BRITISH STANDARD

BS EN
14187-9:2006

Cold applied joint sealants — Test methods —

Part 9: Function testing of joint sealants

The European Standard EN 14187-9:2006 has the status of a British Standard

ICS 93.080.20

BSI
British Standards

National foreword

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The UK participation in its preparation was entrusted by Technical Committee B/510, Road materials, to Subcommittee B/510/3, Materials for concrete roads, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 10, an inside back cover and a back cover.

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EUROPEAN STANDARD

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EN 14187-9

February 2006

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English Version

Cold applied joint sealants - Test methods - Part 9: Function testing of joint sealants

Mastics pour joints appliqués à froid - Méthodes d'essai - Partie 9 : Fonctionnalité des mastics pour joints

Kalt verarbeitbare Fugenmassen - Prüfverfahren - Teil 9: Funktionsprüfung von Fugenmassen

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Ref. No. EN 14187-9:2006: E

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Foreword

This European Standard (EN 14187-9:2006) has been prepared by Technical Committee CEN/TC 227 “Road materials”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by August 2006, and conflicting national standards shall be withdrawn at the latest by December 2006.

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

EN 14187-1, *Cold applied joint sealants - Part 1:Test method for the determination of rate of cure*

EN 14187-2, *Cold applied joint sealants - Part 2:Test method for the determination of tack free time*

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

EN 14187-4, *Cold applied joint sealants - Part 4: Test method for the determination of the change in mass and volume after immersion in test fuel*

EN 14187-5, *Cold applied joint sealants - Part 5: Test method for the determination of the resistance to hydrolysis*

EN 14187-6, *Cold applied joint sealants - Part 6: Test method for the determination of the adhesion/cohesion properties after immersion in chemical liquids*

EN 14187-7, *Cold applied joint sealants - Part 7: Test method for the determination of the resistance to flame*

EN 14187-8, *Cold applied joint sealants - Part 8: Test method for the determination of the artificial weathering by UV-irradiation*

EN 14187-9, *Cold applied joint sealants — Part 9: Test method for the function testing of joint sealants*

No existing European Standard is superseded.

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

1 Scope

This European Standard specifies a function test for cold applied joint sealants intended for use in joints in roads and airfield pavements in cold climate areas where the total joint movement can be greater than 35 % and the temperature can go below –25 °C.

2 Normative references

The following referenced documents are indispensable for the application 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 13880-12, *Hot applied joint sealants - Part 12: Test method for the manufacture of concrete test blocks for bond testing (recipe methods)*

EN 14187-2, *Cold applied joint sealants - Part 2:Test method for the determination of tack free time*

EN 26927:1990, *Building construction - Jointing products - Sealants - Vocabulary (ISO 6927:1981)*

EN ISO 7390, *Building construction - Jointing products - Determination of resistance to flow of sealants (ISO 7390:2003)*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 26927:1990 apply.

4 Principle

This method describes an accelerated test for the assessment of damage of the cold applied sealants arising from the influence of fluctuating temperatures, water-spraying and simultaneous dynamic load.

5 Apparatus and materials

5.1 Concrete test blocks

Concrete supports in accordance with EN 13880-12, for the preparation of the test specimens, of dimensions as shown in Figure 1. Two supports are required for each test specimen.

5.2 Tensile/compression test rig

Apparatus, which allows specimens to be inserted into holding clamps, conveniently and without disturbing the specimens before, during or after removal shall be used. The apparatus shall be capable of testing a number of test specimens simultaneously and shall not be significantly affected by the failure of one or more specimens.

The apparatus 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 blocks and specimens smoothly and linearly, so that their alignment is maintained at all times without subjecting them to torsion, bending, shock, or significant vibration;

— be capable of exerting on each specimen an appropriate tensile/compression force and extending the specimen uniformly under the specified conditions according to 7.2 and 7.4;

— be capable of measuring and recording the force with an uncertainty of maximum 2 % after application of the force to each system;

— the tolerance of the movement shall not exceed 0,01 mm.

5.3 Climate chamber

Climate chamber shall be capable of reducing the temperature of the specimens to the specified temperature in the range from –30 °C to 30 °C drop/rise throughout the period of examination.

The chamber shall be fitted with a time controlled device to allow the specimen to be subjected to spraying with distilled or demineralized water for 20 % of the total conditioning time at the fixed temperatures as provided in 7.4.

5.4 Temperature indicator

The temperature indicator shall consist of an electronic device capable of measuring temperatures in the range of –40 °C to 50 °C to an accuracy of ± 1 °C.

