BS EN 14187-6:2017

BSI Standards Publication

Cold applied joint sealants — Test method

Part 6: Determination of the adhesion/ cohesion properties after immersion in test fuels and liquid chemicals

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National foreword

This British Standard is the UK implementation of EN 14187-6:2017. It supersedes BS EN 14187-6:2003 which is withdrawn.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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English Version

Cold applied joint sealants - Test method - Part 6: Determination of the adhesion/cohesion properties after immersion in test fuels and liquid chemicals

Mastics pour joints appliqués à froid - Méthodes d'essai - Partie 6 : Détermination des proprietés d'adhesivité/cohésion aprés immersion dans des liquides chimiques liquides

Kalt verarbeitbare Fugenmassen - Prüfverfahren - Teil 6: Bestimmung der Haft- und Dehnungseigenschaften nach Lagerung in flüssigen Chemikalien

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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (EN 14187-6:2017) 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of an identical text or by endorsement, at the latest by September 2017, and conflicting national standards shall be withdrawn at the latest by September 2017.

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 14187-6:2003.

Apart from editorial changes the following major changes have been made in this revision:

a) Change of the title;

b) Table 1, Change of the test fuels and addition of de-icing liquids in accordance with new technical requirements.

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

EN 14187-1, *Cold applied joint sealants — Test methods — Part 1: Determination of rate of cure*.

EN 14187-2, *Cold applied joint sealants — Test methods — Part 2: Determination of tack free time*.

EN 14187-3, *Cold applied joint sealants — Test methods — Part 3: Determination of self-levelling properties*.

EN 14187-4, *Cold applied joint sealants — Test methods — Part 4: Determination of the change in mass and volume after immersion in test fuels and liquid chemicals*.

EN 14187-5, *Cold applied joint sealants — Test methods — Part 5: Determination of the resistance to hydrolysis*.

EN 14187-6, *Cold applied joint sealants — Test methods — Part 6: Determination of the adhesion/cohesion properties after immersion in test fuels and liquid chemicals*.

EN 14187-7, *Cold applied joint sealants — Test methods — Part 7: Determination of the resistance to flame*.

EN 14187-8, *Cold applied joint sealants — Test methods — Part 8: Determination of the resistance to artificial weathering by UV-irradiation*.

EN 14187-9, *Cold applied joint sealants — Test methods — Part 9: Function testing of joint sealants*.

WARNING — Attention is drawn to the health and safety at work and the need to ensure that this test is carried out under suitable environmental conditions to provide adequate protection to persons against the risk of contact or inhalation of toxic liquid chemicals.

Annex A is informative.

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 European Standard specifies a test method to determine the adhesion/cohesion properties after immersion in test fuels or liquid chemicals.

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

EN 14188-4, *Joint fillers and sealants - Part 4: Specifications for primers to be used with joint sealants*

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

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

3 Terms and definitions

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

4 Principle

The test specimen of the cold applied joint sealant is prepared in which the sealant adheres to two parallel contact surfaces. The test specimen is immersed in specified test liquids and subsequently extended to a defined width. This extension is maintained under defined conditions. Any breaks in adhesion or cohesion are recorded.

5 Apparatus and materials

5.1 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 Spacers of dimensions (12 × 12 × 12,5) mm (see Figure 1) for the preparation of test specimens.

5.3 Anti-adherent substrate, for the preparation of the test specimens.

5.4 Spacers of appropriate dimensions to hold the test specimens extended on 100 % of the original width.

5.5 Tensile testing machine capable of extending the test specimens at a rate of (5,5 ± 0,5) mm/min.

5.6 Container for immersion of the test specimens in liquid chemicals, deep enough to provide a minimum of 15 mm of the liquid chemical covering the surface of the specimens.

5.7 Test liquids with compositions as given in Table 1. In addition the relevant jet fuel, hydraulic oil, engine oil, defrosting fluid, glycol or any other liquid chemical can be used as required from the intended application (see Annex A).

