



SLOVENSKI STANDARD
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Bitumenske zmesi - Preskusne metode - 45. del: Preskus staranja na zasičenih asfaltnih preskušancih (preskus SATS)

Bituminous mixtures - Test methods - Part 45: Saturation Ageing Tensile Stiffness (SATS) conditioning test

Asphalt - Prüfverfahren - Teil 45: Alterungsprüfung an gesättigten Asphalt-Probekörpern (SATS-Prüfung)

Mélanges bitumineux - Méthodes d'essai - Partie 45: Saturation vieillissant l'essai de tension de la rigidité (SATS)

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English Version

Bituminous mixtures - Test methods - Part 45: Saturation Ageing Tensile Stiffness (SATS) conditioning test

Mélanges bitumineux - Méthodes d'essai - Partie 45:
Saturation vieillissant l'essai de tension de la rigidité
(SATS)

Asphalt - Prüfverfahren - Teil 45: Alterungsprüfung an
gesättigten Asphalt-Probekörpern (SATS-Prüfung)

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 227.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 12697-45:2018) has been prepared by Technical Committee CEN/TC 227 “Road materials”, the secretariat of which is held by BSI.

This document is currently submitted to the enquiry.

This document will supersede EN 12697-45:2012.

The following is a list of significant technical changes since the previous edition:

- The title no longer makes the method exclusively for hot mix asphalt;
- [ge] Editorial update according to current standard template.

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 12697-45:2020

<https://standards.iteh.ai/catalog/standards/sist/67a06dbb-8823-43ce-86d2-68a0020e53cb/sist-en-12697-45-2020>

prEN 12697-45:2018 (E)**1 Scope**

This document specifies a test method to assess the durability of adhesion in base and binder course asphalt mixtures. The Saturation Ageing Tensile Stiffness (SATS) conditioning regime is used to age the specimens in the presence of water. A comparative test for assessing their performance before and after conditioning is also conducted. The applicability of this test method is limited to bituminous specimens with consistent air voids contents and hard binder, in particular, to asphalt concrete mixtures with a binder content between 3,5 % and 5,5 %, air voids contents between 6 % and 10 % and 10/20 pen hard paving grade bitumen. The test is intended to be used as a screening test for the assessment of a combination of aggregate, filler and additives with respect to the retained adhesion properties after simulated ageing in a moist atmosphere for lean/stiff base and binder course mixtures.

NOTE Alternative conditions for mixtures with binders other than 10/20 hard grade bitumen or other situations not covered by this European Standard are being developed.

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 12697-5, *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 12697-8, *Bituminous mixtures - Test methods for hot mix asphalt - Part 8: Determination of void characteristics of bituminous specimens*

EN 12697-26, *Bituminous mixtures - Test methods - Part 26: Stiffness*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12697-5, EN 12697-6 and the following apply.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1**saturation before conditioning**

saturation of the mixture, determined as the calculated proportion of air voids filled with water after partial vacuum saturation, prior to conditioning by storage under increased pressure and elevated temperature, in percent

3.2

unconditioned stiffness

stiffness modulus of the mixture as determined in accordance with EN 12697-26:2018, Annex C, prior to conditioning by storage under increased pressure and elevated temperature

Note 1 to entry: Alternative comparative tests can be used but should be recorded in the results.

3.3

conditioned stiffness

stiffness modulus of the mixture as determined in accordance with EN 12697-26:2018, Annex C, after conditioning by storage under increased pressure and elevated temperature

3.4

stiffness ratio

ratio of the conditioned stiffness to the unconditioned stiffness

3.5

saturation after conditioning

saturation of the mixture, determined as the calculated proportion of air voids filled with water after conditioning by storage under increased pressure and elevated temperature, in percent

4 Principle

Nominally identical test specimens are subjected to moisture saturation by a vacuum system. They are then transferred into a pressurized vessel partially filled with water where they are subjected to a conditioning procedure by storage at 85 °C temperature and 2,1 MPa pressure for 65 h. The ratios of the stiffness, measured by indirect tension on cylindrical specimens, before and after conditioning by storage under increased pressure and elevated temperature on the individual specimens situated above the water are averaged to determine the sensitivity of the material to ageing and moisture. The whole process is referred to as the Saturation Ageing Tensile Stiffness (SATS) conditioning test. The average ratio is the SATS durability index of the mixture components when the comparative test is the indirect tensile stiffness modulus.