6 Preparation of the test specimens

For each test, at least three test specimens shall be prepared.

Prepare the test specimens in accordance with the manufacturer's instructions including the application of a primer, etc. where stipulated. The test specimens shall be as shown in Figure 1.

Prior to conditioning, the gelation time of the sealant shall be determined in the following way.

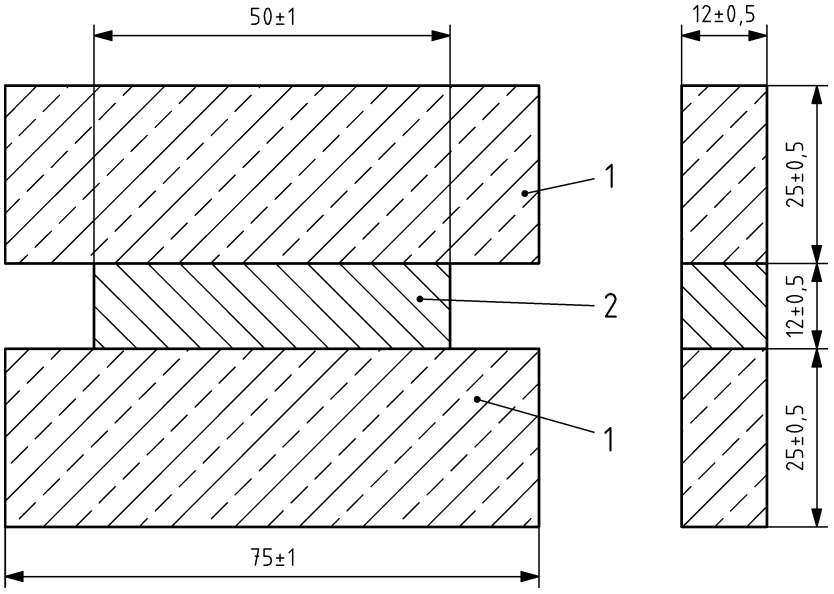
Measure tack free time in accordance with EN 14187-2. Thereafter, prepare test specimens in accordance with EN ISO 7390.

After the preparation, place test specimens in standard conditions ((23 ± 2) °C, (50 ± 5) % r. h.).

Examine the first test specimen as described in EN ISO 7390, procedure B after the time equal to the tack free time. If no flow is observed, the gelation time is equal to the tack free time. In other cases, the examination shall be repeated in steps of additional 10% of the tack free time until no flow is observed.

Prepare the test specimens and immediately after the sealant has gelled carefully mount them in the tensile test rig.

