1. **0 SCOPE**

This procedure describes a method for recovery of unmodified binder from spray seals for microviscosity or Dynamic Shear Rheometer (DSR) analysis. The method is based on that 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.

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**

• Screwdriver, flat blade.

• Claw hammer.

• Plastic bag, approximately 250 x 200mm, self‑sealing.

• 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, 3 µm 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.

• Oven controlled at 135 ± 5°C.

• Portable cutting machine suitable for cutting seal samples from the pavement (a modified chainsaw is suitable).

• 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**

5.1.1 With the aid of the screwdriver (and the claw hammer if required), remove single aggregate pieces at random along the outside wheelpath and place in the plastic bag, taking care to avoid contaminated and shaded areas.

Note: The number of aggregate pieces to be collected shall be as follows:

|  |  |
| --- | --- |
| 14/10 mm aggregate – | 20 pieces minimum. |
| 7/5 mm aggregate – | 40 pieces minimum |

Alternatively, a 200 mm square (approximate) seal sample shall be cut from the pavement using the portable cutting machine.

5.1.2 Place the sample in the plastic bag with sample identification. Forward the sample to Technical Services Group – Laboratory, Walkley Heights as soon as possible, taking care to keep the sample in a cool condition.

5.2 **Sample Preparation**

In the case of square seal samples, place in the oven at 135°C for 10 minutes. Immediately remove the aggregate pieces (approximately 100g) at random, taking care to avoid any adhering non‑bituminous material.

**6.0 PROCEDURE TO BE FOLLOWED**

6.1 Place the aggregate pieces in a 250mL beaker and cover with AR grade toluene. Leave for one‑two hours in a 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 naked 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