INTERNATIONAL STANDARD

ISO 11600

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2004-09-01

Building construction — Jointing products — Classification and requirements for sealants

Construction immobilière — Produits pour joints — Classification et exigences pour les mastics

Reference number
ISO 11600:2002(E)

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

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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 11600 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 11600:1993), clauses 7 and 8 of which have been technically revised.

This corrected version of ISO 11600:2002 incorporates the following corrections:

— in Table 2, the tensile properties, secant tensile modulus at $+ 23\ ^{\circ}C$, have been changed from "> 4 N/mm^2" to "$> 0{,}4$ N/mm^2" for classes 25HM and 20HM;

— in Clause 9, item b), "test number" has been changed to "test report number".

Building construction — Jointing products — Classification and requirements for sealants

1 Scope

This International Standard specifies the types and classes of sealants used in building construction according to their applications and performance characteristics.

The requirements and respective test methods for the different classes are also given.

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 7389, *Building construction — Jointing products — Determination of elastic recovery of sealants*

ISO 7390, *Building construction — Jointing products — Determination of resistance to flow of sealants*

ISO 8339, *Building construction — Sealants — Determination of tensile properties (Extension to break)*

ISO 8340, *Building construction — Sealants — Determination of tensile properties at maintained extension*

ISO 9046, *Building construction — Jointing products — Determination of adhesion/cohesion properties of sealants at constant temperature*

ISO 9047, *Building construction — Jointing products — Determination of adhesion/cohesion properties of sealants at variable temperatures*

ISO 10563, *Building construction — Jointing products — Determination of change in mass and volume of sealants*

ISO 10590, *Building construction — Jointing products — Determination of tensile properties of sealants at maintained extension after immersion in water*

ISO 10591, *Building construction — Jointing products — Determination of adhesion/cohesion properties of sealants after immersion in water*

ISO 11431:2002, *Building construction — Jointing products — Determination of adhesion/cohesion properties of sealants after exposure to heat, water and artificial light through glass*

ISO 11432, *Building construction — Jointing products — Determination of resistance to compression of sealants*

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 Classification

4.1 Types

According to their applications, sealants are separated into two types:

Type G: glazing sealants for use in glazing joints;

Type F: construction sealants for use in building joints other than glazing.

4.2 Classes

Sealants are classified according to their ability to fulfil sealing functions in joints with movement parameters as given in Table 1.

Table 1 — Sealant classes

Class[a]	**Test amplitude** %	**Movement capability**[b] %
25	± 25	25,0
20	± 20	20,0
12,5	± 12,5	12,5
7,5	± 7,5	7,5

[a] Classes 25 and 20 apply to both types of sealant G and F, while classes 12,5 and 7,5 apply to sealants of type F only.

[b] For the correct interpretation and application of movement capability to the design of joints, relevant national standards and advisory documents should be considered.

4.3 Subclasses

4.3.1 Sealants of class 25 and 20 are additionally sub-classified according to their secant tensile modulus (see ISO 6927):

low modulus: code LM;

high modulus: code HM.

If the measured secant tensile modulus value exceeds the values specified below for either or both temperatures, the sealant shall be classified as **high modulus**. Specified values (see Tables 2 and 3, second row) are as follows:

0,4 N/mm^2 at + 23 °C;

0,6 N/mm^2 at − 20 °C.

The secant modulus shall be the mean value of the three measured values. Round the mean value to one decimal place.

EXAMPLE Measured values 0,43 N/mm^2, 0,40 N/mm^2 and 0,46 N/mm^2. Mean value 0,43 N/mm^2. Reported value 0,4 N/mm^2.

4.3.2 Sealants of class 12,5 are additionally classified according to their elastic recovery:

elastic recovery equal to or more than 40 %: Code E (elastic);

elastic recovery less than 40 %: Code P (plastic).

Sealants of classes 25, 20 and 12,5E are called **elastic sealants**; sealants of classes 12,5P and 7,5P are called **plastic sealants**. The full classification scheme is shown in Figure 1.

