COMMENTARY TO AG:PT/T235 - ASPHALT BINDER DRAIN-OFF

PREFACE

This Asphalt Test Method was prepared by the Asphalt Research Review Group on behalf of the Austroads Pavement Technology Review Panel. Representatives of Austroads and the Australian Asphalt Pavement Association have been involved in the development and review of this test method.

FOREWORD

Design of stone mastic and open graded asphalt requires checks to be made on binder drain-off. Binder drain-off can cause binder and filler paste to separate in hot storage or delivery trucks resulting in parts of the mix becoming over-rich in binder and appearing as fatty spots on the surface of the new asphalt layer. The application of this method is described in the Austroads Provisional Guide for the Selection and Design of Asphalt Mixes. (APRG Report No. 18). This method is based on the “Schellenberg Segregation Drain-off Test” developed in Germany to check for binder drain-off in Stone Mastic Asphalt.

SCOPE

This Test Method sets out the procedure for determining the amount of binder drain-off likely to occur in an asphalt mix during storage and transport. The method may be used to determine the amount of binder drain-off at the maximum mixing temperature or alternatively, to determine the maximum mixing temperature at which binder drain-off becomes excessive.

Further Development

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

ASPHALT BINDER DRAIN-OFF

1 REFERENCED DOCUMENTS

The following documents are referred to in this method:

AUSTROADS

APRG Report No. 18 Selection and Design of Asphalt Mixes: Australian Provisional Guide, Revision No. 2, Austroads, Sydney, Australia, December, 2002

AS /NZS

AS 2891 Methods of Sampling and testing asphalt

AS2891.1 Method 1: Sampling of asphalt

2 APPARATUS

The following apparatus is required:

a. Glass beaker - of one litre capacity with glass or metal cover.

b. Balance - of suitable capacity with a limit of performance not greater than ± 0.5 g.

c. Heating Oven - capable of maintaining the required temperature within ± 3°C for a least one hour.

d. Drying Oven – a thermostatically controlled oven capable of maintaining a temperature of 105 to 110°C.

e. Metal dishes.

f. Sieve - 0.600 mm opening.

3 PROCEDURE

3.1 Basic Procedure

a. Determine the mass of the beaker (m_1) to the nearest 0.1g and place it in the oven at the specified temperature for at least 15 min.

b. Obtain a representative sample of about 1 kg of the asphalt at the mixing temperature required by the specification (see Note 1) in accordance with AS2891.1.

c. Immediately place the asphalt in the preheated beaker and determine the mass of the beaker plus asphalt (m_2) to the nearest 0.1g.

d. Place the cover on the beaker and place the beaker with asphalt plus cover in the oven preheated to a test temperature as shown in Table 1 (or as specified). Alternatively, the test may be carried out in increments of 5°C within range of 155°C and 195°C to determine the maximum mixing temperature at which the amount of binder drain-off is unacceptable.

Table 1 – Recommended Test Temperatures

Mix Type and Binder	Test Temperature °C	
	C 320	Modified Binder
OGA	160	170
SMA	175	185

e. Maintain the temperature of the oven at specified temperature ± 3°C.

f. After 60 ± 1 minutes remove the beaker from the oven and immediately upturn smoothly and hold upside down over a metal dish for 10 ± 1 s. to allow the asphalt to fall out of the beaker into the dish, taking care not to shake or vibrate the beaker.

g. Determine the mass of the beaker and binder remaining in the beaker (m_3) to the nearest 0.1g.

h. If the mixture is manufactured with polymer modified bitumen (PMB) binder and the remaining binder is more than 0.3% of the original mass of the mixture proceed to step 3.2.

NOTE: The purpose of undertaking the supplementary procedure in step 3.2 is to determine whether the test result has been unduly influenced by a significant portion of aggregate particles remaining stuck in the beaker. This is most likely to occur in stone mastic asphalt mixes containing PMBs and is normally only undertaken where the total amount of retained binder exceeds 0.3%.

3.2 Supplementary Procedure for Retained Aggregate Particles in Binder Residue

a. Carry out the procedure in 3.1 (a) to (h)

b. Record the mass of the 0.600 mm sieve (m_5) to the nearest 0.1g.

c. Wash all of the residue from the beaker on to the sieve using a suitable solvent. Rinse the sieve to remove all binder from the sieve and the mineral aggregate.

d. Dry the sieve and contents at a temperature of between 105 to 110°C.

e. Determine the combined mass of the 0.600 mm sieve and the mineral aggregate retained on the sieve (m_6) to the nearest 0.1g

4 CALCULATIONS

4.1 For basic procedure

Calculate:

a. The mass of binder (m_4) in the beaker from:

$$m_4 = m_3 - m_1$$

b. The percentage of drained binder in the beaker (*D*) from:

$$D = 100 \times \frac{m_4}{(m_2 - m_1)} \ \%$$

4.2 For supplementary procedure

Calculate:

a. The mass of binder (m_4) in the beaker from:

$$m_4 = m_3 - m_1$$

b. The mass of the mineral aggregate (m_7) retained on the 0.600 mm sieve from:

$$m_7 = m_6 - m_5$$

c. The percentage of *drained* binder (D) in the beaker passing the 0.600mm sieve from:

$$D = 100 \times \frac{m_4 - m_7}{(m_2 - m_1)} \ \%$$

5 INFORMATION TO BE REPORTED

Report the following:

a. The percentage of drained binder (D) to the nearest 0.1%.

b. The test temperature.

c. Sieve residue, if applicable to nearest 1%.

d. Reference to this test method, i.e. AG:PT/T235.

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	Title	Substitution	January 2006
	2b , 2c , 3.1a , 3.1c , 3.1e , 3.1f , 3.1g , 3.2a, 3.2b , 3.2c, 3.2e , 4.2c , Note 1a(i) , Note 1b(i)	Amended	
	5d , Note 1c	Removed	

Key

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