SLOVENSKI STANDARD
oSIST prEN 12697-19:2019

01-februar-2019

Bitumenske zmesi - Preskusne metode - 19. del: Prepustnost preskušancev

Bituminous mixtures - Test methods - Part 19: Permeability of specimen

Asphalt - Prüfverfahren - Teil 19: Durchlässigkeit der Probekörper

Mélanges bitumineux - Méthodes d'essai - Partie 19: Perméabilité des éprouvettes

Ta slovenski standard je istoveten z: **prEN 12697-19**

ICS:

93.080.20 Materiali za gradnjo cest Road construction materials

oSIST prEN 12697-19:2019 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 12697-19

December 2018

ICS

Will supersede EN 12697-19:2012

English Version

Bituminous mixtures - Test methods - Part 19: Permeability of specimen

Mélanges bitumineux - Méthodes d'essai - Partie 19: Perméabilité des éprouvettes

Asphalt - Prüfverfahren - Teil 19: Durchlässigkeit der Probekörper

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 227.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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, 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 United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

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

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

Contents

page

European foreword

This document (prEN 12697-19:2018) has been prepared by Technical Committee CEN/TC 227 “Road materials”, the secretariat of which is held by BSI.

This document is currently submitted to the enquiry.

This document will supersede EN 12697-19:2012.

The following is a list of significant technical changes since the previous edition:

— The title no longer makes the method exclusively for hot mix asphalt;

— [ge] Editorial update according to current standard template.

A list of all parts in the EN 12697 series can be found on the CEN website.

1 Scope

This document specifies a method for determining the vertical and horizontal permeability of cylindrical specimens of bituminous mixtures with interconnecting voids. The standard applies to specimens cored out of the road, specimens from laboratory made slabs or laboratory specimens prepared with a compaction device provided the thickness of the specimen is not less than twice the nominal maximum particle size of the aggregate in the mixture. The nominal diameter of specimens should be either 100 mm or 150 mm unless the nominal maximum particle size of the aggregate size exceeds 22 mm, when the nominal diameter is 150 mm.

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 12697-29, *Bituminous mixtures - Test method for hot mix asphalt - Part 29: Determination of the dimensions of a bituminous specimen*

3 Principle

A column of water with a constant height is applied to a cylindrical specimen and is allowed to permeate through the specimen for a controlled time in either a vertical or horizontal direction depending upon the parameter being measured. The resultant flow rate of the water Q_v or Q_h is a calculated measure of the permeability value K_v or K_h. The test is carried out at ambient temperature.

NOTE When the void content of the same specimen is determined, the relationship between permeability and void content can be established.

4 Vertical permeability

4.1 General

In this method, only the water flow in a vertical direction through the specimen is measured.

4.2 Apparatus for vertical permeability

4.2.1 Apparatus as shown in Figure 1. The dimensions shall be such so as to ensure the water column height is (300 ± 1) mm. The external diameter of the tube and any fittings shall be such that no water can flow between the wall of the tube and the specimen when in place; the thickness of the tube shall be sufficient to ensure it retains its shape but shall not be more than 5 mm.

The external diameter of the tube should generally be greater than the diameter of the specimen by up to 5 mm.

NOTE A suitable rubber cuff that fits snugly around the tube and sample is one method to ensure that no water can flow between the two. Another approach that could be used is to attach the plastic tube with duck tape to the specimen.

