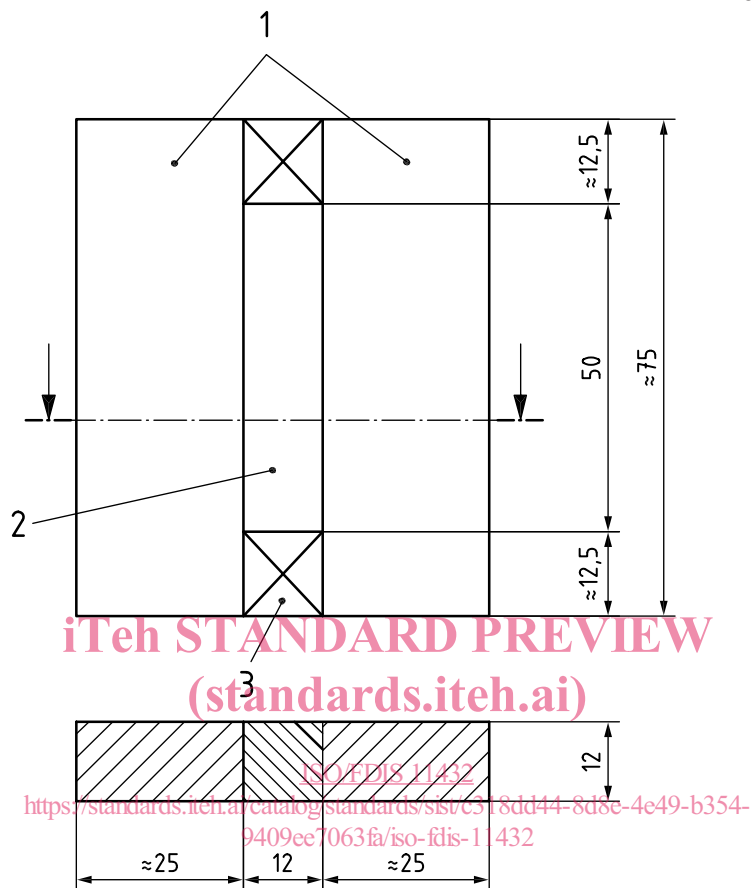
5.3 Anti-adherent substrate, for the preparation of test specimens, e.g. polyethylene (PE) film, preferably according to the advice of the sealant manufacturer.

5.4 Ventilated convection-type oven, capable of operating at (70 ± 2) °C for conditioning according to method B.

5.5 **Container**, for water immersion of the specimen.

5.6 **Tensile test machine**, capable of compressing the test specimens at a rate of $(5,5 \pm 0,5)$ mm/min.

Dimensions in millimetres

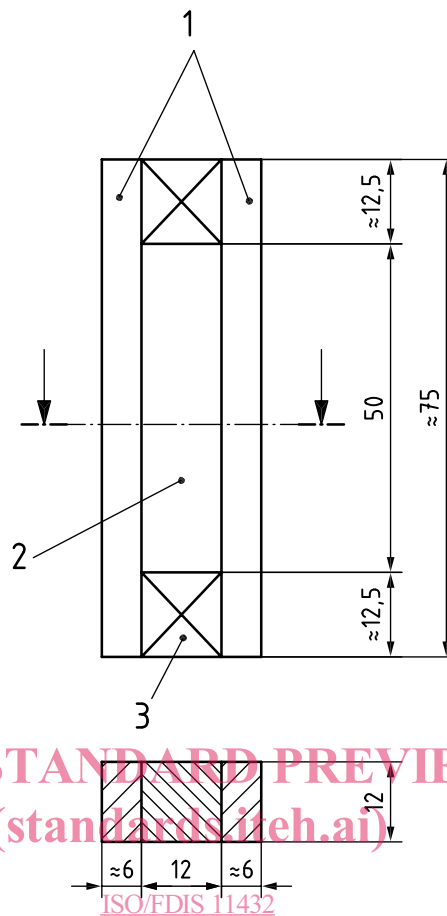


Key

- 1 mortar substrates
- 2 sealant
- 3 spacer

Figure 1 — Test specimen with mortar substrates

Dimensions in millimetres

**Key**

- 1 aluminium or glass substrates
 2 sealant
 3 spacer

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Figure 2 — Test specimen with anodized aluminium or glass substrates

6 Preparation of test specimens

The sealant and the test substrate shall be brought to $(23 \pm 2) ^\circ\text{C}$. For each substrate material, three test specimens shall be prepared.

