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SIST EN 12697-2:2004

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ICS 93.080.20

English version

Bituminous mixtures - Test method for hot mix asphalt - Part 2:
Determination of particle size distribution

Mélange bitumineux - Méthodes d'essai pour mélange
hydrocarboné à chaud - Partie 2 : Granulométrie

Asphalt - Prüfverfahren für Heiasphalt - Teil 2 :
Korngrenverteilung

This European Standard was approved by CEN on 1 August 2002.

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 Management Centre 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 Management Centre has the same status as the official versions.

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

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Foreword

This document EN 12697-2:2002 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of an identical text or by endorsement, at the latest by March 2003, and conflicting national standards shall be withdrawn at the latest by April 2005.

This European Standard is one of a series of standards as follows:

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*

prEN 12697-6, *Bituminous mixtures — Test methods for hot mix asphalt — Part 6: Determination of bulk density of bituminous specimens by hydro-static method*

EN 12697-7, *Bituminous mixtures — Test methods for hot mix asphalt — Part 7: Determination of bulk density of bituminous specimens by gamma rays*

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

prEN 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: Compactibility*

prEN 12697-11, *Bituminous mixtures — Test methods for hot mix asphalt — Part 11: Determination of the compatibility between aggregates and bitumen*

prEN 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*

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

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

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

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

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

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

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

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

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

prEN 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*

prEN 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 methods for hot mix asphalt — Part 29: Determination of the dimensions of bituminous specimen*

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

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

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

prEN 12697-33, *Bituminous mixtures — Test methods for hot mix asphalt — Part 33: Specimen preparation slab compactor*

prEN 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*

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

prEN 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*

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

prEN 12697-39, *Bituminous mixtures — Test methods for hot mix asphalt — Part 39: Soluble binder content of mixtures by ignition method*

prEN 12697-40, *Bituminous mixtures – Test methods for hot mix asphalt – Part 40: Void content, compaction and hydraulic conductivity of material in the layer*

prEN 12697-41, *Bituminous mixtures – Test methods for hot mix asphalt – Part 41: Resistance to deicing fluid*

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

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

prEN 12697-44, *Bituminous mixtures – Test methods for hot mix asphalt – Part 44: Binder content of mixtures with modified binders*

prEN 12697-45, *Bituminous mixtures – Test methods for hot mix asphalt – Part 45: Binder drainage – Schellenberg method*

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

1 Scope

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This European Standard specifies a procedure for the determination of the particle size distribution of the aggregates of bituminous mixtures by sieving. The test is applicable to aggregates recovered after binder extraction in accordance with EN 12697-1.

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The applicability of this European Standard is described in the product standards for bituminous mixtures.

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NOTE Fibres, solid (non-soluble during extraction) additives and (some) binder modifiers influence the test result.

2 Normative references

This European Standard incorporates by dated or undated references, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to, or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 933-1:1997, *Tests for geometrical properties of aggregates - Part 1: Determination of particle size distribution - Sieving method.*

EN 12697-1, *Bituminous Mixtures - Test methods for hot mix asphalt - Part 1: Soluble binder content.*

EN 12697-39:-¹, *Bituminous mixtures – Test methods for hot mix asphalt – Part 39: Soluble binder content of mixtures by ignition method.*

ISO 3310-1, *Test sieves – Technical requirements and testing – Part 1: Test sieves of metal wire cloth.*

ISO 3310-2, *Test sieves – Technical requirements and testing – Part 2: Test sieves of perforated metal plate.*

¹ In preparation.

3 Terms and definitions

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

3.1
particle size distribution
portion of aggregate on specified sieves expressed as cumulative percentages by mass passing those sieves

3.2
D
upper sieve size of the aggregate in the bituminous mixture in millimetre (mm) according to the relevant material specification standard

4 Significance and use

The composition of a bituminous mixture in terms of binder content and aggregates grading is a significant quality parameter. The European Standard for bituminous mixtures contains some grading specifications. Controlling the mixture grading is an important instrument for product quality management.

5 Principle

The test consists of the determination of the particle size distribution of the aggregates in the bituminous mixture by sieving and weighing. A granulometric analysis of the aggregate is performed after binder extraction.

6 Apparatus

6.1 Unless stated otherwise, the apparatus as required in EN 933-1 shall be used.

6.2 Sieves with aperture size up to and including 2,8 mm shall be in accordance with ISO 3310-1.

6.3 Sieves with aperture size of 4 mm and larger shall be in accordance ISO 3310-2.

7 Sample preparation

The test shall be carried out on the material recovered after completion of the test as specified in EN 12697-1 or EN 12697-39:².

NOTE 1 It should be ensured visually that all aggregate is recovered from the mixture and that no binder remained adhering.

The recovered aggregate shall be dried to constant mass. Particles shall be separated completely.

NOTE 2 "Constant mass" is obtained when the change of mass of the aggregate between two determinations at an interval of at least 30 min at a temperature of $(110 \pm 5) ^\circ\text{C}$ is less than 0,1 %.

8 Procedure

The test shall be carried out on the aggregate according to EN 933-1. When less material to be tested is available than required in this European Standard, the total amount of material available shall be tested. However the minimum amount of material shall be 50 D g.

² In preparation.

When the aggregate is visually greasy after carrying out the test in accordance with EN 12697-1, a decrement of the surface tension may be required by adding some peptising additive.

When this test is carried out after a binder extraction procedure in which a sieving stage is incorporated containing the applicable sieves, and when the aggregate is thoroughly washed during the execution of test EN 12697-1, or when the aggregate remains from EN 12697:-², the particle size distribution may be determined by dry sieving only. For each mixture a verification test shall be carried out including washing the aggregate ("wet sieving"). If the differences between dry sieving tests and wet sieving tests of the aggregate mass passing sieve 63 μm are larger than 0,2 %, the dry sieving tests result are not valid for the specific mixture. In that case the test shall be carried out including washing the recovered aggregate.

Where the binder content of the bituminous mixture is being determined by difference, the total mass of the material shall be obtained by adding the mass of the material recovered from the centrifuge or filter apparatus to the dried mass of the aggregate. The mass of the material passing the 63 μm sieve shall be obtained by adding the mass of the recovered material to this mass.

9 Calculation

The calculation shall be in accordance with EN 933-1.

10 Report

With reference to this European Standard the test report shall include the following information:

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- a) identification of the laboratory;
- b) identification of the specimen;
- c) particle size distribution by mass for all portions to nearest whole percentages, however the mass on 0,063 mm to nearest single decimal place;
- d) date of the test.
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11 Precision

The precision data of this test are as follows:

	Standard deviation	Precision
Repeatability	$\sigma_r = 0,4 \%$	$r = 1,0 \%$
Reproducibility	$\sigma_R = 0,6 \%$	$R = 1,7 \%$

where

r is the repeatability limit under repeatability r conditions according to EN 932-6: $r = 2,77 \times \sigma_r$

R is the reproducibility limit under reproducibility R conditions according to EN 932-6: $R = 2,77 \times \sigma_R$

σ_r the standard deviation of the test results obtained under repeatability conditions