4.2.2 A balance with suitable capacity and capable of weighing to the nearest 0,5 g.

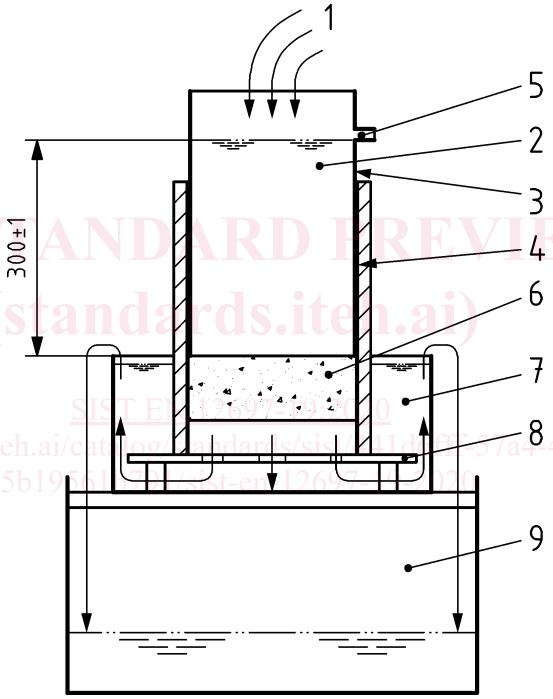
4.3 Procedure

4.3.1 Determine the dimensions of the specimen, to the nearest millimetre, according to EN 12697-29. The thickness shall be greater than 25 % of the diameter and greater than twice the nominal maximum aggregate size of the mixture.

4.3.2 If the specimen is trimmed by saw cutting, it shall be cleaned prior to testing, to prevent restriction of the water flow.

4.3.3 The test shall be carried out at ambient temperature within the ranges of 15 °C to 25 °C and shall be monitored and recorded. Place the specimen in a rubber cuff. Insert a plastic tube in the cuff and place it on top of the specimen. Carefully inflate the rubber cuff with air to at least 50 kPa, so that it presses firmly around the wall of the specimen to prevent leakage of water along the wall. A seal needs to be ensured between the cuff and the tube.

Dimensions in millimetres



Key

1 water supply
2 water column
3 plastic tube
4 rubber cuff (optional)
5 outlet to maintain water column height
6 specimen
7 water bath
8 perforated plate
9 collecting reservoir

Figure 1 — Apparatus for vertical permeability

4.3.4 Place the cuff with the specimen on a perforated plate and place it in a container that is filled with water to the maximum level. Adjust the feet of the perforated plate in such a way that the upper side of the specimen is at the same level as the water in the bath. Allow the water to flow into the specimen for approximately 10 min. After this time, it is assumed that the specimen is saturated with water and all enclosed air is removed.

4.3.5 Fill the plastic tube with water. There is an outlet in the plastic tube, so that a water column height of (300 ± 1) mm is always maintained.

4.3.6 Allow the water to flow through the specimen into a container. The container shall be located above a second container of mass m_1 into which the water passing through the sample can overflow into at the level of the top of the sample. After about 1 min, empty the second container and collect the water that flows through into the weighed second container for a certain time t, minimum 60 s. After the time t weigh the second container together with the collected water m_2.

At a voids content of about 20 %, the vertical flow of water is about 3 l/min to 10 l/min. It should be noted, however, that when the test is carried out on a core taken from the road surface, the surface can be somewhat clogged and although still retaining 20 % voids may not have a flow in this range.

The measuring time can be decreased from 60 s if the amount of water exceeds 8 l. The decreased measuring time should then be reported in the test report.

4.3.7 Repeat the test on the same specimen.

4.4 Calculation

4.4.1 Determine the vertical flow of water through the specimen Q_v as follows:

$$Q_v = \frac{(m_2 - m_1)}{t} \times 10^{-6} \quad (1)$$

where

Q_v is the vertical flow, through the specimen, in cubic metres per second (m^3/s);

m_1 is the mass of the empty second container, in grams ± 0,5 g (g);

m_2 is the mass of the filled second container, in grams ± 0,5 g (g);

t is the time of collecting the water, in seconds (s);

4.4.2 Calculate the vertical permeability K_v according to the formula of Darcy:

$$K_v = \frac{4 \times Q_v \times l}{h \times \pi \, D^2} \quad (2)$$

where

K_v is the vertical permeability, in metres per second, (m/s);

Q_v is the vertical flow through the specimen, in cubic metres per second (m^3/s);

l is the thickness of the specimen, in metres (m);

h is the actual height of water column, in metres (m);

D is the diameter of the specimen, in metres (m).

NOTE Usually the permeability is between $0,5 \times 10^{-3}$ m/s and $3,5 \times 10^{-3}$ m/s, when testing porous asphalt.