NOTE Tests other than stiffness by indirect tension on cylindrical specimens can be used as the comparative test.

5 Apparatus

5.1 Sample manufacture

5.1.1 Asphalt mixer

5.1.2 Coring equipment

5.1.3 Saw for cutting asphalt

5.2 Conditioning regime

5.2.1 Vacuum desiccator and **vacuum pump**, including manometer or calibrated vacuum gauge in accordance with EN 12697-5.

5.2.2 Balance with a capacity greater than the mass of a sample that is accurate to 0,1 g.

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5.2.3 Pressure/temperature vessel designed to operate at $(2,1 \pm 0,1)$ MPa between 80 °C and 115 °C and which shall be made from stainless steel, having internal dimensions adequate to contain the specimen tray (see 5.2.7) and an integral temperature control system that is capable of:

- a) bringing the loaded pressurized vessel to the desired conditioning temperature $\pm 0,5$ °C, as recorded by a suitable thermometer inside the vessel, within 2 h;
- b) maintaining the temperature at all points within the vessel at the ageing temperature $\pm 0,5$ °C.

SAFETY PRECAUTIONS — The pressure ageing vessel operates at high temperatures and high pressures. All safety guidelines issued by equipment manufacturers shall be adhered to.

5.2.4 Pressure controlling devices

5.2.4.1 Pressure release valve, which prevents pressure in the vessel from exceeding 2,5 MPa during the ageing procedure.

5.2.4.2 Pressure regulator, capable of controlling the pressure within the vessel to $\pm 0,1$ MPa and with a capacity sufficient to reduce the pressure from the source of compressed air so that the pressure within the vessel is maintained at the operating pressure of $(2,1 \pm 0,1)$ MPa.

5.2.4.3 Slow release bleed valve, which allows the pressure in the vessel at the completion of the test to be reduced from the 2,1 MPa operating pressure, to atmospheric pressure within 20 min to 30 min.

5.2.4.4 Pressure gauge, capable of measuring the pressure within the vessel to within 0,3 MPa during the test. The pressure gauge shall be calibrated to an accuracy of $\pm 0,1$ MPa at appropriate intervals.

5.2.4.5 Porous disc, 5 mm thick by 100 mm diameter, with a permeability substantially greater than that of the asphalt and the capability withstand the maximum vertical pressure likely to be imposed. The discs shall be checked before each use to ensure that they are not clogged by particles. They shall be boiled for at least 10 min in distilled water before use and kept immersed in de-aerated water until required.

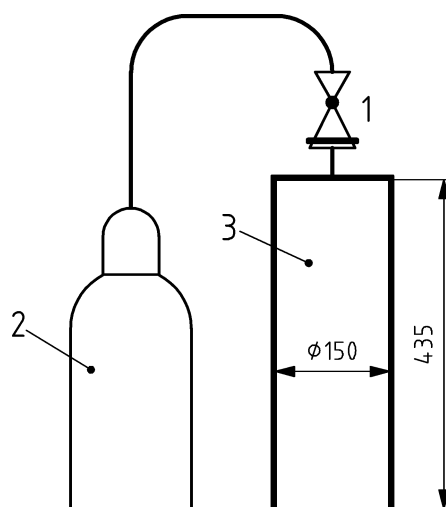
5.2.5 Thermometer, accurate to 0,1 °C, for measuring the temperature inside the pressure vessel.

NOTE A resistance thermal detector (RTD) has been found to be suitable.

5.2.6 Temperature recording device, data acquisition system capable of recording the temperature throughout the test to 0,1 °C.

NOTE The current method of monitoring temperature is via a computerized log of time and temperature. It is assumed the temperature recorded is that which is to be found within every point within the ageing vessel.

