

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
METHODS OF TESTING BITUMEN AND RELATED
ROADMAKING PRODUCTS

AS 2341.10

DETERMINATION OF THE EFFECT OF HEAT AND AIR
ON A MOVING FILM OF BITUMEN
(ROLLING THIN FILM OVEN (RTFO) TEST)

1 SCOPE. This standard sets out a treatment of bitumen which is intended to simulate the conditions obtained when the bitumen is used to manufacture hot plant mix, and stipulates a procedure for measuring the flow properties of the bitumen before and after the treatment.

2 REFERENCES. This standard requires references to the following standards:

- AS 2341.2 Determination of Dynamic Viscosity by Flow Through a Capillary Tube
AS 2341.3 Determination of Kinematic Viscosity by Flow Through a Capillary Tube
AS 2341.4 Determination of Dynamic Viscosity-by-Rotational-Viscometer
AS 2341.5 Determination of Apparent Viscosity by 'Shell' Sliding Plate Micro-viscometer
AS 2341.11 Determination of ductility
ASTM D2872 Method of Test for Effect of Heat and Air on a Moving Film of Asphalt
ASTM E1 ASTM Thermometers
IP Standard Thermometers

3 APPLICATION. This method is applicable to residual bitumens for pavement (AS 2008) and the residue from the distillation of cutback bitumens (AS 2157).

4 PRINCIPLE. A moving film of bitumen is heated in an oven at 163°C for 85 min. Viscosity at 60°C (AS 2341.2 or AS 2341.3 or AS 2341.4) or apparent viscosity at 25°C (AS 2341.5) is measured before and after treatment. Also the ductility is measured (AS 2341.11) after treatment.

5 APPARATUS. The following items of apparatus are required:

- (a) Oven\*. The oven shall be electrically heated and have forced draught air circulation (see Fig. 1 for details of dimensions and direction of airflow).

The door shall be fitted with a symmetrically located inspection window, 300 mm wide and 200 mm high, consisting of sheets of heat-resistant glass separated by a sealed air space.

NOTE: A removable cover should be provided.

Ventilation of the oven is provided at the top by two symmetrically placed circular openings 25 mm in diameter.

The oven shall be provided with a circular carriage, with openings and clips for firmly holding eight glass sample bottles in a horizontal position parallel to the shaft (for details see Figs 2 and 3). This carriage is rotated in a vertical plane at a speed of 15 ± 0.5 r/min by a shaft which is preferably supported by external ball bearings.

The oven shall be fitted with a proportional temperature controller capable of maintaining the temperature at 163 ± 0.5°C as indicated by the thermometer shown in Fig. 2. The controller and heaters shall be such that the oven temperature is regained within 10 min of closing the door after the insertion of the bottles containing the bitumen sample. The sensing element(s) of the temperature controller shall be placed above and near to the circular carriage.

The oven shall be equipped with an air jet positioned to blow heated air centrally into the mouth of each bottle as it passes the lowest point of rotation of the carriage. The air jet, with an outlet orifice of 1.0 ± 0.2 mm diameter, is connected to a 7.5 ± 0.5 mm length of 8 mm nominal OD thin-walled copper tubing. This tubing is coiled to lie flat near the bottom of the oven and is provided with a suitable coupling through the oven wall for connection to the air supply.

- (b) An air supply, capable of providing fresh, dried, dust-free air.

NOTE: Activated silica gel treated with an indicator is a satisfactory desiccant for the drying of the air.

\*The oven as specified in ASTM D2872 may be used instead of the oven described in this standard.