SLOVENSKI STANDARD
SIST EN 1426:2025

01-januar-2025

Nadomešča:
SIST EN 1426:2015

Bitumen in bitumenska veziva - Določanje penetracije z iglo

Bitumen and bituminous binders - Determination of needle penetration

Bitumen und bitumenhaltige Bindemittel - Bestimmung der Nadelpenetration

Bitumes et liants bitumineux - Détermination de la pénétrabilité à l'aiguille

Ta slovenski standard je istoveten z: **EN 1426:2024**

ICS:

75.140	Voski, bitumni in drugi naftni proizvodi	Waxes, bituminous materials and other petroleum products
91.100.50	Veziva. Tesnilni materiali	Binders. Sealing materials

SIST EN 1426:2025 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1426

November 2024

ICS 75.140; 91.100.50

Supersedes EN 1426:2015

English Version

Bitumens and bituminous binders - Determination of needle penetration

Bitumes et liants bitumineux - Détermination de la pénétrabilité à l'aiguille

Bitumen und bitumenhaltige Bindemittel - Bestimmung der Nadelpenetration

This European Standard was approved by CEN on 16 September 2024.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN 1426:2024 E

Contents

Page

European foreword

This document (EN 1426:2024) has been prepared by Technical Committee CEN/TC 336 “Bitumens and bituminous binders”, the secretariat of which is held by AFNOR.

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 May 2025, and conflicting national standards shall be withdrawn at the latest by May 2025.

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 1426:2015.

EN 1426:2024 includes the following significant changes with respect to EN 1426:2015:

a) Clause 1, Scope, has been updated;

b) Clause 2, Normative references, has been updated;

c) Clause 5, Apparatus, has been updated and revised, so that:

   — the specifications of the penetrometer (5.1) have been further detailed and a substructure of 5.1 has been introduced;

   — the specifications of the penetration needle and ferrule (5.2) have been further detailed and a substructure has been introduced;

   — the specifications of the test sample container (5.3) have been further detailed to include containers of different volumes for which a substructure has been introduced;

   — the transfer equipment (5.5) now consists of a transfer bath and a transfer dish;

d) Clause 6, Calibration and verification, has been added containing the revised and expanded specifications of former subclause 5.8;

e) Clause 7, Sampling, has been updated and further detailed regarding, e.g. filling the test sample container, duration between test sample preparation and start of testing and the specification of the ambient temperature;

f) Clause 8, Procedure, has been updated and revised to include, e.g. the updated apparatus and automatic surface detection;

g) the former subclause 7.1, Preparation of the needle holder and needles, has been split up into new subclause 8.1, Preparation of the penetrometer, and new subclause 8.2, Preparation of the penetration needles, and the specifications of former subclause 5.2.2 on the continuous check of penetration needles have been move there;

h) Clause 11, Test report, has been updated;

i) Figures 1 and 2 have been updated;

j) the Bibliography has been updated.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

1 Scope

This document specifies a method for the determination of the needle penetration of bitumens and bituminous binders.

The standard procedure for the determination of the needle penetration (consistency) is described for penetrations up to (330 × 0,1) mm at a temperature of 25 °C. The method also allows for penetrations up to (500 × 0,1) mm using a longer needle.

WARNING — The use of this document can involve hazardous materials, operations and equipment. This document does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this document to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use.

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 58, *Bitumen and bituminous binders — Sampling bituminous binders*

EN 1425, *Bitumen and bituminous binders — Characterization of perceptible properties*

EN 10088-3, *Stainless steels — Part 3: Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resistant steels for general purposes*

EN 12594, *Bitumen and bituminous binders — Preparation of test samples*

EN 12597, *Bitumen and bituminous binders — Terminology*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12597 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
penetration
distance expressed in tenths of a millimetre that a penetration needle will penetrate vertically into a test sample of a material under specified conditions of temperature, load and loading duration

4 Principle

The penetration of a standard needle into a conditioned test sample is measured. For penetrations up to (330 × 0,1) mm, the operating parameters are a test temperature of 25 °C, an applied load of 100 g, and a loading duration of 5 s. For penetrations expected to be above (330 × 0,1) mm, the test temperature is 15 °C while the operating parameters regarding the applied load and the loading duration remain unchanged.

