SLOVENSKI STANDARD
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Bitumenske zmesi - Preskusne metode - 16. del: Obraba zaradi gum ježevk

Bituminous mixtures - Test methods - Part 16: Abrasion by studded tyres

Asphalt - Prüfverfahren für Heißasphalt - Teil 16: Abrieb durch Spikereifen

Mélanges bitumineux - Méthodes d'essai pour enrobés à chaud - Partie 16 : Abrasion par pneus à crampons

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Bituminous mixtures - Test methods - Part 16: Abrasion by studded tyres

Mélanges bitumineux - Méthodes d'essai pour enrobés à chaud - Partie 16 : Abrasion par pneus à crampons

Asphalt - Prüfverfahren für Heißasphalt - Teil 16: Abrieb durch Spikereifen

This European Standard was approved by CEN on 23 January 2016.

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Contents

Page

European foreword ... 3
1 Scope ... 7
2 Normative references ... 7
3 Terms and definitions ... 7
4 Method A ... 8
4.1 Principle ... 8
4.2 Apparatus ... 8
4.3 Test specimen ... 10
4.4 Conditioning ... 10
4.5 Determination of abrasion ... 10
4.6 Calculation ... 11
4.7 Test report ... 11
4.8 Precision ... 11
5 Method B ... 12
5.1 Principle ... 12
5.2 Apparatus ... 12
5.3 Test specimen ... 13
5.4 Conditioning ... 14
5.5 Determination of abrasion ... 14
5.6 Calculation ... 15
5.7 Test report ... 15
5.8 Precision ... 16
Annex A (normative) Stud chart ... 17
Annex B (normative) Spring force measurement ... 18
B.1 General ... 18
B.2 Measuring the spring force with spring balance or dynamometer ... 18
B.2.1 Measuring equipment ... 18
B.2.2 Procedure and an example ... 18
Bibliography ... 20

European foreword

This document (EN 12697-16:2016) 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of an identical text or by endorsement, at the latest by October 2016, and conflicting national standards shall be withdrawn at the latest by October 2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12697-16:2004.

Compared with EN 12697-16:2004 the following changes have been made:

a) Scope: Clarification regarding application of the Method. NOTES regarding use of polymer-modified bitumen or rubber modified bitumen added.

b) 4.2 Apparatus: Clarified that sample collar shall consist of stainless steel. Completed with important parts about measuring stroke height and installation of equipment; needed measurements to the manufacturer of equipment; dimension for new sample collar and NOTE for old equipment; defined quality of stainless steel balls and weight of steel ball set with tolerances; added normative text regarding the importance of fixed rubber plate without bubbles; added normative text regarding when rubber plate needs to be replaced; tightened accuracy of balance from 0,3 to ± 0,1 g; and corrections of Figure 1 (including key) and Figure 2 (including key). Figure 1 and Figure 2 placed in order due to the actual clause.

c) 4.3 Test specimen: paragraphs added.

d) 4.4 Conditioning: Completed with maximum conditioning time and minor editorial changes.

e) 4.5 Determination of abrasion: Completed with defined procedure for how to handle test when water flow is interrupted; additional notes; and minor editorial changes for inconsistencies. In 4.5.1 added that tape shall be water proof or similar. In 4.5.3 Checkpoint added regarding condition of rubber plate.

f) 4.6 Calculation: Changed for calculation of rounded abrasion value; unit for bulk density; and minor editorial changes.

g) 4.7 Test report: Clarified and minor editorial changes. In 4.7 f) Added that also individual values shall be reported.

h) 4.8 Precision: Updated based on results in the Nordic research project in NordFoU.

This European standard is one of a series of standards as listed below:

— EN 12697-1, *Bituminous mixtures — Test methods for hot mix asphalt — Part 1: Soluble binder content*

— EN 12697-2, *Bituminous mixtures — Test methods — Part 2: Determination of particle size distribution*

— EN 12697-3, *Bituminous mixtures — Test methods for hot mix asphalt — Part 3: Bitumen recovery: Rotary evaporator*

— EN 12697-4, *Bituminous mixtures — Test methods — Part 4: Bitumen recovery: Fractionating column*

— EN 12697-5, *Bituminous mixtures — Test methods for hot mix asphalt — Part 5: Determination of the maximum density*

