



**SLOVENSKI STANDARD**  
**SIST EN 12697-31:2004**

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Bituminous mixtures - Test methods for hot mix asphalt - Part 31: Specimen preparation  
by gyratory compactor

Asphalt - Prüfverfahren für Heißasphalt - Teil 31: Herstellung von Probekörpern - Gyrator  
-Verdichter

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Mélanges bitumineux - Méthodes d'essai pour mélange hydrocarboné a chaud - Partie  
31: Confection d'éprouvettes a la presse a compactage giratoire

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ICS 93.080.20

English version

Bituminous mixtures - Test methods for hot mix asphalt - Part  
31: Specimen preparation by gyratory compactor

Mélanges bitumineux - Méthodes d'essai pour mélange  
hydrocarboné à chaud - Partie 31: Confection d'éprouvettes  
à la presse à compactage giratoire

Asphalt - Prüfverfahren für Heißasphalt - Teil 31:  
Herstellung von Probekörpern - Gyrator-Verdichter

This European Standard was approved by CEN on 2 March 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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## Contents

page

Foreword.....	3
1 Scope .....	6
2 Normative references .....	6
3 Terms and definitions, symbols and abbreviations.....	7
3.1 Terms and definitions .....	7
3.2 Symbols .....	7
4 Principle.....	8
5 Apparatus .....	8
5.1 Test device .....	8
5.2 Metallic moulds .....	9
5.3 Round metallic inserts .....	9
5.4 Device for measuring the distance between inserts.....	10
5.5 Device for counting the number of rotations to within one revolution.....	10
6 Preparation of specimens .....	10
6.1 Mass of mixture to be introduced in the mould.....	10
6.1.1 Preparation of specimens of a given height at a predetermined bulk density .....	10
6.1.2 Derivation of a curve density versus number of gyrations .....	10
6.2 Preparation of test pieces .....	10
7 Test procedure .....	11
7.1 Preliminary setting.....	11
7.1.1 Pre-load.....	11
7.1.2 Force $F$ .....	11
7.1.3 Setting of the angle of inclination .....	11
7.1.4 Speed of rotation .....	11
7.1.5 Test temperature.....	11
7.2 Compaction of specimens .....	12
7.2.1 Start of compaction .....	12
7.2.2 Preparation of specimens of a given height at a predetermined density .....	12
7.2.3 Derivation of a curve density or void content versus number of gyrations.....	13
8 Test report .....	13
9 Precision.....	14
Annex A (normative) Procedure for setting the gyratory-type angle and the type conformity (force $F$ is fixed) .....	15
A.1 Gyratory-type testing procedure.....	15
A.1.1 Central reference materials for gyratory-type testing.....	15
A.1.2 Gyratory-type angle test .....	16
A.2 Procedure to test the conformity of a gyratory compactor to a type.....	16
A.3 Summary of the gyratory calibration chain .....	17

## Foreword

This document (EN 12697-31:2004) 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 August 2005.

The method described in the annex A for setting the angle is only intended as an interim measure until the use of specially designed equipment has been fully validated. The procedure for a revised annex is currently being investigated by CEN/TC 227 and may be used in a future revision of this European Standard.

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 methods 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 12697-31:2004 (E)

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.*

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 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, 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 vibratory compactor.*

EN 12697-33, *Bituminous mixtures - Test methods for hot mix asphalt - Part 33: Specimen prepared 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 of porous asphalt.*

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.*

No existing European Standard is superseded.

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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## 1 Scope

This document specifies the method for compaction of cylindrical specimens of bituminous mixtures using a gyratory compactor. Such compaction is achieved by combining a rotary shearing action and a vertical resultant force applied by a mechanical head.

The method can be used for

- a) determination of the air voids content of a mixture for a given number of gyrations;
- b) derivation of a curve density versus number of gyrations;
- c) preparation of specimens of given height at a predetermined density, for subsequent testing of their mechanical properties.

For purposes a) and b), the performance based procedure of the annex A specifies a calibration chain so that the result of the test should be independent from the used type of gyratory compactor.

For purpose c), compliance with annex A may be not necessary.

This European Standard applies to bituminous mixtures (both those made up in laboratory and those resulting from work site sampling), with an upper aggregate size not larger than 31,5 mm.

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## 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 12591, *Bitumen and bituminous binders - Specifications for paving grade bitumens*.

EN 12697-5, *Bituminous mixtures — Tests 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 12697-8, *Bituminous mixtures - Test methods for hot mix asphalt - Part 8: Determination of void characteristics of bituminous specimens*.

prEN 12697-35, *Bituminous mixtures - Test methods for hot mix asphalt - Part 35: Laboratory mixing*.

prEN 13108-1; *Bituminous mixtures - Material specifications - Part 1: Asphalt concrete*.

EN ISO 4287, *Geometrical product specifications (GPS) - Surface texture: Profile method - Terms, definitions and surface texture parameters (ISO 4287:1997)*.

EN ISO 6508-1, *Metallic materials - Rockwell hardness test - Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T) (ISO 6508-1:1999)*.

ISO 5725-2; *Accuracy (trueness and precision) of measurement methods and results -- Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*.



### 3 Terms and definitions, symbols and abbreviations

#### 3.1 Terms and definitions

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

##### 3.1.1

##### **gyratory compactor type**

representative model of a given production compactor

##### 3.1.2

##### **force-angle calibration chain**

the force  $F$  and the angle  $\phi$  determined for a type of gyratory compactor in order to comply with the central reference material requirements in A.1.2

NOTE Production gyratory compactors of the same type are adjusted using the determined values of  $F$  and  $\phi$ . The conformity of a production gyratory compactor to a type can be verified by doing a comparative test on a bituminous mixture or by checking the variations of the internal angle as described in A.2.

##### 3.1.3

##### **central reference material**

two bituminous mixtures, produced under defined conditions from constituents stored at a given site, of which the compositions are not specified but the air voids content (the constancy of which is traceable) at fixed numbers of gyrations complies respectively

NOTE The characteristics of the central reference material are specified in A.1.1.

#### 3.2 Symbols

For the purposes of this European Standard, the following symbols apply:

- $\phi$  is the angle of incline of axis of test piece, in degrees ( $^{\circ}$ );
- $F$  is the axial resultant force applicable to the ends of the test pieces, in Newton (N);
- $\omega$  is the speed of rotation of the axis of symmetry of revolution of the test piece, in revolutions per minute (rev/min);
- $D$  is the internal diameter of the mould, in millimetres (mm);
- $M$  is the mass of the mixture to be introduced in the mould, in kilograms (kg);
- $\rho_M$  is the maximum density of the mixture, in kilograms per cubic metre ( $\text{kg/m}^3$ );
- $h_{\min}$  is the minimum height of compacted specimen, corresponding to a zero percentage of voids, in millimetres (mm);
- $h(n_g)$  is the height of specimen after a number of gyrations  $n_g$ , in millimetres (mm);
- $\rho(n_g)$  is the bulk density of specimen after a number of gyrations  $n_g$ , in kilograms per cubic metre ( $\text{kg/m}^3$ );
- $P$  is the preload, initial value of  $F$ , in Newton (N);
- $v$  % is the void content, in percentage (%).