



SLOVENSKI STANDARD
SIST EN 12697-10:2002

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Bituminous mixtures - Test methods for hot mix asphalt - Part 10: Compactability

Bituminous mixtures - Test methods for hot mix asphalt - Part 10: Compactability

Asphalt - Prüfverfahren für Heißasphalt - Teil 10: Verdichtbarkeit

Mélanges bitumineux - Méthodes d'essai pour mélange hydrocarboné a chaud - Partie 10: Compactabilité

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Ta slovenski standard je istoveten z: EN 12697-10:2001

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EUROPEAN STANDARD
NORME EUROPÉENNE
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EN 12697-10

November 2001

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English version

Bituminous mixtures - Test methods for hot mix asphalt - Part 10: Compactability

Mélanges bitumineux - Méthodes d'essai pour mélange
hydrocarboné à chaud - Partie 10: Compactabilité

Asphalt - Prüfverfahren für Heißasphalt - Teil 10:
Verdichtbarkeit

This European Standard was approved by CEN on 14 October 2001.

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 Management Centre 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This European Standard 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of an identical text or by endorsement, at the latest by May 2002, and conflicting national standards shall be withdrawn at the latest by August 2005.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.*

prEN 12697-2, *Bituminous mixtures - Test methods for hot mix asphalt - Part 2: 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.*

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

prEN 12697-6, *Bituminous mixtures - Test methods for hot mix asphalt - Part 6: Determination of bulk density of bituminous specimen by hydro-static method.*

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

prEN 12697-8, *Bituminous mixtures - Test methods for hot mix asphalt - Part 8: Determination of the air voids content of bituminous materials.*

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

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

prEN 12697-11, *Bituminous mixtures - Test methods for hot mix asphalt - Part 11: Determination of the compatibility between aggregate and bitumen.*

prEN 12697-12, *Bituminous mixtures - Test methods for hot mix asphalt - Part 12: Determination of the water sensitivity of bituminous specimen.*

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.*

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

prEN 12697-16, *Bituminous mixtures - Test methods for hot mix asphalt - Part 16: Abrasion by studded tyres.*

prEN 12697-17, *Bituminous mixtures - Test methods for hot mix asphalt - Part 17: Partial loss of porous asphalt specimen.*

prEN 12697-18, *Bituminous mixtures - Test methods for hot mix asphalt - Part 18: Binder drainage from porous asphalt.*

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

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prEN 12697-20, *Bituminous mixtures - Test methods for hot mix asphalt - Part 20: Indentation using cube or marshall specimen.*

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

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

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

prEN 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: Dynamic creep test.*

prEN 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.*

prEN 12697-29, *Bituminous mixtures - Test methods for hot mix asphalt - Part 29: Determination of the dimensions of bituminous specimen.*

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

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

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

prEN 12697-33, *Bituminous mixtures - Test methods for hot mix asphalt - Part 33: Specimen preparation, slab compactor.*

prEN 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.*

prEN 12697-36, *Bituminous mixtures - Test methods for hot mix asphalt - Part 36: Method for the determination of the thickness of a bituminous pavement.*

prEN 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.*

The applicability of this European Standard is described in the product standards for bituminous materials.

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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard describes three test methods for characterising the compactability of a bituminous mix, by the relation between its density or void content and the compaction energy applied to it, using an impact (Marshall) compactor, gyratory compactor, or a vibratory compactor.

This European Standard applies to hot bituminous mixtures (both those prepared in laboratory and those resulting sampled from plant produced mixtures), with D not larger than 31,5 mm in accordance with prEN 13043 for the impact and gyratory compactors, and 40 mm for the vibratory compactor. The results of the test method serve to supplement the results of mixture design.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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

prEN 12697-6, *Bituminous mixtures – Test methods for hot mix asphalt – Part 6: Determination of bulk density of bituminous specimen by hydro-static method.*

prEN 12697-8, *Bituminous mixtures – Test methods for hot mix asphalt – Part 8: Determination of the air voids content of bituminous materials.*

prEN 12697-30, *Bituminous mixtures – Test methods for hot mix asphalt – Part 30: Specimen preparation, impact compactor.*

prEN 12697-31:2000, *Bituminous mixtures – Test methods for hot mix asphalt – Part 31: Specimen preparation, gyratory compactor.*

prEN 12697-32, *Bituminous mixtures – Test methods for hot mix asphalt – Part 32: Laboratory compaction of bituminous mixtures by a vibratory compactor.*

prEN 13043, *Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas.*

ISO 5725, *Accuracy (trueness and precision) of measurement methods and results.*

