



BSI Standards Publication

## Hot applied joint sealants

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Part 7: Function testing of joint sealants

## National foreword

This British Standard is the UK implementation of EN 13880-7:2019. It supersedes [BS EN 13880-7:2003](#), which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/510/3, Materials for concrete roads.

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

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### **Amendments/corrigenda issued since publication**

Date	Text affected
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English Version

## Hot applied joint sealants - Part 7: Function testing of joint sealants

Produits de scellement de joints appliqués  
à chaud - Partie 7 : Test fonctionnel sur  
produits de scellement de joints

Heiß verarbeitbare Fugenmassen - Teil 7:  
Funktionsprüfung von Fugenmassen

This European Standard was approved by CEN on 25 February 2019.

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## European foreword

This document (EN 13880-7:2019) has been prepared by Technical Committee CEN/TC 227 “Road materials”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by October 2019, and conflicting national standards shall be withdrawn at the latest by October 2019.

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

This document supersedes [EN 13880-7:2003](#).

This European Standard is one of a series of standards as listed below:

- [EN 13880-1](#), *Hot applied joint sealants — Part 1: Test method for the determination of density at 25 °C*
- [EN 13880-2](#), *Hot applied joint sealants — Part 2: Test method for the determination of cone penetration at 25°C*
- [EN 13880-3](#), *Hot applied joint sealants — Part 3: Test method for the determination of penetration and recovery (resilience)*
- [EN 13880-4](#), *Hot applied joint sealants — Part 4: Test method for the determination of heat resistance — Change in penetration value*
- [EN 13880-5](#), *Hot applied joint sealants — Part 5: Test method for the determination of flow resistance*
- [EN 13880-6](#), *Hot applied joint sealants — Part 6: Method for the preparation of samples for testing*
- [EN 13880-7](#), *Hot applied joint sealants — Part 7: Function testing of joint sealants*
- [EN 13880-8](#), *Hot applied joint sealants — Part 8: Test method for the determination of the change in weight of fuel resistance joint sealants after fuel immersion*
- [EN 13880-9](#), *Hot applied joint sealants — Part 9: Test method for the determination of compatibility with asphalt pavements*
- [EN 13880-10](#), *Hot applied joint sealants — Part 10: Test method for the determination of adhesion and cohesion following continuous extension and compression*
- [EN 13880-11](#), *Hot applied joint sealants — Part 11: Test method for the preparation of asphalt test blocks used in the function test and for the determination of compatibility with asphalt pavements*
- [EN 13880-12](#), *Hot applied joint sealants — Part 12: Test method for the manufacture of concrete test blocks for bond testing (recipe methods)*
- [EN 13880-13](#), *Hot applied joint sealants — Part 13: Test method for the determination of the discontinuous extension (adherence test)*

The following significant changes have been introduced in this edition:

- Accuracy requirements of apparatus have been added.
- Measurement device to measure depth of failures has been added.
- The conditioning procedure has been removed.
- Procedure for sealant type N2 and F2 has been added.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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 document describes a function test for hot-applied joint sealants intended to be used in areas where the joints are subjected to combined conditions of temperature  $\leq -20$  °C and crack joint movement  $\leq 35$  % in construction joints as well as in spontaneously formed cracks in road and airfield pavements.

## 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.

[EN 13880-6](#), *Hot applied joint sealants — Part 6: Method for the preparation of samples for testing*

[EN 13880-11](#), *Hot applied joint sealants — Part 11: Test method for the preparation of asphalt test blocks used in the function test and for the determination of compatibility with asphalt pavements*

[EN 13880-12](#), *Hot applied joint sealants — Part 12: Test method for the manufacture of concrete test blocks for bond testing (recipe methods)*

[EN 14188-1](#), *Joint fillers and sealants — Part 1: Specifications for hot applied sealants*

[ISO 5893](#), *Rubber and plastics test equipment — Tensile, flexural and compression types (constant rate of traverse) — Specification*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in [EN 14188-1](#) and the following apply.

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

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

### 3.1

#### **adhesion failures**

part of the surface area of the test blocks from which the hot applied joint sealant has completely separated

### 3.2

#### **cohesion failures**

cracks in the superficial areas on the faces of the hot applied joint sealant

## 4 Principle

This method is intended to serve as an accelerated test for the assessment of damage to hot applied sealants resulting from fluctuating temperatures, water-spraying and simultaneous dynamic loads.