Table 1 — Composition of test fuels and liquid chemicals

Chemical liquid	**Test fuel I in accordance with** EN 228 **with maximum content of 20 % bioalcohol** V-%	**Test fuel II** V-%	**Test liquid DC Ground** W-%	**Test liquid DC Aircraft** W-%	**Other liquid chemical**
Isooctane	25,0	70	—	—	in accordance with Annex A, Table A.1
Toluene	42,5	30	—	—	
Ethanol	5,0	—	—	—	
Diisobutylene	12,0	—	—	—	
Methanol	15,0	—	—	—	
Water	0,5	—	60	60	
Sodium formate [a]	—	—	40	—	
Ethylene glycol	—	—	—	40	

[a] With pH buffer, pH < 10,5 V% percent by volume W% percent by weight

6 Preparation of test specimens

Prepare three test specimens for each test liquid and test temperature. Assemble two concrete supports (5.1) and two spacers (5.2) according to Figure 1 and set up on the anti-adherent substrate (5.3).

Follow the instructions of the sealant manufacturer, for instance whether a primer is to be used.

Fill the volume between concrete supports and spacers with sealant, previously conditioned for 24 h at (23 ± 2) °C.

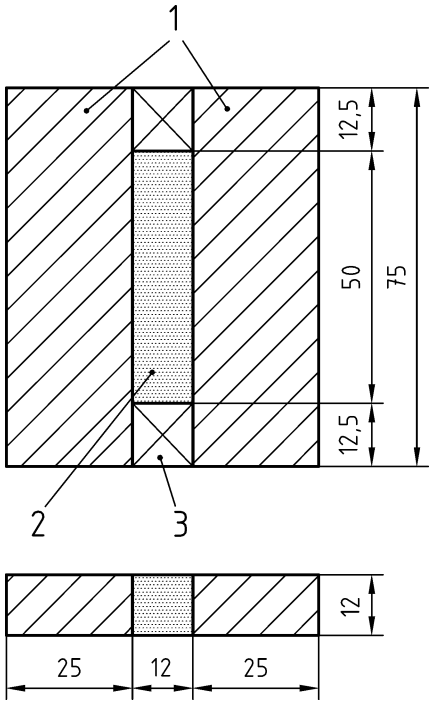
The following precautions shall be taken:

— avoid the formation of air bubbles;

— ensure that no sealant is running out at the bottom;

— trim the sealant surface so that it is flush with the faces of the support and spacers.

Dimensions in millimetres



Key

1 support from concrete
2 cold applied joint sealant
3 spacers

Figure 1 — Test specimen

7 Conditioning

Condition the test specimens in accordance with either method A or method B of EN ISO 8340. If method B is used, after conditioning store the test specimens 24 h at (23 ± 2) °C and (50 ± 5) % relative humidity before immersion in test fuel or other liquid chemical.

8 Procedure

8.1 Test fuels

Carry out the test with test fuel I or test fuel II or other liquid chemical as required (see Annex A).

8.2 Temperature of immersion

Carry out the test at one or more of the following temperatures:

— (23 ± 1) °C;

— (35 ± 1) °C;

— (50 ± 1) °C.

8.3 Test period

The period of immersion shall be 8 h, 24 h, 72 h, 7 days or 21 days.

8.4 Test procedure

After conditioning, immerse the test specimens in accordance with 8.3 in 500 ml test fuel or liquid chemical at the temperature of immersion in the container (5.6). Use a covered constant temperature water bath to maintain the container, test fuel and specimens at the required temperature.

Immediately after the period of immersion dry the specimens with a cloth, place in the tensile test machine (5.5) and extend for 100 % or 140 % of the original width in accordance with the designated movement capacity of 25 % or 35 %, at a rate of (5,5 ± 0,5) mm/min. Record the tensile modulus at 100 % extension. Maintain the extension of 100 % or 140 % for 24 h using the spacers (5.2). Record any breaks in adhesion or cohesion.

9 Test report

The test report shall include the following information:

a) reference to this European Standard;

b) name and type of the cold applied joint sealant;

c) batch of sealant from which the test specimens were produced;

d) description of the test liquid;

e) the time and temperature of immersion;

f) note of the appearance of the test specimen (i.e. cracking, delamination);

g) note of the appearance of the test liquid (i.e. discoloration, sedimentation);

h) any deviations from the specified test conditions;

i) test results;

j) date of test.

