
**Building construction — Jointing
products — Determination of
adhesion/cohesion properties of sealants at
variable temperatures**

*Construction immobilière — Produits pour joints — Détermination des
propriétés d'adhésivité/cohésion des mastics à température variable*



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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 9047 was prepared by Technical Committee ISO/TC 59, *Building construction*, Subcommittee SC 8, *Jointing products*.

This second edition cancels and replaces the first edition (ISO 9047:1989), clause 5, subclauses 5.1 and 5.7 of which have been technically revised.

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Building construction — Jointing products — Determination of adhesion/cohesion properties of sealants at variable temperatures

1 Scope

This International Standard specifies a method for the determination of the adhesion/cohesion properties of sealants with predominantly elastic behaviour which are used in joints in building construction.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 6927, *Building construction — Jointing products — Sealants — Vocabulary*

ISO 13640, *Building construction — Jointing products — Specifications for test substrates*

3 Terms and definitions

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

4 Principle

Test specimens are prepared in which the sealant to be tested adheres to two parallel contact surfaces. After submission to cycles of compression and extension under defined conditions, the test specimens are examined for evidence of loss of adhesion and cohesion.

5 Apparatus

5.1 Substrate materials, used for the preparation of test specimens, shall be as defined in ISO 13640.

Select the substrate material(s) 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 a cross-section of 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-section 12 mm × 12 mm with anti-adherent surface (see Figures 1 and 2).

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 being maintained at $(70 \pm 2) ^\circ\text{C}$.

5.5 Refrigerated enclosure, capable of holding the test specimens during extension at a temperature of $(-20 \pm 2) ^\circ\text{C}$.

5.6 Container for water immersion of the specimen for conditioning according to method B.

5.7 Test machine, capable of extending and compressing the test specimens at a rate of $(5,5 \pm 0,7)$ mm/min.

5.8 Spacers for extension, capable of holding the specimens at an elongation of 12,5 %, 20 % or 25 % (see Table 1 for the width of the spacers), or any other elongation agreed between the parties concerned.

5.9 Spacers for compression, capable of holding the specimens at a compression of 12,5 %, 20 % or 25 % (see Table 1 for the width of the spacers), or any other compression agreed between the parties concerned.

5.10 Measuring device, scaled in intervals of 0,5 mm.

6 Preparation of test specimens

Bring the sealant and the substrate material to a temperature of $(23 \pm 2) ^\circ\text{C}$. For each substrate prepare three test specimens.

For each specimen, assemble two substrates (5.1) and two spacers (5.2) (see Figure 1) and set up on the anti-adherent substrate (5.3).

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

Take the following precautions:

- a) avoid the formation of air bubbles;
- b) press the sealant to the contact surfaces of the substrates;
- c) trim the sealant surface so that it is flush with the faces of the substrates and the spacers.

Set the test specimens at the edge of one of the supports. Remove the anti-adherent substrate as soon as possible. Rest the specimens in this position to allow curing or optimum drying of the sealant.

Maintain the spacers in place during conditioning.

7 Conditioning of test specimens

7.1 Conditioning method A

Condition the test specimens for 28 days at $(23 \pm 2) ^\circ\text{C}$ and (50 ± 5) % relative humidity.

7.2 Conditioning method B

First condition the test specimens according to method A and subsequently subject them three times to the following storage cycle:

- a) 3 days in the oven (5.4) at $(70 \pm 2) ^\circ\text{C}$;
- b) 1 day in distilled water (5.6) at $(23 \pm 2) ^\circ\text{C}$;
- c) 2 days in the oven (5.4) at $(70 \pm 2) ^\circ\text{C}$;
- d) 1 day in distilled water (5.6) at $(23 \pm 2) ^\circ\text{C}$.

Alternatively this cycle may be carried out in the sequence: c) — d) — a) — b).

NOTE Conditioning method B is a normal conditioning procedure using the influence of heat and water. It is not intended to give information on the durability of the sealant.

After conditioning according to method B, store the test specimens for a further period of between 24 h and 6 days at $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity before testing.

8 Test procedure

Following the conditioning according to clause 7, remove the spacers.