## 5 Apparatus

**5.1 Tensile test rig**, which allows the test specimens to be inserted into holding clamps, conveniently and without disturbing the test specimens before, during or after removal. The test rig shall be capable

of testing one specimen or a number of test specimens simultaneously and shall not be significantly affected by the failure of one or more test specimens.

The testing rig shall have the following characteristics:

- be motor driven through positive drives without slip or significant backlash, so that cycles of extension and compression are carried out steadily and automatically;
- be capable of moving the test specimens smoothly and linearly, so that their alignment is maintained at all times without subjecting them to torsion, bending, shock, or significant vibration;
- under the specified conditions in [Clause 8](#);
- be capable of measuring and recording the changes in force;
- The accuracy of the test rig shall be class 2A according to [ISO 5893](#).

Testing may also be carried out at differing ratios of temperature, deformation and movement in accordance with the sealant manufacturer's recommendations provided that the criteria are within the capabilities of the test rig described above.

**5.2 Climate chamber**, capable of reducing or raising the temperature of a full complement of test specimens to the specified temperature throughout the period of examination.

The chamber shall be fitted with a time controlled device to allow the specimen to be subjected to water spraying for 20 % of the total conditioning time at the appropriate temperature as provided for in [Clause 7](#).

**5.3 Temperature indicator**, consisting of an electronic device capable of measuring temperatures in the range of  $-30\text{ °C}$  to  $+30\text{ °C}$  to an accuracy of  $\pm 1\text{ °C}$ ;

**5.4 Depth gauge**, device to measure depth of failures to the nearest 1 mm.

## 6 Preparation and conditioning of test specimens

**6.1** Prepare the test specimens according to [EN 13880-6](#).

**6.2** Concrete test blocks in accordance with [EN 13880-12](#) and asphalt test blocks in accordance with [EN 13880-11](#) shall be used. The dimensions of the test blocks are  $(75 \pm 1)$  mm length,  $(25,0 \pm 0,5)$  mm width and  $(12,0 \pm 0,5)$  mm height. The concrete test blocks shall have a moisture content within the limits of  $(5,5 \pm 1,5)$  %.

**6.3** Use a suitable mould to place two test blocks exactly opposite each other for a joint width of  $(12,0 \pm 0,5)$  mm.

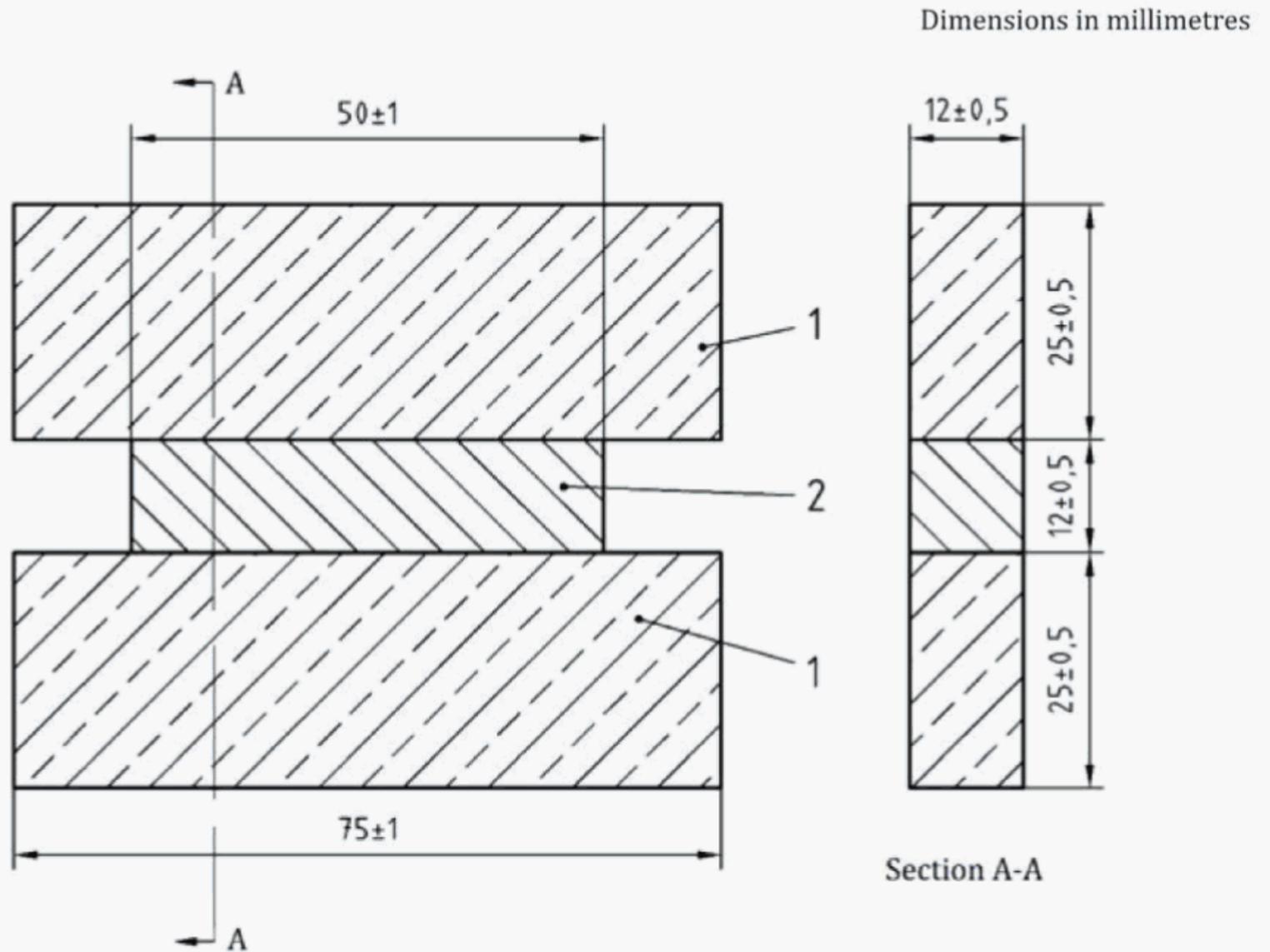
**6.4** If a primer is used, apply it to the sawn test faces of the test blocks in accordance with the manufacturer's instructions.

