

### SLOVENSKI STANDARD SIST EN 12697-36:2022

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Nadomešča: SIST EN 12697-36:2004

# Bitumenske zmesi - Preskusne metode - 36. del: Ugotavljanje debeline bitumenskega vozišča

Bituminous mixtures - Test methods - Part 36: Determination of the thickness of bituminous pavement

Asphalt - Prüfverfahren - Teil 36: Bestimmung der Dicke von Asphalt-Konstruktionen

Mélanges bitumineux - Méthodes d'essai - Partie 36 : Méthode dévaluation d'épaisseur d'un revêtement bitumineux og/standards/sist/044c0061-da21-47f6-87e2-61dff99f6b0f/sisten-12697-36-2022

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93.080.20 Materiali za gradnjo cest

Road construction materials

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#### SIST EN 12697-36:2022

# EUROPEAN STANDARD NORME EUROPÉENNE EUROPÄISCHE NORM

## EN 12697-36

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Supersedes EN 12697-36:2003

**English Version** 

### Bituminous mixtures - Test methods - Part 36: Determination of the thickness of bituminous pavement

Mélanges bitumineux - Méthodes d'essai - Partie 36 : Méthode d'évaluation d'épaisseur d'un revêtement bitumineux Asphalt - Prüfverfahren - Teil 36: Bestimmung der Dicke von Asphalt-Konstruktionen

This European Standard was approved by CEN on 21 February 2022.

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 CEN-CENELEC 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 CEN-CENELEC Management Centre 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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#### **European foreword**

This document (EN 12697-36:2022) 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 October 2022, and conflicting national standards shall be withdrawn at the latest by October 2022.

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 12697-36:2003.

The main changes compared to the previous edition are listed below:

- the title no longer refers to hot mix asphalt;
- general editorial update according to current standard template;
- addition of Clause 2. Normative references according to CEN/CENELEC Internal Regulations, Part 3:2019;
- addition of Clause 3. Terms and definitions according to CEN/CENELEC Internal Regulations, Part 3:2019;
- Clause 4, title amended to "Apparatus" due to the introduction of Clause 2 and 3;
- Clause 4, introduction of Figure 1. Example of calliper with one extended leg;
- 4.4, NOTE has been transformed into main text;
- https://standards.iteh.ai/catalog/standards/sist/044c0061-da21-47f6-87e2-61dff99f6b0f/sist
- Clause 5, amended title to "Test specimens" due to the introduction of Clause 2 and 3;
- Clause 5, NOTE has been transformed into main text;
- Clause 6, title amended to "Procedure" due to the introduction of Clause 2 and 4;
- 6.1.4, NOTE has been transformed into main text;
- 6.2, editorial corrections of keys to Figure 3 and Figure 4;
- addition of Clause 7. Test report, due to the introduction of Clause 2 and 3;
- Clause 7, revision of data to be reported according to CEN/CENELEC Internal Regulations, Part 3:2019;
- addition of Clause 8. Precision, due to the introduction of Clause 2 and 3.

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

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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

#### 1 Scope

This document describes two test methods for determining the thickness of bituminous pavement. The first method describes measurements carried out on one or more cores which have been drilled from the full depth of the slab or road structure (destructive method). The second method electro-magnetic (non-destructive) measurement are used.

#### 2 Normative references

There are no normative references in this document.

#### 3 Terms and definitions

No terms and definitions are listed in this document.

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

- ISO Online browsing platform: available at https://www.iso.org/obp
- IEC Electropedia: available at https://www.electropedia.org/

## 4 Apparatus iTeh STANDARD PREVIEW

- **4.1** Metal rule or tape with a maximum permissible error of 1 mm.
- **4.2 Calliper gauge** with a maximum permissible error of 1 mm.

To facilitate the thickness measurement of cores with multiple layers, a calliper gauge with one extended leg can be used. See Figure 1.



Figure 1 — Example of calliper with one extended leg

#### 4.3 Approved jig or other device.

**4.4 Electro-magnetic apparatus** for non-destructive measurements consisting of aluminium foil or aluminium sheet-metal that is stuck on the bituminous layer or aluminium sheet-metal that is fastened on the unbound aggregates of the subgrade. The quality of the antipole shall be the same all the time.

No other metal object shall be present within 1 m distance of the antipole, because this can influence the measurement.

