SLOVENSKI STANDARD
oSIST prEN 12697-22:2018

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Bitumenske zmesi - Preskusne metode - 22. del: Preskus nastajanja kolesnic

Bituminous mixtures - Test methods - Part 22: Wheel tracking

Asphalt - Prüfverfahren - Teil 22: Spurbildungstest

Mélanges bitumineux - Méthodes d'essai - Partie 22 : Essai d'orniérage

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English Version

Bituminous mixtures - Test methods - Part 22: Wheel tracking

Mélanges bitumineux - Méthodes d'essai - Partie 22 : Essai d'orniérage

Asphalt - Prüfverfahren - Teil 22: Spurbildungstest

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 12697-22:2018) 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 CEN Enquiry.

This document will supersede EN 12697-22:2003+A1:2007.

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

— symbols for properties in the different methods made more consistent;

— moulds added to the list of equipment [Clause 6];

— vibratory compactor excluded as a method of sample preparation [7.2.1.1];

— requirement added for storing samples on a flat surface [7.6];

— range of time for conditioning prior to testing extended [7.6];

— Formula (7) corrected [9.3.1.2];

— required rounding of WTS_{AIR} values specified [9.3.2.2];

— required rounding of WTS_{AIR} values specified [9.3.3.2];

— type of roller compactor required to be reported [10.1.2].

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

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

1 Scope

This document describes test methods for determining the susceptibility of bituminous materials to deform under load. The test is applicable to mixtures with upper sieve size less than or equal to 32 mm.

The tests are applicable to specimens that have either been manufactured in a laboratory or cut from a pavement; test specimens are held in a mould with their surface flush with the upper edge of the mould.

The susceptibility of bituminous materials to deform is assessed by the rut formed by repeated passes of a loaded wheel at constant temperature. Three alternative types of device can be used according to this standard: large-size devices, extra large-size devices and small-size devices. With large-size devices and extra large-size devices, the specimens are conditioned in air during testing. With small-size devices, specimens are conditioned, in either air or water.

NOTE Large-size and extra large-size devices are not suitable for use with cylindrical cores.

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 12697-6, *Bituminous mixtures — Test methods for hot mix asphalt — Part 6: Determination of bulk density of bituminous specimens*

EN 12697-7, *Bituminous mixtures — Test methods for hot mix asphalt — Part 7: Determination of bulk density of bituminous specimens by gamma rays*

EN 12697-27, *Bituminous mixtures — Test methods — Part 27: Sampling*

EN 12697-33, *Bituminous mixtures — Test methods for hot mix asphalt — Part 33: Specimen preparation by roller compactor*

EN 12697-35, *Bituminous mixtures — Test methods — Part 35: Laboratory mixing*

ISO 48, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

ISO 7619, *Rubber, vulcanized or thermoplastic — Determination of indentation hardness*

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
nominal thickness
for laboratory prepared specimens, the target thickness, in millimetres, to which the specimens are to be prepared

Note 1 to entry: The target thickness is the required thickness that is targeted when making the specimen.

3.2
rut depth
reduction in the thickness of a test specimen, in millimetres, caused by repeated passes of a loaded wheel

3.3
test surface
surface of the test specimen on which the loaded wheel runs

3.4
single test result
value obtained by applying this European standard, once, to a single test portion

3.5
test portion
number of samples that are required to be tested for a single test result

3.6
tyre track
impression of the tyre on a flat surface when a vertical load is applied

3.7
load cycle
two passes (outward and return) of the loaded wheel

3.8
measurement sequence
test phase corresponding to the completion of n_i load cycles

4 Symbols and abbreviated terms

For the purposes of this document, thesymbols and abbreviations given in Table 1 apply.

Table 1 — Symbols and abbreviated terms

Symbol	Definition	Unit
d_{ij}	local distance between a reference plane and the *j* predetermined location on the test surface at the *i* measurement sequence with multiple measurement points NOTE *j* varies between 1 and 15.	mm
d_{0j}	initial value of d_{ij}	mm
d_{nj}	value of d_{ij} after *n* load cycles	mm
$d_{i,5\,000}$, $d_{i,10\,000}$	rut depth after 5 000 load cycles and 10 000 load cycles, respectively, with multiple measurement points	mm
d_i	distance between a reference plane and the measurement location on the test surface at the *i* measurement sequence with single measurement points	mm
d_n	rut depth after *n* load cycles	mm
$d_{i,5\,000}$,	rut depth after 5 000 load cycles and 10 000 load cycles, respectively, with	mm

