SLOVENSKI STANDARD
SIST EN 12697-8:2019

01-marec-2019

Nadomešča:
SIST EN 12697-8:2004

Bitumenske zmesi - Preskusne metode - 8. del: Ugotavljanje značilnosti votlin v bitumenskih preskušancih

Bituminous mixtures - Test methods - Part 8: Determination of void characteristics of bituminous specimens

Asphalt - Prüfverfahren - Teil 8: Bestimmung von volumetrischen Charakteristiken von Asphalt-Probekörpern

Mélanges bitumineux - Méthodes d'essai - Partie 8: Détermination des pourcentages de vides caractéristiques des éprouvettes bitumineuses

Ta slovenski standard je istoveten z: **EN 12697-8:2018**

ICS:

93.080.20 Materiali za gradnjo cest Road construction materials

SIST EN 12697-8:2019 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12697-8

December 2018

ICS 93.080.20

Supersedes EN 12697-8:2003

English Version

Bituminous mixtures - Test methods - Part 8: Determination of void characteristics of bituminous specimens

Matériaux enrobés - Méthodes d'essai - Partie 8: Détermination de la teneur en vides caractéristiques des matériaux bitumineux

Asphalt - Prüfverfahren - Teil 8: Bestimmung von volumetrischen Charakteristiken von Asphalt-Probekörpern

This European Standard was approved by CEN on 9 November 2018.

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

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Ref. No. EN 12697-8:2018 E

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European foreword

This document (EN 12697-8:2018) has been prepared by Technical Committee CEN/TC 227 "Road materials", the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by June 2019 and conflicting national standards shall be withdrawn at the latest by June 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12697-8:2003.

The following is a list of significant technical changes since the previous edition:

— The series title no longer makes the method exclusively for hot mix asphalt;

— [General] For clarity, "v/v" and "m/m" is replaced by "by volume" and "by mass";

— [General] Change of indices in symbols for void content, binder density and binder content;

— [1] clarification that specimens cut from the pavement or from laboratory compacted slabs can be by either coring or sawing;

— [2] EN 12697-7 added. Also in [4.3];

— [3.3] The term "bituminous material" amended to "bituminous mixture" to be in line with other parts;

— [3.6] New term and definition of VMA_{ad} inserted (void including additives in the mineral aggregate). Following sub-clause renumbered;

— [3.8] New term and definition of VFB_{ad} inserted (voids filled with binder and additives;

— [4.1] clarification added in for mixtures with water in their composition that the bulk density refers to its dry bulk density;

— [4.2] Excessive text: "% by volume" deleted in Formula (1);

— [4.2] Key for V_a: The word "mixture" is replaced with "bituminous specimen" to be in line with definition [3.2] and [4.1] Principle;

— [4.2] and [5.2] Change of units from kg/m³ into Mg/m³;

— [4.3] Formula (2) including related text deleted for consistency with other parts. Following formulas renumbered accordingly;

— [5.1] Principle for mixtures without additives now described in new sub-clause [5.1.1]. New sub-clause added for mixtures with additives [5.1.2];

— [5.2] Calculation for mixtures without additives now described in new sub-clause [5.2.1]. New sub-clause added for calculation of mixtures with additives [5.2.2];

— [5.2.2] Excessive text: “%” deleted in Formula (4);

— [5.4] dimension of specimen to the nearest 0,1 mm (if measured) added to results.

A list of all parts in the EN 12697 series can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document describes a procedure for calculating volumetric characteristics of a compacted bituminous specimen: the air voids content ($V_{a)}$, the voids content in the mineral aggregate filled with binder (*VFB*) and the voids content in the mineral aggregate filled with binder and additives (VFB_{ad}) for the case of mixtures containing additives in their composition.

The method is suitable for specimens which are laboratory compacted or specimens cut from the pavement after placement and compacting or from laboratory compacted slabs, either by coring or sawing.