Dimensions in millimetres



Key

1 Concrete test blocks
2 Sealant

Figure 1 — Test specimen mounted between the concrete test blocks

7 Procedure

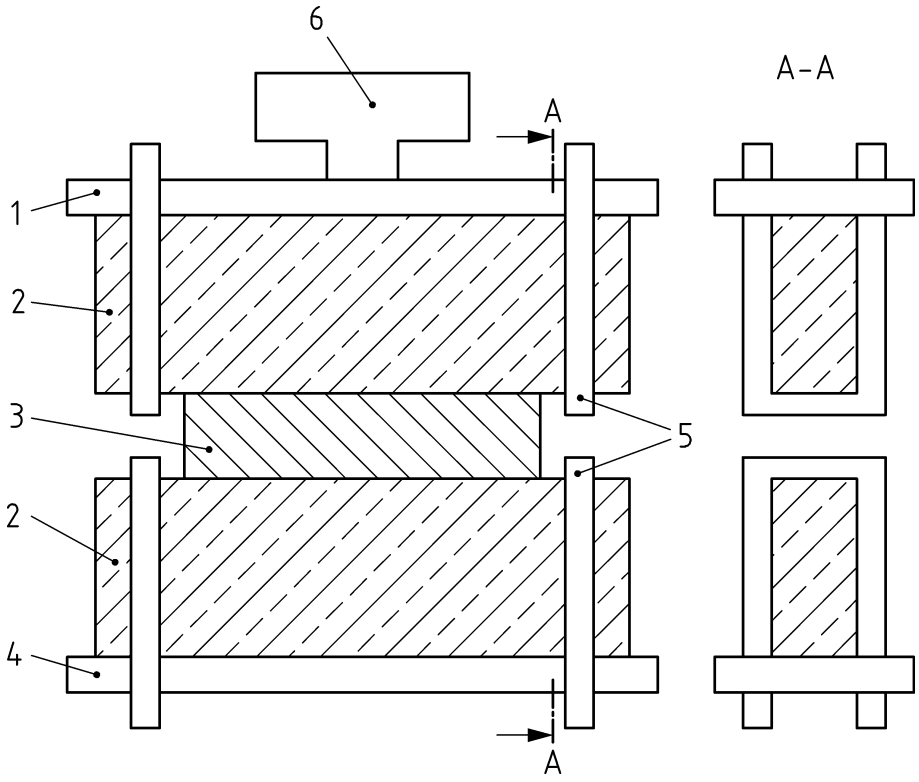
7.1 Conditioning cycle

Prior to testing, the test specimens shall be subjected to the conditioning procedure described below.

Mount the test specimens on a tensile test rig in the climate chamber as shown in Figure 2.

Subject the test specimens to the following conditioning cycle shown in Figure 3.

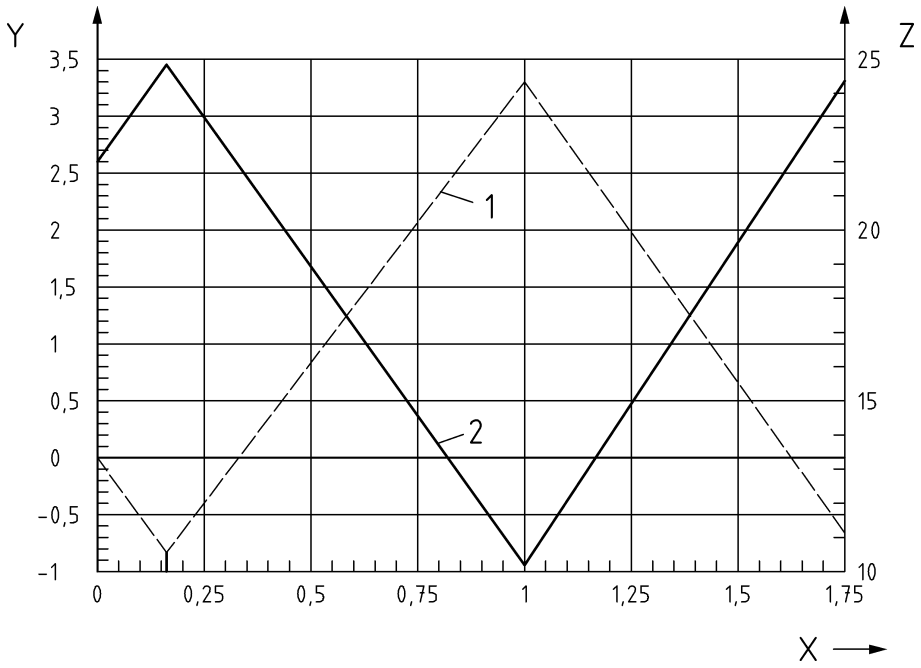
Temperature cycling:	minimum temperature	(10 ± 1) °C,	
	maximum temperature	(25 ± 1) °C.	
Rate of deformation:	(0,010 ± 0,002) mm/min.		
Movement:	Extension	(0,40 ± 0,03) mm	(3,33 ± 0,25) %,
	Compression	(0,10 ± 0,03) mm	(0,83 ± 0,25) %.
Water spraying:	20 % of total time (1 min water spraying, 4 min pause),		
	Water temperature	10 °C to 20 °C.	



Key

1 Stationary beam
2 Concrete test blocks according to EN 13880-12
3 Sealant
4 Moveable beam
5 Grips
6 Load cell

Figure 2 — Test specimen mounted in the test rig



Key

X Time, in hours
Y Compression, in percent
Z Temperature, in degrees Celsius
1 Movement
2 Temperature, in degrees Celsius

Figure 3 — Conditioning cycle

This conditioning cycle shall be repeated for at least 3 days, or longer if the manufacturer recommends a longer curing time to have a fully cured sealant. After conditioning, the test specimens shall be subjected to the test procedure in accordance with 7.4.

