

Test Method

Recovery of Bituminous Binder from Asphalt for Measurement of Viscosity

RC 212.01

1. Scope

This procedure is used to recover the bituminous binder from asphalt or surface dressings made with unmodified road-making grade bitumen and to prepare a sample of the binder for measurement of its viscosity as described in AS 2341.5 - *Determination of apparent viscosity by 'Shell' sliding plate micro-viscometer*.

The procedure is not applicable when the bitumen to be recovered contains additives such as distillate cutters or amines unless the concentration of the additive and its effect on binder viscosity are known or can be determined from "blank" samples.

2. Apparatus

- (a) Centrifuge - capable of producing a relative centrifugal force of 2600 gravitational units and arranged to accommodate MSE HR 50 ml tubes.
- (b) Carbon dioxide source - with a means of regulating and measuring the flow.
- (c) Electric hot plate - thermostatically controlled to maintain a constant temperature and accurate to $\pm 2^{\circ}\text{C}$.
- (d) Evaporation assembly - to fit on the hot plate. The assembly requires a gas inlet tube in one side and an annular escape gap in its upper surface surrounding a microviscometer glass plate support of cylindrical shape and a top surface area sufficient to accommodate two plates (Note 1, Fig. 1).
- (e) Temperature controller with thermistor probe - to maintain the temperature in the evaporation assembly within $\pm 2^{\circ}\text{C}$. The probe shall be inserted in the inner space of the central glass support (Fig. 1).
- (f) Microviscometer glass plates - a matched pair, 6 x 20 x 30 mm (AS 2341.5).
- (g) Hypodermic syringe and needle (1 mL).
- (h) Specimen tubes (ca. 10 mL).

- (i) Analytical balance reading to 0.0001 g with a limit of performance not greater than ± 0.0005 g.
- (j) Fume cupboard.
- (k) Erlenmeyer flask - 150mL (Screw cap).
- (l) Pyrex glass funnel - 70 mm dia.
- (m) Flask shaker - optional.
- (n) Glass funnel - 35 mm dia.
- (o) Filter papers - No. 40 Whatman.
- (p) Time clock.
- (q) Toluene - analytical grade.

3. Test Sample

Obtain a test sample of asphalt containing from 2.5 to 3.0 g of bitumen (about 50g of asphalt) in accordance with AS 2891.1.

4. Procedure

- (a) Place the test sample in a 150mL Erlenmeyer flask and add about 10mL of analytical grade toluene (about 10mL) to cover the sample.
- (b) Cork the flask and shake it until all the bitumen is dissolved (about 15 min on a flask shaker).
- (c) Allow the flask to stand for one minute then decant the solution into a centrifuge tube.
- (d) Cork the tube, place it in the centrifuge and balance the system with an equal and opposite load.
 - Spin the solution at a speed of 4000r/min for 15 minutes.
- (e) Filter the centrifuged solution through a No. 40 Whatman filter paper into a specimen tube.
- (f) Weigh a pair of matched microviscometer plates to the nearest 0.1 mg and record.

- (g) With the evaporation assembly on the hot plate, switch on the plate and adjust the temperature controller so that the temperature in the assembly is $110 \pm 2^\circ\text{C}$. (Note 3).
- (h) Connect the inlet tube of the evaporation assembly to the source of carbon dioxide and adjust the flow of gas to about 5 cm/s.
- (i) Place both microviscometer plates on the top of the plate support.
- (j) Fill the 1 mL hypodermic syringe with the solution from step (e) and squirt about 0.5 mL of the solution onto the microviscometer plates, making sure that both plates are evenly covered.
- (k) Place the Pyrex glass funnel so that the whole of the annular gap is contained under the funnel.
- (l) Start the time clock.
- (m) After 20 minutes, remove the plates and carefully put one on top of the other. Let the plates cool until the bitumen between them is at a workable consistency. If the bitumen becomes too hard, either in this step or in step (n) below, it is permissible to reheat the plates under an infra-red lamp.
- (n) Press the plates together and work them between the fingers until an even film of thickness from 50 to 100 μm is formed (Note 2).
- (o) Allow further cooling to take place until the bitumen is set. Carefully clean the excess bitumen from the edges of the plates firstly with a razor blade and then by wiping with a clean cloth slightly dampened with turpentine.
- (p) Weigh the plate/film/plate sandwich to the nearest 0.1 mg and record.
- (q) Subtract the mass of the plates found in step (f) from the mass of the sandwich found in step (p) to obtain the mass of bitumen between the plates. This value must be from 0.03 to 0.06 g.
- (r) Measure the viscosity of the bitumen at 25°C in accordance with AS 2341.5.

5. Reporting

Report the viscosity of the bitumen, at a rate of shear of 10m.s, in kPa.s to the nearest whole number; and Log Pa.s to the nearest 0.01.

6. Notes

Note 1

To expedite testing and in consideration of the requirement of AS 2341.5 for triplicate determinations, the viscosity determination should be done in triplicate, and the assembly is commonly made with more than one escape gap and support.

Fig. 1 shows an assembly for three samples.

Note 2

The thickness and uniformity of the film can be checked by viewing the filament of a tungsten lamp through various areas of the film.

Note 3

Whenever a new bottle of toluene is opened, a check should be made to ensure that $110 \pm 2^\circ\text{C}$ is sufficient to evaporate the solvent from the sample.

Test Method - Revision Summary

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Date	Clause Number	Description of Revision	Authorised by
June 2013	Full document Step 4(n)	Re-issued without change, except for Unit changed to μm	Manager Construction Materials

