



SLOVENSKI STANDARD
SIST EN 12697-7:2004
01-junij-2004

6]li a Ybg_Y'na Ygj'È'DfYg_i gbY'a YrcXY'nUj fc Y'UgZJ'fbY'na Ygj'È+'XY.
I [cHJj`'Ub'Y[cglcH'V]li a Ybg_] `dfYg_i ýUbWj `n`yUf_] [Ua U

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

Asphalt - Prüfverfahren für Heißasphalt - Teil 7: Bestimmung der Raumdichte von Asphalt-Probekörpern mit Gamma-Strahlen

Mélanges bitumineux - Méthodes d'essai pour mélange hydrocarboné a chaud - Partie 7: Détermination de la masse volumique apparente des éprouvettes bitumineuses par les rayons gamma

<https://standards.iteh.ai/catalog/standards/sist/cbea0240-cffb-4817-99a1-070e9b2fdc80/sist-en-12697-7-2004>

Ta slovenski standard je istoveten z: EN 12697-7:2002

ICS:

93.080.20 Materiali za gradnjo cest Road construction materials

SIST EN 12697-7:2004 **en**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 12697-7:2004](#)

<https://standards.iteh.ai/catalog/standards/sist/cbea0240-cffb-4817-99a1-070e9b2fdc80/sist-en-12697-7-2004>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 12697-7

September 2002

ICS 93.080.20

English version

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

Mélanges bitumineux - Méthodes d'essai pour mélange hydrocarboné à chaud - Partie 7: Détermination de la masse volumique apparente des éprouvettes bitumineuses par les rayons gamma

Asphalt - Prüfverfahren für Heiasphalt - Teil 7: Bestimmung der Raumdichte von Asphalt-Probekrpern mit Gamma-Strahlen

This European Standard was approved by CEN on 1 August 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, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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
Introduction	4
1 Scope	6
2 Normative references	6
3 Terms and definitions.....	6
4 Principle	7
5 Apparatus	8
6 Preparation of specimens	8
7 Procedure	9
8 Expression of results	10
9 Test report	12
10 Precision	12

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 12697-7:2004](https://standards.iteh.ai/catalog/standards/sist/cbea0240-cffb-4817-99a1-070e9b2fdc80/sist-en-12697-7-2004)

<https://standards.iteh.ai/catalog/standards/sist/cbea0240-cffb-4817-99a1-070e9b2fdc80/sist-en-12697-7-2004>

Foreword

This document EN 12697-7:2002 has been prepared by Technical Committee CEN/TC "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 March 2003, and conflicting national standards shall be withdrawn at the latest by April 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 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*

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

EN 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 void characteristics of bituminous specimens*

prEN 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 compatibility between aggregates and bitumen*

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*

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*

EN 12697-7:2002 (E)

prEN 12697-17, *Bituminous mixtures – Test methods for hot mix asphalt – Part 17: Particle 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*

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

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*

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*

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

prEN 12697-39, *Bituminous mixtures – Test methods for hot mix asphalt – Part 39: Soluble binder content of mixtures by ignition method*

prEN 12697-40, *Bituminous mixtures – Test methods for hot mix asphalt – Part 40: Void content, compaction and hydraulic conductivity of material in the layer*

prEN 12697-41, *Bituminous mixtures – Test methods for hot mix asphalt – Part 41: Resistance to deicing fluid*

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

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

prEN 12697-44, *Bituminous mixtures – Test methods for hot mix asphalt – Part 44: Binder content of mixtures with modified binders*

prEN 12697-45, *Bituminous mixtures – Test methods for hot mix asphalt – Part 45: Binder drainage – Schellenberg method*

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, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 12697-7:2004

<https://standards.iteh.ai/catalog/standards/sist/cbea0240-cffb-4817-99a1-070e9b2fdc80/sist-en-12697-7-2004>

EN 12697-7:2002 (E)**Introduction**

Bulk density measurement in the laboratory using gamma rays is a method which does not affect the properties of the material. It can be included in a series of tests carried out on a given sample. It allows the plotting of a density chart or gradient.

1 Scope

This European Standard specifies a method for measuring the bulk density of pavement mixtures using a transmission-type gamma radiation test bench.

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

NOTE The safety regulations applicable to the use of gamma rays should be applied.

This standard is applicable to cylindrical specimens or blocks, prepared in a laboratory or cut from a pavement, for which the thickness and the mass absorption coefficient, which is a function of the chemical composition are known. The thickness of the specimen traversed by the radiation should be between 30 mm and 300 mm. This method does not apply to mixtures containing slags, with variable metal content or chemical composition which can affect the absorption of gamma rays.

iTeH STANDARD PREVIEW
(standards.iteh.ai)

2 Normative references

SIST EN 12697-7:2004

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

3 Terms and definitions

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

3.1**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.

3.2**repeatability**

precision under repeatability conditions

3.3**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

3.4**reproducibility**

precision under reproducibility conditions

3.5**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

4 Principle

The method is based upon the absorption of gamma radiation by the material. Under the conditions of the test described in this European Standard and for materials such as bituminous mixtures, the method follows an exponential law of the following formula:

$$C = C_o \exp(-k\mu' \rho_{b\gamma} d) \quad (1)$$

where

- C is the count rate after going through the mixture (ratio of N to count time) in counts per second;
- N is the number of gamma photons of the incident radiation directly transmitted after having gone through the mixture;
- C_o is the count rate in the air;
- k is the calibration coefficient;
- μ' is the mass absorption coefficient (depending on composition of the mixture);
- $\rho_{b\gamma}$ is the bulk density, in megagrams per cubic metre (Mg/m^3);
- d is the thickness of the mixture traversed by the radiation, in millimetre (mm).

The bulk density of the material is given by the formula:

$$\rho_{b\gamma} = \frac{1}{k\mu' d} \ln \frac{C_o}{C} \quad (2)$$

where

- $\rho_{b\gamma}$ is the bulk density, in megagrams per cubic metre (Mg/m^3);
- k is the calibration coefficient;
- μ' is the mass absorption coefficient (depending on composition of the mixture);
- d is the thickness of the mixture traversed by the radiation, in millimetres (mm);