



SLOVENSKI STANDARD
SIST EN 12697-16:2004

01-september-2004

6]li a Ybg_Y'na Yg]!'DfYg_i gbY'a YrcXY'nUj fc Y'UgZf'fbY'na Yg]!'%' "XY.'CVfUVU
nUfUX]'[i a 'YyYj _

Bituminous mixtures - Test methods for hot mix asphalt - Part 16: Abrasion by studded
tyres

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

STANDARD PREVIEW

Mélanges bitumineux - Méthodes d'essai pour mélange hydrocarboné a chaud - Partie
16: Abrasion par pneus a crampons

[SIST EN 12697-16:2004](https://standards.iteh.ai/catalog/standards/sist/1b189969-c677-457d-adeb-2d921d409b9a/sist-en-12697-16-2004)

Ta slovenski standard je istoveten z: **EN 12697-16:2004**

ICS:

93.080.20 Materiali za gradnjo cest Road construction materials

SIST EN 12697-16:2004

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 12697-16:2004

<https://standards.iteh.ai/catalog/standards/sist/1b189969-c677-457d-adeb-2d92fd409b9a/sist-en-12697-16-2004>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 12697-16

July 2004

ICS 93.080.20

English version

Bituminous mixtures - Test methods for hot mix asphalt - Part 16: Abrasion by studded tyres

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

Asphalt - Prüfverfahren für Heiasphalt - Teil 16: Abrieb
durch Spikereifen

This European Standard was approved by CEN on 2 March 2004.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

[SIST EN 12697-16:2004](https://standards.iteh.ai/catalog/standards/sist/1b189969-c677-457d-adeb-2d92fd409b9a/sist-en-12697-16-2004)

<https://standards.iteh.ai/catalog/standards/sist/1b189969-c677-457d-adeb-2d92fd409b9a/sist-en-12697-16-2004>



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

page

Foreword.....	3
1 Scope	6
2 Normative references	6
3 Terms and definitions	6
4 Method A.....	7
4.1 Principle.....	7
4.2 Apparatus	7
4.3 Test specimen	8
4.4 Conditioning.....	9
4.5 Determination of abrasion	10
4.6 Calculation.....	10
4.7 Test report	11
4.8 Precision.....	11
5 Method B.....	11
5.1 Principle.....	11
5.2 Apparatus	11
5.3 Test specimen	13
5.4 Conditioning.....	13
5.5 Determination of abrasion	13
5.6 Calculation.....	13
5.7 Test report	14
5.8 Precision.....	14
Annex A (normative) Stud chart	15
Annex B (normative) Spring force measurement	16
B.1 General.....	16
B.2 Measuring the spring force with spring balance or dynamometer	16
B.2.1 Measuring equipment.....	16
B.2.2 Procedure and an example	16
Bibliography.....	18

iTech STANDARD PREVIEW
(standards.itech.ai)

SIST EN 12697-16:2004

<https://standards.itech.ai/catalog/standards/sist/1b189969-c677-457d-adeb-2d92fd409b9a/sist-en-12697-16-2004>

Foreword

This document (EN 12697-16:2004) 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 January 2005, and conflicting national standards shall be withdrawn at the latest by August 2005.

This document includes a Bibliography.

This document 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.*

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

EN 12697-16:2004 (E)

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.*

prEN 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, 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.*

prEN 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.*

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

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

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

prEN 12697-42, *Bituminous mixtures - Test methods for hot mix asphalt - Part 42: Amount of foreign matters in reclaimed asphalt.*

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

No existing European Standard is superseded.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 12697-16:2004](https://standards.iteh.ai/catalog/standards/sist/1b189969-c677-457d-adeb-2d92fd409b9a/sist-en-12697-16-2004)

<https://standards.iteh.ai/catalog/standards/sist/1b189969-c677-457d-adeb-2d92fd409b9a/sist-en-12697-16-2004>

EN 12697-16:2004 (E)**1 Scope**

This document describes test methods (method A and method B) for determining abrasion by studded tyres, tested on cylindrical specimens of bituminous mixtures.

NOTE Method A originates from the 'Prall'-method, which has been improved by comprehensive research work. According to Swedish research work, the method correlates with abrasion in the field. Method B originates from Finnish experience and correlates with abrasion in the field.

2 Normative references

The following referenced documents are indispensable for the application 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 12697-27, *Bituminous mixtures - Tests methods for hot mix asphalt - Part 27: Sampling.*

EN 12697-30, *Bituminous mixtures - Test methods for hot mix asphalt - Part 30: Specimen preparation, 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, *Rolling bearings – Balls - Dimensions and tolerances.*

3 Terms and definitions

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

3.1**abrasion**

loss of mass by abrasive action, in millilitres (ml)

3.2**precision**

closeness of agreement between independent test results obtained under stipulated conditions

NOTE 1 Precision depends only on the distribution of random errors and does not relate to the true value or the specified value.

NOTE 2 The measure of precision is usually expressed in terms of imprecision and computed as a standard deviation of the test results. Less precision is reflected by a larger standard deviation.

NOTE 3 "Independent test results" mean results obtained in a manner not influenced by any previous result on the same or similar test sample. Quantitative measures of precision depend critically on the stipulated conditions. Repeatability and reproducibility conditions are particular sets of extreme conditions.

