BS EN 15651-4:2017

BSI Standards Publication

Sealants for non-structural use in joints in buildings and pedestrian walkways

Part 4: Sealants for pedestrian walkways

bsi.

National foreword

This British Standard is the UK implementation of EN 15651-4:2017. It supersedes BS EN 15651-4:2012 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/547, Sealants for building and construction.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Mastics pour joints pour des usages non structuraux dans les constructions immobilières et pour chemins piétonniers - Partie 4 : Mastics pour chemins piétonniers

Fugendichtstoffe für nicht tragende Anwendungen in Gebäuden und Fußgängerwegen - Teil 4: Fugendichtstoffe für Fußgängerwege

This European Standard was approved by CEN on 25 December 2016.

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European foreword

This document (EN 15651-4:2017) has been prepared by Technical Committee CEN/TC 349 “Sealants for joints in building construction”, the secretariat of which is held by AFNOR.

This document supersedes EN 15651-4:2012.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2017, and conflicting national standards shall be withdrawn at the latest by November 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports basic work requirements of EU Regulation.

For relationship with EU Regulation, see informative Annex ZA, which is an integral part of this document.

This document is one of the product European Standards within the framework series of EN 15651 on *Sealants for non-structural use in joints in buildings and pedestrian walkways*, as follows:

— *Part 1: Sealants for facade elements*,

— *Part 2: Sealants for glazing*,

— *Part 3: Sealants for sanitary joints*,

— *Part 4: Sealants for pedestrian walkways* (this document),

— *Part 5: Assessment and verification of constancy of performance, marking and labelling*.

The following significant technical changes have been implemented in this new edition:

— Clause 4.1.3 and Clause 5 have been improved;

— Clause 4.5 has been modified;

— Clause 7 and Annex ZA have been changed in accordance with the regulation (EU) No.305/2011.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies definitions and requirements for cold applied non-structural elastic sealants used for movement joints in floors in building construction for interior and exterior use.

Areas of application are: floor joints designed for pedestrian walkways, public areas, movement joints between concrete slabs, areas with pedestrian load, areas used with trolleys, walkable floors, balconies, terraces, warehouses.

NOTE Provisions on assessment and verification of constancy of performance - AVCP (i.e. Product type determination and Factory Production Control) and marking of these products are given in EN 15651–5.

Chemical containment, cold applied joint sealants for concrete pavements to be used in roads, airfields and sewage treatment plants, perimeter seals and seals in wood floors are excluded.

This European Standard does not apply to non-structural sealants in any of non-paste form, to those used in pedestrian walkways.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13238, *Reaction to fire tests for building products - Conditioning procedures and general rules for selection of substrates*

EN 13501-1, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*

EN 14187-3, *Cold applied joint sealants - Part 3: Test method for the determination of self-levelling properties*

EN 15651-5:2017, *Sealants for non-structural use in joints in buildings and pedestrian walkways - Part 5: Evaluation of conformity and marking*

EN ISO 291, *Plastics - Standard atmospheres for conditioning and testing (ISO 291)*

EN ISO 868, *Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868)*

EN ISO 2811-1:2016, *Paints and varnishes - Determination of density - Part 1: Pycnometer method (ISO 2811-1:2016)*

EN ISO 6927, *Buildings and civil engineering works - Sealants - Vocabulary (ISO 6927)*

EN ISO 7389, *Building construction - Jointing products - Determination of elastic recovery of sealants (ISO 7389)*

EN ISO 7390, *Building construction - Jointing products - Determination of resistance to flow of sealants (ISO 7390)*

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

EN ISO 8340, *Building construction - Sealants - Determination of tensile properties at maintained extension (ISO 8340)*

EN ISO 9047, *Building construction - Jointing products - Determination of adhesion/cohesion properties of sealants at variable temperatures (ISO 9047)*

EN ISO 10563, *Building construction - Sealants - Determination of change in mass and volume (ISO 10563)*

EN ISO 10590, *Building construction - Sealants - Determination of tensile properties of sealants at maintained extension after immersion in water (ISO 10590)*

EN ISO 11358 (all parts), *Plastics — Thermographimetry (TG) of polymers — General principles (ISO 11358)*

EN ISO 11431, *Building construction - Jointing products - Determination of adhesion/cohesion properties of sealants after exposure to heat, water and artificial light through glass (ISO 11431)*

EN ISO 11600:2003, *Building construction - Jointing products - Classification and requirements for sealants (ISO 11600:2002)*

EN ISO 11925-2, *Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test (ISO 11925-2)*

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

3 Terms and definitions

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

3.1
reactive sealant
mainly curing by chemical reaction, with significant increase of the molecular weight of the main polymer

3.2
cure
irreversible transformation of a sealant from a liquid or paste-like state into a hardened or rubber-like solid state

3.3
uncured / wet
state of a sealant prior to the above transformation

4 Requirements

4.1 Identification requirements

4.1.1 Short description of the sealant

The short description of the non-structural sealant for pedestrian walkways shall include brand name, type (general, chemical, family, one or multi-component e.g. one component Polyurethane sealant in different colours, etc.).