3 Terms and definitions

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

3.1

soluble binder

percentage by mass of extractable binder in an anhydrous sample determined by extracting the binder from the sample

NOTE Extraction may be followed by binder recovery.

3.2

insoluble binder content

percentage by mass of binder that adheres to the aggregate particles after extraction

3.3

precision

closeness of agreement between independent test results obtained under stipulated conditions

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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 indicated 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 sample. Quantitative measures of precision depend critically on the stipulated conditions. Repeatability and reproducibility conditions are particular sets of extreme conditions.

3.4**repeatability**

precision under repeatability conditions

3.5**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

3.6**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*.

3.7**reproducibility**

precision under reproducibility conditions

3.8**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

3.9**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*.

3.10**single test result**

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

4 Principle

The bituminous mixture is compacted at a prescribed temperature with varying compaction energies.

One of two methods is used. In the first method two or more specimen are compacted with different amounts of compaction energy and their densities are measured. In the second method one specimen is used and its increase in density is determined after each stage of its compaction from its decrease in thickness.

NOTE For impact compaction, both methods can be used. For gyratory compaction, the second method only is used. For vibratory compaction, the first method only is used.

A graph is drawn of density (or voids content) against compaction energy. When the impact compaction is used, the compaction energy is characterized by the number of blows, when the gyratory compaction is used, by the number of gyrations and when the vibratory compactor is used, by the duration in seconds.

A mathematical equation is derived from the experimental results, the parameters of which equation characterize the compactability of the bituminous mixture.

5 Apparatus

5.1 Impact compaction

5.1.1 Different specimen for each level of compaction energy, recording increases in density

5.1.1.1 Marshall compactor in accordance with prEN 12697-30.

5.1.2 One specimen for all levels of compaction energy, recording decreases in thickness

5.1.2.1 Marshall compactor in accordance with prEN 12697-30

5.1.2.2 Measuring device for automatically recording the thickness of the specimen after each blow of compaction with an accuracy of at least 0,1 mm.

5.2 Gyrotory compaction

5.2.1 Gyrotory compactor in accordance with prEN 12697-31

5.3 Vibratory compaction

5.3.1 Vibratory compactor in accordance with prEN 12697-32

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6 Test procedure

6.1 Impact compaction

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6.1.1 Different specimens for each level of compaction energy, recording increases in density

For the determination of a single value of the compactability, prepare and compact Marshall specimen in accordance with prEN 12697-30 for each number of blows of compaction. The numbers of blows shall be 5, 15, 25, 35, 50, and 100 to each side of the specimen.

If required, determine the mass of bituminous mixture, to be used in the specimen in order to achieve the specimen thickness in accordance with prEN 12697-30 by a preliminary compaction test.

Determine the bulk density of the compacted specimens in accordance with prEN 12697-6.

6.1.2 One specimen for all levels of compaction energy, recording decreases in thickness

For the determination of a single value of compactability prepare and compact a Marshall specimen in accordance with prEN 12697-30 using 100 blows of compaction to each side.

If required, determine the mass of bituminous mixture to be used in the specimen in order to achieve the specimen thickness in accordance with prEN 12697-30 by a preliminary compaction test after 100 blows to each side by a preliminary compaction test.

Measure the change in thickness of the specimen after each blow using the specified device. Once the specimen has cooled to room temperature, measure its final thickness with a slide calliper rule with 1/10 mm accuracy at four points uniformly spaced around the periphery. Calculate the thickness of the specimen for each number of blows as the mean of each set of four measurements for the final thickness and after each blow.