For each test specimen, two substrates (5.1) and two spacers (5.2) shall be assembled (see Figures 1 and 2) and set on the anti-adherent substrate (5.3).

The instructions of the sealant manufacturer shall be followed concerning, for instance, whether a primer is to be used and the mixing procedure for multi-component sealants. The hollow volume formed by the substrates shall be filled with the sealant.

The following precautions shall be taken:

- the formation of air bubbles shall be avoided;
- the sealant shall be pressed to the contact surfaces of the substrates;
- the sealant surface shall be trimmed so that it is flush with the faces of the substrates and the spacers.

The test specimens shall be set on the edge of one of the supports and the anti-adherent substrate shall be removed as soon as possible. The test specimens shall be kept in this position to allow curing or optimum drying of the sealant.

The spacers shall be maintained in place during conditioning.

7 Conditioning of test specimens

7.1 General

The test specimens shall be conditioned either according to method A (see 7.2) or method B (see 7.3).

7.2 Conditioning method A

The test specimens shall be conditioned for 28 days at (23 ± 2) °C and (50 ± 10) % relative humidity.

7.3 Conditioning method B

First the test specimens shall be conditioned according to method A and subsequently subjected three times to the following storage cycle:

- a) three days in the oven (5.4) at (70 ± 2) °C;
- b) one day in distilled water (5.5) at (23 ± 2) °C;
- c) two days in the oven (5.4) at (70 ± 2) °C;
- d) one day in distilled water (5.5) at (23 ± 2) °C.

This cycle may be carried out alternatively in the sequence: c), d), a), b).

After conditioning according to method B, the test specimens shall be stored for a further period of 24 h at (23 ± 2) °C and (50 ± 10) % relative humidity before testing.

NOTE Method B is a commonly used conditioning procedure using the influence of heat and water. It is not suitable for giving information on the durability of the sealant.

8 Test procedure

The test shall be carried out at (23 ± 2) °C and (50 ± 10) % relative humidity. The spacers (5.2) shall be removed. The test specimens shall be placed in the tensile test machine (5.6) and compressed at a rate of $(5,5 \pm 0,5)$ mm/min to 75 % or 80 % of the initial width, or by any other percentage as agreed by the parties concerned.

Table 1 gives the correspondence in millimetres of the percentage compression for a test specimen of 12 mm initial width.

Table 1 — Correspondence of compression values (original width 12 mm)

| Compressed width relative to the original width % | Compression % | Width after compression mm |
|--|------------------|-------------------------------|
| 75 | 25 | 9,0 |
| 80 | 20 | 9,6 |

The force, expressed in newtons, required for the appropriate compression shall be recorded.

9 Expression of results

For each test specimen, the secant compression modulus shall be calculated, for the chosen compression amplitude, rounded to 0,01 N/mm², using the follow formula:

$$M = \frac{F}{A}$$

Where

- M is the secant compression modulus, in N/mm²;
- F is the force at chosen compression, expressed in N;
- A is the initial cross-section area, expressed in mm².

The arithmetic mean of the three secant compression modulus values shall be calculated, rounded to 0,01 N/mm².

10 Test report

The test report shall contain the following information:

- a) the test laboratory's name and the date of testing;
- b) a reference to this document;
- c) name, type (chemical family) and colour of sealant;
- d) batch of sealant from which the test specimens were produced;
- e) substrate material used;
- f) the primer used, if applicable;
- g) the method of conditioning (see [Clause 7](#));
- h) the percentage compression (see [Clause 8](#));
- i) the secant compression modulus of each test specimen (N/mm²);
- j) the arithmetic mean of the three secant compression modulus;
- k) any deviations from this document.

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