The primer shall be stated for the substrate concerned, if relevant (name, chemical type, etc.).

4.1.2 Thermogravimetric test

The test shall be carried out in accordance with EN ISO 11358 on the uncured or wet sealant, between 35 °C and 900 °C, temperature slope 10 °C/min, non-oxidative condition (e.g. nitrogen). A single sample shall be used for this test. A single specimen may be tested and there shall be no significant difference between the reference curve and derivative (profile).

In the case of a multi-component sealant, each component shall be evaluated (if relevant).

4.1.3 Density

4.1.3.1 Principal

A pyknometer is filled with the product under test. The density is calculated from the mass of the product in the pyknometer and the known volume of the pyknometer.

4.1.3.2 Method

A test temperature of (23,0 ± 0,5) °C shall be used and the test sample and pyknometer shall be conditioned to this temperature, and it shall be ensured that the temperature variation does not exceed 0,5 °C during testing.

The determination of the density shall be in accordance with EN ISO 2811-1:2016 using a suitable 50 cm^3 calibrated pyknometer as described in EN ISO 2811-1:2016, 6.1.1. An alternative is the 50 cm^3 Hubbard pyknometer as described in ISO 3507.

Measurements should be carried out on the uncured or wet sealant and in the case of a multi-component sealant, each component shall be evaluated. At least three samples shall be tested. The specific pyknometer used and the mean value, recorded to two decimal places, shall be declared. The tolerance of the declared values shall be within ± 5 %.

4.1.4 Indentation hardness (Shore hardness)

The determination of the indentation hardness shall be in accordance with EN ISO 868. The test shall be performed on the cured sealant.

The exact conditions of test shall be defined by the manufacturer (i.e. thickness, cure/drying times and temperature and relative humidity, specific Shore type (A, D…), test time, temperature, etc.).

At least three samples shall be tested and five measurements taken per sample. The mean value and tolerances of all measurements, recorded to the nearest unit, shall be declared.

4.2 Conditioning, test procedure and substrates

4.2.1 General

When determining the classification of a sealant according to the requirements of this standard, the same conditioning procedure shall be used in all relevant test methods (use only Method A or Method B). For each test method, three test specimens for each substrate shall be tested. 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.

4.2.2 Classification

4.2.2.1 General

Classes for cold applied elastic sealants for movement joints in floors in building construction are referred to as type:

— PW (= pedestrian walkways);

— EXT (= exterior application) and INT (= interior application);

— CC (= cold climate).

4.2.2.2 Classification according to the movement capability

According to their movement capability, sealants are subdivided into different classes as given in Table 1.

Table 1 — Sealant classes

Class	Elongation %	Test amplitude %	Movement capability % [a]
25	100	±25	25,0
20	60	±20	20,0
12,5	60	±12,5	12,5
[a] For the correct interpretation and application of movement capability to the design of joints, relevant national standards and advisory documents should be considered.			

4.2.2.3 Classification according to the secant tensile modulus

Sealants of class 25 and class 20 are additionally sub-classified according to their secant tensile modulus (see EN ISO 6927 and EN ISO 11600):

— low modulus: code LM;

— high modulus: code HM.

If the evaluated 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 column) are as follows:

— 0,4 N/mm² at + 23 °C;

— 0,6 N/mm² 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/mm² 0,40 N/mm² 0,46 N/mm² and mean value 0,43 N/mm². Reported value0,4 N/mm² .

Substrates to be used in all mechanical tests concerned are; mortar M1 or M2 according to ISO 13640 and/or other substrates.

4.2.3 Test procedure

The specific test conditions shall be in accordance with Table 2.

Table 2 — Specific test conditions

	Test method	Classes of non-structural sealants for pedestrian walkways elements				
		25LM	**25HM**	**20LM**	**20HM**	**12,5E**
Elongation [a]	EN ISO 7389 EN ISO 8339 EN ISO 8340 EN ISO 10590 EN ISO 11431	100 %	100 %	60 %	60 %	60 %
Amplitude	EN ISO 9047	±25 %	±25 %	±20 %	±20 %	±12,5 %
[a] The value of elongation is given as a percentage of the original width: elongation % = [(final width – original width) / (original width)] x 100 %						

Substrates to be used in all mechanical tests concerned shall be mortar M1 or M2 and/or anodised aluminium and/or glass, according to ISO 13640.