The test procedures also provide for testing at other conditions, e.g. 200 g, 60 s and 5 °C for lower temperature performance, to address different purposes.

5 Apparatus

The usual laboratory apparatus and glassware, together with the following, shall be used.

5.1 Penetrometer

5.1.1 The penetrometer shall be an apparatus that permits a needle holder to move vertically without measurable friction and allows the determination of the penetration of the penetration needle (5.2) with a maximum permissible measurement error of 0,1 mm. An example of a penetrometer is shown in Figure 1.

NOTE Penetrometers are either operated manually or automatically.

5.1.2 The needle holder shall be such that the ferrule (5.2) can be held firmly. The needle holder shall be readily detachable from the penetrometer. It shall have a mass of (47,50 ± 0,05) g.

5.1.3 The needle holder shall be either equipped with a weight of (50,00 ± 0,05) g underneath the support as shown in Figure 1 or it shall be possible to attach the weight to the needle holder there.

The mass of the penetration needle and ferrule (5.2) plus the needle holder together with the weight shall provide a moving load of (100,00 ± 0,10) g. The penetration needle plus needle holder together with the weight are also called “needle dropping assembly”.

5.1.4 The penetrometer shall be equipped with a flat and horizontal base plate (stand) to accommodate the constant temperature bath (5.4) or the transfer dish from the transfer equipment (5.5) as shown in Figure 1. The needle dropping assembly shall move perpendicularly with reference to the base plate.

5.1.5 The penetrometer shall be located on a plane and stable surface without vibration.

5.1.6 Level adjustment of the penetrometer, e.g. by level adjustment screws, shall be possible. To facilitate levelling, the penetrometer should be equipped with a built-in spirit level.

5.2 Penetration needle and ferrule

5.2.1 The dimensions of the penetration needle and the ferrule shall be in accordance with Figure 2. For penetrations up to (330 × 0,1) mm, the penetration needle shall be in accordance with Figure 2 with a total length of (50 ± 5) mm. For penetrations between (330 × 0,1) mm and (500 × 0,1) mm, the apparent length of the penetration needle, shown in Figure 2 as (42,5 ± 2,5) mm, shall, if necessary, be increased sufficiently to prevent the ferrule, in which the needle is fixed, coming into contact with the test sample during the test.

5.2.2 The penetration needle shall be made from fully hardened, tempered and polished stainless steel of type X105CrMo17 (1.4125) in accordance with EN 10088-3 taking into account that neither the minimum content of molybdenum specified in EN 10088-3 nor the Rockwell hardness of C54 to C60 as determined in accordance with EN ISO 6508-1[3] are required. The hardness of the needle shall be certified.

5.2.3 The penetration needle shall be rigidly fixed in a ferrule made from brass or stainless steel over a distance between 5 mm to 10 mm. Monobloc cast penetration needle-ferrules in accordance with the dimensions in Figure 2 may be used. The run-out of the tip of the penetration needle or any part of the penetration needle relative to the ferrule axis shall not exceed 1,0 mm. The ferrule shall fit firmly into the needle holder of the penetrometer (5.1). All dimensions shall be certified.

5.2.4 The mass of the assembly of the ferrule and penetration needle shall be (2,50 ± 0,05) g. In order to comply with the requirement on the mass, the ferrule may have a drill hole at the end opposite of the penetration needle or a flat on the side.

5.2.5 Each assembly of the ferrule and penetration needle shall be clearly identifiable and distinguishable through marking engraved or stamped on the ferrule of each needle.

NOTE The typical useful life of a penetration needle is three years. If two assemblies of the ferrule and penetration needle have the same marking, they cannot be tracked back individually.

5.2.6 For penetrations needles, the requirements on the continuous check as specified in 8.2.2 shall be applied.

5.3 Test sample container

5.3.1 General

The test sample container shall be made from metal or glass, cylindrical shape, flat-bottomed. The test sample container shall not deform during test sample preparation or testing.