— 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 12697-8, *Bituminous mixtures — Test methods for hot mix asphalt — Part 8: Determination of void characteristics of bituminous specimens*

— EN 12697-10, *Bituminous mixtures —Test methods for hot mix asphalt — Part 10: Compactability*

— EN 12697-11, *Bituminous mixtures — Test methods for hot mix asphalt — Part 11: Determination of the affinity between aggregate and bitumen*

— EN 12697-12, *Bituminous mixtures — Test methods for hot mix asphalt — Part 12: Determination of the water sensitivity of bituminous specimens*

— EN 12697-13, *Bituminous mixtures — Test methods for hot mix asphalt — Part 13: Temperature measurement*

— EN 12697-14, *Bituminous mixtures — Test methods for hot mix asphalt — Part 14: Water content*

— EN 12697-15, *Bituminous mixtures — Test methods for hot mix asphalt — Part 15: Determination of the segregation sensitivity*

— EN 12697-16, *Bituminous mixtures — Test methods — Part 16: Abrasion by studded tyres*

— EN 12697-17, *Bituminous mixtures — Test methods for hot mix asphalt — Part 17: Particle loss of porous asphalt specimen*

— EN 12697-18, *Bituminous mixtures — Test methods for hot mix asphalt — Part 18: Binder drainage*

— EN 12697-19, *Bituminous mixtures — Test methods for hot mix asphalt — Part 19: Permeability of specimen*

— EN 12697-20, *Bituminous mixtures — Test methods for hot mix asphalt — Part 20: Indentation using cube or cylindrical specimens (CY)*

— EN 12697-21, *Bituminous mixtures — Test methods for hot mix asphalt — Part 21: Indentation using plate specimens*

— EN 12697-22, *Bituminous mixtures — Test methods for hot mix asphalt — Part 22: Wheel tracking*

— EN 12697-23, *Bituminous mixtures — Test methods for hot mix asphalt — Part 23: Determination of the indirect tensile strength of bituminous specimens*

— EN 12697-24, *Bituminous mixtures — Test methods for hot mix asphalt — Part 24: Resistance to fatigue*

— EN 12697-25, *Bituminous mixtures — Test methods for hot mix asphalt — Part 25: Cyclic compression test*

— EN 12697-26, *Bituminous mixtures — Test methods for hot mix asphalt — Part 26: Stiffness*

— EN 12697-27, *Bituminous mixtures — Test methods for hot mix asphalt — Part 27: Sampling*

— EN 12697-28, *Bituminous mixtures — Test methods for hot mix asphalt — Part 28: Preparation of samples for determining binder content, water content and grading*

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

— EN 12697-30, *Bituminous mixtures — Test methods for hot mix asphalt — Part 30: Specimen preparation by impact compactor*

— EN 12697-31, *Bituminous mixtures — Test methods for hot mix asphalt — Part 31: Specimen preparation by gyratory compactor*

— EN 12697-32, *Bituminous mixtures — Test methods for hot mix asphalt — Part 32: Laboratory compaction of bituminous mixtures by vibratory compactor*

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

— EN 12697-34, *Bituminous mixtures — Test methods for hot mix asphalt — Part 34: Marshall test*

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

— EN 12697-36, *Bituminous mixtures — Test methods for hot mix asphalt — Part 36: Determination of the thickness of a bituminous pavement*

— EN 12697-37, *Bituminous mixtures — Test methods for hot mix asphalt — Part 37: Hot sand test for the adhesivity of binder on precoated chippings for HRA*

— EN 12697-38, *Bituminous mixtures — Test methods for hot mix asphalt — Part 38: Common equipment and calibration*

— EN 12697-39, *Bituminous mixtures — Test methods for hot mix asphalt — Part 39: Binder content by ignition*

— EN 12697-40, *Bituminous mixtures — Test methods for hot mix asphalt — Part 40: In situ drainability*

— EN 12697-41, *Bituminous mixtures — Test methods for hot mix asphalt — Part 41: Resistance to de-icing fluids*

— EN 12697-42, *Bituminous mixtures — Test methods for hot mix asphalt — Part 42: Amount of foreign matter in reclaimed asphalt*

— EN 12697-43, *Bituminous mixtures — Test methods for hot mix asphalt — Part 43: Resistance to fuel*