4.3 Performance requirements and test methods for non-structural sealants for pedestrian walkways

4.3.1 General

The requirements and test methods are specified in Table 3.

Table 3 — Summary of characteristics required and classes for sealants in pedestrian walkways

Properties	Class					Test method
	25 LM	25 HM	20 LM	20 HM	12,5 E	
Elastic recovery (%)	≥ 70	≥ 70	≥ 60	≥ 60	≥ 40	EN ISO 7389
Tensile properties secant modulus at (23 ± 2) °C (MPa) at (- 20 ± 2) °C (MPa)	≤ 0,4 and ≤ 0,6	> 0,4 or > 0,6	≤ 0,4 and ≤ 0,6	> 0,4 or > 0,6		EN ISO 8339
Tensile properties at maintained extension [a]	NF	NF	NF	NF	NF	EN ISO 8340
Adhesion/cohesion properties at variable temperatures	NF	NF	NF	NF	NF	EN ISO 9047
Adhesion/cohesion properties at maintained extension after water immersion	NF	NF	NF	NF	NF	EN ISO 10590
Loss of volume non sagging sealant (%)	≤ 10 %	≤ 10 %	≤ 10 %	≤ 10 %	≤ 15 %	EN ISO 10563
Loss of volume self-levelling sealants (%)	≤ 10 %	≤ 10 %	≤ 10 %	≤ 10 %	≤ 15 %	Adapted EN ISO 10563 See Annex B
Resistance to flow for non-sagging sealants (mm)	≤ 3	≤ 3	≤ 3	≤ 3	≤ 5	EN ISO 7390
Sealants with self-levelling properties	declared value	declared value	declared value	declared value	declared value	EN 14187–3
Tear resistance	NF	NF	NF	NF	NF	EN ISO 8340 Modified, see 4.3.5
NF = No Failure						
[a] For exterior use, secant modulus has to be recorded during the EN ISO 8340 test.						

4.3.2 Sealants in pedestrian walkways used in cold climates

4.3.2.1 General

This test has been developed to demonstrate that elastic sealants for exterior use perform well at lower temperatures than those currently tested at in EN ISO 11600 (e.g. common winter temperatures in Northern Europe). The specific intention is to ensure that the sealant continues to perform at - 30 °C, which is a common winter temperature in cold climate areas.

In addition to the requirements given in Table 3, elastic non-structural for sealants in pedestrian walkways required to maintain performance in cold climates (- 30 °C) shall fulfil the requirements given in Table 4.

The classification of the sealant given in Table 3 shall be determined prior to this optional additional test and the corresponding test amplitude shall be applied to this additional test.

The designation CC (cold climate) shall be declared for any sealant meeting the requirements of Table 3 and 4. For example, Type PW Class 25LM CC.

Mortar M1 or M2 according to ISO 13640 and/or other substrates shall be used.

4.3.2.2 Tensile properties - Secant modulus to EN ISO 8339:— test procedure at (- 30 ± 2) °C

The test specimens shall be stored at (- 30 ± 2) °C for at least 4 h before the start of the test. The spacers for the preparation of the test specimens shall be removed and the test specimen placed in the tensile test machine and extended at (- 30 ± 2) °C at a rate of (5,5 ± 0,7) mm/min until rupture occurs. The force/extension diagram shall be recorded.

4.3.2.3 Tensile properties at maintained extension to EN ISO 8340:— test procedure at (- 30 ± 2) °C

The test specimens shall be stored at (− 30 ± 2) °C for at least 4 h before the start of the test. The spacers for the preparation of the test specimens shall be removed and the test specimens placed in the tensile test machine at (- 30 ± 2) °C and extended at a rate of (5,5 ± 0,7) mm/min by 60 % or 100 % of the original width (to 19,2 mm and 24 mm respectively). The separators shall be used to maintain the elongation at (- 30 ± 2) °C for 24 h. The test specimens shall be brought to (23 ± 2) °C. The depth of any loss of adhesion or cohesion shall be measured using a suitable measuring device capable of reading to 0,5 mm.

Table 4 — Requirements to be suitable for use in cold climate areas

Characteristics		Classes of sealants in pedestrian walkways used in cold climates					Test method
		25LM	25HM	20LM	20HM	12,5E	
Tensile properties: - Secant modulus	MPa	≤ 0,9	NR [a]	≤ 0,9	NR [a]	NR [a]	4.3.2.2
Tensile properties at maintained extension	-	NF [b]	NF [b]	NF [b]	NF [b]	NF [b]	4.3.2.3

[a] NR = Not required.

[b] NF = No failure according to EN ISO 11600.

4.3.3 Resistance to flow for non-sagging sealants

The resistance to flow shall be measured according to EN ISO 7390, with the precise test method modified according to the following details.

