



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 (ref. EN 13074-1 and EN 13074-2).

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 the mixing 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.

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.
- Other conditioning temperatures and times used are: 85, 90, 100 or 110°C with ageing times of 20 or 65 h.

The sample preparation, loading and unloading conditions need to be carefully followed.

- The sample pans should be pre-heated to allow the binder to flow, see section 6.4 of EN 14769.
- The loading process into the pressure vessel shall be carried out as quickly as possible to minimise temperature loss. The vessel should be pre-heated up to 15 °C above the chosen conditioning temperature to reduce the drop in temperature during the loading process, see section 6.2, Note 1 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 6.5 of EN 14769, making use of a vacuum oven.

The time 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.

