
6]li a Ybg_Y'na Ygj'È'DfYg_i gbY'a YrcXY'nUj fc Y'UgZJ'fbY'na Ygj'È'%'XY.
I [cHUj `Ub'Y'UZ]b]hY'a YX'U[fY[Urc a]b`V]h a bca

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

Asphalt - Prüfverfahren für Heißasphalt - Teil 11: Bestimmung der Affinität von Gesteinskörnungen und Bitumen

Mélanges bitumineux - Méthodes d'essai pour mélange hydrocarboné a chaud - Partie 11: Détermination de l'affinité granulat-bitume

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93.080.20 Materiali za gradnjo cest Road construction materials

SIST EN 12697-11:2004 **en**

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 12697-11

December 2003

ICS 93.080.20

English version

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

Mélanges bitumineux - Méthodes d'essai pour mélange
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l'affinité granulats-bitume

Asphalt - Prüfverfahren für Heißasphalt - Teil 11:
Bestimmung der Affinität von Gesteinskörnungen und
Bitumen

This European Standard was approved by CEN on 3 November 2003.

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.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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

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Foreword

This document (EN 12697-11:2003) has been prepared by Technical Committee CEN/TC 227 "Road materials", the secretariat of which is held by DIN.

The method described in this European Standard measures a property that is a surrogate for the affinity between aggregate and bitumen because no satisfactory method has been developed for measuring the property directly. Alternative surrogate methods are currently being investigated by Technical Committee CEN/TC227 and may be used in a future revision of this European Standard.

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 June 2004, and conflicting national standards shall be withdrawn at the latest by August 2005.

This European Standard does not replace any existing European Standard.

This European Standard is one of a series of standards for the testing of mechanical and physical properties of bituminous mixtures, 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 the 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: 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*

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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*

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

prEN 12697-17, *Bituminous mixtures — Test methods for hot mix asphalt — Part 17: Partial 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*

EN 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*

EN 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 a 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*

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*

prEN 12697-34, *Bituminous mixtures — Test methods for hot mix asphalt — Part 34: Marshall test*

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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*

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: Binder content by ignition*

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*

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

The applicability of this European Standard is described in the product standards for bituminous mixtures (series of prEN 13108).

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

EN 12697-11:2003 (E)**1 Scope**

This European Standard describes a procedure for the determination of the affinity between aggregate and bitumen, expressed by visual registration of the degree of bitumen coverage on uncompacted bitumen-coated mineral aggregate particles after influence of mechanical stirring action in the presence of water.

This method can be used to evaluate the effect of moisture with or without adhesion agents including liquids, such as amines, and fillers, such as hydrated lime or cement, and the moisture effect on different aggregate for the same binder.

NOTE If the aggregate to be tested is susceptible to abrasion, the water sensitivity test EN 12697-12 is alternatively recommended to avoid influence from aggregate abrasion during the specified rolling procedure.

2 Normative references

This European Standard incorporates by dated or undated reference, 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 1426, *Bitumen and bituminous binders — Determination of needle penetration.*

EN 12697-2, *Bituminous mixtures — Test methods for hot mix asphalt — Determination of particle size distribution.*

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

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3 Terms and definitions

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

3.1 affinity between aggregate and bitumen
degree of bitumen coverage visually determined on uncompacted bitumen coated mineral aggregate particles after influence of mechanical stirring action in the presence of water

3.2 degree of bitumen coverage
average proportion of the surface area of the aggregate particles that are covered with bitumen, expressed as a percentage

3.3 precision
closeness of agreement between independent test results obtained under stipulated conditions

NOTE 1 Precision depends only on the distribution of random errors and does not relate to the true value or the specified value.

NOTE 2 The measure of precision is usually expressed in terms of imprecision and computed as a standard deviation of the test results. Less precision is reflected by a larger standard deviation

NOTE 3 “Independent test results” means results obtained in a manner not influenced by any previous result on the same or similar test object. Quantitative measures of precision depend critically on the stipulated conditions. Repeatability and reproducibility conditions are particular sets of extreme conditions.

3.4

repeatability

precision under repeatability conditions

3.5

repeatability conditions

conditions where independent test results are obtained with the same method on identical test items in the same laboratory by the same operator using the same equipment within short intervals of time

3.6

repeatability limit

value less than or equal to which the absolute difference between two test results obtained under repeatability conditions may be expected to be within probability of 95 %

NOTE The symbol used is *r*.

3.7

reproducibility

precision under reproducibility conditions

3.8

reproducibility conditions

conditions where test results are obtained with the same method on identical test items in different laboratories with different operators using different equipment

3.9

reproducibility limit

value less than or equal to which the absolute difference between two test results obtained under reproducibility conditions may be expected to be with a probability of 95 %

NOTE The symbol used is *R*.

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3.10

single test result

value obtained by applying the standard test method fully, once to a single specimen; it may be the mean of two or more observations or the result of a calculation from a set of observations as specified by the standardized test method

4 Principle

An aggregate is sieved in accordance with EN 12697-2. The 8 mm to 11,2 mm (alternatively 5,6 mm to 8 mm or 6,3 mm to 10 mm) fraction is washed, dried and mixed with bitumen to obtain uniform, total coverage. The bitumen coated aggregate is placed loosely distributed on a metal plate or silicone coated paper, stored at ambient temperature overnight, and then divided into three part samples for analysis.

Each part-sample is transferred to a bottle filled with water. The bottle is sealed and placed on a bottle rolling device. The bottles are rolled at ambient temperature and at a specified speed. At specified time intervals the degree of bitumen coverage on the aggregate particles is visually estimated by two technicians independently.

5 Apparatus

5.1 Test sieves with square openings conforming to EN 12697-2; 11,2 mm and 8 mm; 8 mm and 5,6 mm; or 6,3 mm and 10 mm.

5.2 Ventilated oven, thermostatically controlled, adjustable from 100 °C to 180 °C, able to maintain the sample at (110 ± 5) °C for drying procedure and at the specified mixing temperature ± 5 °C (refer to 6.3.1).