NOTE In case of being made from metal, experience has shown that a wall thickness of at least 0,15 mm is suitable to provide for form stability.

The internal depth of test sample container shall be at least 10 mm greater than the expected penetration.

Under certain conditions, the dimensions of the standard test sample container (5.3.2) are not suitable and containers with a smaller volume are needed. In case of only small quantities of bituminous binder available for testing, e.g. if it was obtained by extraction of bituminous mix core or while monitoring short- or long-term ageing development, either small test sample containers (5.3.3) or test sample containers with metal rings (5.3.4) may be used.

It shall be documented in the test report if the standard test sample container is not used for testing.

The precision of the penetration values determined with other than standard test sample containers can be different from those given in Clause 10.

5.3.2 Standard test sample container

The dimensions of the standard test sample container shall be in accordance with Table 1.

Table 1 — Dimensions of the standard test sample container

Penetration [0,1 mm]	**Internal depth *P*** mm	**Internal diameter *D*** mm	**Approx. volume of sample** cm^3
Penetration < 160	$35 \leq P \leq 60$	$55 \leq D \leq 70$	80
160 ≤ penetration < 330	$45 \leq P \leq 60$		170
330 ≤ penetration ≤ 500 [a]	$45 \leq P \leq 70$		230
[a] Determination is performed at 15 °C and the result is between (90 × 0,1) mm and (360 × 0,1) mm.			

5.3.3 Small test sample container

The small test sample container shall allow to test as described in 8.5. It shall have the following dimensions:

— for penetrations lower than (100 × 0,1) mm, the inner height of the small test sample container shall be at least 20 mm;

— for penetrations from (100 × 0,1) mm up to (200 × 0,1) mm including limits, the inner height of the small test sample container shall be at least 30 mm.

To ensure a good stable temperature during testing, the container shall be placed in a brass ring with an inner diameter within 0,5 mm of the outer diameter of the sample container and a height of (21 ± 1) mm or (31 ± 1) mm and a thickness of at least (5 ± 1) mm.

5.3.4 Standard test sample container with metal ring

In order to reduce the volume of the standard test sample container, a metal ring may be placed in it. Standard test sample container with a metal ring shall allow to test as described in 8.5. It shall have the following dimensions:

— for penetrations lower than (100 × 0,1) mm, the remaining inner height for the test sample shall be at least 20 mm;

— for penetrations from (100 × 0,1) mm up to (200 × 0,1) mm including limits, the remaining inner height for the test sample shall be at least 30 mm.

5.4 Constant temperature bath (water bath)

The constant temperature bath shall have a capacity of at least 10 l and a means of ensuring uniformity of temperature (circulation, agitation, stirring). By means of the constant temperature bath, it shall be possible to maintain the temperature of the test sample within ±0,15 °C of the desired temperature.

EXAMPLE If set at 25 °C, the temperature of the constant temperature bath is kept uniformly between 24,85 °C and 25,15 °C.

The constant temperature bath shall have a perforated shelf supported in a position not less than 50 mm from the bottom and not less than 100 mm below the water level. If penetration tests are to be made in the constant temperature bath itself, it shall be provided with an additional shelf, strong enough to support the penetrometer (5.1) equipped with the penetration needle (5.2).

It is recommended to use distilled or deionized water for the water bath. The water shall not be contaminated by active surface agents or any other material that can affect the penetration values. It is recommended to cover the constant temperature bath when not carrying out penetration testing.

5.5 Transfer equipment, being either a transfer dish (5.5.1) or a transfer bath (5.5.2)

5.5.1 Transfer dish

The transfer dish shall have a capacity of at least 350 ml and shall be deep enough so that the test sample container (5.3) can be completely placed in it without protruding.

The bottom of the transfer dish shall be constructed so that it cannot be rocked when placed on the base plate (stand) of the penetrometer (5.1). The inner bottom of the transfer dish shall be made so that the test sample container cannot be rocked during testing.

For test temperatures lower than 25 °C, the volume of the transfer dish shall be at least 1,5 l.