A vertical, anodised aluminium U-profile shall be used with dimensions 20 mm × 10 mm. Testing shall be carried out under two test temperature conditions:

a) temperature of (50 ± 2) °C and relative humidity of (50 ± 10) %;

b) temperature of (5 ± 2) °C.

If the flow exceeds the required value, then the test may be repeated once.

4.3.4 Sealants with self-levelling properties

Evaluation according to EN 14187-3.

4.3.5 Tear resistance

Evaluation according to EN ISO 8340 modified.

Substrates: Mortar M1 or M2 according to ISO 13640 and/or other substrates.

Primer may be used if necessary. The use of primer shall be documented in the classification of the product.

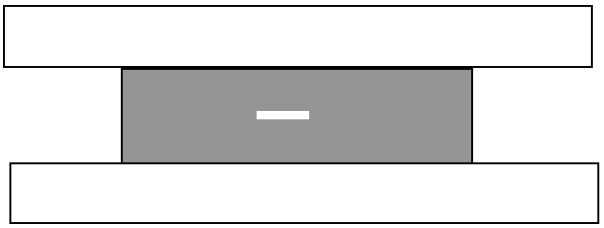
Test procedure at (23 ± 2) °C.

After conditioning Method A or Method B, the test specimens shall be cut in the centre with a 6 mm broad knife blade or chisel blade through the complete thickness of the sealant (12 mm) (see Figure 1).

Afterwards the specimen has to be extended to the double of the movement capability e.g. a sealant with 25 % movement capability shall be extended to 50 % (from 12 mm to 18 mm). An example of an extended sealant with cut is shown in Figure 2.

After 24 h elongation, the test specimen will be examined and any tear propagation noted.

The position of the cut can be taken from Figure 1. The sealant meets the requirement if the cut in the extended specimen does not exceed 12 mm in the length of the sealant.



NOTE Induced cut 6 mm wide and cut through the whole sealant.

Figure 1 — Test specimen with cut (not extended)

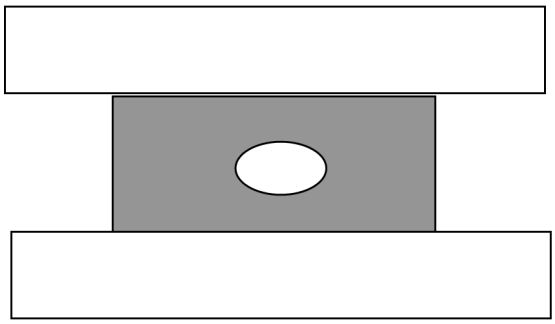


Figure 2 — Test specimen with cut (extended)

4.4 Additional performance requirements for exterior applications

4.4.1 General

When a sealant does not meet the following requirements (see Table 5), it is not suitable for exterior use.

Table 5 — Summary of characteristics required and classes

Properties	Class					Test method
	25 LM	25 HM	20 LM	20 HM	12,5 E	
Adhesion/cohesion properties after water immersion [b]	NF change of secant modulus: ≤ 50 %	NF change of secant modulus: ≤ 50 %	NF change of secant modulus: ≤ 50 %	NF change of secant modulus: ≤ 50 %	NF change of secant modulus: ≤ 50 %	EN ISO 10590 modified, with 28 days water immersion instead of 4 days
Adhesion/cohesion properties after salt water immersion [a]	NF	NF	NF	NF	NF	EN ISO 10590 modified With 28 days salt water immersion instead of 4 days water immersion (10 % NaCl- solution)
Artificial weathering by UV-radiation	NF	NF	NF	NF	NF	Modified EN ISO 11431
NF = no failure						
[a] If necessary, other chemicals can be used according to specific application requirements. [b] Compared with the value recorded during the EN ISO 8340 test (See note in Table 3).						

4.4.2 Artificial weathering by UV-radiation

Joint sealants have to be sufficiently resistant to weathering by outdoor use. This standard is achieved when the change of the tensile strength value is not bigger than 20 % according to the test mentioned below after the exposure with artificial weathering. The tensile strength value at test elongation shall be calculated and the change shall be presented compared to untreated test specimen.

The weathering test has to be performed according to EN ISO 11431. The positioning of the test specimen is shown in Figure 3. A contact material is used instead of glass concrete and also the direction of light exposure has to be changed to the surface of the sealant.

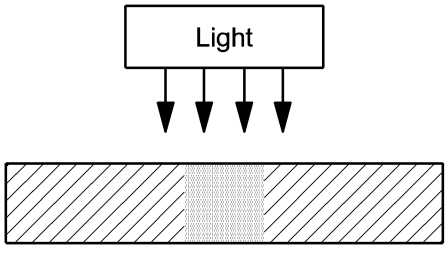


Figure 3 — Test specimen for artificial weathering by UV-radiation

After exposure with artificial weathering and water, the test specimens are stored for 24 h at standard climate (23 °C, 50 % relative humidity), deviation bracket 2 according to EN ISO 291. Afterwards they are elongated with a rate of stress increase of (5,5 ± 0,5) mm/min (test elongation, see EN ISO 11600, Table 5).