3.3

repeatability

precision under repeatability conditions

3.4

repeatability conditions

conditions in which independent test results are obtained with the same method on identical test items in the same laboratory by the same operator using the same equipment within short intervals of time

3.5

repeatability limit

value less than or equal to which the absolute difference between two test results obtained under repeatability conditions may be expected to be with a probability of 95 %

NOTE The symbol used for repeatability limit is r .

3.6

reproducibility

precision under reproducibility conditions

3.7

reproducibility conditions

conditions in which test results are obtained with the same method on identical test items in different laboratories with different operators using different equipment

3.8

reproducibility limit

value less than or equal to which the absolute difference between two test results obtained under reproducibility conditions may be expected to be with a probability of 95 %

NOTE The symbol used for reproducibility limit is R .

3.9

single test result

value obtained by applying the standard test method fully, and may be the mean of two or more observations or the result of a calculation from a set observations as specified by the standard test method

4 Method A

4.1 Principle

A cylindrical specimen having a diameter of 100 mm and a length of 30 mm is brought to a temperature of 5 °C. The specimen is worn during 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

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

4.2.2 Lid to abrasion apparatus, stainless steel according to Figure 2.

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

EN 12697-16:2004 (E)

4.2.4 Spheres made of stainless steel according to ISO 3290 with a diameter between 11,50 mm and 12,01 mm. The hardness expressed in HRC shall be between 63 and 66.

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 $(100,0 \pm 0,2)$ mm, internal diameter $(87,4 \pm 0,2)$ 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 (Neoprene or similar) to be glued at the underside of the lid (see Figure 2), diameter $(90,0 \pm 1,0)$ mm, thickness $(2,0 \pm 0,2)$ mm.

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, accurate to 0,3 g.

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

4.3 Test specimen

4.3.1 The cylindrical test specimens shall have a diameter of (100 ± 2) mm. The specimens shall be either laboratory-produced in accordance with EN 12697-30, EN 12697-31, or EN 12697-32, or cores sampled from the road according to EN 12697-27, or cores drilled from slabs produced in accordance with EN 12697-33.

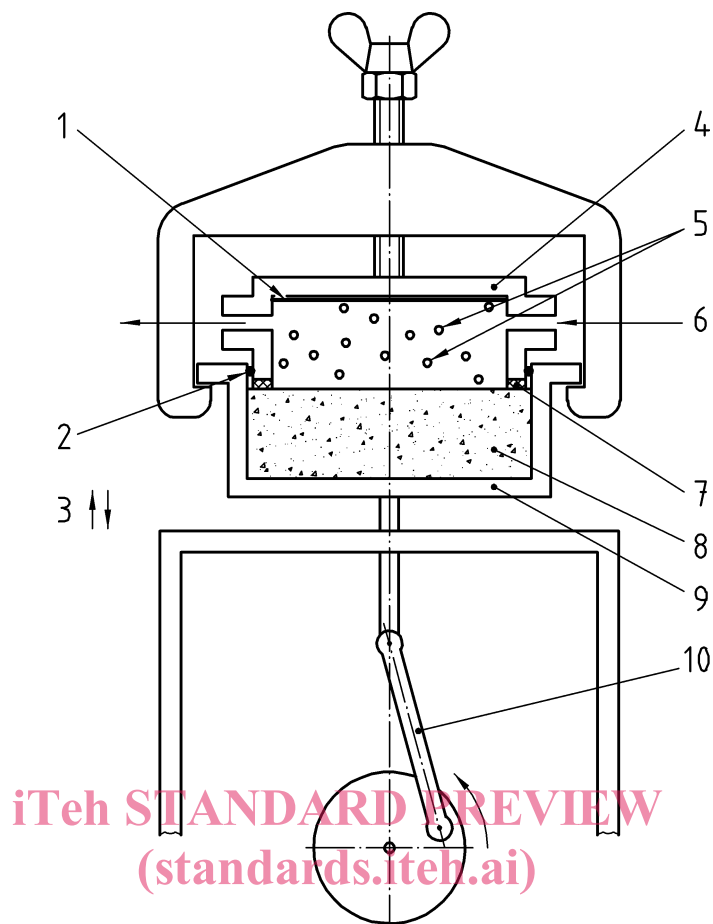
NOTE The maximum aggregate size of the bituminous mixture should not exceed 22 mm.

4.3.2 Make at least four specimens with a diameter of (100 ± 2) mm. Cut the specimens to a length of (30 ± 2) mm.

NOTE When cutting, avoid damaging the edges of the specimen, and the end surfaces should be made as even and parallel as possible.

4.3.3 Determine the bulk density according to EN 12697-6.

NOTE The dimensions can be checked in accordance with EN 12697-29.



iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 12697-16:2004

<https://standards.iteh.ai/catalog/standards/sist/1b189969-c677-457d-adeb-2d92fd409b9a/sist-en-12697-16-2004>

Key

- | | |
|--------------------|-------------------|
| 1 Rubber plate | 6 Cooling water |
| 2 Flat rubber ring | 7 O-ring |
| 3 Stroke | 8 Specimen |
| 4 Lid | 9 Test chamber |
| 5 Steel spheres | 10 Connection rod |

Figure 1 — Abrasion apparatus, in general

4.4 Conditioning

4.4.1 Condition the specimens for at least 5 h in water of temperature $(5 \pm 1) ^\circ\text{C}$.

4.4.2 Remove the specimen from the water, dry the surface, removing any drops adhering to it by wiping with a damp chamois.

4.4.3 Determine the mass of the saturated, surface wiped specimen in air immediately after drying M_1 to $\pm 0,5$ g.