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Bituminous mixtures - Test methods - Part 35: Laboratory mixing

Asphalt - Prüfverfahren - Teil 35: Labormischen

Mélanges bitumineux - Essais - Partie 35: Malaxage de laboratoire

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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: Labormischen

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European foreword

This document (EN 12697-35:2016) has been prepared by Technical Committee CEN/TC 227 “Road materials”, the secretariat of which is held by DIN.

This document supersedes EN 12697-35:2004+A1:2007.

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of an identical text or by endorsement, at the latest by October 2016, and conflicting national standards shall be withdrawn at the latest by October 2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

Compared with EN 12697-35:2004+A1:2007, the following changes have been made:

a) Title changed to allow inclusion of asphalt produced at lower temperatures;

b) Annex A (normative) added for the manufacture of samples of asphalt with foamed bitumen;

c) Annex B (normative) added for the manufacture of samples of asphalt with bitumen emulsion;

d) Annex C (normative) added for the manufacture of samples from mastic asphalt;

e) introduction of formula for super-heating aggregate when significant proportions of reclaimed asphalt are used;

f) “Target mixing temperature” extended to “target laboratory mixing temperature” and used throughout the document;

g) introduction of the term “Reference compaction temperature”;

h) determination of reference compaction temperature in 6.1 extended, including an allowance to reduce it for asphalt mixtures designed to be produced at lower temperatures;

i) the term “pen” removed from units in Table 1;

j) the time to reach mixing temperature in 6.2.4 changed;

k) “RAP” changed to “reclaimed asphalt” in 6.3;

l) the option to defer adding the filler in 6.5.3 extended to allow deferring adding the fine aggregate as well or instead;

m) added requirement for addition of cold reclaimed asphalt to the mixer;

n) adjusted scope to be in line with text in Table 1.

This European standard 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 — 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 — 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 12697-10, *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 — 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 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*

— EN 12697-35, *Bituminous mixtures — Test methods — 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 matter in reclaimed asphalt*

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

— EN 12697-44, *Bituminous mixtures — Test methods for hot mix asphalt — Part 44: Crack propagation by semi-circular bending test*

— EN 12697-45, *Bituminous mixtures — Test methods for hot mix asphalt — Part 45: Saturation Ageing Tensile Stiffness (SATS) conditioning test*

— EN 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*

— FprCEN/TS 12697-50, *Bituminous mixtures — Test methods — Part 50: Resistance to scuffing*[1)]

— FprCEN/TS 12697-51, *Bituminous mixtures — Test methods — Part 51: Surface shear strength test*[1)]

— prEN 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)]

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1) Currently at Enquiry stage.

1 Scope

This European Standard describes the laboratory mixing of bituminous materials for the manufacture of specimens. The standard 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, 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 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 12591, *Bitumen and bituminous binders - Specifications for paving grade bitumens*

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

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

EN 13108-1, *Bituminous mixtures - Material specifications - Part 1: Asphalt Concrete*

EN 13108-2, *Bituminous mixtures - Material specifications - Part 2: Asphalt Concrete for very thin layers*

EN 13108-3, *Bituminous mixtures - Material specifications - Part 3: Soft Asphalt*

EN 13108-4, *Bituminous mixtures - Material specifications - Part 4: Hot Rolled Asphalt*

EN 13108-5, *Bituminous mixtures - Material specifications - Part 5: Stone Mastic Asphalt*

EN 13108-6, *Bituminous mixtures - Material specifications - Part 6: Mastic Asphalt*

EN 13108-7, *Bituminous mixtures - Material specifications - Part 7: Porous Asphalt*

prEN 13108-9, *Bituminous mixtures - Material specifications - Part 9: Asphalt for Ultra-Thin Layers*

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 modified bitumen by cone and plate method*

EN 13924-1, *Bitumen and bituminous binders - Specification framework for special paving grade bitumen - Part 1: Hard paving grade bitumens*

EN 13924-2, *Bitumen and bituminous binders - Specification framework for special paving grade bitumen - Part 2: Multigrade paving grade bitumens*

EN 14023, *Bitumen and bituminous binders - Specification framework for polymer modified bitumens*

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
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

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

θ_{RCT}	is the reference compaction temperature
θ_{TLMT}	is the target laboratory mixing temperature
θ_{RA}	is the reclaimed asphalt temperature
θ_{FA}	is the temperature to which the fresh aggregate shall be heated
p	is the proportion of reclaimed asphalt