



**SLOVENSKI STANDARD**  
**SIST EN 12697-38:2005**  
**01-januar-2005**

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nU hYj Y`nUcdfYa c`j`b`i a Yf`Ub`Y

Bituminous mixtures - Test methods for hot mix asphalt - Part 38: Common equipment and calibration

Asphalt - Prüfverfahren für Heißasphalt - Teil 38: Prüfeinrichtung und Kalibrierung

**STANDARD PREVIEW**

Mélange bitumineux - Méthodes d'essai pour mélanges hydrocarbonés a chaud - Partie 38: Appareillage commun, calibrage et étalonnage

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Ta slovenski standard je istoveten z: **EN 12697-38:2004**

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**ICS:**

93.080.20      Materiali za gradnjo cest      Road construction materials

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 12697-38**

July 2004

ICS 93.080.20

English version

## Bituminous mixtures - Test methods for hot mix asphalt - Part 38: Common equipment and calibration

Mélange bitumineux - Méthodes d'essai pour mélange  
hydrocarboné à chaud - Partie 38: Appareillage commun,  
calibrage et étalonnage

Asphalt - Prüfverfahren für Heißasphalt - Teil 38:  
Prüfeinrichtung und Kalibrierung

This European Standard was approved by CEN on 1 April 2004.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION  
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## Foreword

This document (EN 12697-38:2004) has been prepared by Technical Committee CEN/TC 227 "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of an identical text or by endorsement, at the latest by January 2005, and conflicting national standards shall be withdrawn at the latest by January 2005.

This document 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 method 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*

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*

EN 12697-8, *Bituminous mixtures - Test methods for hot mix asphalt - Part 8: Determination of void characteristics of bituminous specimens*

EN 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: Compactability*

EN 12697-11, *Bituminous mixtures - Test methods for hot mix asphalt - Part 11: Determination of the affinity between aggregate and bitumen*

EN 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*

EN 12697-15, *Bituminous mixtures — Test methods for hot mix asphalt — Part 15: Determination of the segregation sensitivity*

EN 12697-16, *Bituminous mixtures — Test methods for hot mix asphalt — Part 16: Abrasion by studded tyres*

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EN 12697-17, *Bituminous mixtures — Test methods for hot mix asphalt — Part 17: Particle loss of porous asphalt specimen*

EN 12697-18, *Bituminous mixtures — Test methods for hot mix asphalt — Part 18: Binder drainage*

EN 12697-19, *Bituminous mixtures — Test methods for hot mix asphalt — Part 19: Permeability of specimen*

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

EN 12697-21, *Bituminous mixtures - Test methods for hot mix asphalt - Part 21: Indentation using plate specimens*

EN 12697-22, *Bituminous mixtures — Test methods for hot mix asphalt — Part 22: Wheel tracking*

EN 12697-23, *Bituminous mixtures - Test methods for hot mix asphalt - Part 23: Determination of the indirect tensile strength of bituminous specimens*

EN 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*

EN 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.*

EN 12697-29, *Bituminous mixtures - Test method for hot mix asphalt - Part 29: Determination of the dimensions of a bituminous specimen*

EN 12697-30, *Bituminous mixtures — Test methods for hot mix asphalt — Part 30: Specimen preparation by impact compactor*

EN 12697-31, *Bituminous mixtures — Test methods for hot mix asphalt — Part 31: Specimen preparation by gyratory compactor*

EN 12697-32, *Bituminous mixtures — Test methods for hot mix asphalt — Part 32: Laboratory compaction of bituminous mixtures by a vibratory compactor*

EN 12697-33, *Bituminous mixtures — Test methods for hot mix asphalt — Part 33: Specimen preparation by roller compactor*

EN 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*

EN 12697-36, *Bituminous mixtures — Test methods for hot mix asphalt — Part 36: Determination of the thickness of a bituminous pavement*

EN 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*

EN 12697-38, *Bituminous mixtures — Test methods for hot mix asphalt — Part 38: Common equipment and calibration*

prEN 12697-39, *Bituminous mixtures — Test methods for hot mix asphalt — Part 39: Binder content by ignition.*

prEN 12697-40, *Bituminous mixtures — Test methods for hot mix asphalt — Part 40: In-situ drainability*

prEN 12697-41, *Bituminous mixtures — Test methods for hot mix asphalt — Part 41: Resistance to de-icing fluids*

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

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

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

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**EN 12697-38:2004 (E)****1 Scope**

This document specifies general requirements for common test equipment, calibration procedures and reagents for the testing of bituminous materials in the EN 12697 series of standards.

