BRITISH STANDARD

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13880-2:2003

# Hot applied joint sealants —

## Part 2: Test method for the determination of cone penetration at 25 °C

The European Standard EN 13880-2:2003 has the status of a British Standard

ICS 93.080.20

# National foreword

This British Standard is the official English language version of EN 13880-2:2003.

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 the 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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EUROPEAN STANDARD

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# EN 13880-2

August 2003

ICS 93.080.20

English version

# Hot applied joint sealants - Part 2: Test method for the determination of cone penetration at 25°C

Produits de scellement de joints appliqués à chaud - Partie 2: Méthode d'essai pour la détermination de la pénétration au cône à 25°C

Heiß verarbeitbare Fugenmassen - Teil 2: Prüfverfahren zur Bestimmung der Konus-Penetration bei 25°C

This European Standard was approved by CEN on 2 May 2003.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

**Management Centre: rue de Stassart, 36 B-1050 Brussels**



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# Foreword

This document EN 13880-2:2003 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of an identical text or by endorsement, at the latest by February 2004, and conflicting national standards shall be withdrawn at the latest by March 2005.

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

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 selants — 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.*

prEN 13880-6, *Hot applied joint sealants — Part 6: Test 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).*

Annexe A is informative.

# 1 Scope

This European Standard describes a method for determining the cone penetration of hot applied joint sealants using a standard penetrometer fitted with a suitable penetration cone. The initial and fuel immersed penetration values are recorded using this test method as required in prEN 14188-1.

# 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1426, *Bitumen and bituminous binders — Determination of needle penetration.*

prEN 13880-6, *Hot applied joint sealants — Part 6: Test method for the preparation of samples for testing.*

prEN 14188-1:2001, *Joint fillers and sealants — Part 1:Specifications for hot applied sealants.*

# 3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in prEN 14188-1:2001 and the following apply.

**3.1**
**cone penetration value**
depth to which a standard cone penetrates the test specimen under defined conditions of mass, time and temperature

# 4 Principle

A portion of the sample is poured into two metal containers to provide the test specimens which be cooled in air and conditioned by immersion in a constant temperature water bath, together with the transfer dish.

After the period of conditioning, the transfer dish, containing the test specimens shall be taken from the water bath and placed on the penetration apparatus stand. The cone penetration test is carried out on the test specimens immediately.

# 5 Apparatus

## 5.1 Penetrometer

A penetrometer conforming to EN 1426 has been found to be suitable. To facilitate levelling, the penetrometer should be provided with level adjustment screws.

