



**SLOVENSKI STANDARD**  
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**Bitumenske zmesi - Preskusne metode - 35. del: Laboratorijska zmes**

Bituminous mixtures - Test methods - Part 35: Laboratory mixing

Asphalt - Prüfverfahren - Teil 35: Labormischen

Mélanges bitumineux - Méthodes d'essais - Partie 35: Malaxage de laboratoire

**Ta slovenski standard je istoveten z: prEN 12697-35**

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## Bituminous mixtures - Test methods - Part 35: Laboratory mixing

Mélanges bitumineux - Méthodes d'essais - Partie 35:  
Malaxage de laboratoire

Asphalt - Prüfverfahren - Teil 35: Labormischung

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 227.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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<b>Contents</b>	<b>Page</b>
<b>European foreword</b> .....	<b>3</b>
<b>1 Scope</b> .....	<b>5</b>
<b>2 Normative references</b> .....	<b>5</b>
<b>3 Terms, definitions and symbols</b> .....	<b>5</b>
<b>3.1 Terms and definitions</b> .....	<b>5</b>
<b>3.2 Symbols</b> .....	<b>6</b>
<b>4 Principle</b> .....	<b>6</b>
<b>5 Apparatus</b> .....	<b>6</b>
<b>6 Procedure</b> .....	<b>7</b>
<b>6.1 Reference compaction temperature for mixtures, reference installation temperature for mastic asphalt</b> .....	<b>7</b>
<b>6.2 Preparation of aggregate and filler</b> .....	<b>8</b>
<b>6.3 Preparation of reclaimed asphalt</b> .....	<b>8</b>
<b>6.4 Preparation of binder</b> .....	<b>9</b>
<b>6.5 Mixing</b> .....	<b>9</b>
<b>7 Test report</b> .....	<b>11</b>
<b>Annex A (normative) Asphalt using foamed bitumen</b> .....	<b>12</b>
<b>Annex B (normative) Asphalt using bitumen emulsion</b> .....	<b>15</b>
<b>Annex C (normative) Preparing mastic asphalt</b> .....	<b>18</b>
<b>Bibliography</b> .....	<b>19</b>

[oSIST prEN 12697-35:2023](https://standards.iteh.ai/catalog/standards/sist/5131f5f7-6dbd-402e-b083-dcff33520d46/osist-pren-12697-35-2023)

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## European foreword

This document (prEN 12697-35:2023) has been prepared by Technical Committee CEN/TC 227 “Road materials”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 12697-35:2016.

prEN 12697-35:2023 includes the following significant technical changes with respect to EN 12697-35:2016:

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

- [ge] editorial update according to current standard template and CEN/CENELEC Internal Regulations Part 3:2022;
- [2] deletion of normative references to standards in EN 13108-series;
- [5] NOTE modified;
- [5.2] deletion to reference to EN12697-38. Replacement of “accuracy” with “maximum permissible error of 2°C;
- [5.3] deletion to reference to EN12697-38. Replacement of “accuracy” with “maximum permissible error at least 0,1 g for masses up to 5 kg, and 1 g for masses over 5 kg;
- [5.4] replacement of “accuracy” with “maximum permissible error of 2°C;
- [5.5] replacement of “accuracy” with “maximum permissible error of 2°C;
- [6] amendment of title “mixing temperature” to read “Reference compaction temperature”;
- [6.1] references to product standards EN 12591, EN 13924-1, EN 14023, EN 13924-2 and EN 13108-series placed in NOTES;
- [6.1] amendment of title of TABLE 1 to add “reference installation temperature”;
- [6.2.2] replacement of “accuracy” with “to the nearest”;
- [6.2.3] replacement of “accuracy of 1%” with “to the nearest 0,1 g”;
- [6.2.4] amendment of the sentence to take into account additives such as pigments and fibres;
- [6.3.1] replacement of “accuracy” with “to the nearest”;
- [6.3.7] the NOTE in 6.3.8 has been transformed into main text in 6.3.7;
- [6.5.2] reference to EN 13043 added in a Note;
- [6.5.6] addition of a Note for mixing times of mastic asphalt;
- [A.3.4.2] addition of the water content of the foam bitumen;

**prEN 12697-35:2023 (E)**

- [A.4.4.2] addition of the water content of the foam bitumen;
- [A.5.3.2] replacement of “accuracy” with “to the nearest 0,1g”;
- [B.2.2.4] addition of the sentence to require the measurement of the water content of the reclaimed asphalt;
- [B.2.4.4] deletion of waiting time after mixing;
- [B.3.4.4] amendment of waiting time after mixing ( $30 \pm 5$ ) s to read ( $300 \pm 5$ ) s;
- [C.2] amendment of maximum temperature 150°C to read 160°C;
- [Bibliography] addition of reference to EN13018-series, EN 12595, EN13924-1, EN13924-2, EN14023, EN 13043, deletion of references to EN 12595.

