

# **COMMENTARY TO AG:PT/T132 - COMPRESSIVE LIMIT OF POLYMER MODIFIED BINDERS**

## **PREFACE**

This modified binder test method was prepared by the Bituminous Surfacing Research Reference Group on behalf of Austroads. Representatives of Austroads, ARRB Group and the Australian Asphalt Pavement Association have been involved in the development and review of this test method.

## **FOREWORD**

Crumb rubber modified binders (primarily used in sprayed works), are manufactured from particulate crumbed rubber dispersed in a bitumen binder. These dispersions, when tested using the current set of specification test methods perform in a manner similar to the moderately modified classes of PMBs. In practice their performance is reported to be at a significantly higher level. This is thought to be due to the rubber particles acting across the thinner gaps associated with real surfacings.

This test method is not designed to indicate a performance related property but provide a measure of the contribution made by the rubber as distinct from the traditional homogeneous systems at low binder film thicknesses

## **SCOPE**

This test method is applicable to all binders that do not have a viscous response at 70°C and at long loading times when confined to film thicknesses in the range 0.1 to 1mm. It is applicable to all modified binders.

## **Further Development**

There are no further plans for the development of this test method.

# COMPRESSIVE LIMIT OF POLYMER MODIFIED BINDERS

## 1 REFERENCED DOCUMENTS

The following documents are referred to in this method:

### AUSTROADS

AG:PT/T101 Method of sampling polymer modified binders, polymers and crumb rubber

AG:PT/T102 Protocol for handling polymer modified binders in the laboratory

### AS

2341.5 Method 5 Determination of apparent viscosity

### RTA NSW

T261 Assessment of primer or binder absorption by road gravel

## 2 APPARATUS

The following apparatus is required:

- a. **A pair of glass plates** 20 x 30 mm as specified in AS2341.5. Plates with slightly chipped edges are satisfactory.
- b. **Forced convection oven** - able to maintain a temperature in the range 70 to 180°C, with a setpoint accuracy better than  $\pm 5^\circ\text{C}$ .
- c. **Optional: Oven or hot box** (T126) capable of holding temperature of  $70 \pm 0.5^\circ\text{C}$
- d. **Thermometer** accurate and readable to  $0.5^\circ\text{C}$  eg. ASTM 15C
- e. **Gauge** capable of reading to 0.01 mm (dial gauge, micrometer or penetrometer capable of measuring to a flat surface)
- f. **Press** capable of loading top plate with 2000 gram mass and ensuring parallelism of the plates during compression. A cylindrical plunger sliding in a partially cut-away cylindrical tube with a tolerance of 0.5 mm such as described in Highway Research Board Record 132, p.12 or as described in Stanhope Seta Catalogue No. 2348 is satisfactory.

## 3 PROCEDURES

### 3.1 General

PMBs are complex mixtures of polymers and a variety of petroleum products. If handled in accordance with the directions of the suppliers, there should be no significant risk. The hazard of burns with PMBs is greater than with standard bitumens, due to the (normally) higher handling temperatures. It is recommended that notices, describing the action to be

taken in the event of bitumen or PMB burns, should be displayed in the laboratory in the areas where bitumen and PMBs are handled. A suitable warning could be as follows:

**WARNING: HOT BITUMEN & PMBs CAN CAUSE BURNS**

The following precautions should be taken when handling bitumen, or PMBs:

- a. Eye protection, such as safety glasses and/or face shields, shall be worn when handling hot bitumen or PMBs.
- b. Heat-resistant gloves, with close-fitting cuffs, and other suitable protective clothing, shall be worn when handling hot bitumen or PMBs.
- c. There shall be no smoking while handling hot bitumen or PMBs.
- d. While the material is still cold, loosen the lid of the sample container (invert the can and warm the lid, if necessary), or punch a hole in the lid.
- e. Examine the cold sample for the presence of water. If water is thought to be present, drain most of it out, or blow with clean compressed air to evaporate the free water.

**3.2 Sample Preparation**

Samples for testing shall be provided in accordance with AG:PT/T101 and AG:PT/T102.

**3.3 Method**

- a. Set the oven to 70°C and place the press in the oven ensuring that the press reaches 70°C.
- b. Allow to equilibrate for at least 2 hours (see Note 1) before commencing the test.
- c. Thoroughly clean the plates, completing the process with a soft cotton cloth. Ensure that the plates when sandwiched together do not vary by more than 0.02 mm. Record the average of 4 measurements as  $T_1$  to the nearest 0.01 mm.
- d. Prepare the binder according to AG:PT/T102. Using a stirring rod or spatula quickly drop a circular sample of hot binder onto one of the plates covering the lesser dimension to a thickness of approximately 3 mm.
- e. Place the second plate onto the binder and press gently.
- f. Load the plate assembly into the press with the 2000 gram load and leave for 60 minutes in the oven.
- g. Remove the press assembly from the oven and allow to cool at  $23 \pm 3^\circ\text{C}$  for 30 minutes.
- h. Remove the plate assembly from the press and allow to cool for a further 10 minutes.
- i. Measure the final thickness of the plate assembly. Record the mean of 5 readings (at each corner and the centre) as  $T_2$  to the nearest 0.01 mm.

## 4 CALCULATION

Compressive limit (mm) =  $T_2 - T_1$

## 5 REPORTING

The following information shall be reported:

- a. Report the compressive limit to the nearest 0.1 mm (see Note 2). If the temperature conditions varied from the target this should be reported.

## Notes

1. Where the oven has low air circulation levels, the time required to bring the press temperature to 70°C may be greater than 2 hours. The actual time required should be established before testing commences.
2. Although the test is applicable to all bituminous binders, only those containing particulate crumbed rubber are expected to return results in the range 0.1 to 1.0 mm.

## AMENDMENT RECORD

Amendment No.	Clauses amended	Action	Date
1	Commentary Page	New	June 2005
	Footer and header	Format	
	Applied revised test method number	Format	
	Applied new styles	Format	
2	Applied new test method numbers	Substitution	March 2006
	Moved notes to the end of the method	Format	

### Key

Format	Change in format
Substitution	Old clause removed and replaced with new clause
New	Insertion of new clause
Removed	Old clauses removed