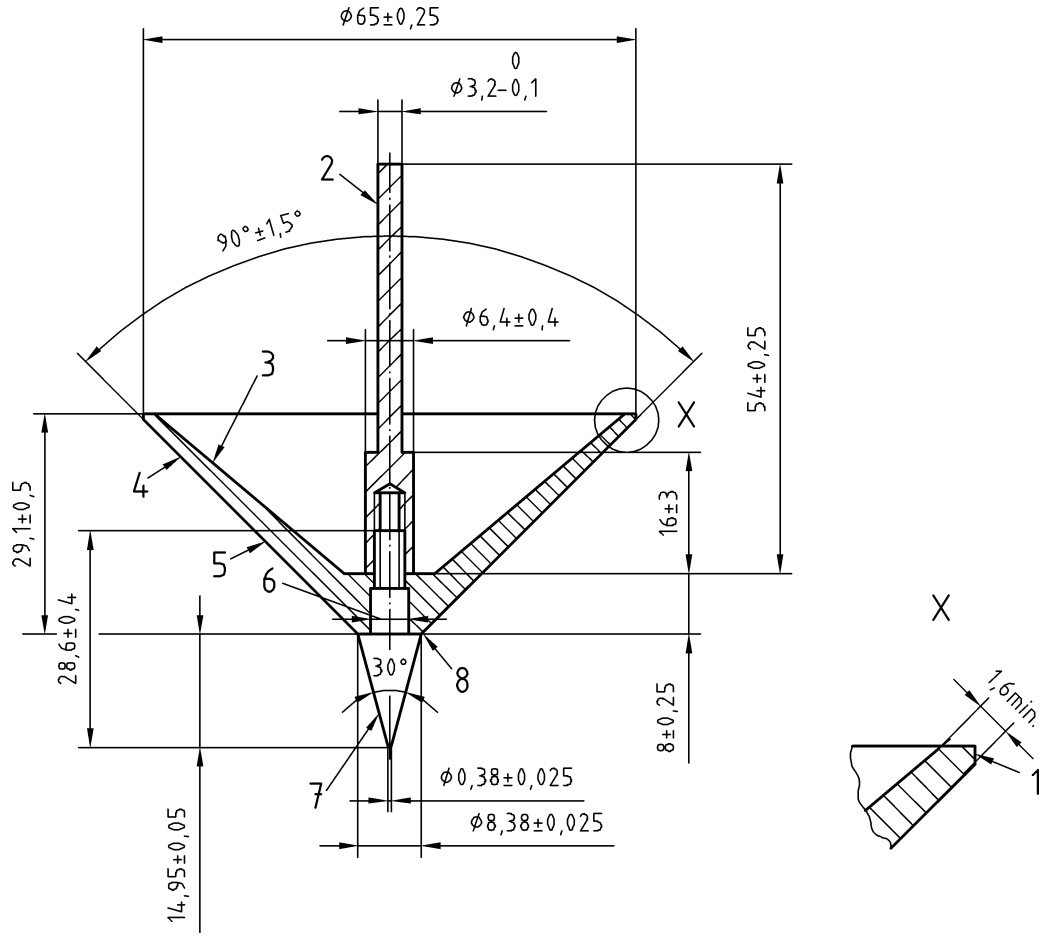
NOTE Equipment which is automatically controlled may also be used. Such equipment requires regular calibration on the correct penetration time.

## 5.2 Penetration cone

Penetration cone constructed of brass and conforming to the dimensions given in Figure 1.

The cone shall have a smooth polished finish to the outside surface and the tip. The total moving mass of the cone and attachments shall be (150,0 ± 0,1) g.

All dimensions in millimetres




**Key**

1 break all sharp corners
2 stainless steel
3 machine to desired weight
4 brass
5 smooth and polish surface
6 tight fit with a diameter of maximum 4 mm
7 hardened steel tip
8 no shoulder

**Figure 1 — Cone for penetration test**

## 5.3 Water bath

Water bath with a capacity of at least 10 l of water with a perforated shelf not less than 50 mm from the bottom of the bath and capable of maintaining the test specimens at the required test temperature of (25,0 ± 0,3) °C.

### 5.4 Transfer dish

Transfer dish comprising a cylindrical glass or metal container with a flat bottom provided to ensure a firm bearing and prevent rocking when placed on the penetration apparatus stand. The dish shall have a minimum inside diameter of 90 mm and a minimum depth above the bottom bearing of 56 mm.

### 5.5 Metal containers

Two metal containers in which the test specimens are tested, cylindrical in shape and having a flat bottom with a nominal capacity of about 100 g. The containers shall have inside dimensions of (56 ± 5) mm in diameter and (35 ± 2) mm in depth. To facilitate pouring the right amount of material, a mark shall be made at a depth of 30 mm.

## 6 Preparation and conditioning of test specimens

**6.1** Prepare the test sample according to prEN 13880-6.

**6.2** Pour the test sample taking care to avoid any contamination. Record the actual temperature at the end of pouring.

**6.3** Immediately after filling, loosely cover each metal container and its contents with a lipped beaker of suitable size as a protection against dust and to assist in the elimination of air bubbles. Allow the test specimens to cool in air at a temperature of (23 ± 2) °C for a period of (1,75± 0,25) h.

**6.4** Place the test specimens in the water bath along with the transfer dish and allow them to remain immersed for a further period of (1,75 ± 0,25) h.

