



**SLOVENSKI STANDARD**  
**SIST EN 12697-1:2006**

**01-februar-2006**

**BUXca Yý U**  
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Bituminous mixtures - Test methods for hot mix asphalt - Part 1: Soluble binder content

Asphalt - Prüfverfahren für Heiasphalt - Teil 1: Lslicher Bindemittelgehalt

Mlanges bitumineux - Mthode d'essai pour mlange hydrocarbon a chaud - Partie 1:  
Teneur en liant soluble

**Ta slovenski standard je istoveten z: EN 12697-1:2005**

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EUROPEAN STANDARD  
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## Bituminous mixtures - Test methods for hot mix asphalt - Part 1: Soluble binder content

Mélanges bitumineux - Méthode d'essai pour mélange  
hydrocarboné à chaud - Partie 1: Teneur en liant soluble

Asphalt - Prüfverfahren für Heiasphalt - Teil 1: Lslicher  
Bindemittelgehalt

This European Standard was approved by CEN on 30 September 2005.

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.

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

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**EN 12697-1:2005 (E)****Foreword**

This document (EN 12697-1:2005) 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of an identical text or by endorsement, at the latest by May 2006, and conflicting national standards shall be withdrawn at the latest by January 2008.

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

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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 matters in reclaimed asphalt.*

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

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

This European Standard supersedes EN 12697-1:2000.

**WARNING — The method described in this European Standard may require the use of dichloromethane (methylene chloride), 1,1,1 trichloroethane, benzene, trichloroethylene, xylene, toluene, perchloroethylene (tetrachloroethylene) or other solvent capable of dissolving bitumen. These solvents are hazardous to health and are subject to occupational exposure limits as detailed in relevant legislation and regulations.**

Exposure levels are related to both handling procedures and ventilation provision and it is emphasised that adequate training should be given to staff employed in the usage of these substances.

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.

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## Introduction

This European Standard describes a unified approach to the examination of bituminous mixtures that allows some divergence in the detail of procedures followed by individual laboratories. In clause 5 of this European Standard, a description is given of the basic operations that together form the test method for the proper determination of the binder content of bituminous mixtures. Guidance on the test method is given in Annex A and Figure A.1 whilst the use of alternative items of equipment that are equally suitable for carrying out particular parts of the test method are described in Annex B. Although the apparatus specified for the separation of mineral filler from the binder solution obtained after extraction is of a suitably efficient level not to affect the precision of the test described in clause 8, a method for determining the amount of residual mineral matter in the extract is given in Annex C for use in those particular cases where some doubt may exist.

Methods and equipment other than those described in Annex B and Annex C, including automated equipment, are permissible provided that it has been demonstrated that they provide the same results as one of the methods in Annex B or Annex C within the limits of the precision given in this document. Guidance on determination of soluble binder content of mixtures with polymer-modified binders is given in Annex D.

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**EN 12697-1:2005 (E)****1 Scope**

This document describes test methods for the determination of the soluble binder content of samples of bituminous mixtures.

The test methods described are suitable for quality control purposes during the production of plant mix and for checking compliance with a product specification.

The analysis of mixtures containing modified binders is outside the scope of this document unless the advice given in Annex D is followed. Even when that advice is followed, the precision of the analysis may be compromised.

**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 12697-3:2005, *Bituminous mixtures — Test methods for hot mix asphalt — Part 3: Bitumen recovery: Rotary evaporator.*

EN 12697-4:2005, *Bituminous mixtures — Test methods for hot mix asphalt — Part 4: Bitumen recovery: Fractionating column.*

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

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

ISO 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth.*

ISO 3310-2, *Test sieves — Technical requirements and testing — Part 2: Test sieves of perforated metal plate.*

**3 Terms and definitions**

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

**3.1****soluble binder content**

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

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

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### 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 Preparatory treatment of laboratory samples of bituminous mixtures

Prepare laboratory samples in accordance with EN 12697-28 to obtain suitable test portions.

## 5 Determination of binder content

### 5.1 General principles of test

The test method for determining the binder content of a test portion of bituminous mixture, prepared in accordance with clause 4, normally comprises the following basic operations:

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- a) binder extraction by dissolving in a hot or cold solvent;
- b) separation of mineral matter from the binder solution;
- c) determination of binder quantity by difference or binder recovery;
- d) calculation of soluble binder content.

NOTE 1 The sequence of operations and choice of test procedures to be followed are illustrated in Figure A.1.