NOTE 1 This document makes use by reference of the requirements for common equipment and calibration prepared for aggregates.

NOTE 2 Bodies providing accreditation of test equipment may need to consider alternative requirements and/or calibration frequencies in order to cover the possibilities of National Health & safety, regulatory and legislative requirements.

Advice is also given on recommendations for laboratory management (annex A), on the accuracy of measurement (annex B) and on the rounding of values for reported results (annex C).

**2 Normative references**

The following referenced documents are indispensable for the application 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 932-5, *Tests for general properties of aggregates — Part 5: Common equipment and calibration*

EN 61010-2-020, *Safety requirements for electrical equipment for measurement, control and laboratory use — Part 2-020: Particular requirements for laboratory centrifuges (IEC 61010-2-020, modified)*

EN ISO 376, *Metallic materials - Calibration of force-proving instruments used for the verification of uniaxial testing machines (ISO 376:1999)*

ISO 48, *Rubber, vulcanised or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

ISO 4662, *Rubber — Determination of rebound resilience of vulcanizates*

ISO 7619, *Rubber — Determination of indentation hardness by means of pocket hardness meters*

ISO 11095, *Linear calibration using reference materials*

**3 Terms and definitions**

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

**3.1**  
**calibrating**  
set of operations that establish, under specified conditions, the relationship between values of quantities indicated by a measuring instrument or measuring system, or values represented by a material measure or a reference material, and the corresponding values realised by standards

NOTE See ISO 10012.

**3.2**  
**checking**  
operation of assuring either:



— that the results of measurements of a property (such as length, mass, temperature or time) at selected values made by an item, or a set of items, of equipment has not deviated from that which was measured when the equipment was last calibrated within a pre-defined tolerance; or

— that a property (such as hardness) of an item, or a set of items, of equipment complies with the relevant requirements for that equipment

### 3.3

#### reference instrument

item of equipment that is used to calibrate other items of equipment that are to be used to perform tests

NOTE A reference instrument should not be used to perform a test.

### 3.4

#### reference document

item with a property (such as mass or length) whose known value is traceable to national standards and is used in the calibration of items of equipment that is to be used to perform tests

NOTE A reference document should not be used to perform a test.

### 3.5

#### accuracy (of a measurement) (see Figure 1)

difference between the measurement and the real or target value. Normally, the accuracy consists of two items: accuracy = random error or precision + systematic error or bias (trueness)

NOTE 1 The accuracy of measurement is important because there is uncertainty in any measurement of physical properties. This uncertainty results from variations between two measurements of nominally identical samples and can result from various reasons including:

- differences in the composition of the samples tested;
- differences in the dimensions and shape of the samples tested;
- differences in equipment (dimensions, stiffness of moving parts, etc) used to carry out the tests;
- the precise procedure that the test is carried out (often due to different layout of equipment within different laboratories);
- the physical strength (in terms of the time to press buttons or speed in lifting items), speed of reactions and predilections of the operatives; and
- the precise environmental conditions prevalent during the test.

These differences can be so minor that it is impractical to specify them within a test procedure, but they still combine to produce noticeable differences.

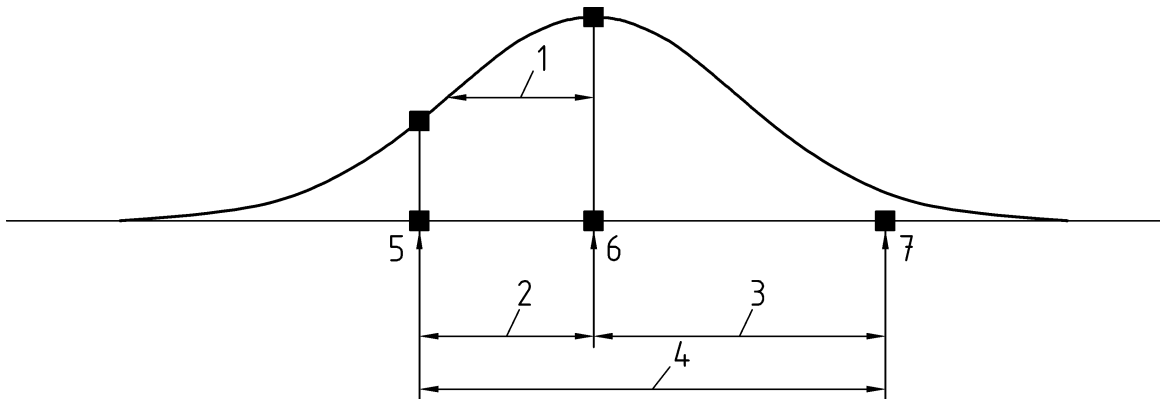
NOTE 2 There is a distinction between “readability” and “accuracy”. If equipment can be accurately read to 1 unit, then the random error in the value of the reading cannot be less than  $\pm 0,5$  units, that is 1 unit. There can also be random errors in the measurement method. Therefore, the accuracy of equipment, that is the total random error plus any bias, can never be closer than its readability and will usually be in excess of that. However, equipment cannot be calibrated to better than the readability, so that the accuracy is generally an order of magnitude greater than the readability and should always be at least twice the readability.