These volumetric characteristics can be used as mix design criteria or as parameters for evaluating the mixture after placing and compacting in the road.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 12697-5, *Bituminous mixtures — Test methods — 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*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— Electropedia I.E.C. available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
air void
pocket of air between the bitumen-coated aggregate particles (including any existing additives) in a compacted bituminous specimen

3.2
air voids content
V_a
volume of the air voids in a bituminous specimen, expressed as a percentage of the total volume of that specimen

3.3
maximum density
ρ_m
mass per unit volume without air voids of the bituminous mixture

3.4
bulk density
ρ_b
mass per unit volume including the air voids of a specimen

3.5
void in the mineral aggregate
VMA
volume of inter-granular void space between the aggregate particles of a compacted bituminous mixture that includes the air voids and the volume of the bituminous binder in the specimen

Note 1 to entry: The absorbency of binder by the aggregate can lead to an over estimation of the air voids content. The level of absorbency depends on the porosity of the aggregate.

3.6
void including additives in the mineral aggregate
VMA_{ad}
volume of inter-granular void space between the aggregate particles of a compacted bituminous mixture that includes the air voids, the volume of the bituminous binder and the volume of additives, in the specimen

3.7
voids filled with binder
VFB
percentage of the voids in the mineral aggregate filled with binder (for mixtures not containing additives)

3.8
voids filled with binder and with additives
VFB_{ad}
percentage of the voids in the mineral aggregate filled with binder and additives (for mixtures with additives in their composition)

4 Determination of the air voids content (V_a)

4.1 Principle

The air voids content of a bituminous specimen is calculated using the maximum density of the mixture and the bulk density of the specimen. For mixtures with water in their composition (e.g. mixtures produced with bituminous emulsion or foamed bitumen), the bulk density of the specimen shall refer to its dry bulk density.

4.2 Calculation

The air voids content shall be calculated to the nearest 0,1 % (by volume) as follows:

$$V_a = \frac{\rho_m - \rho_b}{\rho_m} \cdot 100 \quad (1)$$

where

V_a is the air voids content of the bituminous specimen, in 0,1 percent (by volume);

ρ_m is the maximum density of the mixture, in megagrams per cubic metre (Mg/m^3);

ρ_b is the bulk density of the specimen, in megagrams per cubic metre (Mg/m^3).

4.3 Precision

From the average values of σ_r and σ_R as obtained in tests on hot asphalt mixtures according to EN 12697-5, and EN 12697-6 or EN 12697-7 this results in the following values for the air voids content calculation:

Repeatability *r*:

Standard deviation: $\sigma_r = 0{,}4$ % (by volume);

Repeatability: $r = 2{,}77 \times \sigma_r = 1{,}1$ % (by volume)

Reproducibility *R*:

Standard deviation: $\sigma_R = 0{,}8$ % (by volume);

Reproducibility: $R = 2{,}77 \times \sigma_R = 2{,}2$ % (by volume).

4.4 Test report

With reference to this European Standard, the test report for the determination of the air voids content (V_a) shall include the following information:

a) origin of the specimen;

b) type of mixture and identification of additives, if any;

c) dimensions of the specimen in 0,1 millimetres (when measured);

d) methods used to determine maximum density and bulk density;

e) maximum density and bulk density, in megagrams per cubic metre;

f) air voids content in percent to 0,1 % (by volume).

5 Determination of the percentage of the voids in the mineral aggregate filled with binder

5.1 Principle

5.1.1 Mixtures without additives (*VFB*)

The percentage of the voids in the mineral aggregate of a bituminous specimen (without additives) filled with binder is calculated from the binder content, the voids in the mineral aggregate, the bulk density of the specimen and the density of the binder.

5.1.2 Mixtures with additives (VFB_{ad})

For mixtures with a known content and density of additives in their composition the percentage of the voids in the mineral aggregate of a bituminous specimen filled with binder and additives is calculated from the binder content, the additives content, the voids in the mineral aggregate, the bulk density of the specimen, the density of the binder and the density of the additives.