Tensile strength value at test elongation is calculated and compared to the values of untreated specimen.

The elongation is maintained with spacers over a period of 24 h. Afterwards the specimens are analysed on changes like discolouration, crack formation, stickiness, adhesion loss and softening.

4.5 Release of dangerous substances

National regulations on dangerous substances may require verification and declaration on release, and sometimes content, when construction products covered by this standard are placed on those markets.

In the absence of European harmonized test methods, verification and declaration on release/content should be done taking into account national provisions in the place of use.

NOTE: An informative database covering European and national provisions on dangerous substances is available at the Construction website on EUROPA accessed through:

http://ec.europa.eu/enterprise/construction/cpd-ds/

4.6 Reaction to fire

4.6.1 General

Products shall be classified in accordance with EN 13501-1. The appropriate reaction to fire class shall be declared.

4.6.2 Mounting and fixing conditions for test samples

Mounting and fixing conditions for the test samples of the reaction to fire performance for the following reaction to fire classes shall be as follows:

a) Class A2, B, C or D:

   Design of specimen:

   1) substrate: calcium silicate panel

b) Class E

   Design of specimen:

   1) substrate: beech wood, mean bulk density about 720 kg/m^3, or calcium silicate panel according to EN 13238;

   2) joint dimension: 20 mm x 10 mm x 250 mm (width x depth x length) , see Figure 4;

   3) conditioning: 28 days at 23 ± 2 °C and 50 ± 5 % relative humidity (according to EN 13238);

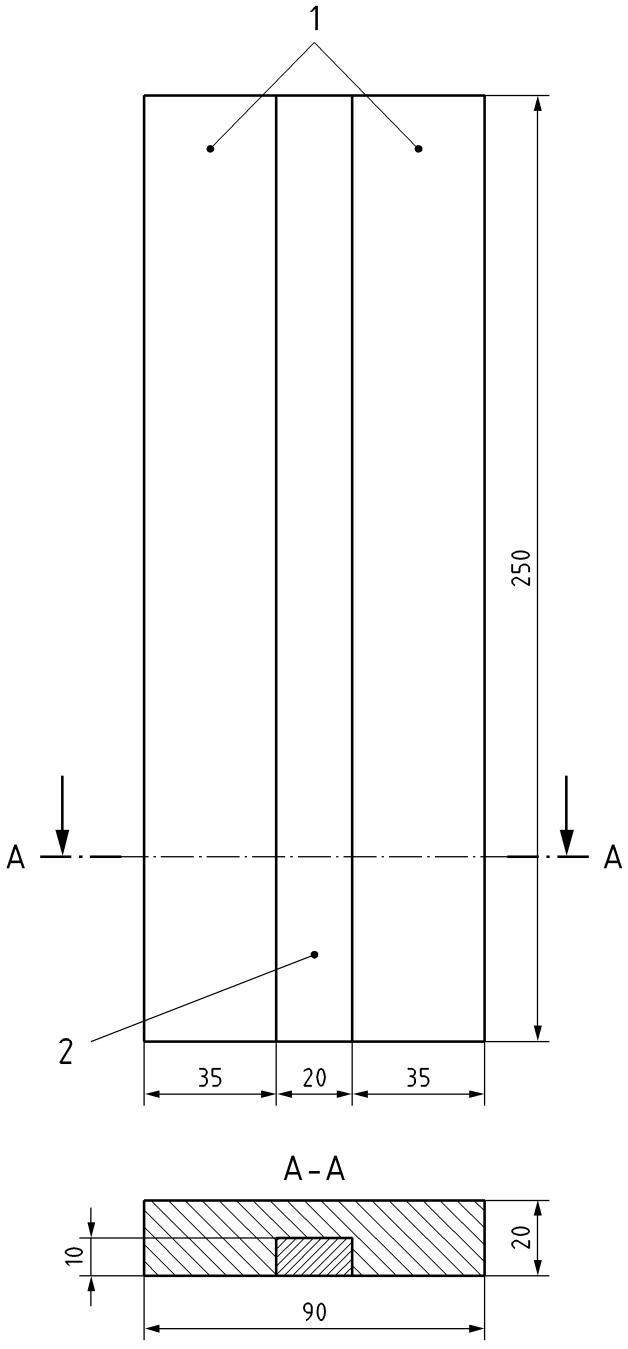
   4) number of specimens: 6 (according to EN ISO 11925-2);

   5) fire test: impingement of flame in centre to the bottom edge (according to EN ISO 11925-2).

