COMMENTARY TO AG:PT/T236 - ASPHALT PARTICLE LOSS

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

Open Graded Asphalt (OGA) mixes particularly rely on the binder content and binder properties for cohesion between the aggregate particles, more so than other types of mixes where there is a greater degree of aggregate particle interlock. The Particle Loss test is used as an indicator of cohesion for a given binder type and content by measuring particle loss (or abrasion) after turns in a Los Angeles machine. This method is based procedures originally developed in Spain where it was commonly referred to as Cantabro Abrasion Loss Test.

SCOPE

This test method sets out the procedures for determining particle loss (abrasion) from laboratory prepared specimens of open graded asphalt. The test may be performed on dry samples or after period of moisture conditioning.

Further Development

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

ASPHALT PARTICLE LOSS

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

2891	Methods for Sampling and Testing of Asphalt
2891.7.1	Determination of the maximum density of asphalt – Water presaturation method
2891.9.3	Determination of the bulk density of compacted asphalt – Mensuration method
1141.23	Los Angeles Value

2 APPARATUS

The following apparatus is required:

2.1 For particle loss test

a. Los Angeles machine as defined in AS 1141.23.

b. Balance – of at least 5 kg capacity with a limit of performance not exceeding ± 0.5 g.

c. Temperature controlled environment – a chamber or enclosure large enough to hold the Los Angeles machine and capable of maintaining a temperature of 23 ± 3°C during the test, this temperature being measured in the air close to the Los Angeles machine.

2.2 For moisture conditioning of specimens

a. Water bath - capable of maintaining a temperature of 25 ± 1°C.

b. Vacuum pump - capable of maintaining a vacuum pressure of 600 ± 25 mm Hg.

c. Vacuum desiccator - with tap.

d. Timer - readable to the nearest second.

e. Towel - dampened and wrung by hand to remove excess water.

3 PREPARATION OF SPECIMENS

3.1 Sampling and Compaction

a. Obtain samples from a single batch of asphalt prepared in accordance with AS 2891.2.1.

b. Compact three samples in accordance with AS 2891.2.2. so that each specimen has air voids within the design voids range at 80 compaction cycles with the Gyratory compactor and a height of 65 ± 1 mm for a 100 mm diameter specimen or 80 ± 1 mm for a 150 mm diameter specimen

c. Determine the bulk density of each specimen in accordance with AS 2891 9.3.

d. Determine the maximum density (ρ_{max}) of the mix in accordance with AS 2891.7.1.

e. Calculate the air voids content of each specimen in accordance with AS 2891.8.

3.2 Moisture Conditioning (optional)

If required, moisture condition each specimen as follows:

a. Determine and record the dry mass of the specimen, (m_1).

b. Place the specimen in a water bath at 25 ±1°C for at least 5 minutes.

c. Remove the specimen from the water bath and place it in a vacuum desiccator and cover it with water at room temperature. Reduce the pressure in the desiccator until a vacuum of 600 ± 25 mm of Hg is attained. Maintain this vacuum for 10 ± 1 minutes.

d. Gently release the vacuum. Remove the specimen and place it the water bath at 25 ± 1°C for 20 ± 1 hours.

e. Remove the specimen from the water bath and dry the surface of the specimen by blotting with the damp towel.

4 PROCEDURE

Laboratory prepared specimens shall stored prior to testing for at least 2 days at a temperature of not more than 25°C and tested within 7 days of manufacture.

4.1 For each unconditioned specimen, i

a. Record the dry mass of the specimen (m_{i1}).

b. Allow the specimen to attain a temperature of 25 ± 1°C.

c. Place the specimen in the drum of the Los Angeles machine without the steel balls. Close the lid on the drum and rotate for 300 revolutions at the rate prescribed in AS 1141.23.

d. Open the lid and remove the largest remaining fragment of the asphalt specimen. Determine the mass of this fragment (m_{i2}). Remove the residue from the drum.

4.2 For each moisture conditioned sample, i

e. Immediately after blotting the damp specimen with the damp towel, place the specimen in the drum of the Los Angeles machine without the steel balls. Close the lid on the drum and allow to rotate for 300 revolutions at the rate prescribed in AS 1141.23.

f. Open the lid and remove the largest remaining fragment of the asphalt specimen. Dry to constant mass and determine the mass of this fragment (m_{i2}). Remove the residue from the drum.

5 CALCULATIONS

Calculate the following:

a. The particle loss (PL_i) for each specimen from the following equation:

$$PL_i = \frac{(m_{i1} - m_{i2})}{m_{i1}} \times 100$$

b. The mean particle loss (PL) for the three specimens.

NOTE: If the PL_i for any specimen is greater than 50%, repeat the test for an additional three specimens.

6 INFORMATION TO BE REPORTED

Report the following:

a. the particle loss for each specimen;

b. the mean particle loss for the three specimens;

c. the percent air voids for each specimen;

d. whether laboratory prepared or field sampled;

e. the bulk density;

f. the maximum density of the mix.

g. the date and method of manufacture.

h. Whether the samples were conditioned or not.

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	

Key

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