7.2 After conditioning

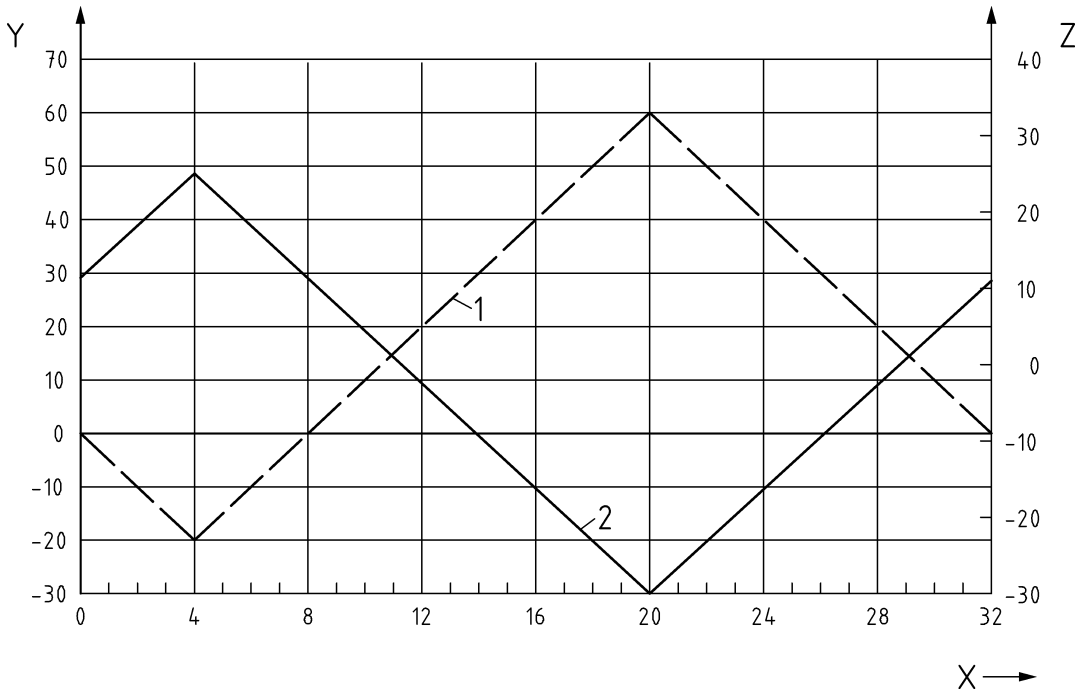
After completion of the conditioning cycle the temperature shall be lowered to (11 ± 1) °C without moving the test specimens.

7.3 Test procedure

The test specimens shall be subjected to the test cycle (see Figure 4) as described below:

Temperature cycling range:	starting point	(11 ± 1) °C,
	maximum temperature	(24 ± 1) °C,
	minimum temperature	(–30 ± 1) °C.
Rate of deformation:	(0,010 ± 0,002) mm/min.	
Movement:	Compression	20 % (2,4 mm),
	Extension	60 % (7,2 mm).
Number of cycles:	3	

Water spray: 20 % of the total time at the temperature intervals ((5 to 20) ± 1)°C and ((20 to 5) ± 1) °C.



Key

X Time, in hours
Y Compression < Movement > Extension, in percent
Z Temperature, in degrees Celsius
1 Movement
2 Temperature, in degrees Celsius

Figure 4 — Test cycle

The force shall be continuously recorded.

After completion of the test cycles the temperature shall be raised to (23 ± 2) °C and the following inspections shall be performed:

— Extend the specimens to 19,2 mm (60 %) and inspect for visible damage and fractures, such as adhesion- or cohesion-failures.

— Bring the specimens to the original dimensions.

— Cut a 3 mm deep notch with a sharp knife 1 mm from the concrete blocks at the short side of the joint. Extend the specimen to 19,2 mm (60 %) and inspect it after 5 min with respect to further visible damage and fracture such as adhesion- or cohesion-failure.

8 Calculation and expression of results

The force at –30 °C in each cycle and for each test specimen shall be converted to tensile stress according to the formula:

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

where

σ is the tensile stress, in newton per square millimetre;

F is the force, in newton;

A is the area, in square millimetre.

The maximum tensile stress at –30 °C shall be reported.

After completion of the test cycles the result of the visual inspections shall be reported as visible damage and/or fracture, such as adhesion- and/or cohesion-failure.

9 Test report

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

a) Name and type of the cold applied joint sealant;

b) name and type of primer if applicable;

c) source of sample, batch number and date of manufacture where appropriate or expiry date;

d) date of testing, name of laboratory;

e) number of specimens tested;

f) conditions under which the test specimens were prepared: curing temperature, total curing time, time to gelling;

g) test cycle and testing conditions;

h) test results: assessment of adhesion, maximum stress at –30 °C, type of failures adhesion/cohesion if any.

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