BRITISH STANDARD

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12697-37:2003

Bituminous mixtures — Test methods for hot mix asphalt —

Part 37: Hot sand test for the adhesivity of binder on precoated chippings for HRA

The European Standard EN 12697-37:2003 has the status of a British Standard

ICS 93.080.20

National foreword

This British Standard is the official English language version of EN 12697-37:2003.

The UK participation in its preparation was entrusted by Technical Committee B/510, Road materials, to Subcommittee B/510/1, Coated macadam and hot asphalt, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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English version

Bituminous mixtures - Test methods for hot mix asphalt - Part 37: Hot sand test for the adhesivity of binder on precoated chippings for HRA

Mélanges bitumineux - Méthodes d'essai pour enrobés à chaud - Partie 37: Essai au sable chaud de l'adhésion du liant sur des gravillons pré-enrobés pour HRA (hot rolled asphalt)

Asphalt - Prüfverfahren für Heißasphalt - Teil 37: Prüfung des Haftvermögens eines Bindemittels auf vorumhülltem Splitt für Hot-Rolled-Asphalt mittels heißem Sand

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Foreword

This document (EN 12697-37:2003) 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of an identical text or by endorsement, at the latest by November 2003, and conflicting national standards shall be withdrawn at the latest by August 2005.

It does not replace any existing European Standard.

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 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 specimen 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.*

EN 12697-8, *Bituminous mixtures — Test methods for hot mix asphalt — Part 8: Determination of 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: Compactability.*

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

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: 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 specimen.*

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 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 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.*

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

The applicability of this European Standard is described in prEN 13108-4.

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.

1 Scope

This European Standard describes a hot sand test method for determining the condition of the binder on coated chippings for use with hot rolled asphalt (HRA) surface course.

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 933-2, *Tests for geometrical properties of aggregates — Part 2: Determination of particle size distribution - Test sieves, nominal size of apertures.*

EN 933-6, *Tests for geometrical properties of aggregates — Part 6: Assessment of surface characteristics — Flow coefficient of aggregates.*

EN 13043, *Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas.*

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

EN 12697-28:2000, *Bituminous mixtures — Test methods for hot mix asphalt — Part 28: Preparation of samples for determining binder content, water content and grading.*

3 Terms and definitions

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

3.1
representative sample
portion or a combination of portions of a quantity of material, such as a stockpile, for which the extent that the sample accurately represents all the material in the stockpile is important and is, therefore, specified. For a normal sample, the extent of representation is not necessarily important

3.2
set 1, set 2 and basic set
sets of test sieve sizes in accordance with EN 13043

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 indicated 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 in which 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 with a probability of 95 %

NOTE The symbol used for repeatability limit is r.

3.7
reproducibility
precision under reproducibility conditions

3.8
reproducibility conditions
conditions in which 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 for reproducibility limit is R.

4 Principle

This test is used to ensure that coated chippings to be applied to the surface of surface course rolled asphalt have not been overheated to such an extent that their adhesion to the asphalt will be prevented. The dried coated chippings are immersed in hot sand under specified conditions and the degree of coating by the sand assessed both by weighing and by visual inspection.

NOTE The test should be carried out sufficiently in advance of constructing the asphalt surface course to enable fresh supplies of chippings to be obtained if necessary.

5 Materials

5.1 Clean dry silica sand

In accordance with the grading given in Table 1 and having a flow coefficient (FCF), measured in accordance with EN 933-6, of not less than 27 s.

NOTE The sands used in the hot sand test should be changed after testing approximately 20 samples or earlier if obviously contaminated.

5.2 Clean dry silica grit

In accordance with the grading given in Table 1 and having a flow coefficient (FCF), measured in accordance with EN 933-6, of not less than 27 s.

Table 1 — Grading of sand and grid

Test sieve mm	Proportion by mass passing	
	silica sand %	**silica grit** %
2	–	100
1	–	70 to 80
0,500	100	0 to 15
0,250	65 to 75	–
0,125	0 to 10	0

6 Apparatus

NOTE If it is required that the results are traceable back to recognised standards, the apparatus should conform to, and be calibrated in accordance with prEN 12697-38.

6.1 **Oven**, thermostatically controlled to maintain the temperature 125 °C to 130 °C.

6.2 **Balance**, capable of weighing a sample to an accuracy of ± 1 g.

6.3 **Two metal trays**, minimum size 400 mm 350 mm 60 mm deep. A greater number of smaller trays may be used to provide a total area of 0,3 m² but their depth shall not be less than 60 mm.

6.4 **Thermometer**, able to measure the temperature to ±1 °C over the range 100 °C to 130 °C.

6.5 **Sieves**, complying with EN 933-2, with a diameter of 200 mm or 350 mm and apertures of:

¾ 4 mm (from basic set) for 8 mm chippings;

¾ 4 mm (from basic set) and 5,6 mm (from set 1) for 11 mm chippings;

¾ 4 mm (from basic set) and 6,3 mm (from set 2) for 14 mm chippings; or

¾ 4 mm (from basic set) and 10 mm (from set 2) for 20 mm chippings.