A list of all parts in a series can be found on the CEN website: [www.cencenelec.eu](http://www.cencenelec.eu).

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## 1 Scope

This document describes the laboratory mixing of bituminous materials for the manufacture of specimens. This document specifies the reference compaction temperatures for mixing based on the grade of the binder for paving grade and hard paving grade bitumen.

Annex A describes the method for manufacture of samples of asphalt mixtures using foamed bitumen.

Annex B describes the method for manufacture of samples of asphalt mixtures using bitumen emulsion.

Once mixed, mastic asphalt samples are prepared in accordance with Annex C.

## 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 58, *Bitumen and bituminous binders - Sampling bituminous binders*

EN 1097-5, *Tests for mechanical and physical properties of aggregates - Part 5: Determination of the water content by drying in a ventilated oven*

EN 12697-42, *Bituminous mixtures - Test methods - Part 42: Amount of foreign matter in reclaimed asphalt*

EN 13302, *Bitumen and bituminous binders - Determination of dynamic viscosity of bituminous binder using a rotating spindle apparatus*

EN 13702, *Bitumen and bituminous binders - Determination of dynamic viscosity of bitumen and bituminous binders by the cone and plate method*

## 3 Terms, definitions and symbols

### 3.1 Terms and definitions

oSIST prEN 12697-35:2023

<https://standards.iteh.ai/catalog/standards/sist/5131f5f7-6dbd-402e-b083-dcff33520d46/osist-pren-12697-35-2023>

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

ISO and IEC maintain terminology 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/>

#### 3.1.1

##### **reference compaction temperature**

target value at which compaction (or installation for mastic asphalt) of an asphalt mixture starts

Note 1 to entry: The term “reference compaction temperature” is used here for mastic asphalt despite mastic asphalt not being compacted.

#### 3.1.2

##### **target laboratory mixing temperature**

value at which component materials are mixed to form an asphalt mixture

**prEN 12697-35:2023 (E)****3.1.3****maximum laboratory mixing temperature**

value that an asphalt mixture shall not exceed during the mixing process

**3.1.4****reclaimed asphalt temperature**

target value to which a reclaimed asphalt shall be heated before mixing

**3.2 Symbols**

$\theta_{RCT}$  is the reference compaction temperature

$\theta_{TLMT}$  is the target laboratory mixing temperature

$\theta_{RA}$  is the reclaimed asphalt temperature

$\theta_{FA}$  is the temperature to which the fresh aggregate shall be heated

$p$  is the proportion of reclaimed asphalt

**4 Principle**

The bituminous mixture is prepared at a target laboratory mixing temperature within a time that is limited in order to reduce mechanical degradation of the aggregates and thermal degradation of the binder.

NOTE The target laboratory mixing temperature for mixing is related to the grade of binder and to the reference compaction temperatures used for its subsequent compaction.

**5 Apparatus**

**5.1 Laboratory mixer** capable of entirely coating all mineral substances in not more than 5 min.

The mixer shall be of the whisk or other type that is not so rigid that it can damage either the aggregate particles or the bowl.

The mixer may be equipped with a thermostatically controlled heating system, a mechanical speed control; and a mixing time programmer.

**5.2 Ventilated oven**, for heating aggregates and bitumen up to a temperature at least 20 °C above the relevant reference compaction temperature and with a maximum permissible error of 2 °C.

**5.3 Balance**, capable of measuring the mass of the intended mixture with a maximum permissible error of at least 0,1 g for masses up to 5 kg, and 1 g for masses over 5 kg.

**5.4 Device**, capable of measuring the relevant target laboratory mixing temperature with a maximum permissible error of 2 °C.

**5.5 Adjustable hot plate**, capable of maintaining the required target laboratory mixing temperature during the manual mixing with a maximum permissible error of 2 °C.



## 6 Procedure

### 6.1 Reference compaction temperature for mixtures, reference installation temperature for mastic asphalt

The reference compaction temperature for mixture or reference installation temperature for mastic asphalt shall be either:

- for mixtures with paving grade bitumen or hard paving grade bitumen, the reference compaction temperatures given in Table 1, or

NOTE 1 Paving grade bitumen is covered by EN 12591 and hard bitumen is covered by EN 13924-1.

