



BSI Standards Publication

Bituminous mixtures — Test methods

Part 39: Binder content by ignition

National foreword

This British Standard is the UK implementation of EN 12697-39:2020. It supersedes BS EN 12697-39:2012, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/510/1, Asphalt products.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Teneur en bitume par calcination

Asphalt - Prüfverfahren - Teil 39: Bindemittelgehalt
durch Thermoanalyse

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European foreword

This document (EN 12697-39:2020) 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of an identical text or by endorsement, at the latest by August 2020, and conflicting national standards shall be withdrawn at the latest by August 2020.

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 12697-39:2012.

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

- the title no longer makes the method exclusively for hot mix asphalt;
- [ge] editorial update according to current standard template;
- [ge] references added to each formula in related text;
- [ge] NOTES modified or adjusted to normal text where appropriate according to ISO/IEC Directives – Part 2:2016, 24.5;
- [Clause 2] titles for test methods EN 12697-series corrected.

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

WARNING — The temperature of the oven and the different accessories is extremely high during the ignition method. Special care should be taken when handling the equipment and the samples baskets etc. should be placed, shielded and marked in a way that helps ensure any unpremeditated contact is avoided.

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 a test method for the determination of the binder content of samples of bituminous mixtures by ignition. As such, it is an alternative to the more traditional method of extracting the binder using solvents. The method can be used for evaluation of mixture composition because the remaining aggregate can be used for determining aggregate gradation and density, provided excessive breakdown of the aggregate particles does not occur at the temperature reached. The results can be used for process control or checks on the compliance of mixtures. However, the need for calibration of a mixture, either on the complete mixture or on each of its component materials separately, before an analysis can be carried out makes this method easier to use with regularly used mixtures rather than with an extensive range of different mixtures from different aggregate sources. The test method is equally suitable for the analysis of mixtures containing unmodified or modified binders because the method has to be calibrated for each mixture being checked when calibration on mixtures is used. In case of doubt/dispute, the determination of the calibration value based on laboratory-prepared bituminous mixtures (see A.1 and A.2) is the reference method.

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 12597, *Bitumen and bituminous binders — Terminology*

EN 12697-1, *Bituminous mixtures — Test methods — Part 1: Soluble binder content*

EN 12697-14, *Bituminous mixtures — Test methods — Part 14: Water content*

EN 12697-27, *Bituminous mixtures — Test methods — Part 27: Sampling*

EN 12697-28, *Bituminous mixtures — Test methods — Part 28: Preparation of samples for determining binder content, water content and grading*

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:

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

3.1 binder

covers bituminous binder as described in EN 12597

3.2 corrected binder content

calculated binder content after correction by the calibration value in order to compensate for components in the asphalt material itself that, due to the high temperatures during ignition, could give rise to misinterpretations

3.3

calibration value

mean difference between the actual and measured binder contents for a particular bituminous mixture, in per cent, as measured from three samples

Note 1 to entry: The calibration value is a specific, material-dependent value that normally results from a loss of mass during the ignition from constituents in the mixture other than the binder. The principle of the binder content by ignition is based upon a pre-determination of the corrections for the constituents used in the mixture, primarily the aggregate.

Note 2 to entry: Mineral aggregates will show varying losses of mass during the test depending on their origin (petrographic composition). Examples of components that give rise to high corrections are limestone, hydrated lime and cellulose fibres.

Note 3 to entry: Methods for determining the calibration values are given in Annex A (normative).

3.4

target temperature

temperature to which the furnace would raise the sample in the test without the rise in temperature due to the exothermic reaction of burning the binder

Note 1 to entry: The target temperature (usually 540 °C) is determined during the calibration.

3.5

test completion time

time from when the temperature in the furnace returns to the target temperature, after the initial rise above that temperature, to when the test is completed with the sample having nominally reached constant mass

Note 1 to entry: If a furnace with an internal balance is used, the completion time is when the loss of mass between individual readings taken at 1 min intervals for three consecutive minutes is less than a constant mass limit. If a furnace without an internal balance is used, the completion time is when the change in the mass of the sample after further ignition for 15 min is less than a constant mass limit.

4 Principle

The test method determines the binder content of bituminous mixtures by ignition of the mixture in a furnace.

The corrected binder content is obtained by a calculation that includes a calibration term. Calibration terms are determined for particular asphalt mixtures or aggregates. Two test methods are described: Method A utilizes a furnace with an internal balance; Method B permits the use of a furnace and external balance. Re-determination (re-calibration or re-calculation depending on the calibration method chosen from Annex A) shall be undertaken for each significant change in the mixture, including changes in the constituent materials or their proportions.

The ignition process should have a controlled rise in temperature in order to avoid excessive heating of the mineral aggregate which can break down the aggregate particles depending on the petrographic composition.

NOTE The calculation of the calibration value based on parallel analysis with extraction methods (A.1 and A.3) is appropriate for mixtures for which the intended proportions of the constituent materials are not known.