5 Horizontal permeability

5.1 General

In this test method, the water flows partially in a horizontal direction through the specimen. The result of the test is a combination of vertical and horizontal permeability.

5.2 Apparatus for horizontal permeability

5.2.1 Apparatus as shown in Figure 2. The external diameter of the upper and lower tubes and any fittings shall be such that no water can flow between the wall of the upper and lower tubes nor between the lower tube and the specimen when in place; the thickness of the tubes shall be sufficient to ensure it retains its shape but shall not be more than 5 mm.

The external diameter of the upper tube should generally be greater than the diameter of the specimen by up to 5 mm.

NOTE A suitable rubber cuff that fits snugly around the tubes is one method to ensure that no water can flow between the two. Another approach that could be used is to attach the two plastic tubes with duck tape.

5.2.2 The tray in which the specimen sits shall be held in place by adjustable feet or other suitable means so that the upper face of the specimen is horizontal and the height of the top of the upper tube shall be capable of being adjusted to attain the required distance above the upper face of the specimen.

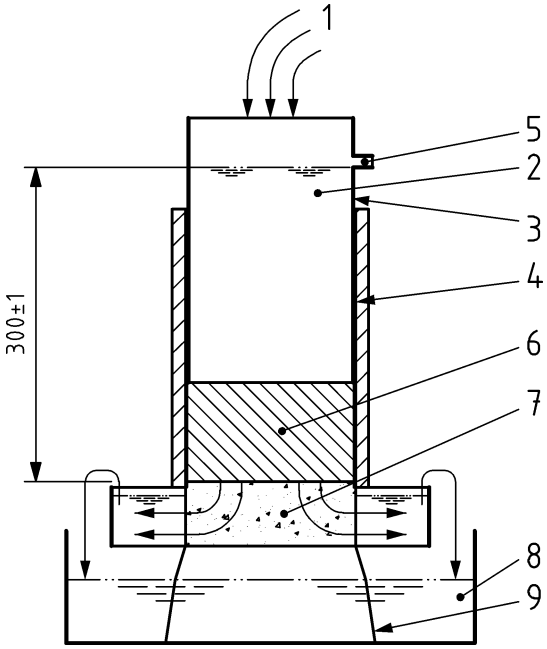
A tray capacity of 5 l to 7 l is recommended.

5.2.3 Collecting reservoir of suitable size.

A capacity of 15 l is recommended.

5.2.4 A balance with suitable capacity and capable of weighing to the nearest 0,5 g.

Dimensions in millimetres



Key

1 water supply
2 water column
3 upper plastic tube
4 rubber cuff (optional)
5 outlet to maintain water column height
6 lower plastic tube
7 specimen
8 collecting reservoir
9 support

Figure 2 — Apparatus for horizontal permeability

NOTE The rubber cuff is not strictly necessary for the horizontal permeability. It is only used to keep the apparatus unchanged from that for vertical permeability.

5.3 Procedure

5.3.1 Determine the dimensions of the specimen, to the nearest millimetre, according to EN 12697-29. The thickness shall be greater than 25 % of the diameter and greater than twice the nominal maximum aggregate size of the mixture.

5.3.2 If the specimen is trimmed by saw cutting, it shall be cleaned prior to testing, to prevent restriction of the water flow.

5.3.3 The test shall be carried out at ambient temperature within the ranges of 15 °C to 25 °C and shall be monitored and recorded. Seal the bottom of the specimen, for example with paraffin wax, so that no water can flow in a vertical direction out of the specimen. Fix a plastic tube, with a height of about 100 mm and the same diameter as the specimen, on the upper circumference of the specimen using a glue or high viscosity silicone. Insert the plastic tube and specimen in a rubber cuff in such a way that only the plastic tube is in the cuff. Insert a second tube in the cuff on top of the plastic tube that is already fixed to the specimen.

5.3.4 Place the cuff with the specimen on a perforated plate and place it in a container filled to the maximum level. Adjust the feet of the plate so that the upper side of the specimen is at the same level as