**6.5** Place a top-mask on the mould so that the joint can be overfilled when the test sample is poured into it.

**6.6** Any adhering of the test sample to the borders of the joint shall be avoided.

**6.7** Allow the test specimens to cool at laboratory temperature for 2 h after which remove the excess test sample using a heated knife so that the test specimens are flush with the surface of the test blocks.

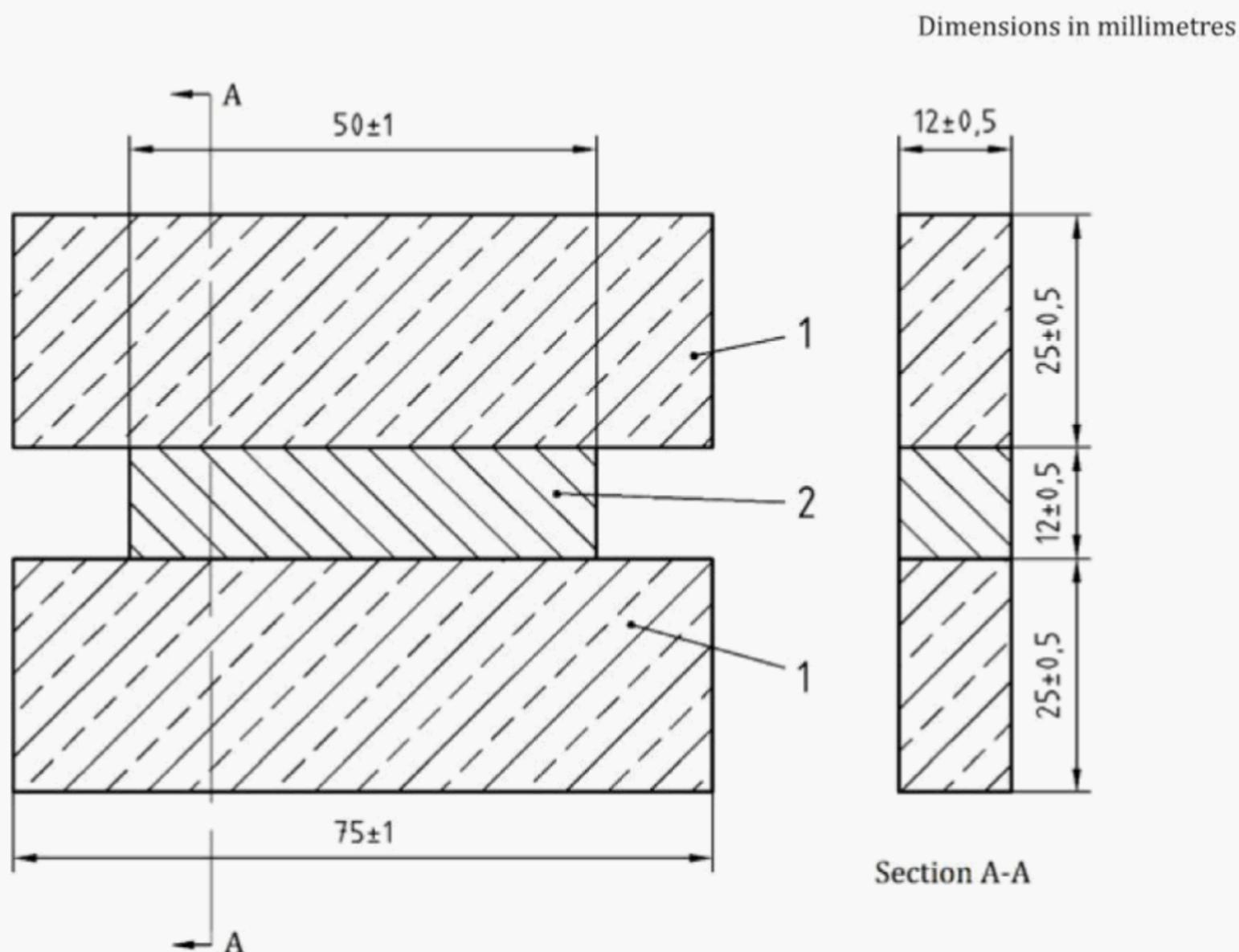
6.8 Three test specimens shall be prepared for each test. The test specimens shall be as described in [Figures 1](#) and [2](#).



