

**Asfaltsegud. Kuuma asfaltsegu katsemeetodid. Osa 11:  
Täitematerjali ja bituumeni vahelise nakke määramine**

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

## EESTI STANDARDI EESSÕNA

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See Eesti standard EVS-EN 12697-11:2012 sisaldab Euroopa standardi EN 12697-11:2012 ingliskeelset teksti.	This Estonian standard EVS-EN 12697-11:2012 consists of the English text of the European standard EN 12697-11:2012.
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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  
hydrocarboné à chaud - Partie 11: Détermination de  
l'affinité granulats-bitume

Asphalt - Prüfverfahren für Heiasphalt - Teil 11:  
Bestimmung der Affinität von Gesteinskörnungen und  
Bitumen

This European Standard was approved by CEN on 9 March 2012.

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# Contents

Page

Foreword.....	3
1 Scope .....	7
2 Normative references .....	7
3 Terms and definitions .....	7
4 Principle .....	8
5 Rolling bottle method .....	8
5.1 Equipment .....	8
5.2 Preparation of test specimens .....	11
5.2.1 Aggregate .....	11
5.2.2 Bitumen .....	12
5.2.3 Mixing aggregate and bitumen .....	12
5.3 Conditioning .....	13
5.4 Procedure .....	13
5.5 Calculation and expression of results .....	15
5.6 Report .....	15
5.7 Precision .....	16
6 Static method .....	16
6.1 Equipment .....	16
6.2 Solvent and other materials .....	17
6.3 Preparation of test specimens .....	17
6.3.1 Aggregate .....	17
6.3.2 Bitumen .....	17
6.4 Procedure .....	17
6.5 Calculation and expression of results .....	18
6.6 Report .....	18
6.7 Precision .....	18
7 Boiling water stripping method .....	18
7.1 General .....	18
7.2 Equipment and materials .....	19
7.3 Sample preparation .....	20
7.3.1 Aggregate .....	20
7.3.2 Bitumen .....	21
7.3.3 Mixing aggregate and bitumen .....	21
7.4 Conditioning .....	21
7.5 Test procedure .....	21
7.5.1 Establishing the acid/base equivalence factor .....	21
7.5.2 Establishing the calibration curve .....	22
7.5.3 Stripping test .....	23
7.6 Calculation and expression of results .....	24
7.6.1 Determination of the calibration curve .....	24
7.6.2 Calculation of the degree of bitumen coverage .....	25
7.7 Test report .....	26
7.8 Precision .....	26
Annex A (informative) Guidance for estimation of the degree of bitumen coverage .....	27
Bibliography .....	28

## Foreword

This document (EN 12697-11:2012) 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 October 2012, and conflicting national standards shall be withdrawn at the latest by October 2012.

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.

This document supersedes EN 12697-11:2005.

List of main changes since this new edition:

- Most clauses, subclauses, etc. in the existing standard renumbered and headlines for methods A (rolling bottle), B (static immersion) and C (Boiling water stripping method) deleted (which may be confusing to users of previous version of standard!);
- 5.1.12: Requirement to horizontally positioning of rolling machine added;
- 5.2.2.1: Reference to EN 58 added for sampling;
- 6.1.1: "Shallow trays" changed to "Flat bottomed container";
- 6.3.1 and 6.3.2: Original text for preparation of aggregate and bitumen changed to reference to similar clauses in the rolling bottle method;
- 6.4.1: Now allowing use of 8-11,2 mm fraction alternatively, and definition of mixing temperature changed from  $130\text{ °C} \pm 5\text{ °C}$  to  $15\text{ °C}$  less than the mixing temperature defined in EN 12697-35;
- 6.6: In report, new list entry b) (sample identification number and date and time of testing, is added;
- 7.2.1: Requirements for test sieves changed to reference to 5.2.1 (previously specified sieves 7 and 14 mm deleted);
- 7.5.1.1., 7.5.1.2, 7.6.1.1, and 7.6.2.1: the symbol "r" previously used for acid/base equivalent factor is changed to " $f_{eq}$ " to avoid misunderstanding as "r" is also used for repeatability (change introduced with the latest comments);
- 7.3.3.4: Use of (8-11,2) mm aggregates added;
- Informative Annex A added.

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 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: Binder 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 specimen*
- 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 aggregates 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 methods 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 a 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 coarse 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*
- FprEN 12697-45, *Bituminous mixtures — Test methods for hot mix asphalt — Part 45: Saturation Ageing Tensile Stiffness (SATS) conditioning test*
- FprEN 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 12697-49, *Bituminous mixtures — Test methods for hot mix asphalt — Part 49: Determination of friction after polishing*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, 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 Scope

This European Standard specifies procedures for the determination of the affinity between aggregate and bitumen and its influence on the susceptibility of the combination to stripping. This property is intended to be of assistance to the designer for mixture design rather than as a type test. Susceptibility to stripping, as determined by these procedures, is an indirect measure of the power of a binder to adhere to various aggregates, or of various binders to adhere to a given aggregate. The procedures can also be used to evaluate the effect of moisture on a given aggregate-binder combination with or without adhesion agents including liquids, such as amines, and fillers, such as hydrated lime or cement.

In the rolling bottle method, the affinity is 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.

NOTE 1 The rolling bottle test is a simple but subjective test and suitable for routine testing. It is not appropriate for aggregates that are highly abrasive.

In the static test method, the affinity is expressed by visual registration of the degree of bitumen coverage on uncompacted bitumen-coated mineral aggregate particles after storage in water.

NOTE 2 The static test is a simple, though subjective test that is generally less precise, but that can cope with high PSV-aggregates.

In the boiling water stripping test method, the affinity is expressed by determining the degree of bitumen-coverage on uncompacted bitumen-coated aggregate after immersion in boiling water under specified conditions.

NOTE 3 The boiling water stripping test is an objective test and has a high precision. However, it is a more specialist test because it requires greater skill of the operatives and uses chemicals as reagent. The latter point may also imply extra health and safety considerations.

NOTE 4 The boiling water stripping test procedure can be used for any binder-aggregate combinations in which the mineral aggregate is calcareous, silico-calcareous or siliceous by nature.

## 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 1426, *Bitumen and bituminous binders — Determination of needle penetration*

EN 12697-2, *Bituminous mixtures — Test method for hot mix asphalt — Part 2: Determination of particle size distribution*

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

## 3 Terms and definitions

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

### 3.1

#### acid/base equivalence factor

$f_{eq}$   
ratio of the volume of base needed to neutralise 25 ml of acid