



SLOVENSKI STANDARD
kSIST FprEN 14769:2011

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Bitumen in bitumenska veziva - Pospešeno staranje v tlačni posodi (PAV)

Bitumen and bituminous binders - Accelerated long-term ageing conditioning by a Pressure Ageing Vessel (PAV)

Bitumen und bitumenhaltige Bindemittel - Beschleunigte Langzeit-Alterung mit einem Druckalterungsbehälter (PAV)

Bitumes et liants bitumineux - Vieillissement long-terme accéléré réalisé dans un récipient de vieillissement sous pression (PAV)

Ta slovenski standard je istoveten z: FprEN 14769

ICS:

75.140	Voski, bitumni in drugi naftni proizvodi	Waxes, bituminous materials and other petroleum products
91.100.50	Veziva. Tesnilni materiali	Binders. Sealing materials

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Bitumen and bituminous binders - Accelerated long-term ageing conditioning by a Pressure Ageing Vessel (PAV)

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Foreword

This document (FprEN 14769:2011) has been prepared by Technical Committee CEN/TC 336 “Bituminous binders”, the secretariat of which is held by AFNOR.

This document is currently submitted to the Unique Acceptance Procedure.

This document will supersede EN 14769:2005.

FprEN 14769:2011 (E)

1 Scope

This European Standard specifies an accelerated ageing/conditioning procedure for bituminous binders. The procedure involves ageing trays of binder at elevated temperatures under pressurised conditions in a pressure ageing vessel (PAV).

NOTE For binders to be used in hot asphalt applications the pre-conditioning of the sample would typically be by one of the methods in EN 12607 series. For binders to be used in bituminous emulsion and cut-back or fluxed applications the stabilising of the sample should be such that there are no volatiles remaining.

WARNING — The use of this European Standard can involve hazardous materials, operations and equipment, in particular, the use of a high pressure ageing vessel. This European Standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this European Standard to establish appropriate health and safety practices and determine the applicability of regulatory limitations prior to use. If there is the likelihood of volatile components being present in a binder, this procedure shall not be used.

2 Normative references

The following referenced documents are indispensable for the application 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 12607-1:2007, *Bitumen and bituminous binders — Determination of the resistance to hardening under the influence of heat and air — Part 1: RTFOT method*

EN 12607-2:2007, *Bitumen and bituminous binders — Determination of the resistance to hardening under the influence of heat and air — Part 2: TFOT method*

EN 12607-3:2007, *Bitumen and bituminous binders — Determination of the resistance to hardening under the influence of heat and air — Part 3: RFT method*

3 Terms and definitions

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

3.1 short-term ageing/conditioning
conditioning that the binder experiences during the method described in EN 12607-1:2007, EN 12607-2:2007 and EN 12607-3:2007

3.2 stabilisation
conditioning of the binders from bituminous emulsions, cutbacks or fluxed bitumens to produce residual binders for further determination of their characteristics

EXAMPLE the procedure described in EN 13074-2:2007

3.3 long-term ageing
ageing that the binder experiences during its service life

3.4

accelerated long-term ageing conditioning

simulated long-term ageing that the binder goes through during the accelerated pressure ageing procedure. In the case of hot mix asphalt binders the long-term ageing is carried out on binders that have already been conditioned through short-term ageing/conditioning

NOTE In the case of bituminous emulsion and cut-back, the long term ageing is carried out on binders after a stabilisation procedure.

4 Principle

A static film of binder is heated to a specified temperature, under a specified air pressure for a given period of time. This is to simulate the changes occurring to the binder within the pavement during use.

The effects of this ageing procedure are evaluated on the residual binder after the test.

NOTE The ageing of binders during service is affected by ambient temperature and air pressure as well as by mixture associated variables such as volumetric mixture proportions, mixture permeability, aggregate properties and other factors. This test is intended to provide an evaluation of the relative ageing behaviour of binders under specified conditions, but cannot account entirely for bituminous application variables or provide relative resistance to ageing at in-service conditions.

5 Apparatus

Usual laboratory apparatus and glassware, together with the following:

5.1 Pressure/temperature vessel designed to operate at $2,1 \text{ MPa} \pm 0,1 \text{ MPa}$ between $80 \text{ }^\circ\text{C}$ and $115 \text{ }^\circ\text{C}$. Either 5.1.1 and 5.1.2 or 5.1.3 applies (see Figure 1).

5.1.1 Pressure vessel, which shall be made from stainless steel and shall have internal dimensions adequate to contain a pan holder capable of holding a number of containers (as per requirements and dimensions given in EN 12607-2:2007). The bottom of the pressure vessel shall be such that the containers are held in a horizontal position with the binder film thickness evenly distributed across the diameter of the container. A schematic showing a possible configuration of the vessel pan holder and containers and specifying dimensional requirements is shown in Figure 2.

NOTE 1 Most pan holder assemblies hold up to 10 containers.

NOTE 2 Other pressure vessels of different internal dimensions may be used provided that the operating conditions can be satisfied. In such cases the containers used may differ from the standard dimensions given in EN 12607-2:2007.

5.1.2 Forced-draft oven, to be used with 5.1.1, capable of

- a) bringing the loaded pressurised vessel to the desired conditioning temperature $\pm 0,5 \text{ }^\circ\text{C}$, as recorded by a suitable thermometer inside the vessel, within two hours after loading the pressure vessel into the oven,
- b) maintaining the temperature at all points within the vessel at the ageing temperature $\pm 0,5 \text{ }^\circ\text{C}$.

The oven shall have sufficiently large interior dimensions to allow forced air to freely circulate within the oven and around the pressure vessel. The oven shall contain a stand or a shelf, which supports the loaded pressure vessel in a level position above the lower surface of the oven.

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5.1.3 Pressure vessel, having the same dimensions described in 5.2.1, with an integral temperature control system that is capable of

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

The vessel may be a separate unit to be placed in a forced draft oven or an integral part of a temperature control system.

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 Pressure controlling devices

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

5.2.2 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 $2,1$ MPa $\pm 0,1$ MPa.

5.2.3 Slow release bleed valve, which allows the pressure in the vessel at the completion of the test to be reduced from 2,1 MPa, the operating pressure, to atmospheric pressure within 8 min to 15 min.

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

5.3 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.

5.4 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 computerised log of time and temperature. It is assumed the temperature recorded is that within every point within the ageing vessel.

5.5 Metal containers

The standard container is defined in EN 12607-2:2007, 4.3, and has a diameter of 140 mm ± 1 mm. Similar containers with other diameters can be used if their diameters are determined with the same tolerance and the amount of binder is adjusted as given in Equation (1).

Weighing

Weigh 50,0 g $\pm 0,5$ g in the container (nominal diameter 140 mm \varnothing). If a container with another diameter is used weigh the amount given in Equation (1):

$$M = 50,0 \text{ g} \times (d_2 \times d_2) / (d_1 \times d_1) \pm 0,5 \text{ g} \quad (1)$$

where

d_1 is the normal container diameter (140 mm ± 1 mm),

d_2 is the actual container diameter in millimetres with tolerance ± 1 mm, and

M is the mass of binder at ambient temperature for the actual container.