### 3.6

#### standard deviation (of a measurement) (see Figure 1)

quantitative statistical expression of the precision of a measurement

NOTE 1 There does not have to be a relation between precision and accuracy. A measurement can be precise and not accurate (in which case the bias is large).

**Key**

1	Standard deviation $\sigma, s$	5	Average of multiple measurements $\mu, x$
2	Random error	6	Target value $t$
3	Systematic error or bias $\delta$	7	Accuracy
4	Single measurement		

**Figure 1 — Diagram showing definitions**

NOTE 2 The size of the random error for a single measurement and the systematic error or bias for the target value are illustrative only and do not show the size of these values for all, or even most, cases.

**3.7 confidence**  
expectation that a measurement will be in an interval of results, between a lower and an upper value (see Table 1)

NOTE 1 The interval normally used is with a confidence of 95 %.

NOTE 2 A small confidence interval characterises a confident measurement method. The associated standard deviation of the measurement will be small.

NOTE 3 Confidence does not relate to the systematic error or the accuracy of a measurement.

NOTE 4 Table 1 gives translations of the different terms that are related to measurements and testing. Table 1 is based on part of Dutch Standard NEN 3114.

Table 1 — Terminology for measurement and testing

English	French	German	Dutch
confidence level: confidence coefficient	niveau de confiance	statistische Sicherheit	betrouwbaarheid
confidence interval	intervalle de confiance	Vertrauensbereich	betrouwbaarheidsinterval
correction	correction	Korrektur	correctie
individual measurement; single observation	mesure unique; observation isolée	Einzelwert; Einzelbeobachtung	enkelvoudige meetuitkomst
sample standard deviation	écart-type d'échantillon	Standardabweichung	gemeten standaardafwijking
deviation from the sample mean; deviation from the arithmetic mean	écart par rapport à la moyenne arithmétique	Abweichung vom Mittelwert	gemeten toevallige afwijking
arithmetic mean; sample mean	moyenne arithmétique	(arithmetischer) Mittelwert	gemiddelde
target value	valeur de consigne	wahrer Wert	gezochte waarde
repeatability	répétabilité	Wiederholbarkeit	herhaalbaarheid
measurement	mesurage; mesure	Messung	meting
measuring instrument; measuring equipment	instrument de mesurage	Messgerät; Messinstrument	meetinstrument
measuring method	Méthode de mesurage	Messmethode	meetmethode
population mean	moyenne théorique	Mittelwert der Grundgesamtheit	meetverwachting
nominal value	valeur nominale	Nennwert	nominale waarde
inaccuracy	imprécision	Messunsicherheit	onnauwkeurigheid
systematic error; bias	erreur systématique; biais	systematischer Fehler	systematische afwijking; onzuiverheid
precision	exactitude	Genauigkeit	precisie
reproducibility	reproductibilité	Reproduzierbarkeit	reproduceerbaarheid
range	Étendue	Variationsbereich	spreidingsbreedte
standard deviation	Ecart-type	Standardabweichung der Grundgesamtheit	standaardafwijking
standard deviation of the mean	écart-type de la moyenne arithmétique	Standardabweichung des Mittelwertes	standaardafwijking van het gemiddelde
random error	erreur aléatoire	zufälliger Fehler	toevallige afwijking
outlier; maverick	observation aberrante	Ausreißer	uitschieter
coefficient of variation	coefficient de variation	Variationskoeffizient	variatiecoëfficiënt
unbiased; without systematic error	non biaisé; sans erreur systématique	ohne systematische Fehler	zuiver