The substrates are not standard-substrates according to EN 13238. They serve only to prepare a standardized sample according to EN ISO 11925-2.

Furthermore, the defined joint dimension is not a classification parameter with respect to the dimension of the tested product. If the product meets the test requirements, it should be classified independently from its dimensions.

Dimensions in millimetres



Key

1 substrate

2 sealant

Figure 4 — Test specimen

5 Durability

The durability of a sealed joint is only as good as both the adhesion of the sealant (and primer) to the surfaces forming the joint and also the cohesive stability of the sealant itself. It is important that the sealant has sufficient adhesion and cohesion to survive the mechanical and environmental stresses to which the sealed joint is likely to be exposed.

In service experience indicates that sealants meeting the requirements given in the technical classifications in Table 3 demonstrate the necessary durability if correctly installed using a suitable joint design. Long-term durability of joints based on such sealants is seen when they are selected and applied according to the sealant data sheets, taking into account the expected service conditions on site.

Durability shall be evaluated by selecting the appropriate test from the table below depending on the class of sealants given in Table 3 and Table 5:

Durability Evaluation for Sealants for Interior Use only	Durability Evaluation for Sealants for Interior and Exterior Use
EN ISO 8340 (Report Failure or No Failure according to test method)	EN ISO 9047 or EN ISO 10590 (Report Failure or No Failure according to test method) (Elastic Sealants)

6 Sampling

General requirements for sampling of the sealant shall be as set out in EN 15651-5.

7 Assessment and verification of constancy of performance

7.1 General

The Assessment and verification of constancy of performance (AVCP) needs to be defined by each sealant manufacturer in order to show compliance to the level of performance indicated in the Product type determination.

7.2 Product type determination

General requirements for the product type determination of the sealant shall be as set out in EN 15651-5.

7.3 Factory production control

Requirements for the factory production control shall be in accordance with EN 15651-5.

An example of suitable frequency of identification and performance tests for FPC is given in Annex A. Frequencies may be increased during initial production or following an incident of non-conformity.

Any deviation from this guidance should be justified by documented evidence that demonstrates equivalence.

8 Marking and labelling

Requirements for marking and labelling shall be as set out in EN 15651-5.

Annex A
(informative)

Example on the frequency of tests for factory production control

An example of a suitable frequency of identification and performance tests for factory production control of sealants for pedestrian walkways is given in Table A.1.

Table A.1 — Frequency of tests for factory production control

Identification **Characteristics/property**	**Frequency**
One test on the appearance such as colour, homogeneity, etc.	F_A
One test on the uncured product such as viscosity, density, skin over time, stringiness, extrusion rate, etc.	F_A
One test on the cured sealant such as indentation hardness, adhesion peeling test, tensile properties, etc.	F_B
Tensile properties, volume shrinkage, tensile properties at maintained extension at (- 30 ± 2) °C for cold climate areas [a], tear resistance, adhesion/cohesion properties at maintained extension after 28 days water immersion [b], adhesion/cohesion properties at maintained extension after 28 days salt water immersion [b]	F_C
F_A - Every batch (as defined in EN 15651–5) F_B - Every week F_C - Once per year	
[a] Only required when used in cold climate areas. [b] Not required for interior use.	
All tests shall be carried out on the same batch.	

Annex B
(normative)

Determination of the change of volume of self-levelling cold applied joint sealants

B.1 Principle

Test specimens consisting of metal moulds filled with the self-levelling cold applied joint sealant to be tested in horizontal position are submitted to room temperature and to elevated temperature. The difference between the masses and/or the volume of the tested specimens measured before and after exposure to the temperatures are recorded.

B.2 Apparatus and materials

B.2.1 Balance, capable of weighing the suspended test specimens immersed in air and in distilled water and accurate to ≤ 1 mg.

B.2.2 Hydrostatic balance, with an accuracy of 1 mg.

B.2.3 Device to suspend the mould in horizontal position for example with magnetic fixation.

B.2.4 Mould from metal, with an internal diameter of (30 ± 1) mm and a depth of at least (8,0 ± 0,1) mm.

B.2.5 Container for the immersion of the test specimens in water.

B.2.6 Ventilated oven, convection-type, capable of being controlled at (70 ± 2) °C having an air exchange rate of (30 ± 5) times per hour.

B.3 Preparation of test specimens

The balance with the suspended device for suspension of the mould is adjusted to zero (TARA) and the mass of the empty mould is determined in air (m_1) and in water (m_2). After drying the mould thoroughly the mould is filled with the self levelling sealant with a thickness of about 8 mm. Immediately after filling the mass is determined again in air (m_3) and immersed in water (m_4). Take care that the level of immersion of the device for suspension of the mould is always the same.