— EN 12697-44, *Bituminous mixtures — Test methods for hot mix asphalt — Part 44: Crack propagation by semi-circular bending test*

— EN 12697-45, *Bituminous mixtures — Test methods for hot mix asphalt — Part 45: Saturation Ageing Tensile Stiffness (SATS) conditioning test*

— EN 12697-46, *Bituminous mixtures — Test methods for hot mix asphalt — Part 46: Low temperature cracking and properties by uniaxial tension tests*

— EN 12697-47, *Bituminous mixtures — Test methods for hot mix asphalt — Part 47: Determination of the ash content of natural asphalts*

— prEN 12697-48, *Bituminous mixtures — Test methods for hot mix asphalt — Part 48: Interlayer Bonding*

— EN 12697-49, *Bituminous mixtures — Test methods for hot mix asphalt — Part 49: Determination of friction after polishing*

— FprCEN/TS 12697-50, *Bituminous mixtures — Test methods — Part 50: Resistance to scuffing*[1)]

— FprCEN/TS 12697-51, *Bituminous mixtures — Test methods — Part 51: Surface shear strength test*

— prEN 12697-52, *Bituminous mixtures — Test methods — Part 52: Conditioning to address oxidative ageing*[1)]

— prEN 12697-53, *Bituminous mixtures — Test methods — Part 53: Cohesion increase by spreadability-meter method*[1)]

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: 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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1) Currently at Enquiry stage.

1 Scope

This European Standard describes two test methods (method A and method B) for determining the susceptibility of abrasion by studded tyres, tested on cylindrical specimens of bituminous mixtures. The test methods are applicable to bituminous mixtures with aggregate with upper sieve size not exceeding 22 mm.

The tests are applicable to laboratory produced specimens or cores drilled from a slab or pavement.

NOTE 1 Method A originates from the 'Prall'-method, which has been improved by comprehensive Nordic research work. The method correlates with abrasion in the field when using paving grade bitumen. According to Nordic experience by method A the correlation between laboratory and abrasion in field is not established when polymer modified bitumen or rubber modified bitumen, etc. is used.

NOTE 2 Method B originates from Finnish experience and is suitable also when polymer modified bitumen is used. The correlation between laboratory and abrasion in field is not established when rubber is used.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 12697-27, *Bituminous mixtures - Test methods for hot mix asphalt - Part 27: Sampling*

EN 12697-30, *Bituminous mixtures - Test methods for hot mix asphalt - Part 30: Specimen preparation by impact compactor*

EN 12697-31, *Bituminous mixtures - Test methods for hot mix asphalt - Part 31: Specimen preparation by gyratory compactor*

EN 12697-32, *Bituminous mixtures — Test methods for hot mix asphalt — Part 32: Laboratory compaction of bituminous mixtures by vibratory compactor*

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

ISO 3290-1, *Rolling bearings — Balls — Part 1: Steel balls*

3 Terms and definitions

For the purposes of this document, the following term and definition applies.

3.1
abrasion
loss of mass by abrasive action

Note 1 to entry: Expressed as volume loss in millilitres (ml).

4 Method A

4.1 Principle

A cylindrical specimen having a diameter of 100 mm and a height of 30 mm is brought to a temperature of 5 °C. The specimen is worn by abrasive action during 15 min by 40 steel spheres. The loss of volume in millilitre is recorded and is reported as the abrasion value.

4.2 Apparatus

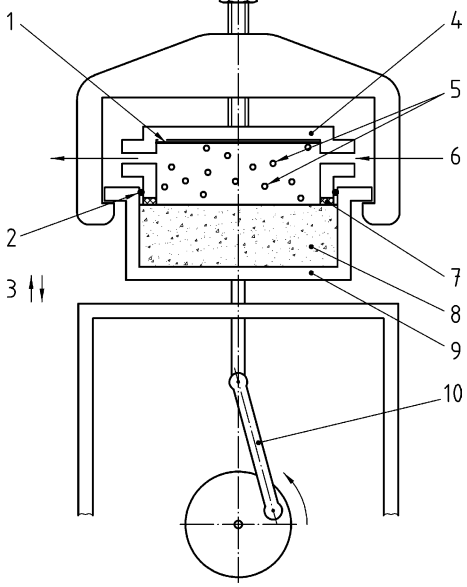
Abrasion apparatus according to Figure 1, including a stroke, (43 ± 1) mm, and a connection rod, length (200 ± 5) mm.

