
**Building construction — Jointing
products — Determination of elastic
recovery of sealants**

*Construction immobilière — Produits pour joints — Détermination de la
reprise élastique des mastics*



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Foreword

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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 7389 was prepared by Technical Committee ISO/TC 59, *Building construction*, Subcommittee SC 8, *Joining products*.

This third edition cancels and replaces the second edition (ISO 7389:1987), subclauses 5.1 and 5.7 and clause 8 of which have been technically revised.

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Building construction — Jointing products — Determination of elastic recovery of sealants

1 Scope

This International Standard specifies a method for the determination of the elastic recovery of sealants after maintained extension.

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

The test sealant is extended, held in extension and released. The elastic recovery is expressed as a percentage of the extension.

5 Apparatus

5.1 Substrate materials used for the preparation of test specimens are defined in ISO 13640.

The materials shall be selected from mortar or anodized aluminium or glass. Other substrate materials may be used as agreed by the parties concerned. For each test specimen, two supports 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-section 12 mm × 12 mm, with anti-adherent surface.

5.3 Spacers, with a width of 15 mm or 19,2 mm or 24 mm, to hold the test specimens at an elongation of 25 %, 60 % or 100 % respectively (see Table 1).

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

5.5 Ventilated convection-type oven, capable of operating at $(70 \pm 2) ^\circ\text{C}$ for conditioning according to method B.

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

5.7 Extension machine, capable of extending at a rate of $(5,5 \pm 0,7) \text{ mm/min}$.

5.8 Vernier inside caliper, accurate to 0,1 mm.

6 Preparation of test specimens

The sealant and the test substrate shall be brought to $(23 \pm 2) ^\circ\text{C}$. For each substrate three test specimens shall be prepared. For each specimen, two supports (5.1) and two spacers (5.2) shall be assembled (see Figure 1) and set up on the anti-adherent substrate (5.4).

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

The following precautions shall be taken:

- a) the formation of air bubbles shall be avoided;
- b) the sealant shall be pressed to the contact surfaces of the substrates;
- c) 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 edge of one of the supports and the anti-adherent shall be removed as soon as possible. The test specimens shall rest 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 $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \%$ 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) 3 days in the oven (5.5) 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 (5.5) at $(70 \pm 2) ^\circ\text{C}$;
- d) 1 day in distilled water (5.6) at $(23 \pm 2) ^\circ\text{C}$.

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 $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity before testing.

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.

8 Procedure

The test shall be carried out at $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity and all measurements shall be taken with the vernier caliper (5.8). The measurements may be made either between the contact surfaces or may include them.

The spacers used for the preparation of the test specimens shall be removed and the initial width, W_i , shall be measured at both ends of each test specimen. The test specimens shall be placed in the extension machine (5.7) and extended at a rate of $(5,5 \pm 0,7) \text{ mm/min}$ to 25 % or 60 % or 100 % of the initial width, or by any other percentage as agreed by the parties concerned. W_e is the width after elongation.

Table 1 gives the correspondence between the percentage elongation and the final elongated width for a test specimen of 12 mm initial width.

Table 1 — Correspondence of elongation values

Elongation percentage ^a	Width after elongation
%	mm
25	15,0
60	19,2
100	24,0
^a Initial width, 12 mm.	

The elongation shall be maintained for 24 h using the appropriate spacers. After this time the spacers shall be removed and the test specimens shall be placed, with the long axis vertical, on a smooth low-friction surface such as a talc-dusted glass plate. After 1 h, the width after elastic recovery, W_r , shall be measured at both ends of each test specimen.

For W_i , W_e and W_r , the arithmetic mean of the respective measurements at both ends of the test specimen shall be calculated.

9 Expression of results

The elastic recovery of each test specimen shall be calculated, by the equation

$$R = \frac{(W_e - W_r)}{(W_e - W_i)} \times 100$$

where

R is the elastic recovery, in percent;

W_i is the initial width, in millimetres, between the contact surfaces after conditioning;

W_e is the width, in millimetres, between the contact surfaces under elongation;

W_r is the width, in millimetres, between the contact surfaces after elastic recovery.

Values are rounded to the nearest 1 %.

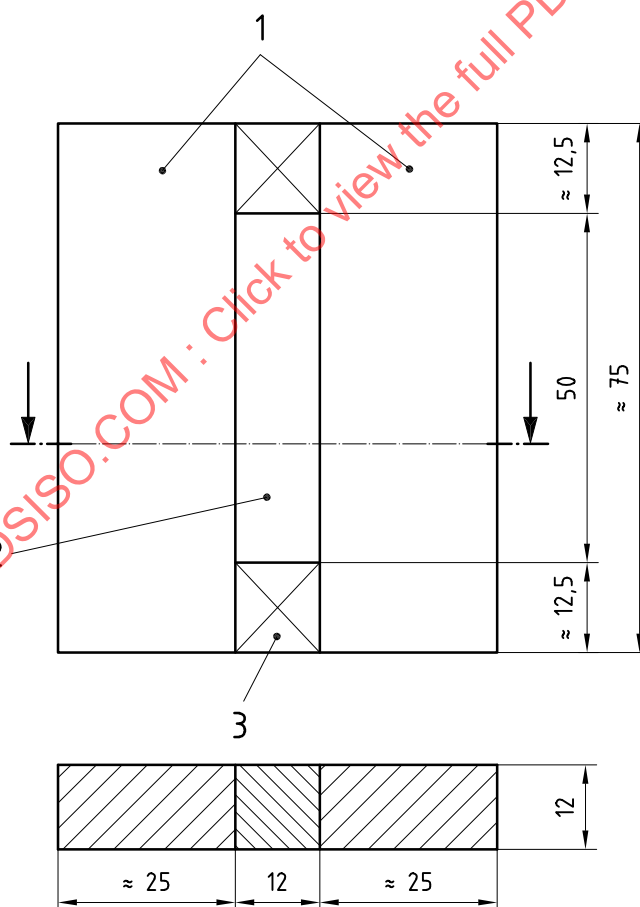
The arithmetic mean of the three elastic recoveries shall be calculated, rounded to the nearest 1 %.

10 Test report

The test report shall contain the following information:

- a) name of the laboratory and date of test;
- b) a reference to this International Standard;
- 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) primer used, if applicable;
- g) method of conditioning (see clause 7);
- h) percentage elongation in percent (see clause 8);
- i) elastic recovery of each test specimen, in percent rounded to the nearest 1 % (see clause 9);
- j) value of the mean elastic recovery;
- k) any deviations from the method of this International Standard.

Dimensions in millimetres



Key

- 1 Mortar substrates
- 2 Sealant
- 3 Spacer

Figure 1 — Test specimen with mortar substrates