- for mixtures with modified binders or other additives or with polymer modified bitumen or multigrade bitumen, a temperature at which the binder has a viscosity similar to the binders at the temperature provided in Table 1 or the temperature at which the binder has a dynamic viscosity of  $(0,28 \pm 0,03)$  Pa·s measured according to EN 13702 or EN 13302, or the temperatures indicated by suppliers, or
- for asphalts designed to be produced at lower temperatures, the temperature at which compaction is intended for the asphalt during normal production.

NOTE 2 Polymer modified bitumen is covered by EN 14023 and multigrade bitumen is covered by EN 13924-2.

- for mixtures with reclaimed asphalt, the temperature shall be calculated using the overall penetration, softening point or viscosity calculated from the penetrations, softening points or viscosities and proportions of both the added binder and the binder recovered from the reclaimed asphalt.

NOTE 3 Guidance for the calculations of the penetration or the softening point of the binder of a mixture when reclaimed asphalt is used can be found in relevant product standards in the EN 13108-series.

**Table 1 — Reference compaction temperatures for mixtures, and reference installation temperature for mastic asphalt with paving grade and hard paving grade bitumen**

Paving grade of bitumen	Reference compaction temperature for mixtures other than mastic asphalt (in °C)	Reference installation temperature for mastic asphalt mixtures (in °C)	Paving grade of bitumen	Reference compaction temperature for mixtures other than mastic asphalt (in °C)
10/20 to 20/30	180	230	250/330	130
30/45	175	220	330/430	125
35/50	165	210	500/650	120
40/60	155	200	650/900	115
50/70	150	-	V12000	115
70/100	145	-	V6000	110
100/150	140	-	V3000	100

## prEN 12697-35:2023 (E)

Paving grade of bitumen	Reference compaction temperature for mixtures other than mastic asphalt (in °C)	Reference installation temperature for mastic asphalt mixtures (in °C)	Paving grade of bitumen	Reference compaction temperature for mixtures other than mastic asphalt (in °C)
160/220	135	-	V1500	90

The maximum laboratory mixing temperature reached shall not be more than 20 °C above the reference compaction temperature or the reference installation temperature of mastic asphalt mixtures. The target laboratory mixing temperature shall be selected so that the mixture will have cooled to the reference compaction temperature  $\pm 5$  °C when compaction is due to commence but shall not be greater than the maximum laboratory mixing temperature. For mastic asphalt, the target laboratory mixing temperature only shall use the reference installation temperatures in the column for mastic asphalt.

NOTE The target laboratory mixing temperature is generally the temperature at which the binder has a dynamic viscosity of  $(0,17 \pm 0,02)$  Pa·s, measured according to EN 13702 or EN 13302.

## 6.2 Preparation of aggregate and filler

**6.2.1** The mineral aggregate shall consist either of the particle mixture, as supplied, with the required particle size distribution, or of a set of fractions from which the required particle size distribution can be constructed. If not already dry, dry the aggregate, including the filler, at  $(110 \pm 5)$  °C to constant mass in a ventilated oven. Constant mass is obtained when successive weightings at least 1 h apart do not differ by more than 0,1 % of the test portion mass.

**6.2.2** Weigh the aggregate, including the filler to the nearest 1 g. The measured quantity shall correspond to the composition of the bituminous mixture and to the mass of the batch to be produced. The mass of the batch shall take into account the effective capacity of the mixer.

**6.2.3** Weigh the additives (such as fibres), if any, to the nearest 0,1 g.

**6.2.4** Before use, place all the material (except for additives such as pigments and fibres) in a ventilated heating chamber until it has consistently reached the target laboratory mixing temperature  $\pm 5$  °C. Additives such as pigments and fibres are only placed in the ventilated heating chamber when required according to the supplier's instructions.

## 6.3 Preparation of reclaimed asphalt

**6.3.1** If the mixture is to contain reclaimed asphalt, break up the reclaimed asphalt into separate aggregate particles. Check the particles for foreign matter in accordance with EN 12697-42. Weigh the reclaimed asphalt to the nearest 1 g. The measured quantity shall correspond to the proportion of the bituminous mixture and to the mass of the batch to be produced.

**6.3.2** If any reclaimed asphalt has to be dried before being heated, place the reclaimed asphalt in a ventilated heating chamber at  $(50 \pm 10)$  °C in thin layer to constant mass.

**6.3.3** For mixtures where the reclaimed asphalt will be heated to the full target laboratory mixing temperature at the mixing plant, follow 6.3.4. For mixtures where the reclaimed asphalt will not be heated to the full target laboratory mixing temperature at the mixing plant or for mixtures where the procedure is not determined, follow 6.3.5.