### 5 Test specimens

Cores used as specimens for thickness measurements shall be representative of the bituminous pavement slab from which they are taken. The cores shall be drilled completely through the bituminous pavement slab for which the thickness is to be measured. The core axis shall preferably be within 5° of the normal axis to the pavement. Furthermore, the ends shall be free from all conditions not typical of the surfaces of the paving. Cores that show defects which influence the measurements or that have been damaged appreciably in the drilling operation (e.g. fragmented cores, split cores and curved cores), shall not be used. The recommended diameter of the cores taken is 100 mm or 150 mm.

#### 6 Procedure

#### **6.1 Destructive measurement**

**6.1.1** The thickness of each core or each layer shall be measured to the nearest 1 mm. The thickness measurements shall be perpendicular to the upper plane of the core. Measurements shall be between upper and lower surfaces or between well-defined boundary lines in cases where the core consists of more than one layer.

**6.1.2** Four measurements shall be taken evenly spaced about the diameter of each core. The position of these measurements shall be clearly marked along each core.

**6.1.3** When the core consists of one layer or when only the total thickness of the bituminous pavement is relevant, record the average of the four measurements as the pavement thickness.

**6.1.4** When the core consists of more than one layer and also the thickness of the individual layers is relevant, then at each of the four points a line shall be drawn to the bottom surface of the core, perpendicular to the upper surface. The boundary lines of the layers shall then be marked on the drawn lines, as shown in Figure 2.



#### Key

- 1 markings on the upper surface
- 2 upper surface
- 3 lines perpendicular to the upper surface
- 4 crosspoints
- 5 boundary line

#### Figure 2 — Marking for thickness measurement of cores with multiple layers

When it is difficult to distinguish the boundary lines, the core may be rolled on the floor or wetted. When this is not sufficient and the core is not to be used for other purposes, the core may be sawn in half along its length (from top to bottom).

**6.1.5** Beginning at the top layer, the individual layer thickness shall be measured with cumulative measurement at the crosspoints of the four perpendicular lines with the boundary lines, as shown in Figure 3.



#### Key

1 upper surface

#### Figure 3 — Principle of cumulative measurement

**6.1.6** Calculate the individual layer thickness to the nearest 1 mm according to Formula (1):

where

*i* is the layer thickness i in millimetres (mm);

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 $t_i$  is the thickness from the surface to layer i in millimetres (mm);

 $t_{i-1}$  is the thickness from the surface to layer i-1 in millimetres (mm).

Define the average of the four measurements for each layer as the layer thickness and express it in millimetres.

**6.1.7** When the angle between the wall of the core and a vertical plane is more than  $5^{\circ}$  then the core shall be placed with its top face on a horizontal surface. The total thickness or the individual layer thickness shall be measured relative to the vertical (rather than parallel to the axis of the core) in accordance with 6.1.2 to 6.1.6.

#### 6.2 Electromagnetic measurement

**6.2.1** The layer thickness shall be measured with an electromagnetic apparatus (eddy current principle) and an antipole that is fixed on the road prior to laying the coated material the thickness of which is to be measured. The measurements obtained shall be readable to 1 mm.

**6.2.2** Before measuring, the apparatus shall be calibrated, e.g. by means of calibration rings.

NOTE In general, the calibration procedure of the apparatus is described in the user manual.

As the measurement can be influenced by electrical and magnetic properties of the materials (especially aggregates) the layer calibration should be conducted with at least one independent measurement of thickness using the destructive measuring method.

The layer thickness shall be measured individually or cumulatively, as shown in Figure 4 and Figure 5. The thickness shall be measured at one point approximately in the middle of the antipole and shall be expressed to the nearest 1 mm.

Individual measurement:  $d_1 = M_1$ ;  $d_2 = M_2$ ;  $d_3 = M_3$ 





cumulative measurement:

 $d_1 = M_1, d_2 = M_2 - M_1;$ 

 $d_3 = M_3 - M_2$ ;  $d_4 = M_4 - M_3$ 

cumulative measurement variant:

 $d_1 = M_1, d_2 = M_2 - M_1;$ 

 $d_3 = M_3$ ;  $d_4 = M_4 - M_3$ 

#### Key

1 2

3

4 5

6

- 1 antipole 1
- 2 antipole 2
- surface 3
- 4 boundaries
- 5 base-layer