NOTE Wherever the term “test sieve” is used in this European Standard, it should be taken to mean “test sieve complying with EN 933-2”.

6.6 **Cylindrical tins**, of (5,0 ± 0,5) l capacity, each with a tight fitting lid.

7 Procedure

7.1 Take 10 evenly sized portions from different positions of the stockpile of coated chippings at not less than 100 mm beneath the surface to produce a 25 kg representative sample of material (see EN 12697-27). Take care to remove all of the surface material, including any material falling back into the hole.

NOTE Samples should not be taken from surplus chippings swept up from the road after application nor from residues of abandoned stockpiles.

7.2 Produce a test sample in accordance with the procedure for sample reduction given in EN 12697-28:2000, 4.5. Reduce the representative sample to a required quantity of not more than 3 kg.

NOTE The appropriate size of one portion should generally be more than 2 000 g but less than 3 000 g.

7.3 Fill the trays to a level depth of about 25 mm with the 250 µm to 125 µm clean sand and place in the oven at 125 °C to 130 °C with the thermometer immersed in the sand.

7.4 Sieve the chippings using the 10 mm, 6,3 mm, 5,6 mm or 4 mm sieve for 20 mm, 14 mm, 11 mm or 8 mm chippings, respectively. Reject those chippings passing through the sieve.

7.5 Ensure that the sieved chippings are dry and, if necessary, dry by heating in the oven at about 60 °C. Weigh the sieved specimen to the nearest gram, W_1.

7.6 Remove one tray from the oven when the sand temperature has reached 125 °C to 130 °C and spread chippings from the sample onto the hot sand until a uniform overall cover is achieved without contact between adjacent chippings. Complete this operation within 3 min to prevent excessive heat losses.

7.7 Cover the chippings by pouring hot sand from the second tray. Level the sand quickly without disturbing the chippings and replace the tray with chippings in the oven both for a minimum of 10 min and until the sand reaches a temperature of not less than 100 °C.

7.8 Remove the tray with chippings from the oven ensuring that the sand temperature is not less than 100 °C. Pour sand and chippings onto the 4 mm sieve allowing the sand to fall freely through the sieve apertures. Allow the chippings on the sieve to cool for approximately 10 min.

7.9 Place the cool chippings in the 5 l tin half filled with 1 mm to 500 µm silica grit. Shake the tin longitudinally along a horizontal axis for a total of 100 cycles in about 60 s with a displacement amplitude of about 100 mm.

7.10 Re-sieve the chippings using the 4 mm test sieve and wash with a strong jet of cold water, drain the chippings, tip onto paper and allow to dry thoroughly.

NOTE Drying by means of a hot air blower is permitted.

7.11 Weigh the sample of chippings and adhering sand, W_2, in grams.

7.12 Visually examine the chippings individually in a good light and reject those having less than half sand-cover and weigh the rejected chippings, W_3, in grams.

NOTE Those chippings with less than half coverage are examined to establish whether the lack of retained sand is due to limited retention on all chippings or due to effectively zero retention on some chippings.

7.13 If the result from clause 8 is not clear-cut, produce a new test sample from the remaining quantity of the representative sample and repeat steps 7.2 to 7.12.

NOTE 1 If a marginal result is obtained in the hot sand test after two separate samples have been tested, confirmation may be obtained by taking additional samples and calculating the mean sand mass retained and the mean proportion failing the visual assessment.

NOTE 2 In cases of dispute, a minimum of four samples is suggested.

8 Test result

8.1 Calculate for each test: the mass of sand, as a proportion of the mass of chippings, that is retained on the chippings to the nearest 0,1 percent from the expression:

$$\text{Proportion of retained sand} = 100\ \frac{W_2 - W_1}{W_1}\ \text{in \%}.$$

8.2 Calculate for each test: the proportion of chippings, by mass, failing the visual assessment to the nearest 0,1 percent from the expression:

$$\text{Proportion of failed chippings} = 100\,\frac{W_3}{W_1} \text{ in \%.}$$

9 Test report

9.1 Obligatory Information

The test report shall include the following information:

a) the number and date of this European Standard;

b) date, time and place of sampling;

c) Identification of sample;

d) date and time of testing;

e) the mass of sand retained as a proportion of the mass of chippings to the nearest 0,1 % for each sample and the mean value;

f) the proportion by mass of chippings rejected to the nearest 0,1 % for each sample tested and the mean value;

g) name of person performing the test.

9.2 Optional Information

The test report may also include additional optional information such as the following:

a) the name of the project;

b) name of supplier and source of material.

10 Precision

Data is not available for developing precision statements for this test method.

Bibliography

prEN 13108-4, *Bituminous mixtures — Material specifications — Part 4: Hot rolled asphalt*.

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

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