The speed of extension and compression used in the test procedure is $(55 \pm 0,7) \text{ mm/min}$. The amplitude of testing is $\pm 12,5 \%$ or $\pm 20 \%$ or $\pm 25 \%$, or any amplitude agreed by the parties concerned.

Table 1 — Correspondence of amplitude and width values

Amplitude %	Width after extension mm	Width after compression mm
± 25	15,0	9,0
± 20	14,4	9,6
$\pm 12,5$	13,5	10,5
NOTE Initial width 12 mm.		

Subject the test specimens to the following extension/compression cycles at the required amplitude.

First week

Day 1: Place the test specimens in the refrigerated enclosure (5.5) at $(-20 \pm 2) ^\circ\text{C}$. After 3 h extend the test specimens in the test machine (5.7) to the required amplitude. Maintain the extension at $(-20 \pm 2) ^\circ\text{C}$ for 21 h.

Day 2: Release the extension. Place the test specimens in the oven (5.4) at $(70 \pm 2) ^\circ\text{C}$. After 3 h compress the test specimen in the test machine (5.7) to the required amplitude. Maintain the compression at $(70 \pm 2) ^\circ\text{C}$ for 21 h.

Day 3: Release the compression and follow the procedure of Day 1.

Day 4: Follow the procedure of Day 2.

Day 5 to 7: Release the compression, store at $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity without applying any mechanical force.

Second week

Repeat the procedure of the first week.

After the test specimens have been submitted to the above cycles, they are examined for loss of cohesion or adhesion. Measure the depth of any adhesive or cohesive failures using a suitable measuring device (5.10) capable of reading to 0,5 mm.

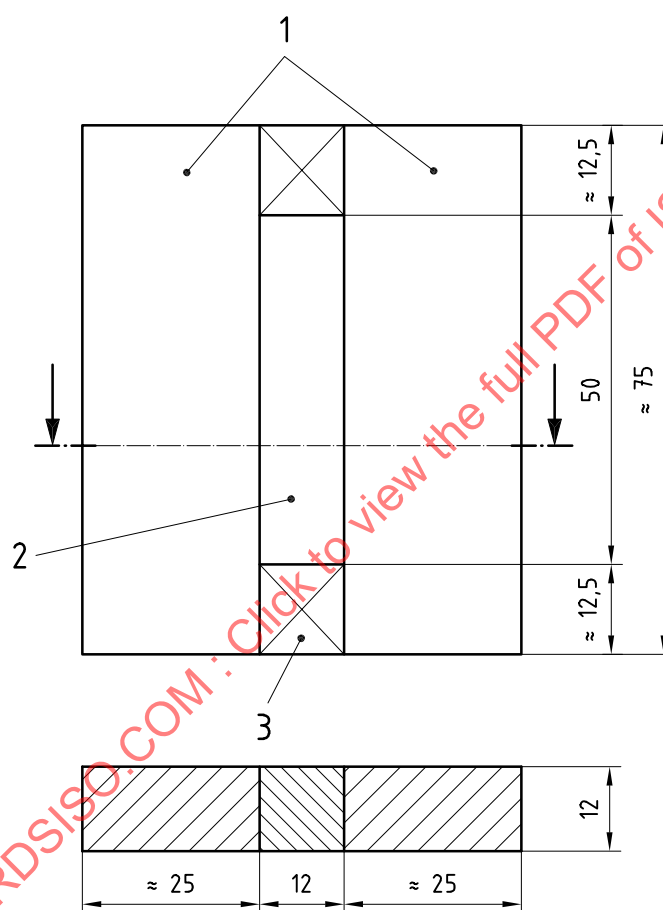
9 Test report

The test report shall contain the following information:

- laboratory's name and date of test;
- a reference to this International Standard;
- name, type (chemical family) and colour of sealant;
- batch of sealant from which the test specimens were produced;

- e) substrates used (see 5.1);
- f) primer(s) used, if applicable;
- g) method of conditioning (see clause 7);
- h) amplitude of the extension/compression cycling (see clause 8);
- i) depth and location of loss of adhesion and cohesion for each test specimen;
- j) any deviation from the procedure specified in this International Standard.

Dimensions in millimetres



Key

- 1 Concrete supports
- 2 Sealant
- 3 Spacer

Figure 1 — Test specimen with mortar substrates