SLOVENSKI STANDARD
oSIST prEN 12697-40:2019

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Bitumenske zmesi - Preskusne metode - 40. del: Prepustnost vgrajene plasti (in situ)

Bituminous mixtures - Test methods - Part 40: In situ drainability

Asphalt - Prüfverfahren - Teil 40: In-situ-Durchlässigkeit

Mélanges bitumineux - Méthodes d'essai - Partie 40 : Perméabilité en place

Ta slovenski standard je istoveten z: prEN 12697-40

ICS:

93.080.20 Materiali za gradnjo cest Road construction materials

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EUROPEAN STANDARD

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ICS

Will supersede EN 12697-40:2012

English Version

Bituminous mixtures - Test methods - Part 40: In situ drainability

Mélanges bitumineux - Méthodes d'essai - Partie 40 : Perméabilité en place

Asphalt - Prüfverfahren - Teil 40: In-situ-Durchlässigkeit

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.

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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.

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

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European foreword

This document (prEN 12697-40:2018) 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 12697-40:2012.

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 describes a method to determine the *in situ* relative hydraulic conductivity, at specific locations, of a road surfacing that is designed to be permeable. An estimate of the average value for the surfacing is obtained from the mean value of a number of determinations on each section of road.

The test measures the ability to drain water (drainability) achieved *in situ* of a surfacing. As such, it can be used as a compliance check to ensure that a permeable surface course has the required properties when it is laid. The test can also be used subsequently to establish the change of drainage ability with time.

For the test to be valid, the surface of the test area should be clean and free from detritus. Measurements can be made when a road is either wet or dry, but not if it is in a frozen state.

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 13036-1, *Road and airfield surface characteristics - Test methods - Part 1: Measurement of pavement surface macrotexture depth using a volumetric patch technique*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
outflow time
time (s) that elapses for an outflow of 4,0 L through the permeameter, between the meniscus at the 5 L mark and when it falls to the 1 L mark

3.2
series resistance time
r
outflow time(s) that is determined when the permeameter is located so the outlet is clear of any surfacing that could impede the exit of out-flowing water

Note 1 to entry: The method for calculating the series resistance time is given in Annex A.

Note 2 to entry: The series resistance time is subtracted from measurements of outflow time when the permeameter is used on a surfacing of a pavement.

3.3
parallel leakage time
outflow time when the outlet is restricted by an impermeable surface

3.4
relative hydraulic conductivity
(*HC*)
reciprocal of the outflow time minus the series resistance time

Note 1 to entry: The relative hydraulic conductivity is specific to apparatus as shown in Figure 1 with the dimensions given in 5.1.

4 Principle

A permeameter is used to determine the time taken for 4 l of water to dissipate through an annular area of the surfacing of a pavement under known head conditions. The reciprocal of the outflow time is then used to calculate the relative hydraulic conductivity of the surfacing.

The result is relative, rather than absolute, because the time taken is dependent on the dimensions of the permeameter. However, all measurements with the specified equipment should give mutually consistent results.

5 Apparatus

5.1 Permeameter

Radial-flow falling head permeameter of the basic construction shown in Figure 1 and with the following critical dimensions that has been calibrated in accordance with Annex A:

— internal diameter of standpipe (125 ± 0,5) mm,

— length of standpipe (560 ± 20) mm,

— diameter of orifice in base (48 ± 0,1) mm,

— taper to orifice (15 ± 0,5) °,

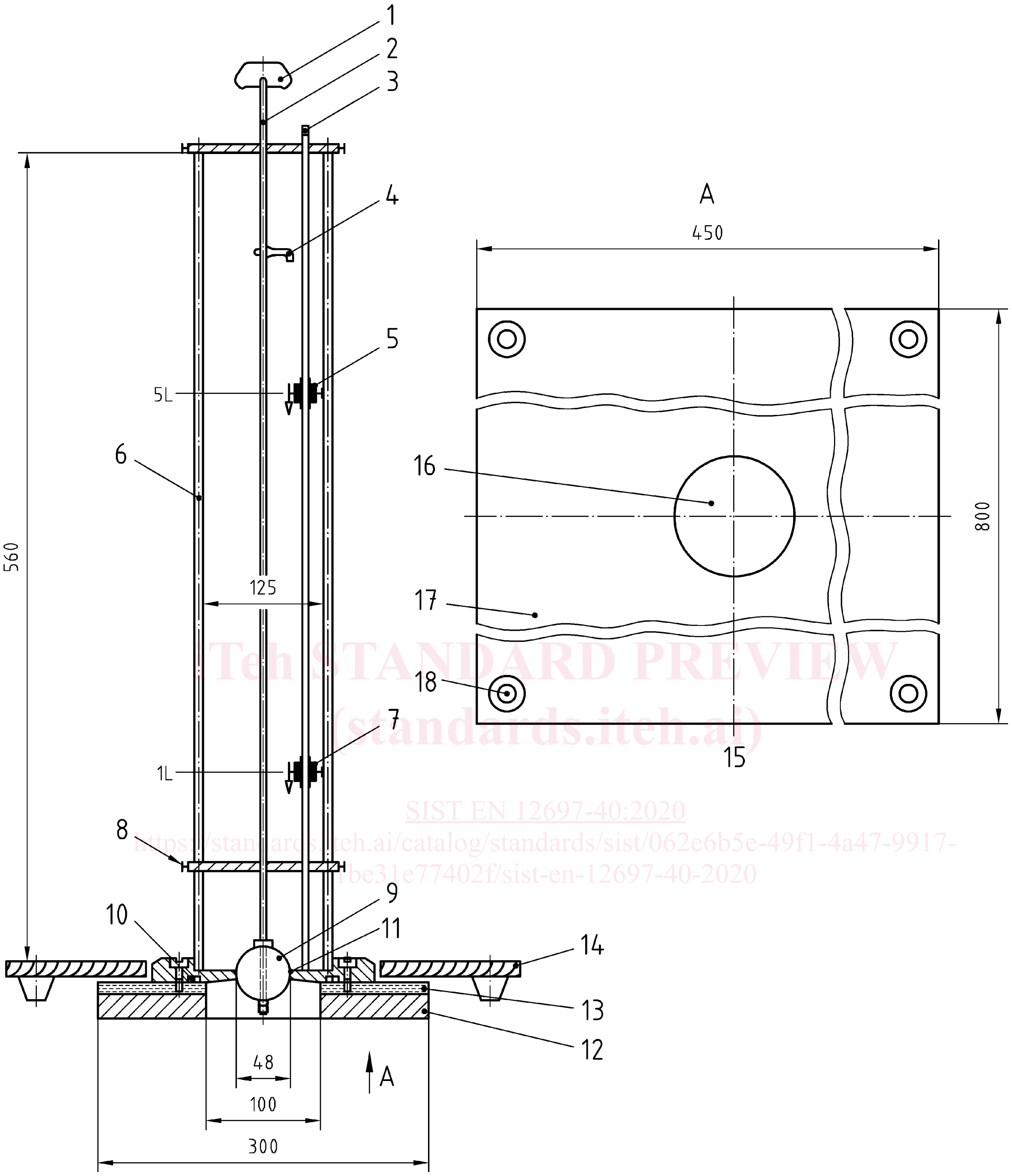
— diameter of rubber ball attached to plunger (51 ± 0,5) mm,

— external diameter of sponge rubber under base (300 ± 2) mm,

— internal diameter of sponge rubber under base (100 ± 2) mm.

The standpipe shall be a tube of acrylic or other transparent material that will allow the height of water to be observed at any time. The standpipe shall be sealed to the base as to be watertight. The closed cell sponge rubber seal should have a durometer hardness of 30 to 45 measured with a type 00 durometer according to ASTM D2240.

Dimensions in millimetres



Key

1 handle
2 plunger
3 support for sensors
4 plunger rest
5 sensor (optional)
6 standpipe
7 sensor (optional)
8 support for sensors
9 rubber ball
10 O-ring
11 Orifice
12 sponge rubber seal (sealed cell); thickness (20 ± 5) mm
13 base, synthetic resin bonded fabric, thickness (13 ± 3) mm
14 standing board (end elevation), thickness (20 ± 5) mm
15 standing board (plan view)
16 central hole
17 plywood
18 rubber foot, 25 mm high

Figure 1 — Typical permeameter and standing board (tolerances to dimensions given in 5.1)

5.2 Standing board

Standing board that fits over the permeameter, as illustrated in Figure 1, or mechanical means holding down the permeameter.

5.3 Stopwatch

Stopwatch, capable of measurement to 0,1 s.

A stopwatch activated by sensors placed inside the permeameter should be used for testing when the accuracy of the result is particularly important, including referee tests. It is recommended for other cases as well.

5.4 Thermometer

Thermometer, capable of measurement to at least ± 1 °C in the range 0 °C to 30 °C.

5.5 Water

Clean water that is free from any solids or other impurities that would affect its flow.

6 Procedure

6.1 Calibration

The permeameter shall be calibrated in accordance with Annex A.

6.2 Locations

6.2.1 Mark on the pavement ten locations at 20 m centres along a diagonal across the laid width of the pavement to be measured.

NOTE A typical layout of test locations is shown in Figure 2.

