



**SLOVENSKI STANDARD**  
**SIST EN 12697-6:2004**  
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Bituminous mixtures - Test methods for hot mix asphalt - Part 6: Determination of bulk density of bituminous specimens

Asphalt - Prüfverfahren für Heißasphalt - Teil 6: Bestimmung der Raumdichte von Asphalt-Probekörpern

**iTeh STANDARD PREVIEW**

Mélanges bitumineux - Méthodes d'essai pour enrobés a chaud - Partie 6: Détermination de la masse volumique apparente des éprouvettes bitumineuses

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English version

## Bituminous mixtures - Test methods for hot mix asphalt - Part 6: Determination of bulk density of bituminous specimens

Mélanges bitumineux - Méthodes d'essai pour enrobés à  
chaud - Partie 6: Détermination de la masse volumique  
apparente des éprouvettes bitumineuses

Asphalt - Prüfverfahren für Heißasphalt - Teil 6:  
Bestimmung der Raumdichte von Asphalt-Probekörpern

This European Standard was approved by CEN on 21 November 2002.

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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

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

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## Foreword

This document (EN 12697-6:2003) 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 September 2003, 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*

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: Binder recovery: Rotary evaporator*

EN 12697-4, *Bituminous mixtures – Test methods for hot mix asphalt – Part 4: Binder 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 specimen*

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: Compactibility*

prEN 12697-11, *Bituminous mixtures – Test methods for hot mix asphalt – Part 11: Determination of the compatability between aggregate and binder*

prEN 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*

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: Particle loss of porous asphalt specimen*

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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*

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: Cyclic compression 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*

EN 12697-29, *Bituminous mixtures – Test methods for hot mix asphalt – Part 29: Determination of the dimensions of a 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*

EN 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*

EN 12697-36, *Bituminous mixtures – Test methods for hot mix asphalt – Part 36: 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*

prEN 12697-38, *Bituminous mixtures – Test methods for hot mix asphalt – Part 38: Test equipment and calibration*

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

No existing European Standard is superseded.

Annex A is informative.

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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## 1 Scope

This European Standard describes test methods for determining the bulk density of a compacted bituminous specimen. The test methods are intended for use with laboratory compacted specimens or specimens from cores cut from the pavement after placement and compacting.

This European Standard describes the following four procedures, the choice of which is used being dependent on the estimated content and accessibility of voids in the specimen:

- a) bulk density — dry (for specimens with a very closed surface);
- b) bulk density — saturated surface dry (SSD) (for specimens with a closed surface);
- c) bulk density — sealed specimen (for specimens with an open or coarse surface);
- d) bulk density by dimensions (for specimens with a regular surface and with geometric shapes, i. e. squares, rectangles, cylinders etc.

NOTE Annex A (informative) gives general guidance on selecting the appropriate procedure.

## 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).

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

## 3 Terms and definitions

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

### 3.1

#### **maximum density**

mass per unit volume, without air voids, of a bituminous mixture at known test temperature

### 3.2

#### **bulk density**

mass per unit volume, including the air voids, of a specimen at known test temperature

## 4 Principle

The bulk density of an intact compacted bituminous specimen is determined from the mass of the specimen and its volume. The mass of the specimen is obtained by weighing the dry specimen in air.

For the first three procedures the volume of the specimen is obtained from its mass in air and its mass in water. In the dry procedure the mass in water is determined without pre-treatment. In the SSD-procedure the specimen is first saturated with water, after which its surface is blotted dry with a damp Chamois. In the sealed specimen procedure, the specimen is sealed before immersion in water to prevent access of water to the voids in the specimen. In the fourth procedure by dimensions the volume of the specimen is obtained by measurement of the dimensions.



## 5 Materials

### 5.1 General

Water, with a known density at the test temperature. The water density at 25 °C shall be 997,1 kg/m<sup>3</sup>. For other temperatures the water density shall be  $(977,1 \times K)$  kg/m<sup>3</sup> (see Table 1).

**Table 1 — Water density**

Water temperature °C	Correction factor K	Water density kg/m <sup>3</sup>	Water temperature °C	Correction factor K	Water density kg/m <sup>3</sup>
10	1,0027	999,8	20	1,0012	998,3
11	1,0026	999,7	21	1,0010	998,1
12	1,0025	999,6	22	1,0007	997,8
13	1,0023	999,4	23	1,0005	997,6
14	1,0022	999,3	24	1,0003	997,4
15	1,0021	999,2	25	1,0000	997,1
16	1,0019	999,0	26	0,9997	996,8
17	1,0017	998,8	27	0,9995	996,6
18	1,0016	998,7	28	0,9992	996,3
19	1,0014	998,5	29	0,9989	996,0
20	1,0012	998,3	30	0,9986	995,7

### 5.2 Additional materials for the sealed specimen procedure

Material to seal the specimen, in such a way, that inclusion of voids (being no part of the specimen) between seal and specimen is prevented. The density of the sealing material at test temperature shall be known to the nearest 0,010 g/cm<sup>3</sup>.

**NOTE** The material used can be paraffin wax, shrinkage foil, latex emulsion etc. The procedure to apply such materials should be such that the specimen is not damaged. It is very important that the seal exactly covers the specimen including the voids which technologically form part of its volume: when applying the seal penetration of the internal voids belonging to the material is prevented, as well as inclusion of extra voids between seal and specimen or in seal folds.

## 6 Apparatus

### 6.1 General

Balance, with sufficient capacity and an accuracy of at least  $\pm 0,1$  g suitable for weighing, the specimen in air and under water (e. g. via a wire basket, the mass and water displacement of which are taken into account by tarring); the precision of the scale shall be limited to a maximum mass of the specimen.

### 6.2 Additional apparatus for the dry, SSD and sealed specimen procedures

**6.2.1** Water-bath, maintained at a uniform temperature within  $\pm 1,0$  °C in the vicinity of the test specimen(s). It shall be provided with a grid to ensure the water circulation around the test specimen. The bath shall have a capacity of at least three times that of the volume of the specimen.

**6.2.2** Thermometer, accurate to at least  $\pm 1,0$  °C;