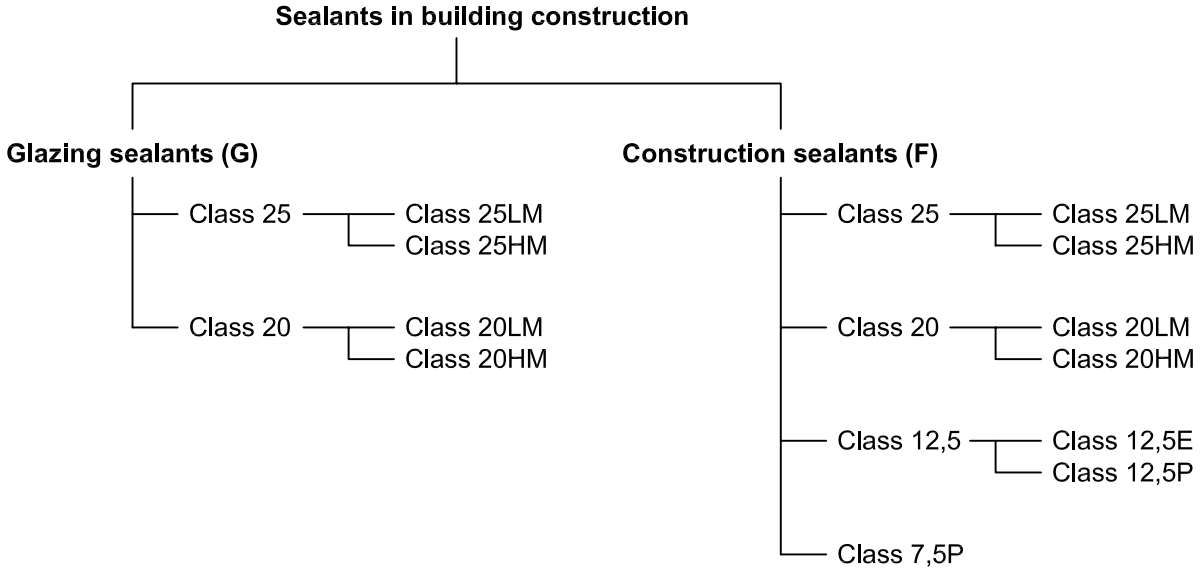


Figure 1 — Diagram of classification of sealants in building construction

5 Requirements and test methods

The requirements and test methods are as specified in Tables 2 and 3 for Type G and Type F sealants respectively. For specific test conditions, see Table 4.

Table 2 — Requirements for glazing sealants (G)

Properties	Class				Test method
	25LM	25HM	20LM	20HM	
Elastic recovery (%)	$\geqslant$ 60	$\geqslant$ 60	$\geqslant$ 60	$\geqslant$ 60	ISO 7389
Tensile properties, secant tensile modulus at + 23 °C (N/mm^2) at − 20 °C (N/mm^2)	$\leqslant$ 0,4 and $\leqslant$ 0,6	$>$ 0,4 or $>$ 0,6	$\leqslant$ 0,4 and $\leqslant$ 0,6	$>$ 0,4 or $>$ 0,6	ISO 8339
Tensile properties at maintained extension	nf	nf	nf	nf	ISO 8340
Adhesion/cohesion properties at variable temperature	nf	nf	nf	nf	ISO 9047
Adhesion/cohesion properties after exposure to heat and artificial light and to water (see Note 1)	nf	nf	nf	nf	ISO 11431
Adhesion/cohesion properties at maintained extension after water immersion	nf	nf	nf	nf	ISO 10590
Resistance to compression (N/mm^2)	see Note 2	see Note 2	see Note 2	see Note 2	ISO 11432
Loss of volume (%)	$\leqslant$ 10	$\leqslant$ 10	$\leqslant$ 10	$\leqslant$ 10	ISO 10563
Resistance to flow (mm) (see Note 3)	$\leqslant$ 3	$\leqslant$ 3	$\leqslant$ 3	$\leqslant$ 3	ISO 7390

nf = no failure as defined in clause 7.

NOTE 1 Use the standard conditions of exposure, as described in ISO 11431:2002, 8.2.2 or 8.2.3.

NOTE 2 Record the value for compression.

NOTE 3 Use the U-profile, made from anodized aluminium, with a nominal width of 20 mm and a nominal depth of 10 mm. Apply test temperatures of (50 ± 2) °C and (5 ± 2) °C. Test to procedure A and procedure B. If the flow exceeds 3 mm, the test may be repeated once.

Table 3 — Requirements for construction sealants (F)

