



SLOVENSKI STANDARD

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Bitumenske zmesi - Preskusne metode za vroče asfaltne zmesi - 44. del: Širjenje razpoke s polkrožnim upogibnim preskusom

Bituminous mixtures - Test methods for hot mix asphalt - Part 44: Crack propagation by semi-circular bending test

Asphalt - Prüfverfahren für Heißasphalt - Teil 44: Bestimmung des Risswachstums durch eine Biegeprüfung unter Aufbringung einer Dreipunkt-Belastung (semi-circular bending test [SCB-Prüfung])

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Mélanges bitumineux - Méthodes d'essai pour mélange hydrocarboné à chaud - Partie 44 : Propagation de fissure par essai de flexion d'un bloc semi-circulaire

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93.080.20 Materiali za gradnjo cest Road construction materials

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EUROPEAN STANDARD

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

Mélanges bitumineux - Méthodes d'essai pour mélange
hydrocarboné à chaud - Partie 44 : Propagation de fissure
par essai de flexion d'un bloc semi-circulaire

Asphalt - Prüfverfahren für Heißasphalt - Teil 44:
Bestimmung der Rissausbreitung mittels Halbzylinder-
Biegeversuch

This European Standard was approved by CEN on 28 August 2010.

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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 Management Centre has the same status as the official versions.

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Foreword

This document (EN 12697-44:2010) 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of an identical text or by endorsement, at the latest by **March 2011**, and conflicting national standards shall be withdrawn at the latest by **March 2011**.

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 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 for hot mix asphalt — 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 for hot mix asphalt — 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 12697-9, *Bituminous mixtures — Test methods for hot mix asphalt — Part 9: Determination of the reference density*

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*

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- 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 for hot mix asphalt — 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 Marshall specimens*
- 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 methods 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 a 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 for hot mix asphalt — 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 coarse 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*

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

prEN 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: Inter-layer bond strength (in preparation)*

prEN 12697-49, *Bituminous mixtures — Test methods for hot mix asphalt — Part 49: Skid resistance of asphalt in the laboratory (in preparation)*

prEN 12697-50, *Bituminous mixtures — Test methods for hot mix asphalt — Part 50: Scuffing resistance of surface course (in preparation)*

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

EN 12697-44:2010 (E)**1 Scope**

This European Standard specifies the Semi-Circular Bending (SCB) test method to determine the tensile strength or fracture toughness of an asphalt mixture for the assessment of the potential for crack propagation. The results of the test can be used to calculate:

- the maximum load that the material containing a notch (crack) can resist before failure;
- when the presence of a notch is critical.

It should be noted that the test only describes a method to determine the resistance to crack propagation of an asphalt mixture. The crack propagation phase describes the second part of failure mechanism during dynamic loading. The first phase, which is the crack initiation phase, is mainly covered by the fatigue test (EN 12697-24).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated referenced, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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

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

EN 12697-35, *Bituminous mixtures — Test methods for hot mix asphalt — Part 35: Laboratory mixing*

3 Terms and definitions

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

3.1**test piece**

sample obtained by sawing an asphalt cylinder through a diameter

3.2**strain**

relative deformation of the test piece

3.3**stress**

force per unit area

3.4**horizontal stress**

tensile stress prevailing at the base of the test piece

3.5**tensile strength**

strength of the material under tensile loading

3.6**fracture toughness**

resistance to failure of the test piece by breaking

4 Symbols

a	Notch depth in millimetres (mm)
D	Diameter in millimetres (mm)
$f(a/W)$	Geometric factor
F	Force in newtons (N)
F_{\max}	Maximum force in newtons (N)
K_{Ic}	Fracture toughness in newtons per millimetre to the power of 1,5 (N/mm ^{1,5})
t	Thickness in millimetres (mm)
ΔW	Vertical displacement at maximum force in millimetres (mm)
ϵ_{\max}	Strain at maximum force in percent (%)
σ	Stress in newtons per square millimetre (N/mm ²)
σ_{hor}	Horizontal stress in newtons per square millimetre (N/mm ²)
σ_{\max}	Maximum stress at failure in newtons per square millimetre (N/mm ²)

5 Principle

A half cylinder test piece with a centre crack is loaded in three-point bending in such a way that the middle of the base of the test piece is subjected to a tensile stress. During the test, the deformation increases at a constant rate of 5 mm/min. The corresponding load increases to a maximum value, F_{\max} , that is directly related to the fracture toughness of the test sample. In Figure 1 an example of the test frame and specimen is given.