SLOVENSKI STANDARD
SIST EN 12697-43:2023

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Nadomešča:
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Bitumenske zmesi - Preskusne metode - 43. del: Odpornost proti gorivu

Bituminous mixtures - Test methods - Part 43: Resistance to fuel

Asphalt - Prüfverfahren - Teil 43: Widerstand gegen Treibstoffe

Mélanges bitumineux - Méthodes d'essais - Partie 43 : Résistance aux carburants

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93.080.20 Materiali za gradnjo cest Road construction materials

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EUROPEAN STANDARD

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English Version

Bituminous mixtures - Test methods - Part 43: Resistance to fuel

Mélanges bitumineux - Méthodes d'essais - Partie 43 : Résistance aux carburants

Asphalt - Prüfverfahren - Teil 43: Widerstand gegen Treibstoffe

This European Standard was approved by CEN on 3 March 2023.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 12697-43:2023) has been prepared by Technical Committee CEN/TC 227 “Road materials”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by October 2023, and conflicting national standards shall be withdrawn at the latest by October 2023.

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

This document supersedes EN 12697-43:2014.

The main changes compared to the previous edition are listed below:

— the title no longer refers to hot mix asphalt;

— general editorial update according to current standard template and CEN/CENELEC Internal Regulations Part 3:2019;

— general editorial change of rotation speed indicated with “rpm” to “min^{-1}” ;

— [Clause 2] deletion of reference to EN 13108-20:2006;

— [Clause 2] added reference to EN 12697-7;

— [5.3] paragraph revised and the term accuracy amended to maximum permissible error;

— [5.6.2] keys referring to Figure 3 corrected to letters;

— [5.6.2] corrected reference to Clause 5.7 in Figure 3, E;

— [5.8] completion of description of soft-haired brush;

— [5.8] introduction of new Figure 5 (example of soft-haired brush). Following Figures re-numbered;

— [5.9] introduction of new Clause with description of pH-meter;

— [7.2] tolerance for the height of specimen amended from “40 to 60 mm” to “(50 ± 5) mm”;

— [7.2] specimens to be tested amended from three to four;

— [7.2] clarified description of porous asphalt and non-porous asphalt with respect to void content;

— [7.2] introduction of paragraph with description of the use of compaction methods;

— [7.2] introduction of explanatory NOTE regarding the impact of height on the result;

— [7.2] introduction of explanatory NOTE regarding the impact of different compaction methods;

— [7.3] reference to EN 13108-20:2006. Annex A deleted;

— [7.3] addition of EN 12697-7 for the determination of bulk density;

— [8.1.1] amended description for the immersion of fuel of the test specimen;

— [8.1.1] changed storage temperature for the immersed specimen to 20 ± 2 °C;

— [8.1.1] introduction of explanatory NOTE regarding influence of the fuel temperature;

— [8.1.2] introduction of “WARNING” regarding the disposal of the soiled water;

— [8.1.3] the term “accuracy” amended to read “to the nearest”. NOTE changed to normal text;

— [8.2.1] clarified description of porous asphalt and non-porous asphalt with respect to void content;

— [8.2.2], [8.2.2.1], [8.2.2.2], [8.2.3], [8.2.3.1], [8.2.3.2], [8.2.4], [8.2.5] amended titles;

— [8.2.5] paragraph with “EXAMPLE” amended to normal text;

— [8.3] deletion of conflictiong and superfluous paragraph “Carry out the test with three specimens”;

— [8.3] added references to Formulas;

— [Clause 9] bullets in test report revised and completed with additional information to be given.

A list of all parts in the EN 12697 series can be found on the CEN website.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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

1 Scope

This document specifies a test method to determine the resistance of a bituminous mixture or pavement to fuels. The procedure involves initial soaking of a test specimen made in the laboratory or cored from a pavement in a fuel, followed by a brushing period with a brush test device. The material loss of the specimen is a measure of the resistance to that fuel for that bituminous mixture.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12697-6, *Bituminous mixtures - Test methods - Part 6: Determination of bulk density of bituminous specimens*

EN 12697-7, *Bituminous mixtures - Test methods - Part 7: Determination of the bulk density of bituminous specimens by gamma rays*

EN 12697-27, *Bituminous mixtures - Test methods - Part 27: Sampling*

EN 12697-30, *Bituminous mixtures - Test methods - Part 30: Specimen preparation by impact compactor*

EN 12697-31, *Bituminous mixtures - Test methods - Part 31: Specimen preparation by gyratory compactor*

EN 12697-33, *Bituminous mixtures - Test method - Part 33: Specimen prepared by roller compactor*

EN 12697-35, *Bituminous mixtures - Test methods - Part 35: Laboratory mixing*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
fuel
liquid (petroleum product) that might be spilled accidentally or sprayed deliberately onto an asphalt pavement and can cause damage to the asphalt mixture

4 Principle

A cylindrical test specimen with a known mass is immersed partly in a bath with the specified fuel for a specified period of time. After removal from the bath, cleaning with water and drying for 24 h at 25 °C, the loss of mass of the specimen is measured and the immersed surface is visually inspected. Then an abrasive loading is applied onto the immersed surface of the test specimen by a steel brush mounted onto a brush test device. The steel brush moves in epicycloids passages over the surface. After 30 s the brushing stops and the specimen is removed. The loss of mass is measured and the brushed surface is visually inspected. The specimen is then put back and the same procedure is carried out again after 30 s and after 60 s, when the brushed surface is visually inspected again.

The total brushing time is 120 s (two brushing periods of 30 s and one of 60 s). The combined material loss after the immersion and the brush test is the main parameter for the resistance to the particular fuel. As additional information the material loss after the immersion (chemical loading) and the brush test (mechanical loading) are further informative parameters for the resistance to the particular fuel.