NOTE 2 If it is suspected that water is present in the laboratory sample, it should be dried to constant mass (see clause 6) or the water content may be determined by the method described in EN 12697-14 or the sample treated as in EN 12697-28.

NOTE 3 All test procedures and associated equipment relating to each basic operation shown in Figure A.1 are equally acceptable. Other equipment and procedures, including non-extraction methods, can also be used. There are documented data to show that the method and equipment will provide results with a precision no worse than that of one of the procedures explicitly shown in Figure A.1.

**5.2 Binder extraction****5.2.1 Solvent**

The tests in this European Standard require the use of solvents capable of dissolving bitumen and in some cases involve distilling the solution to recover all or some of the bitumen.

NOTE 1 Currently all hydrocarbon solvents are regarded as "hazardous" and "environmentally unfriendly" to varying degrees.

NOTE 2 Until such time as there is an agreed CEN policy with regard to their usage, each member state should specify its preferred solvent taking into account the Montreal Protocol and the views of its own Regulatory Bodies (see also "Warning" in the foreword). <https://standards.iteh.ai/catalog/standards/sist/a92c6108-030b-4de5-bb49-b0bbd98d61ab/sist-en-12697-1-2006>

NOTE 3 Trichloroethylene should be stored in sealed bottles or canisters, which are protected against UV radiation.

NOTE 4 When trichloroethylene is recovered by distillation for further use, care should be taken to ensure that the solvent still complies with the appropriate requirements. In particular, acidity may develop and a useful precaution is to store the solvent over calcium oxide in coloured glass or suitable metal containers.

**5.2.2 Apparatus**

NOTE Apparatus should be calibrated and traceable.

**5.2.2.1 Balance**, capable of weighing a test portion to an accuracy of 0,05 % of its mass.

**5.2.2.2 Binder extraction apparatus**, conforming to the requirements of the method selected from clause B.1 as appropriate.

**5.2.3 Procedure**

**5.2.3.1** Prepare laboratory samples in accordance with EN 12697-28 to obtain suitable test portions.

NOTE If determining binder content by difference, see Annex A.

**5.2.3.2** Weigh the test portion to the nearest 0,05 % of the mass taken, and place it in the binder extraction apparatus in accordance with the requirements of the method selected from clause B.1, as appropriate.

**5.2.3.3** The binder extraction procedure shall ensure that no soluble binder is left adhering to the aggregate particles after extraction.

NOTE In limited cases, it may be difficult to dissolve every trace of binder adhering to the aggregate (see clause A.4).

## 5.3 Separation of mineral matter

### 5.3.1 Apparatus

**5.3.1.1** Trays that can be heated without damage or change in mass in which to dry recovered aggregate.

**5.3.1.2** Apparatus for the separation of mineral filler from the binder solution, conforming to the requirements of the method selected from clause B.2, as appropriate.

### 5.3.2 Procedure

**5.3.2.1** Collect the binder solution obtained in accordance with 5.2 and proceed in accordance with the method selected from clause B.2, as appropriate.

**5.3.2.2** The procedure used to separate the mineral filler from the binder solution shall ensure that the residue on ignition of the recovered binder does not exceed 0,5 %, if the nominal filler content is less than 6 % of the mass of aggregate, or 1 % if the nominal filler content is 6 % or greater, when determined in accordance with Annex C.

NOTE This check is not necessary on all samples but only to prove the effectiveness of the method.

**5.3.2.3** Transfer, where necessary, the clean recovered aggregate to a tray. Evaporate the solvent from the aggregate and the binder extraction apparatus. Transfer any remaining fine mineral matter from the binder extraction apparatus to the tray with the rest of the recovered aggregate, ensuring that all mineral matter is removed from the binder extraction apparatus. Weigh and record the mass of the aggregate in the tray.

**5.3.2.4** If required determine the particle size distribution of the recovered aggregate in accordance with EN 933-1 making due allowance for any mineral filler collected by the filter paper, where appropriate.

## 5.4 Binder quantity

### 5.4.1 Apparatus

Recovery apparatus, conforming to the requirements of the method selected from B.3.

NOTE Apparatus should be calibrated and traceable.

### 5.4.2 Procedure

#### 5.4.2.1 Difference method

Where the binder quantity is determined by difference, add the mass of recovered aggregate to the mass of any mineral filler collected by filter paper.

#### 5.4.2.2 Recovery method

Where the binder quantity is determined by recovering the binder from the total or a portion of the binder solution, follow the procedures described in clause B.3.