



PRESSURE AGEING VESSEL (PAV) **LONG-TERM AGEING**

EN 14769: Bitumen and bituminous binders – Accelerated long-term ageing conditioning by a Pressure Ageing Vessel (PAV)

Overview

The test is not a classical test providing results, but an accelerated ageing/conditioning procedure for bituminous binders.

Usually, the PAV-procedure is carried out on bitumen and bituminous binders that have already been conditioned through short-term ageing/conditioning, e.g. RTFOT (ref. EN 12607-1). The PAV-procedure may also be used for binders recovered from bituminous emulsions.

Definition and Terminology

Short-term ageing/conditioning: The conditioning that the binder goes through during the method described in EN 12607 (Part 1, 2 and 3). Short-term ageing is deemed to represent the ageing a bituminous binder undergoes during handling, mixing, storage, and laying of asphalt mixtures.

Long-term ageing/conditioning: The conditioning 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. Long-term ageing is deemed to represent the ageing a bituminous binder undergoes during the service life of an asphalt pavement.

At the time of publication of this document, EN 14769:2012 'Bitumen and bituminous binders - Accelerated long-term ageing conditioning by a Pressure Ageing Vessel (PAV)' was the reference for testing. This document does not overrule the test standard EN 14769, but is intended to help users of the standard to be aware of important factors. However, the reference for testing remains EN 14769. Temperatures, times, and dimensions and their tolerances must be strictly observed, that is checked for accuracy and for maintaining the tolerance during application.

Practical Information:

The test temperature and duration must be carefully selected.

- EN 14769 does not specify only one temperature and one duration, however a typical ageing temperature and time found to be suitable are 100 °C and 20 h ± 10 min.
- The loading process into the pressure vessel shall be carried out as quickly as possible to minimise temperature loss. A pre-heating of the vessel up to 15 °C above the chosen conditioning temperature may be used to reduce the drop in temperature during the loading process, see section 6, Note 2 of EN 14769.
- Ensure that the ageing temperature is reached within 2 hours of the start of the test and check test temperature during the remainder of the test. After this time the set temperature must be within ±1 °C of the selected test temperature. Stop the test and discard the samples if the temperature varies by more than 1 °C for more than 60 minutes.
- The test pressure must be at $(2,1 \pm 0,2)$ MPa during the PAV-procedure. Stop the test and discard the samples if the pressure is different from this for longer than 30 minutes.
- At the completion of the ageing time gradually reduce to atmospheric pressure within a period of 8 to 15 minutes and follow the instructions given by the PAV manufacturer. If the pressure is reduced too rapidly, the binder samples may foam.
- The sample may contain air-bubbles, which are difficult to see. It is therefore recommended to follow the procedure described in section 6 of EN 14769, making use of a vacuum oven.



The time binder between short-term ageing and PAV should be carefully chosen.

- EN 14769 does not explicitly specify these conditions.
- In general, sample preparation has to be done according to EN 12594.
- If residue from RTFOT is not used for PAV-ageing immediately, it should be stored in sealed containers at ambient temperature. Any re-heating of this residue must be in accordance with EN 12594.



The sample needs to be prepared after conditioning.

- If testing of the PAV-residue is not to take place immediately after the ageing procedure, the sample containers shall be allowed to cool, and then sealed and stored at ambient temperature, see section 6 of EN 14769.
- Re-heating of the residue should be in accordance with EN 12594, except that higher sample preparation temperatures should be chosen to reflect the hardening of the binder.