Annex A
(informative)

List of liquid chemicals

Table A.1 — Liquid chemicals

No	Chemical group	Test liquid
1	2	3
LC-1	Gasoline or super gasoline in accordance with EN 228 with maximum content of 20 % bioalcohol	42,5 Vol-% Toluene 25,0 Vol-% Isooctane 15,0 Vol-% Methanol 5,0 Vol-% Ethanol 12,0 Vol-% Diisobutylene 0,5 Vol-% Water
LC-2	Jet fuel	1. Jet fuel 100 LL 2. Jet fuel Jet-A1 with additives (NATO-code F 34)
LC-3	Light fuel oil, diesel unused engine oils unused gear oil with flash-point > 55 °C	Test liquid A 20/NP II
LC-4	All hydrocarbons (including LC-2, LC-3)	60,0 Vol-% Toluene 30,0 Vol-% Xylene 10,0 Vol-% Methylnaphthalene
LC-4a	Benzene and benzene-containing mixtures (including LC-2, LC-3 and LC-4 to LC-4b)	30,0 Vol-% Benzene 30,0 Vol-% Toluene 30,0 Vol-% Xylene 10,0 Vol-% Methylnaphthalene

No	Chemical group	Test liquid
1	2	3
LC-4b	Crude oil	Crude oil
LC-5	Mono- and multifunctional alcohols (max. 48 % methanol), glycolethers (including LC-5b)	48,0 Vol-% Methanol 48,0 Vol-% Isopropanol 4,0 Vol-% Water
LC 5a	All alcohols and glycolethers (including LC-5 and LC 5b)	Methanol
LC 5b	Mono- and multifunctional alcohols	48,0 Vol-% Ethanol 48,0 Vol-% Isopropanol 4,0 Vol-% Water
LC-6	Chlorinated hydrocarbons ≥ C_2 (including LC 6b)	Trichloroethylene
LC-6a	All chlorinated hydrocarbons = C_1 (including LC-6 and LC-6b)	Methylenedichloride
LC-6b	Aromatic chlorinated hydrocarbons	Monochlorobenzene
LC-7	All organic esters and ketones	50,0 Vol-% Ethylacetate 50,0 Vol-% Methyl-isobutylketone
LC-7a	Aromatic esters and ketones	50,0 Vol-% Salicylic-acid-methylester 50,0 Vol-% Acetophenone
LC-8	Aqueous solutions of aliphatic aldehydes up to 40 W-%	Solution of formaldehyde in water (35–40 W-%)
LC-8a	Aqueous solutions of aliphatic aldehydes up to 40 W-% (including LC-8)	50,0 Vol-% n-Butyraldehyde 50,0 Vol-% n-Heptaldehyde
LC-9	Aqueous solutions of organic acids up to 10 W-% and their salts	Aqueous acetic acid (10 W-%)
LC-9a	Aqueous solutions of organic acids exclusive formic acid and their salts	50,0 Vol-% Acetic acid 50,0 Vol-% Propionic acid
LC-10	Inorganic non oxidizing acids up to 20 W-% as well as inorganic salts in water (pH < 6) except HF and its salts	Sulfuric acid (20 W-%)
LC-11	Inorganic bases as well as inorganic salts in water (pH > 8) except ammonia and oxidizing solutions of salts	Sodium hydroxide (20 W-%)

No	Chemical group	Test liquid
1	2	3
LC-12	Aqueous solutions of inorganic non oxidizing salts with pH between 6 and 8	Sodium chloride (20 W-%)
LC-13	Amines and their salts in aqueous solutions	35,0 Vol-% Triethanolamine 30,0 Vol-% n-Butylamine 35,0 Vol-% N,N-Dimethylaniline
LC-14	Cyclic and non-cyclic ethers (inclusive LC-14a)	Tetrahydrofuran (THF)
LC-14a	Non-cyclic ethers	Diethylether

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BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

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