SLOVENSKI STANDARD
SIST EN 12697-25:2005

01-julij-2005

Bitumenske zmesi ï Preskusne metode za vroļ e asfaltne zmesi ï 25. del: Cikliļ ni tlaļ ni preskus

Bituminous mixtures - Test methods for hot mix asphalt - Part 25: Cyclic compression test

Asphalt - Prüfverfahren für Heißasphalt - Teil 25: Druckschwellversuch

Mélanges bitumineux - Méthodes d'essai pour mélange hydrocarboné a chaud - Partie 25 : Essai de compression cyclique

Ta slovenski standard je istoveten z: **EN 12697-25:2005**

ICS:

93.080.20 Materiali za gradnjo cest Road construction materials

SIST EN 12697-25:2005 **en**

EUROPEAN STANDARD

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English version

Bituminous mixtures - Test methods for hot mix asphalt - Part 25: Cyclic compression test

Mélanges bitumineux - Méthodes d'essai pour mélange hydrocarboné à chaud - Partie 25 : Essai cyclique de compression

Asphalt - Prüfverfahren für Heißasphalt - Teil 25: Druckschwellversuch

This European Standard was approved by CEN on 15 March 2005.

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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 Central Secretariat has the same status as the official versions.

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Foreword

This document (EN 12697-25:2005) 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of an identical text or by endorsement, at the latest by October 2005, and conflicting national standards shall be withdrawn at the latest by October 2005.

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 method 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, *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 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.*

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.

Introduction

This European Standard contains two test methods to determine the resistance to permanent deformation of a bituminous mixture by cyclic compression tests with confinement. The tests make it possible to rank various mixes or to check on the acceptability of a given mix. They do not allow making a quantitative prediction of rutting in the field to be made. The choice for confinement was made in order to obtain realistic test results for gap-graded mixes.

1 Scope

This European Standard describes two test methods (A and B) for determining the resistance of bituminous mixtures to permanent deformation.

Test method A describes the method for determining the creep characteristics of bituminous mixtures by means of an uniaxial cyclic compression test with some confinement present. In this test a cylindrical specimen is subjected to a cyclic axial stress. To achieve a certain confinement, the diameter of the loading platen is taken smaller than that of the sample.

NOTE 1 Confinement of the sample is necessary to predict realistic rutting behaviour, especially for gap-graded mixes with a large stone fraction.

Test method B describes the method for determining the creep characteristics of bituminous mixtures by means of the triaxial cyclic compression test. In this test a cylindrical specimen is subjected to a confining stress and a cyclic axial stress. This test is most often used for the purpose of evaluation and development of new types of mixtures.

This European Standard applies to specimens prepared in the laboratory or cored from the road. The maximum size of the aggregates is 32 mm.

NOTE 2 For purposes of compliance with EN 13108, the test conditions are given in prEN 13108-20.

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 — Test methods for hot mix asphalt — Part 27: Sampling.*

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

3 Terms and definitions

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

3.1
accuracy class
permissible measuring error, expressed as a percentage, in the output signal of a transducer

3.2
contact area
that portion of the pressure platen that is in contact with the test specimen

3.3
creep curve
display of the cumulative axial strain, expressed in %, of the specimen as a function of the number of load applications

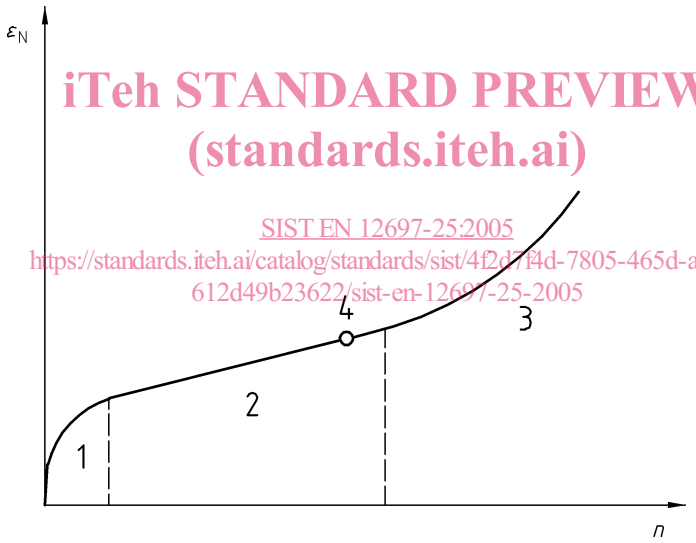
NOTE Generally the following stages can be distinguished (see Figure 1)

— stage 1: the (initial) part of the deformation curve, where the slope of the curve decreases with increasing number of loading cycles;

— stage 2: the (middle) part of the deformation curve, where the slope of the curve is quasi constant and with a turning point in the deformation curve;

— stage 3: the (last) part of the deformation curve, where the slope increases with increasing number of loading cycles.