Symbol	Definition	Unit
$d_{i,10\,000}$	single measurement point	
h	specimen thickness equal to the thickness of the course or courses of the test piece in which a rut can form	mm
L	load applied	N
n	number of cycles	—
n_{15}	number of load cycles for rut depth to reach 15 mm	—
P_i	measured proportional rut depth calculated as the average depth of a rut at the i measurement cycle as a proportion of the thickness of the test specimen	%
$P_{i,LD}$	mean value of P_i obtained on two or more specimens using large size device	%
$P_{i,XL}$	mean value of P_i obtained on two or more specimens using extra-large size device	%
PRD_{AIR}	mean proportional rut depth for the material under test at n cycles using a small size device in air	%
PRD_W	mean proportional rut depth for the material under test at n cycles using a small size device in water	%
RD_{AIR}	mean rut depth for the material under test at n cycles using a small size device in air	mm
RD_W	mean rut depth for the material under test at n cycles using a small size device in water	mm
r_i	mean change in vertical displacement from the initial value, r_0, to the I relevant reading	mm
r_0	depth reading at start of test	Mm
t_{15}	time for rut depth to reach 15 mm	min
s	number of measured cross-sections for extra-large device	—
TR	mean rate of increase of track depth	µm/cycle
TR_m	mean value of the determinations of TR	µm/cycle
w	width of the tyre applying the load	mm
WTR	wheel-tracking rate calculated as the mean rate at which the rut depth increases with time under repeated passes of a loaded wheel of a small size device model A in air	µm/cycle
WTS_W	wheel-tracking slope, calculated as the mean rate at which the rut depth increases with repeated passes of a loaded wheel of a small size device model B in water	mm/1 000 load cycles
WTS_{AIR}	wheel-tracking slope, calculated as the mean rate at which the rut depth increases with repeated passes of a loaded wheel of a small size device model B in air	µm/1 000 load cycles

5 Principle

The susceptibility of a bituminous material to deform is assessed by measuring the rut depth formed by repeated passes of a loaded wheel at a fixed temperature.

6 Apparatus

6.1 Large size devices

6.1.1 Device simulating a rolling load which shall include

6.1.1.1 *Wheel* fitted with a 400 × 8 pneumatic tyre without tread pattern and having a track width of (80 ± 5) mm. The pneumatic tyre pressure shall be (600 ± 30) kPa.

NOTE The Trelleborg T522 BV Extra or Special 6-ply type pneumatic tyre is suitable for this test.

6.1.1.2 The travel of pneumatic tyre relative to the specimen shall be (410 ± 5) mm.

6.1.1.3 The frequency of travel (outward and return) shall be (1,0 ± 0,1) Hz.

6.1.1.4 The rolling load applied to the test specimen shall be (5 000 ± 50) N at the centre of the test specimen, measured at least when the device is static.

6.1.1.5 The centre line of the tyre track shall be not more than 5 mm from the theoretical centre of the test specimen.

6.1.1.6 The angle of skew of the wheel shall be (0,0 ± 0,5)°.

6.1.2 Mould(s)

Mould(s) of internal dimensions (500 × 180 × 50) mm or (500 × 180 × 100) mm, all dimensions ± 2 mm, capable of withstanding the test conditions without distortion.

6.1.3 Depth gauge

Depth gauge to measure local distance from the reference plane, d_{ij}, to within ± 0,2 mm and with a square or circular measurement area of between 5 mm^2 and 10 mm^2. A contact-free sensor can be used if it leads to the same result.

6.1.4 Ventilated enclosure

Ventilated enclosure with a set temperature that is regulated by a probe installed within the test specimen such that the temperature within the specimen is maintained at ± 2 °C of that set (see Figure 1).

6.1.5 Temperature sensors

Temperature sensor(s) suitable for installation within a compacted bituminous test specimen and for the measurement of air temperature.

6.1.6 Temperature monitoring indicator

Temperature monitoring indicator to record the temperature within the test specimen, as shown in Figure 1.

6.1.7 Steel supporting plate

Steel supporting plate with a surface unevenness of less than 1 mm when checked with a steel rule across the diagonals and of a thickness such that the deflection under test conditions of this European Standard shall not exceed 0,5 mm.

6.1.8 Non-stick chemical

Non-stick chemical, such as glycerized sodium oleate.

6.2 Extra large devices

6.2.1 Device simulating a rolling load which shall include

6.2.1.1 General

Wheel fitted with a 6.00-R9 pneumatic tyre without tread pattern and having a track width of (110 ± 5) mm.

6.2.1.2 The travel of pneumatic tyre relative to the specimen shall be (700 ± 5) mm.

6.2.1.3 The time of travel (outward and return) shall be (2,5 ± 0,5) s.

6.2.1.4 The rolling load applied to the test specimen shall be (10 000 ± 100) N at the centre of the test specimen, measured at least when the device is static.

6.2.1.5 The centre line of the tyre track shall be not more than 20 mm from the theoretical centre of the test specimen.

6.2.1.6 The angle of skew of the wheel shall be (0,0 ± 0,5)°.

6.2.2 Moulds

Mould(s) of internal dimensions (700 × 500) mm, all dimensions ± 5 mm, capable of withstanding the test conditions without distortion. The height of the mould corresponds to the nominal thickness of the test specimen at the ends. The height of the side edges correspond to the nominal thickness of the specimen or exceed it by a maximum of 20 mm.

6.2.3 Depth gauge

Laser sensors to measure local deformation within ± 0,2 mm. Laser sensors shall be capable to measure rut depth with interval maximum 2 mm at least in 3 cross-sections as indicated in Figure 2.

6.2.4 Ventilated enclosure

Ventilated enclosure with a set temperature that is regulated by a probe installed within the test specimen such that the temperature within the specimen is maintained at ± 3 °C of the test temperature (see Figure 2).

6.2.5 Temperature sensors

Temperature sensor(s) suitable for installation within a compacted bituminous test specimen and for the measurement of air temperature.

6.2.6 Temperature monitoring indicator

Temperature monitoring indicator to record the temperature within the test specimen, as shown in Figure 2.

6.3 Small size devices for use with rectangular plates

6.3.1 Wheel-tracking apparatus

6.3.1.1 General