Dimensions in millimetres

**Key**

- 1 pressure regulator
- 2 compressed air cylinder
- 3 pressure vessel

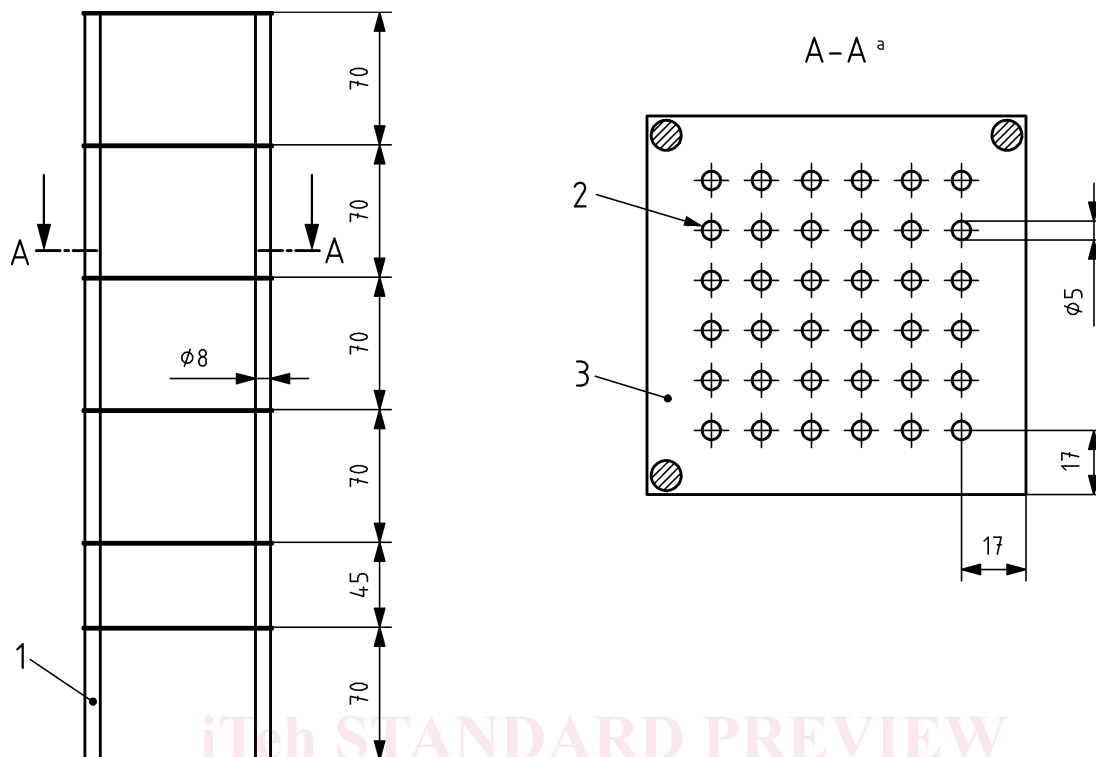
Figure 1 — Schematic diagram and dimensions of typical pressure vessel

5.2.7 Specimen tray, having the form and dimensions specified in Figure 2, to accommodate five test specimens for a full test. The tray shall sit in the pressure vessel on top of a porous disc, as shown in Figure 3.

NOTE 1 The form and dimensions of the pressure vessel and specimen tray shown in Figures 1 and 2 have been found to be practicable in the SATS test when used with different aggregate types. Other forms of pressure vessel and specimen tray may also be suitable, but have not yet been specifically investigated. However, early work carried out in a standard binder pressure ageing vessel in EN 14769 yielded similar results to those generated using the apparatus described in this European Standard.

NOTE 2 The fifth sample is placed so that, unlike the other samples, it is submerged during the test. As such, it is not included in the averaging to produce the overall result. However, the ratio for this sample can be used to provide additional information on the properties of the mixture.

Dimensions in millimetres

**Key**

- 1 8 mm diameter stainless steel pillars
 - 2 5 mm diameter holes, evenly spaced ($6 \times 6 = 36$ holes)
 - 3 100 mm to 105 mm square by 2 mm thick stainless steel plate
- ^a enlarged sectional view

Figure 2 — Schematic diagram and dimensions of typical specimen tray

If the specimens have a diameter greater than 100 mm, then the dimensions of the square plate should also be at least equal to diameter of the specimens in order to avoid any overhang.