**Key**

- 1 concrete test blocks according to [EN 13880-12](#)
- 2 hot applied joint sealant

**Figure 1 — Test specimen of concrete test blocks**



**Key**

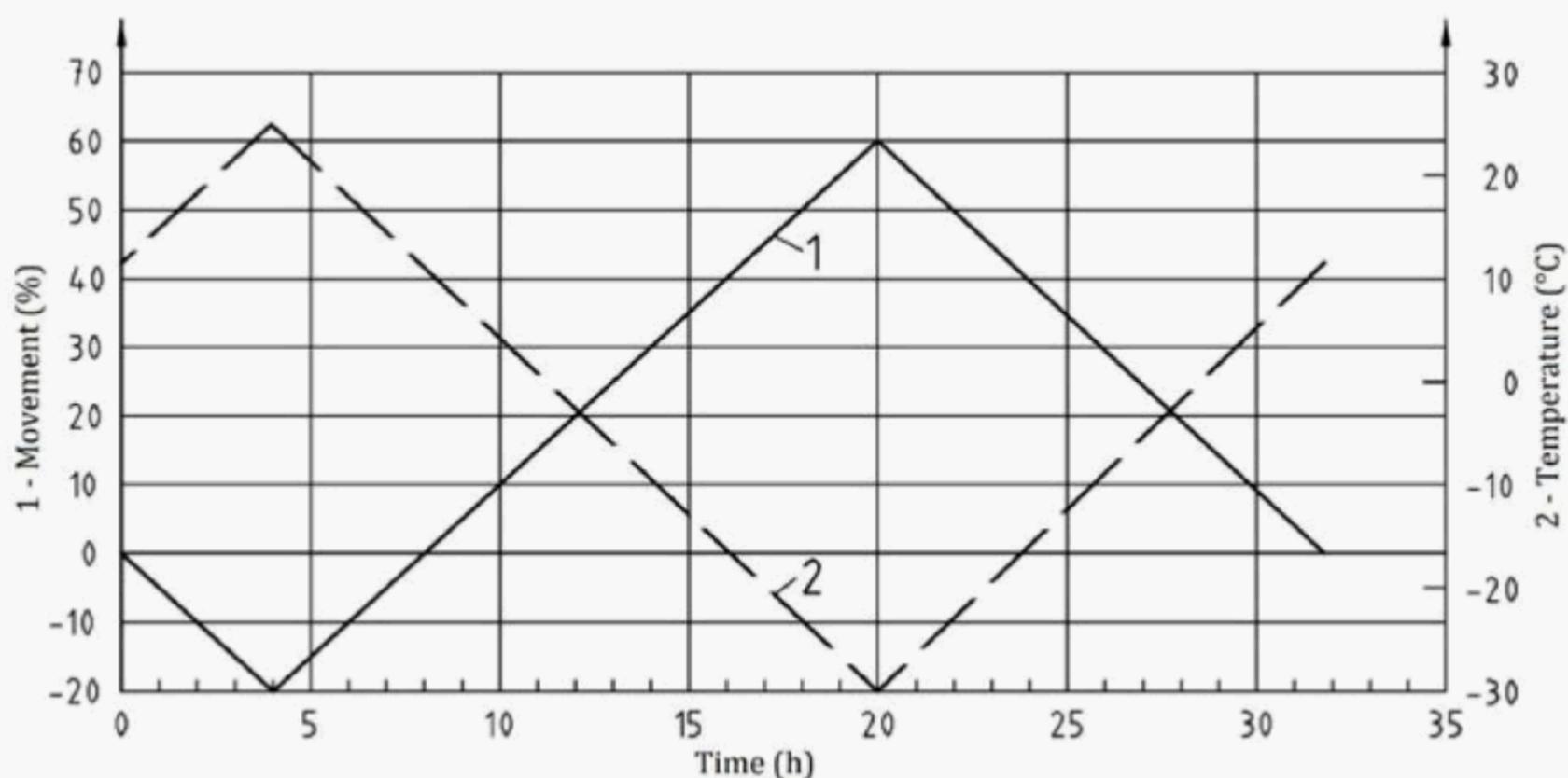
- 1 asphalt concrete blocks according to [EN 13880-11](#)
- 2 hot applied joint sealant