B.4 Test procedure

After preparation and weighting, store the test specimens in horizontal position under the following conditions:

a) 28 days in normal climate conditions at (23 ± 2) °C and (50 ± 5) % r.h;

b) 7 days in at (70 ± 2) °C;

c) 24 h in normal climate conditions at (23 ± 2) °C and (50 ± 5) % r.h.

Following storage, weight the specimens immediately in air (m_5) and in water (m_6).

B.5 Calculation and expression of results

B.5.1 Change in mass

For each test specimen, the change in mass, Δm, expressed as a percentage, shall be calculated using the following formula:

$$\Delta m = \frac{m_5 - m_3}{m_3 - m_1} \times 100 \quad \text{(B.1)}$$

where

m_1 is the mass, in grams of the metal mould and the suspension device before filling with sealant, measured in air;

m_3 is the mass, in grams of the metal mould and the suspension device immediately after filling with sealant, measured in air;

m_5 is the mass, in grams of the metal mould and the suspension immediately after conditioning, measured in air.

The arithmetic mean of the change in mass of the three specimens shall be taken as the test result.

B.5.2 Change in volume

For each test specimen, the change in mass, ΔV, expressed as a percentage, shall be calculated using the following formula:

$$\Delta V = \frac{(m_5 - m_6) - (m_3 - m_4)}{(m_3 - m_4) - (m_1 - m_2)} \times 100 \quad \text{(B.2)}$$

where

m_2 is the mass, in grams of the metal mould and the suspension device before filling with sealant, measured in water;

m_4 is the mass, in grams of the metal mould and the suspension device immediately after filling with sealant, measured in water;

m_6 is the mass, in grams of the metal mould and the suspension device immediately after conditioning, measured in water.

The arithmetic mean of the change in volume of the three specimens shall be taken as the test result.

Annex ZA
(informative)

Relationship of this European Standard with Regulation (EU) No.305/2011

(When applying this standard as a harmonized standard under Regulation (EU) No. 305/2011, manufacturers and Member States are obliged by this regulation to use this Annex)

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under standardization request M/474 "Sealants for non-structural use in joints in buildings and pedestrian walkways" given to CEN and CENELEC by the European Commission (EC) and the European Free Trade Association (EFTA).

When this European standard is cited in the Official Journal of the European Union (OJEU), under Regulation (EU) No 305/2011, it shall be possible to use it as a basis for the establishment of the Declaration of Performance (DoP) and the CE marking, from the date of the beginning of the co-existence period as specified in the OJEU.

Regulation (EU) No 305/2011, as amended, contains provisions for the DoP and the CE marking.

Table ZA.1 — Relevant clauses for sealants for movement joints in floors for exterior and/or interior use

Product:	Sealants for movement joints in floors for exterior and/or interior use		
Intended use:	Sealants for non-structural joints in floors		
Essential characteristics	**Clauses of this Standard related to essential characteristics**	**Classes and/or threshold levels**	**Notes**
Reaction to fire	4.6	Class A1 to F	Classified acc. to EN 13501–1 after being tested acc. to relevant test standards given therein
Release of chemicals dangerous to the environment and health	4.5	-	Evaluation
WATER TIGHTNESS and **AIR TIGHTNESS**			
a) Tensile properties at maintained extension	4.3.1	NF	Tested acc. to EN ISO 8340 and expressed as Pass/Fail criteria
b) Loss of Volume	4.3.1	≤ 10 % or ≤ 15 %	Tested acc. to EN ISO 10563 or adapted EN ISO 10563 (see Annex B) and expressed as a declared loss of volume (in %)
c) Tear resistance	4.3.1	NF	Tested acc. to modified EN ISO 8340 and expressed as Pass/Fail criteria
d) Adhesion/cohesion properties at maintained extension after 28 days water immersion [a]	4.4.1	NF, change of secant modulus: ≤ 50 %	Tested acc. to modified EN ISO 10590 and expressed as Pass/Fail criteria

e) Adhesion/cohesion properties at maintained extension after 28 days salt water immersion [b]	4.4.1	NF	Tested acc. to modified EN ISO 10590 and expressed as Pass/Fail criteria
f) Tensile properties (i.e. secant modulus) at (−30 ± 2)°C for cold climate areas [b]	4.3.2	≤ 0,9 MPa	Tested according to modified EN ISO 8339 and expressed as a declared value
g) Tensile properties at maintained extension at (−30 ± 2)°C for cold climate areas [b]	4.3.2	NF	Tested acc. to EN ISO 8340 and expressed as Pass/Fail criteria
Durability	5	-	Declared test results
NOTE Depending on the performance requirements of the joint design, these minimum requirements may not be sufficient. Then a sealant of higher performance shall be used (see classes in 4.3, Table 3).			
[a] Not required for interior use. [b] Additional requirements for non-structural sealants used in joints in cold climate areas.			