Properties	Class							Test method
	25LM	25HM	20LM	20HM	12,5E	12,5P	7,5P	
Elastic recovery (%)	$\geqslant$ 70	$\geqslant$ 70	$\geqslant$ 60	$\geqslant$ 60	$\geqslant$ 40	$<$ 40	$<$ 40	ISO 7389
Tensile properties								
a) secant tensile modulus								
at + 23 °C (N/mm^2)	$\leqslant$ 0,4 and	$>$ 0,4 or	$\leqslant$ 0,4 and	$>$ 0,4 or	—	—	—	ISO 8339
at − 20 °C (N/mm^2)	$\leqslant$ 0,6	$>$ 0,6	$\leqslant$ 0,6	$>$ 0,6	—	—	—	
b) elongation at break (%) at + 23 °C	—	—	—	—	—	$\geqslant$ 100	$\geqslant$ 25	
Tensile properties at maintained extension	nf	nf	nf	nf	nf	—	—	ISO 8340
Adhesion/cohesion properties at variable temperatures	nf	nf	nf	nf	nf	—	—	ISO 9047
Adhesion/cohesion properties at constant temperature	—	—	—	—	—	nf	nf	ISO 9046
Adhesion/cohesion properties at maintained extension after water immersion	nf	nf	nf	nf	nf	—	—	ISO 10590
Adhesion/cohesion properties after water immersion. Elongation at break (%) at + 23 °C	—	—	—	—	—	$\geqslant$ 100	$\geqslant$ 25	ISO 10591
Loss of volume (%)	$\leqslant$ 10 see Note 1	$\leqslant$ 10 see Note 1	$\leqslant$ 10 see Note 1	$\leqslant$ 10 see Note 1	$\leqslant$ 25	$\leqslant$ 25	$\leqslant$ 25	ISO 10563
Resistance to flow (mm) (Note 2)	$\leqslant$ 3	$\leqslant$ 3	$\leqslant$ 3	$\leqslant$ 3	$\leqslant$ 3	$\leqslant$ 3	$\leqslant$ 3	ISO 7390

nf = no failure as defined in clause 7.

NOTE 1 A maximum of 25 % for water-based dispersion sealants.

NOTE 2 Use the U-profile made from anodized aluminium with a nominal width of 20 mm and a nominal depth of 10 mm. Apply test temperatures of (50 ± 2) °C and (5 ± 2) °C. Test to procedure A and procedure B. If the flow exceed 3 mm, the test may be repeated once.

Table 4 — Specific test conditions for Type F and Type G sealants

	Test method	Class						
		25LM	25HM	20LM	20HM	12,5E	12,5P	7,5P
Elongation[a]	ISO 7389 ISO 8339 ISO 8340 ISO 10590 ISO 11431	100 %	100 %	60 %	60 %	60 %	60 %	25 %
Amplitude	ISO 9046 ISO 9047	± 25 %	± 25 %	± 20 %	± 20 %	± 12,5 %	± 12,5 %	± 7,5 %
Compression	ISO 11432	25 %	25 %	20 %	20 %	—	—	—

[a] The value of elongation is given as a percentage of the original width:

elongation % $= [(\text{final width} - \text{original width})/(\text{original width})] \times 100$ %

6 Conditioning, test procedure and substrates

When determining the classification of a sealant according to the requirements of this International Standard, the same conditioning procedure (cure) shall be used in all the relevant test methods (use only Method A or Method B), for which details are given in the test methods.

For each test method, three test specimens for each substrate shall be tested (see also clause 7). The same batch of sealant (and primer, if used) shall be used in all tests. The same substrates (material and surface finish) shall be used in all tests.

The test substrates, as defined in ISO 13640, shall be selected as follows:

Type G sealants

Obligatory, glass

Optional, anodized aluminium

Type F sealants

Mortar and/or anodized aluminium and/or glass

7 Definition of failure

7.1 General

After preparation, the sealant test specimens shall be examined for defects. Any test specimens deemed unsuitable for testing shall be rejected. After testing, the sealant test specimens shall be examined for evidence of loss of adhesion or cohesion. Wherever it is observed, the depth of adhesion loss and/or cohesion loss shall be measured using a suitable measuring device capable of reading to 0,5 mm. The highest observed value of the depth of either shall be recorded and used to determine a pass or failure.

Because of the excessive stress experienced by the sealant near the ends of the test specimens, during both the preparation and testing, loss of adhesion or cohesion observed within the excluded volume 2 mm $\times$ 12 mm $\times$ 12 mm, at either or both ends of the sealant, shall not be reported as a failure (Figure 2).

Each test shall be carried out in triplicate. In any test method, if two or more of the test specimens fail, then the sealant shall be reported as failing the test. If only one of the test specimens fails, then the complete test shall be repeated. If one of the three repeat test specimens fails, then the sealant has failed the test.

7.2 Failure of subclass P sealants

Reference test methods are as given in ISO 8339, ISO 9046 and ISO 10591.