**Figure 2 — Test specimen of asphalt test blocks**

**7 Test procedure**

The test specimens shall be subjected to the test cycle (see [Figure 3](#)) as described below:

- Temperature cycling range: Type N 1 and F 1: starting point  $(11 \pm 1) ^\circ\text{C}$ ;  
Type N 2 and F 2: starting point  $(14 \pm 1) ^\circ\text{C}$ ;
- rate of deformation:  $(0,010 \pm 0,002) \text{ mm/min}$ ;
- movement: Type N 1 and F 1: elongation 60 % (7,2 mm), compression 20 % (2,4 mm);
- movement: Type N 2 and F 2: elongation 15 % (1,8 mm), compression 5 % (0,6 mm);
- number of cycles: 3 cycles;
- water spray: 20 % of the total time at the temperature intervals  $5 ^\circ\text{C}$  to  $20 ^\circ\text{C}$  and  $20 ^\circ\text{C}$  to  $5 ^\circ\text{C}$  (1 min water spray followed by 4 min dry period).



**Figure 3 — Example: One test cycle for Type N1/F1**

The force shall be recorded during the entire test procedure.

The maximum force of the three test cycles shall be recorded.

Directly after completion of the test cycles raise the temperature to room temperature ( $23 \pm 2$ ) °C for a duration of one hour and perform the following visual inspections:

- the joint shall be elongated to the maximum specified elongation at  $(5,5 \pm 0,7)$  mm/min and inspected to check for visible damage and fractures, such as adhesion or cohesion fractures;
- compress the joint to the original dimensions;
- a 3 mm deep notch in one corner of the joint shall be made with a sharp knife;
- the joint shall once more be elongated to the maximum elongation and inspected with respect to visible damage and fractures such as adhesion or cohesion failure. The depths of any failures are measured to the nearest 1 mm perpendicular to the joint surface.

## 8 Calculation and expression of results

### 8.1 Maximum tension

Calculate the maximum tension according to the following [Formula \(1\)](#):

$$\sigma = \frac{F}{A} \quad (1)$$

where

- $\sigma$  is the maximum tension, in newton per square millimetres (N/mm<sup>2</sup>);
- $F$  is the maximum force, in newton (N);
- $A$  is the area, in square millimetres (mm<sup>2</sup>).

Report the maximum tension as the average of the three test specimens, rounded to the nearest 0,1 N/mm<sup>2</sup>.

## **8.2 Failures**

Report the depth [mm] of any adhesive and cohesive failures.

## **9 Test report**

The test report shall state that the test was carried out in accordance with this European Standard and shall include the following information:

- a) name of sample and related primers if used;
- b) source of sample, batch number and date of manufacture where appropriate or expiry date;
- c) date of testing;
- d) name of laboratory;
- e) reference to the test cycle and testing conditions;
- f) test results.



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