ZA.2 System of Assessment and Verification of Constancy of Performance (AVCP)

The AVCP systems of the non-structural sealants for exterior and/or interior movement joints in floors indicated in Table ZA.1 can be found in the EC legal act adopted by the EC: Decision 2011/19/EU (OJL page L11/49 of 15.1.2011).

Micro-enterprises are allowed to treat products under AVCP system 3 covered by this standard in accordance with AVCP system 4, applying this simplified procedure with its conditions, as foreseen in Article 37 of Regulation (EU) No.305/2011.

ZA.3 Assignment of AVCP tasks

The AVCP systems of the non-structural sealants for exterior and/or interior movement joints in floors as provided in Tables ZA.1 are defined in Tables ZA.3.1 to ZA.3.3 resulting from application of the clauses of this or other European Standards indicated therein. The content of the tasks assigned to the notified body shall be limited to those essential characteristics, if any, as provided for in Annex III of the relevant standardization request and to those that the manufacturer intends to declare.

Taking into account the AVCP systems defined for the products and the intended uses the following tasks are to be undertaken by the manufacturer and the notified body respectively for the assessment and verification of the constancy of performance of the product.

Table ZA.3.1 — Assignment of AVCP tasks for the sealants for non-structural joints in floors under system 3 and of Euroclasses A1*, A2*, B*, C* subject to fire regulations under system 1

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared	7.3 with link to 5.3 of EN 15651–5:2017
	Further testing of samples taken at the manufacturing plant by the manufacturer in accordance with the prescribed test plan	Essential characteristics of Table ZA.1 relevant for the intended use which are declared	7.3 with link to 5.3 of EN 15651–5:2017
Tasks for a notified laboratory	The notified laboratory shall assess the performance on the basis of testing (based on sampling carried out by the manufacturer), calculation, tabulated values or descriptive documentation of the construction product	Essential characteristics of Table ZA.1 relevant for the intended use except reaction to fire	7.2 with link to 5.2 of EN 15651–5:2017
Tasks for the notified product certification body	An assessment of the performance of the construction product carried out on the basis of testing (including sampling), calculation, tabulated values or descriptive documentation of the product	Reaction to fire	7.2 with link to 5.2 of EN 15651–5:2017
	Initial inspection of manufacturing plant and of FPC	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared, namely reaction to fire Documentation of the FPC.	7.3 with link to 5.3 of EN 15651–5:2017
	Continuing surveillance, assessment and evaluation of FPC	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared, namely reaction to fire. Documentation of FPC	7.3 with link to 5.3 of EN 15651–5:2017

Table ZA.3.2 — Assignment of AVCP tasks for the sealants for non-structural joints in floors under system 3 and of Euroclasses A1, A2**, B**, C**, D, E subject to fire regulations under system 3**

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared	7.3 with link to 5.3 of EN 15651–5:2017
Tasks for a notified laboratory	The notified laboratory shall assess the performance on the basis of testing (based on sampling carried out by the manufacturer), calculation, tabulated values or descriptive documentation of the construction product	Essential characteristics of Table ZA.1 relevant for the intended use which are declared, and as indicated in Annex III of the standardization request	7.2 with link to 5.2 of EN 15651–5:2017

Table ZA.3.3 — Assignment of AVCP tasks for the Sealants for non-structural joints in floors under system 3 and of Euroclasses (A1 to E)*, F subject to fire regulations under system 4**

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use	7.3 with link to 5.3 of EN 15651–5:2017
	An assessment of the performance of the construction product on the basis of testing, calculation, tabulated values or descriptive documentation of that product	Reaction to fire	7.2 with link to 5.2 of EN 15651–5:2017
Tasks for a notified laboratory	The notified laboratory shall assess the performance on the basis of testing (based on sampling carried out by the manufacturer), calculation, tabulated values or descriptive documentation of the construction product	Essential characteristics of Table ZA.1 relevant for the intended use which are declared except reaction to fire, and as indicated in Anne III of the standardization request	7.2 with link to 5.2 of EN 15651–5:2017

Bibliography

[1] EN 13823, *Reaction to fire tests for building products — Building products excluding floorings exposed to the thermal attack by a single burning item*

[2] EN ISO 9046, *Building construction - Jointing products - Determination of adhesion/cohesion properties of sealants at constant temperature (ISO 9046)*

[3] EN ISO 10591, *Building construction - Sealants - Determination of adhesion/cohesion properties of sealants after immersion in water (ISO 10591)*

[4] ISO 3507:1999, *Laboratory glassware — Pyknometers*

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