SLOVENSKI STANDARD
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Bitumenske zmesi - Preskusne metode - 31. del: Priprava preskušancev z vrtljivim zgoščevalnikom

Bituminous mixtures - Test methods - Part 31: Specimen preparation by gyratory compactor

Asphalt - Prüfverfahren - Teil 31: Herstellung von Probekörpern mit dem Gyrator-Verdichter

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

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Bituminous mixtures - Test methods - Part 31: Specimen preparation by gyratory compactor

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Asphalt - Prüfverfahren - Teil 31: Herstellung von Probekörpern mit dem Gyrator-Verdichter

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

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Foreword

This document (prEN 12697-31:2014) has been prepared by Technical Committee CEN/TC 227 “Road materials”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 12697-31:2007.

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

— The series title no longer makes the method exclusively for hot mix asphalt;

— advice in Scope on use of alternative calibration Annexes revised and changed from Note to normative;

— definition of internal angle deleted;

— symbols Mw, ITA_{425} and IBA_{425} added and w made the symbol for water content throughout;

— system to collect excess moisture added to requirements for test device;

— ventilated oven, balance and thermometer added to list of equipment;

— existing preparation of specimens made for dry mixtures and separate method for wet mixtures added;

— preparation of mixtures revised;

— the magnitude of force F redefined;

— NOTE to setting angle of inclination deleted and extra line added;

— start of compaction revised;

— number of gyrations at which measurements made clarified;

— water content added as optional in test reports;

— proportion of aggregate fractions revised for Material A in Annex A;

— periodical checks added to Annex A, Annex B and Annex C;

— step 5 of calibration chain revised in Annex A;

— NOTE added allowing different internal angles in Annex B and Annex C;

— compliance requirements clarified in Annex C;

— precision statement updated in Annex C.

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 the 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 12697-10, *Bituminous mixtures — Test methods for hot mix asphalt — Part 10: Compactibility*

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*

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 cylindrical specimens (CY)*

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*

EN 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 specimen 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*

EN 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*

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

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

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

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

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

EN 12397-44, *Bituminous mixtures — Test methods for hot mix asphalt — Part 44: Crack propagation by semi-circular bending test*

prEN 12697-45, *Bituminous mixtures — Test methods for hot mix asphalt — Part 45: Saturation ageing tensile stiffness (SATS) conditioning test*

prEN 12697-46, *Bituminous mixtures — Test methods for hot mix asphalt — Part 46: Low temperature cracking and properties by uniaxial tension tests*

EN 12697-47, *Bituminous mixtures — Test methods for hot mix asphalt — Part 47: Determination of the ash content of natural asphalts*

prEN 12697-48, *Bituminous mixtures — Test methods for hot mix asphalt — Part 48: Interlayer bonding*[1)]

EN 12697-49, *Bituminous mixtures — Test methods for hot mix asphalt — Part 49: Determination of friction after polishing*

prCEN/TS 12697-50, *Bituminous mixtures — Test methods for hot mix asphalt — Part 50: Resistance to scuffing*[1)]

prEN 12697-51, *Bituminous mixtures — Test methods — Part 51, Surface shear strength test*[1)]

prTS 12697-52, *Bituminous mixtures — Test methods — Part 52, Conditioning to address oxidative ageing*[1)]

prEN 12697-53, *Bituminous mixtures — Test methods — Part 53, Cohesion increase by spreadability-meter method*[1)]

1) In preparation.

1 Scope

This European Standard 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 is used for:

— determination of the air voids content of a mixture for a given number of gyrations or derivation of a curve density (or void content) versus number of gyrations;

— preparation of specimens of given height and/or at a predetermined density, for subsequent testing of their mechanical properties.

The equipment used for the method needs to comply with Annex A, Annex B or Annex C.

Annex A is especially suitable for compaction research and Annex A, Annex B and Annex C for the preparation of specimens for mechanical testing and for void content evaluation.

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.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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*

EN 12697-27, *Bituminous mixtures — Test methods for hot mix asphalt — Part 27: Sampling*

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

EN 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)*

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)*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, 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
force F and the angle ϕ determined for a type of gyratory compactor in order to comply with the central reference material requirements in Table A.1

Note 1 to entry: Production gyratory compactors of the same type are adjusted using the determined values of F and ϕ. 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.3.3.

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) is at fixed numbers of gyrations

Note 1 to entry: The characteristics of the central reference material are specified in Table A.1.

3.1.4
internal top angle
angle between the internal mould cross-sectional plane and the upper metallic insert as a mould is gyrated in a gyratory compactor

3.1.5
internal bottom angle
angle between the internal mould cross-sectional plane and the lower metallic insert as a mould is gyrated in a gyratory compactor

3.1.6
internal effective angle
average of the internal top angle and the internal bottom angle

3.1.7
eccentricity
distance, e, away from the axis of gyration at which a force, F, is acting at one end of a gyratory compactor mould

Note 1 to entry: The eccentricity is explained in Figure C.1.

3.1.8
tilting moment
product of the eccentricity, e, and the force, F, acting at one end of a gyratory compactor mould in a direction parallel to the axis of gyration

Note 1 to entry: The tilting moment is explained in Figure C.1.

3.2 Symbols

For the purposes of this document, the following symbols apply.

α is the internal angle, in degrees (°);

ϕ is the angle of incline of axis of test piece, in degrees (°);

F is the axial resultant force applicable to the ends of the test pieces, in newton (N);

ω 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 a dry mixture to be introduced in the mould, in kilograms (kg);

Mw is the mass of a wet mixture to be introduced in the mould, in kilograms (kg);

ρ_M is the maximum density of the mixture, in kilograms per cubic metre (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);

$\rho_{(ng)}$ is the bulk density of specimen after a number of gyrations n_g, in kilograms per cubic metre (kg/m^3);

P is the preload, initial value of F, in newton (N);

$v_{\%}$ is the void content, in percent (%);

e is the eccentricity, in millimetres (mm);

$ITa_{1...4}$ is the measured internal top angle (4 individual measurements);

ITa_{min} is the minimum measured internal top angle (of 4 measurements);

ITa_{max} is the maximum measured internal top angle (of 4 measurements);

ITA is the internal top angle (average of 4 measurements)

ITA_{240} is the internal top angle at 240 Nm tilting moment;

ITA_{425} is the internal top angle at 425 Nm tilting moment;

$IBa_{1...4}$ is the measured internal bottom angle (4 individual measurements);

IBa_{min} is the minimum measured internal bottom angle (of 4 measurements);

IBa_{max} is the maximum measured internal bottom angle (of 4 measurements);

IBA is the internal bottom angle (average of 4 measurements)

IBA_{240} is the internal bottom angle at 240 Nm tilting moment;

IBA_{425} is the internal bottom angle at 425 Nm tilting moment;