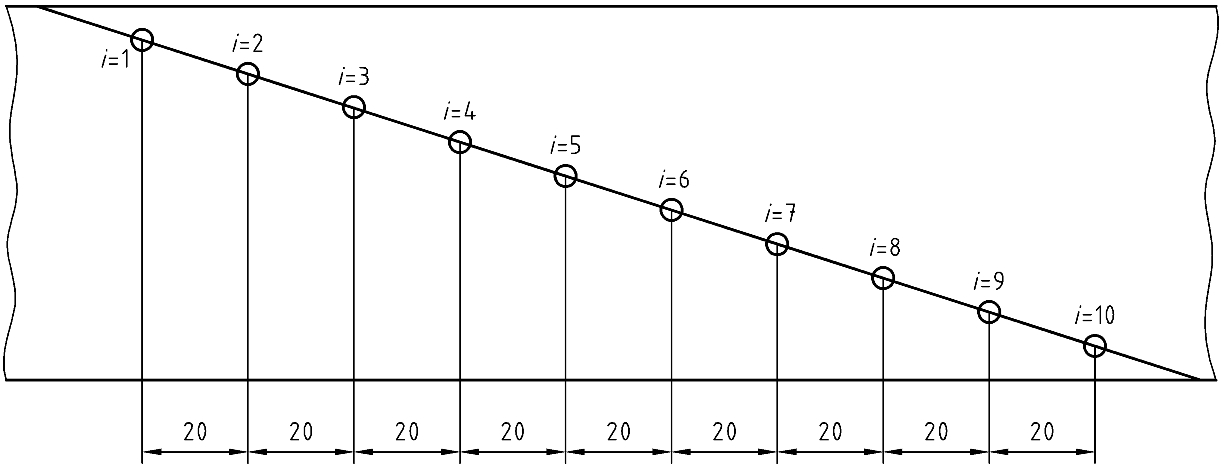


Figure 2 — Typical layout of test locations along a laid width

6.2.2 Measure the average outflow time at each location in accordance with 6.3.

6.2.3 Calculate the relative hydraulic conductivity (*HC*) in accordance with Clause 7 for the area of surfacing designated as being represented by the test.

6.3 Measurement at each location

6.3.1 Place the permeameter over the surfacing at the point where the relative hydraulic conductivity is to be measured. Apply a vertical load uniformly on the base such that all four of the rubber feet on the standing board are in contact with the surface to be measured.

A load of between 1 kN and 2 kN should achieve this contact.

The load can be applied either mechanically or by two operatives of approximately the same mass standing on opposite sides of the standing board. If two operatives are used, the heavier operative should not weigh more than 50 % more than the lighter operative.

6.3.2 Fill the standpipe completely with clean water.

6.3.3 Remove the plunger and hang it by its rest on the top of the standpipe. Allow air bubbles to rise up through the water in the standpipe until they no longer rise through the water, which is dissipating into the road surface.

6.3.4 If air bubbles are still rising through the water in the standpipe when the meniscus nears the 5 L mark, replace the plunger and refill the standpipe to at least 50 mm above the 5 L mark. Without delay, remove the plunger and hang by its rest on the top of the standpipe.

6.3.5 Repeat 6.3.4 until no bubbles are rising through the water in the standpipe when the meniscus nears the 5 L mark.

The pores of the surface should be saturated by water for the test to give the required result, which can be achieved by emptying the permeameter of water before refilling and starting the actual test. However, this procedure should not normally be needed if the permeameter is filled to well above the 5 L mark.

6.3.6 Start the stopwatch when the meniscus falls to the 5 L mark. Stop the stopwatch when the water level falls to the 1 L mark. Record the outflow time, $t_{i,1}$, to the nearest 0,1 s.

6.3.7 Repeat 6.3.2 to 6.3.6 in order to obtain $t_{i,2}$.

6.3.8 Calculate the average outflow time as $(t_{i,1} + t_{i,2})/2$ and the range as $| t_{i,1} - t_{i,2}|$ for the location, both to the nearest 0,1 s. If the range exceeds 5 % of the average outflow time, repeat 6.3.2 to 6.3.6 until the range criterion is met by two successive outflow times and discard outliers. Record the average outflow time for location *i*, t_i, to the nearest 0,1 s.

NOTE Locations where there is a transition gradient may produce results that are inferior to results obtained from the material under other circumstances.

7 Calculation

7.1 Calculate the average outflow time for the test, t, as the mean of the 10 values of t_i for locations i = 1 to 10.

7.2 Calculate the relative hydraulic conductivity (HC) for the area using the equation:

$$HC = \frac{1}{(t - r)} \quad (1)$$

where