5 Apparatus

5.1 Beaker with glass rod

Cylindrical beaker made of glass for soaking the test specimen in the fuel. The container shall be flat-bottomed and have an internal diameter of at least 140 mm (with porous asphalt specimens at least 190 mm) and an internal depth of at least 150 mm. A glass rod with a length of 70 mm and a diameter of 8 mm is put on one side of the bottom of the beaker so that one side of the immersed specimen can rest on the bottom of the beaker and the other side on the glass rod to prevent the enclosure of air under the immersed specimen.

5.2 Glass funnel

The size of the funnel shall be chosen in such a way that the rate of flow of the fluid into the beaker is as small as possible to prevent any damage to the specimen because of the injection of the fluid in the beaker.

5.3 Balance, with a maximum permissible error of 0,1 g.

5.4 Ventilated conditioning chamber, capable of maintaining temperature of (25 ± 2) °C in the vicinity of the specimen.

5.5 Impact hammer, gyrator or roller compactor

Impact hammer (according to EN 12697-30), gyrator (according to EN 12697-31) or roller compactor (according to EN 12697-33) to prepare laboratory made specimens.

5.6 Brush test device

Two different devices for the brush test are available.

5.6.1 Test device based on a laboratory mixer

Any mixer according to EN 12697-35 can be used. This mixer with epicyclical motion covers an area with a diameter 5 mm less than the diameter of the specimen. The rotation speed shall be (60 ± 3) min^{-1}.

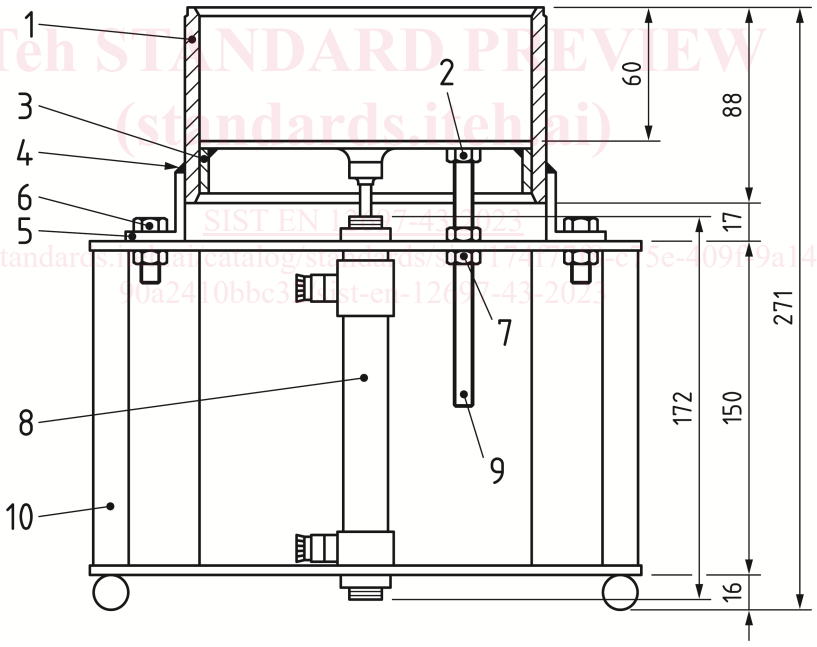
The steel brush is connected to the mixer (see Figure 1).

To press the specimen with a constant force to the brush a special frame shall be built. In Figure 2 an example of this frame is shown. A pneumatic actuator is using compressed air to press the specimen against the brush. The frame itself is placed under the rotating disk of the mixer.

The pressure shall be kept constant. This can be achieved by means of a manometer between the actuator and compressed air control valve.

Figure 1 — Connection pin

Dimensions in millimetres



Key

1	ring (diameter 150 mm)	6	pin
2	nut	7	drilled nut
3	metal ring, 20 mm height, diameter 150 mm	8	pneumatic actuator
4	welding	9	thread
5	L-shaped corner profile	10	bar (diameter 16 mm)

Figure 2 — Example of the frame for the brush test

5.6.2 Test device based on a milling machine

A standard milling machine, as shown in Figure 3, can be adapted to carry out brush tests according to this document. The hand wheel usually used to set the milling head is replaced by a deflection pulley (G) carrying weights (F) that apply the contact pressure from above to the specimen using gravity. The milling head itself is replaced by a clamp for the steel brush (Figure 4). Hence, the brush is moveable in vertical direction throughout the test to ensure a constant contact pressure. The change in the height of the specimen due to abrasion is adjusted by the moving brush. The eccentricity of the epicyclical motion of the brush can be set in a wide range, so that specimens with a diameter of 100 mm and 150 mm can be brushed covering the entire surface. The specimen itself is fixed by clamping jaws (D) with a variable diameter (Figure 3). Thus the position of the specimen is fixed and always centred below the brush. The rotation speed shall be (60 ± 3) min^{-1}.

Key

A	digital speed control	F	weight at deflection pulley
B	emergency shutdown	G	deflection pulley
C	speed display	H	engine for clamping jaws
D	clamping jaws	I	hand wheel to position the clamping jaws for epicyclical motion
E	brush in accordance with 5.7		

Figure 3 — Brush test device based on a milling machine

5.7 Steel brush, (see Figure 4) with:

— power, cup brush with tempered quality crimped steel wires;

— outer diameter: 60 mm;

— inner diameter: 30 mm;

— the hair of the brush are rolled, curled steel with a diameter of 0,3 mm;

— trim length: about 17 mm. Due to brushing, the trim length of the brush decreases. When the trim length has reduced to 75 % of its initial length, the brush shall be replaced.

The allowable maximum rotation speed of the brush should be at least 50 times the rotation speed of the mixer.