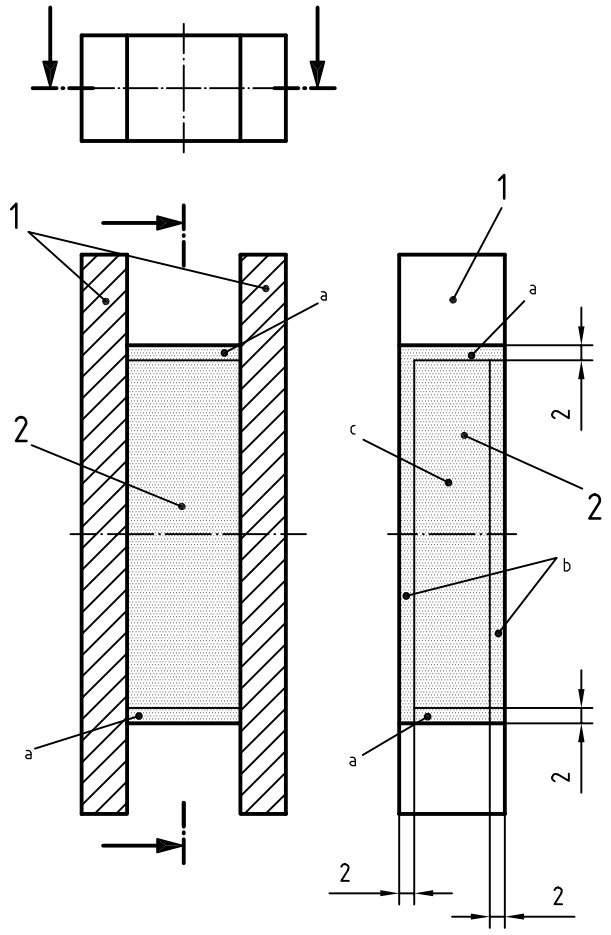
If loss of adhesion or cohesion extends through the whole depth of the sealant, then the sealant test specimen has failed. The principle of light transmission through the defect can be applied to determine pass or failure.

7.3 Failure of subclass E sealants

Reference test methods are as given in ISO 8340, ISO 9047, ISO 10590 and ISO 11431.

If loss of adhesion or cohesion in the depth of the sealant exceeds 2 mm, anywhere on the sealant surface, then the sealant test specimen has failed (see Figure 2).

Dimensions in millimetres



Key

1 Substrates

2 Sealant

[a] Zone A: Failure in the excluded volume 2 mm × 12 mm × 12 mm is allowed and NOT REPORTED.

[b] Zone B: For Subclass E sealants, failure ⩽ 2 mm is allowed, but REPORTED with the test results.

[c] Zone C: For Subclass E sealants, failure extending from the sealant surface into this region (i.e. > 2 mm deep) is not allowed. The test specimen fails and the failure is REPORTED with the test results.

NOTE Loss of adhesion or internal voids observed solely in Zone C (e.g. as seen through a glass substrate) are NOT REPORTED in the test report as failures, but mentioned as general observations with the test results.

Figure 2 — Sections through sealant test specimen

8 Designation

In the case of conformity with this International Standard, the sealants shall be designated by the symbols for the type, class and, if applicable, the subclass in accordance with clause 4:

ISO 11600 - TYPE - CLASS - SUBCLASS

The packages shall be marked with the appropriate designation of the sealant tested for which the holder of the test report (see clause 9) takes responsibility. The substrates used in the tests and the primers used shall be shown on the package using the following abbreviations: mortar (M_1 or M_2), glass (G), anodized aluminium (A), primed (p) or

unprimed (up). A full description of the test substrates may optionally be given on the package, but shall be given in the technical data sheet.

EXAMPLE 1 A construction sealant (F) having a movement capability of 25 % and a modulus greater than 0,4 N/mm^2 (HM) and tested on primed mortar type 1 can be described as follows:

Either

ISO 11600 - F - 25HM - M_1p

or

ISO 11600 - F - 25HM

Tested on primed mortar type 1.

EXAMPLE 2 A glazing sealant (G) having a movement capability of 25 % and a modulus less than 0,4 N/mm^2 (LM) and tested on primed anodized aluminium and unprimed glass can be described as follows:

Either

ISO 11600 - G - 25LM - Ap, Gup

or

ISO 11600 - G - 25LM

Tested on primed anodized aluminium and unprimed glass.

9 Test report

The test report shall contain the following information:

a) name of the test laboratory;

b) date of the test and test report number;

c) reference to this International Standard;

d) holder of test report;

e) name of the sealant, type (chemical family) and colour;

f) batch number;

g) number of components;

h) substrates used (if mortar, state type M_1 or M_2);

i) primer(s) used, with batch number, if applicable;

j) conditioning used (Method A or Method B);

k) procedure used in ISO 11431, including whether the UV lamp was left on during the wet period of test procedure (8.2.1), if applicable;

l) any deviation from the specified test conditions;

m) expected ISO 11600 class;

n) results for each test carried out in determining the sealant classification;

o) ISO 11600 class achieved (state if no class is achieved).

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