Depending on the testing conditions and on the mix, one or more stages may be absent.



Key

ε_N	Cumulative axial strain	1	Stage 1
n	Number of load repetitions	2	Stage 2
		3	Stage 3
		4	Turning point

Figure 1 — Example of a creep curve

3.4
precision
the 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" means results obtained in a manner not influenced by any previous result on the same or similar test object. Quantitative measures of precision depend critically on the stipulated conditions. Repeatability and reproducibility conditions are particular sets of extreme conditions.

3.5
repeatability
precision under repeatability conditions

3.6
repeatability conditions
conditions where 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

3.7
repeatability limit
the value less than or equal to which the absolute difference between two test results obtained under repeatability conditions may be expected to be within probability of 95 %

NOTE The symbol used is r.

3.8
reproducibility
precision under reproducibility conditions

3.9
reproducibility conditions
conditions where test results are obtained with the same method on identical test items in different laboratories with different operators using different equipment

3.10
reproducibility limit
the 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 is R.

3.11
single test result
the value obtained by applying the standard test method fully, once to a single specimen; it may be the mean of two or more observations or the result of a calculation from a set of observations as specified by the standardized test method

3.12
measuring error
difference between the true value of the physical quantity and the value indicated on the measuring instrument, expressed as a percentage of the true value

3.13
permanent deformation
cumulative axial deformation of the specimen after a given number of load applications

4 Test method A — Uniaxial cyclic compression test with confinement

4.1 Principle

This test method determines the resistance to permanent deformation of a cylindrical specimen of bituminous mixture by repeated load. The specimens may be either prepared in the laboratory or be cored from a pavement.

A cylindrical test specimen with a diameter of 150 mm, maintained at elevated conditioning temperature, is placed between two plan parallel loading platens. The upper platen has a diameter of 100 mm (by an inclination the pressure area against the specimen has a real diameter of 96 mm). A schematic representation of the test device is given in Figure 2. The specimen is subjected to a cyclic axial block-pulse pressure, as represented in Figure 3. There is no additional lateral confinement pressure applied.

During the test the change in height of the specimen is measured at specified numbers of load applications. From this, the cumulative axial strain ε_N (permanent deformation) of the test specimen is determined as a function of the number of load applications. The results are represented in a creep curve as given in Figure 3. From this, the creep characteristics of the specimen are computed.

The test does not allow a quantitative prediction of the rutting. Nevertheless, the test makes it possible to rank various mixes or to check on the acceptability of a given mix.

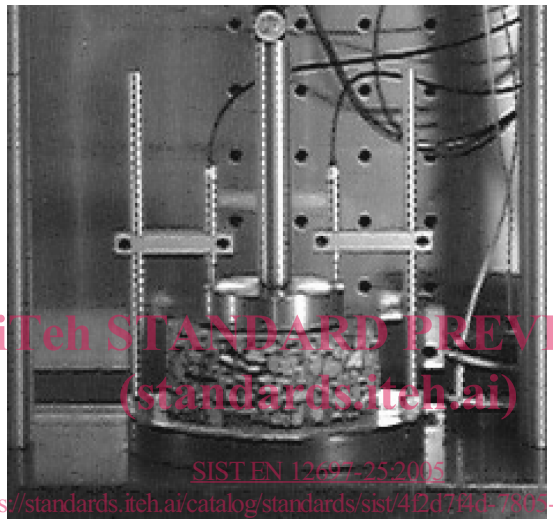


Figure 2 — Test apparatus

4.2 Apparatus

4.2.1 Test system

4.2.1.1 Compression apparatus

A suitable test apparatus to generate a square (see Figure 3 and Figure 4) and periodical loading pulse, with a frequency of 0,5 Hz and a load of (100 ± 2) kPa. The load cell shall have a capacity of at least 2 000 N. All components shall be constructed out of corrosion-resistant steel.