The stroke height shall be measured in a way that possible backlash is included in the stroke height.

The equipment shall be mounted on a concrete foundation, the mass should be at least 300 kg, or be attached to a concrete floor. If rubber feet are used, they shall be of such quality that the equipment does not come into self-oscillation.

4.2.1 Sample collar of stainless steel for test specimen with inner diameter 102,0 ± 0,2 mm, to enable fitting of specimens made by EN 12697-30, and inner height at least 35 mm. Thickness about 6 mm. (Figure 1).

NOTE The measurement for inner diameter is required on new manufactured equipment. Some earlier made equipment may have an inner diameter that is smaller than the tolerance requirement but it does not have influence on the wearing surface area, however the smaller diameter may limit the possibility to enable fitting of specimens made by EN 12697–30.



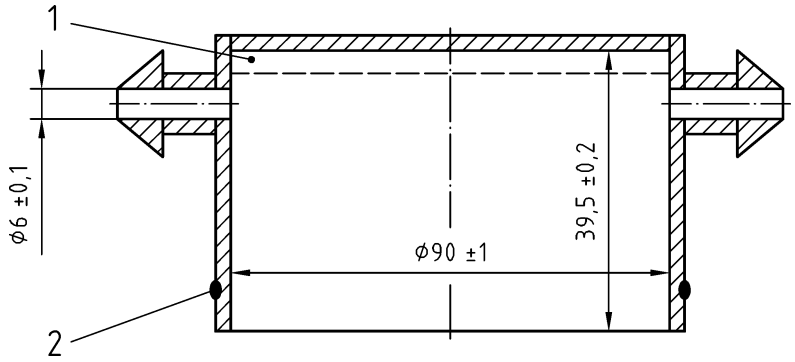
Key

1	rubber plate	6	inlet/ outlet for cooling water
2	O-ring	7	flat rubber ring
3	stroke	8	specimen
4	lid	9	sample collar
5	steel spheres	10	connection rod

Figure 1 — Abrasion apparatus, in general

4.2.2 Lid to abrasion apparatus of stainless steel with ports for water flow. The lid shall have an inner diameter 90 ± 1 mm and inner height 39,5 ± 0,2 mm. Thickness about 6 mm to enable tight fitting (with o-ring) into the sample collar. Diameter of the outlet ports Ø 6,0 ± 0,1 mm. (Figure 2).

Dimensions in millimetres



Key

1 rubber plate

2 O-ring

Figure 2 — Lid of stainless steel

4.2.3 Steel clamp to fasten the lid on top of the machine adjustable by means of the screw at the top.

4.2.4 Spheres made of stainless steel according to ISO 3290-1 with a diameter between 11,50 mm and 12,01 mm. The hardness, expressed in HRC, shall be 58-65 and the weight of 40 steel balls shall be between 265 and 285 g.

NOTE The diameter of the spheres can be checked quickly by passing them over parallel bars 11,50 mm apart.

4.2.5 Flat rubber ring (Nitrile Butadiene Rubber (NBR) or similar), to protect the edges of the specimen (see Figure 1), outer diameter (102,0 ± 0,2) mm, internal diameter (87,4 ± 0,2) mm and thickness 6,3 ± 0,1 mm.

4.2.6 O-ring (Nitrile Butadiene Rubber (NBR) or similar) for the groove outside of the cylindrical part of the lid (see Figure 2), internal diameter 90,0 mm, diameter of cross section 3,0 mm.

4.2.7 Rubber plate (Polychloroprene or similar) with diameter (90,0 ± 1,0) mm, thickness (2,0 ± 0,2) mm. The rubber plate shall be glued firmly without bubbles at the underside of the lid (see Figure 2). The rubber plate shall be replaced when it becomes damaged or brittle.

NOTE The rubber plate undergoes continuous quality degradation over time and during use.

4.2.8 Water reservoir for cooling water and for adjustment of specimen temperature to 5 ± 1 °C.

4.2.9 Balance of appropriate capacity, at least 3 kg, able to weight with an accuracy of at least ± 0,1 g.

4.2.10 Water pump with capacity not less than 2,0 l/min.