## 7 Test conditions

The test conditions shall be:

— temperature: (25,0 ± 0,3) °C;

— applied load: (150,0 ± 0,1) g;

— duration of loading: (5,0 ± 0,1) s.

## 8 Procedure

**8.1** Immerse the test specimen so that there is a depth of not less than 50 mm of water above them, when supported on the shelf. Distilled or deionised water should be used in the bath. After the period of immersion in the water bath, place the test specimens in the transfer dish filled with water from the water bath to sufficient depth to cover the metal container completely.

**8.2** Take the transfer dish containing the test specimen out of the water bath, place it on the stand of the penetration apparatus and test within 1 min.

**8.3** Adjust the penetration cone, which shall also be at a temperature of about 25 °C, so that the tip just makes contact with the surface of the test specimen. Release the cone for (5,0 ± 0,1) s, secure it and measure the distance penetrated.

**8.4** Make three determinations at points on the surface of the test specimen not less than 16 mm from the side of the metal container and from each other.

**8.5** Between determinations, return the test specimen and transfer dish to the water bath while carefully wiping the tip of the cone clean with a clean cloth.

**8.6** If the result of any determination differs from the average of the three determinations by more than 0,5 mm, discard the results and repeat the test on a fresh test specimen.

## 9 Expression of results

Report the penetration as the average of the three determinations, rounded to the nearest 0,1 mm.

## 10 Precision

Estimates of the repeatability and reproducibility of this test method and of the variability due to sampling are not available yet but will be included by amendment when known.

## 11 Test report

The test report shall confirm 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 and relevant primer (if applicable);

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

d) date of testing and results obtained;

e) name of analyst and test laboratory.

# Annex A
(informative)

# Determination of the penetration after fuel immersion

## A.1 Principle

The purpose of this test method is to verify that the properties of fuel resistant type sealants do not deteriorate to an unacceptable degree as the result of contact with spilt fuel or oil.

NOTE 1 The standard test fuel will give results which indicate the probable behaviour of a sealant coming into contact with the usual fuel and lubricating oils, but provision is made for the test to be carried out with a different fluid if the standard fuel is not representative of a particular type of spillage.

NOTE 2 It should be ensured that this test is carried out under suitable environmental conditions to provide adequate protection to personnel against the risk of fire, inhalation of smoke and/or toxic products of combustion.

## A.2 Apparatus

**A.2.1** Small container, made of 1 mm metal sheet. Its nominal internal dimensions are 150 mm in diameter and 150 mm in depth and it has a closely fitting lid which can be sealed with adhesive tape.

**A.2.2** Standard fuel, being a mixture of 70 % iso-octane (V/V) having the properties given in Table A.1, with a 30 % (V/V) industrial grade toluene.

**Table A.1 — Properties of iso-octane**

| | |
|---|---|
| Octane number | 100,0 ± 0,1 |
| Density at 20 °C | (0,69193± 0,00015) g/ml |
| Refractive index, $N_D$ | (1,39145 ± 0,00015) N |
| Freezing point | –107,442 °C |
| Distillation: 50 % recovery | (99,238 ± 0,025) °C |
| Increase from 20 % and 80 % recovery, °C | maximum 0,020 |
| NOTE Alternatively, if agreed between the purchaser and the supplier, a special fluid may be substituted, but the other conditions of the test should not be varied. | |

**A.2.3** Adhesive tape.

## A.3 Preparation and conditioning of test specimens

Prepare the test specimen in accordance with clause 6.

## A.4 Procedure

Place the test specimen which is in its container, in the small container and pour in standard fuel to a depth of 10 mm. Seal the lid with adhesive tape.

Maintain the container at a temperature of (23 ± 2) °C for a period of (24± 1) h. After removal from the fuel, dry the test specimen in airflow with a mean flow velocity between 90 m/min and 150 m/min, for a period of 1 h.

Carry out the test in accordance with 6.4 and 8.1 to 8.6.

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