Extraction of Binder

from Asphalt

TP664

**1.0 SCOPE**

This procedure describes a method to recover unmodified binder from asphalt cores and production asphalt for microviscometry or Dynamic Shear Rheometer (DSR) analysis. The method is based on the method described in ARR 66 published by the Australian Road Research Board.

Recovered residual binder shall be tested in accordance with AS 2341.5 or Austroads AGPT/T192.

**2.0 REFERENCES**

A Method for Following the Hardening of Paving Bitumens in Service (Australian Road Research Board Report), ARR 66.

Sampling of Asphalt, TP425

Sampling of Asphalt, AS 2891.1.

Determination of Apparent Viscosity by `Shell' Sliding Plate Microviscometer, AS 2341.5.

Long term exposure to heat and air, AS 2341.13.

Characterisation of the Viscosity of Reclaimed Asphalt Pavement (RAP) Binder Using the Dynamic Shear Rheometer (DSR), **AGPT/T192.**

**3.0 DEFINITIONS**

Nil.

**4.0 APPARATUS AND MATERIALS**

**4.1 Apparatus**

• Diamond saw.

• Oven, controlled at 60 ± 5°C.

• Beaker, 250 mL.

• Centrifuge, MSE 5‑76 or equivalent, which is capable of achieving relative centrifugal force (RCF) of 6 000.

• Teflon centrifuge tubes with screw caps.

• Membrane Filter, 3µm pore size.

• Buchner funnel with vacuum facilities.

• Cylinder of CO2 gas.

• RTFO Bottle Scraper / Blade, suitable for removing binder from RTFO sample bottles.

• Spatula, metal.

• Fume cupboard.

• Apparatus as per AS 2341.13 - Rolling Thin Film Oven (RTFO), sample bottles, thermometer, heating and mixing assembly.

**4.2 Materials**

• Toluene, AR Grade (Refer to MSDS for handling and storage details)

**5.0 SAMPLING AND SAMPLE PREPARATION**

**5.1 Sampling**

Sampling shall be carried out in accordance with Procedure AS 2891.1.

**5.2 Sample Preparation**

5.2.1 For an asphalt core, cut transversely with the diamond saw to obtain the required depth of sample.

Heat the sample in the oven at 60°C for 15‑20 minutes.

Break up the sample longitudinally. For 100mm diameter cores, break up so that approx. 1/4 of the sample is collected. For 50mm diameter cores, break up so that half of the sample is collected.

5.2.2 For production asphalt, take the sample as received on a sampling tray (approximately 5kg).

Select portions at random, preferably those which are not on the surface of the sample (100g minimum).

**6.0 PROCEDURE TO BE FOLLOWED**

6.1 Take the selected portion of the sample, place in the 250mL beaker and cover with AR grade toluene. Leave for 1‑2 hours in the fume cupboard with a suitable cover, e.g. a watch glass. Retain those portions of the sample not used.

***Note: All operations using toluene are to be carried out in a fume cupboard and away from flames (flash point 5°C)***

6.2 Decant the resulting solution into teflon centrifuge tubes, tighten the caps and centrifuge at speed for approximately 15 – 20 minutes.

***Note: Precautions should be taken when centrifuging toluene solutions***

***Ensure that the centrifuge tubes are securely capped***

6.3Filter the centrifuged solution through a 3µm membrane filter using a Buchner Funnel and store in screw‑capped glass vials.

6.4 Place approximately 25mL of solution into two RTFO bottles (AS 2341.13). Place the bottles into a preheated (100°C) durability oven (AS 2341.13) for 45 minutes with CO2 flowing at 4 L/min.

***Note: Insure oven is fitted with an appropriate ventilation system***

6.5 Remove the bottles and using a RTFO bottle scraper or suitable blade, scrape the inside of the bottles to remove the binder, preferably while they are still warm. Collect all the scrapings from the two bottles onto a PTFE dish.

***Note: Bottles may be placed back into warm oven with CO2 flowing if binder becomes hard to remove***

6.6 Place the dish in the heating and mixing assembly (AS 2341.13) maintained at 200 ± 5°C and through which a stream of CO2 is passing. Remove the PTFE dish from the assembly after five minutes and cool rapidly.

**6.7 TESTING**

6.7.1 The sample may now be tested to AS 2341.5 or Austroads AGPT/T192

**7.0 CALCULATIONS**

Nil

**8.0 PRECISION**

A determination of an uncertainty of measurement is not considered necessary for this procedure.

**9.0 REPORTS AND DOCUMENTATION**

Nil