

# **COMMENTARY TO AG:PT/T272 - DETERMINATION OF ABRASION LOSS OF BITUMINOUS SLURRY (WET TRACK ABRASION TEST)**

## **PREFACE**

This bituminous slurry surfacing test method was prepared by Working Group 1, Bituminous Slurry Surfacing, of the Bitumen Emulsions and Foamed Bitumen Project 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.

## **PRINCIPLE**

Samples of bituminous slurry are prepared at varying binder contents and cast into circular specimens. The samples are fully oven cured and then soaked in water for up to six days. The test determines the amount of material lost when the samples are subjected to a predetermined abrasive effort. The quantity of material lost indicates the computability of the mix and its likely resistance to wear in the field.

## **SCOPE**

This Standard sets out the method for the determination of the wearing qualities of bituminous slurry surfacing systems under wet abrasion conditions to establish minimum permissible emulsion content of a slurry surfacing system.

## **FURTHER DEVELOPMENT**

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

# DETERMINATION OF ABRASION LOSS OF BITUMINOUS SLURRY (WET TRACK ABRASION TEST)

## 1 REFERENCED DOCUMENTS

The following documents are referred to in this method:

### AUSTROADS

AG:PT/T270 Consistency of bituminous slurry

### AS /NZS

AS1141 Methods for sampling and testing of aggregates

AS1141.2 Basic testing equipment

## 2 APPARATUS

The following apparatus is required:

- a. Balance of sufficient capacity (2 kg or greater) with a limit of performance not greater than  $\pm 0.05$  g.
- b. Hobart A-120 mechanical mixer equipped with an abrasion head of mass of 2.27 kg, quick-clamp mounting plate and flat bottom metal pan.
- c. Rust-resistant mixing bowl.
- d. Long-handled mixing spoon of sufficient length to project 100 mm or more out of the mixing bowl during mixing.
- e. Felt discs, approximately 290 mm diameter cut from roofing felt or damp course felt.
- f. Specimen moulds,  $7 \pm 0.2$  mm deep and inside diameter of  $280 \pm 5$  mm.

Note: A raised lip mould is preferred, but a flat surface polymethyl methacrylate mould is satisfactory.

- g. Strike-off tool, such as a 25 mm diameter x 350 mm long metal or wooden dowel or a mechanically tracked one-pass squeegee.
- h. Drying oven, capable of maintaining a temperature of  $60 \pm 3^\circ\text{C}$ , complying with the requirements of AS1141.2. The moulded specimen is deemed to be dry when the difference between successive determinations of mass of the moulded specimen, after additional drying for not less than 30 mins, differs by no more than 1 percent of the total of the previous loss by drying.
- i. Water bath capable of maintaining a temperature of  $25 \pm 1^\circ\text{C}$ .
- j. Lengths of reinforced rubber covered hose, 19 mm internal diameter, 6.25 mm wall thickness and  $127 \pm 3$  mm long, conforming to SAE 100 R3 rating.

Note: Reinforced hydraulic hoses which meet the specification are available.

- k. A suitable prop block or similar device to support the pan and mounting plate assembly during the test.
- l. A sieve complying with AS1152, fitted with a wire mesh having an aperture of 4.75 mm

## 4 PREPARATION OF TEST SPECIMENS

Test specimens shall be prepared as follows:

- a. Use a mix design determined in accordance with Austroads AG:PT/T270.
- b. Dry the aggregate in the drying oven at 105°C to 110°C for approximately 16 hours, until constant weight is achieved, or for a lesser time if drying by alternative means. Remove the aggregate from the oven and allow to cool to room temperature.
- c. Weigh sufficient quantities of the individual components of the mix design to obtain a sample of about 1000 g.
- d. Place the weighed mass aggregate and the filler into the mixing bowl. Using the spoon, dry mix for one minute or until uniformly distributed. Add the predetermined mass of water and additive if required and mix again for one minute, or until all aggregate particles are uniformly wetted.
- e. Add the predetermined mass of bituminous emulsion and mix for a period of not less than 30 seconds and not more than 3 minutes.

Note: If excessive foaming is likely, mix slowly for the first 15 seconds, then increase mixing rate for the remaining 15 seconds. Microsurfacing slurry should be mixed and cast at 30 seconds and finished before breaking occurs, typically less than 60 seconds total working time.

- f. Centre the opening in the specimen mould on a felt disc. Immediately pour the slurry onto the felt disc.
- g. Screed the slurry level with the top of the mould with a minimum of manipulation (excessive working may contribute to segregation). Discard excess material.
- h. Remove the mould without disturbing the casting and place the moulded specimen in the oven and dry at 60°C to constant mass (minimum 24 hours drying time). The exposed felt edge should be weighted down (a 285 mm diameter steel ring is suitable) to prevent the specimen from curling.
- i. Allow the dried specimen to cool to room temperature and determine its mass ( $m_1$ )

## 5 TEST PROCEDURE

The procedure shall be as follows:

- a. Lock the rubber hose abrasion head on the shaft of the mixing machine. A new hose surface only shall be used for each test.

Note: It is permissible to rotate the hose after each test run to expose a fresh section of hose surface for the next test (maximum of four tests per hose).

- b. Place the specimen in the 25°C water bath for at least 60 minutes but not exceeding 75 minutes.
- c. Place the specimen in the 330 mm diameter flat bottom pan. Clamp the specimen to the pan and mounting plate by tightening the quick release clamps. Ensure that the specimen is properly centred and that the rubber hose will not run close to the edge.
- d. Add water at 25°C to the pan to cover the specimen to a minimum depth of 6 mm.
- e. Elevate the bowl resting on the platform of the mixer until the rubber hose bears freely on the surface of the specimen. Use the prop block to support the platform assembly during testing.
- f. Operate the mixer at its low speed setting for the time shown in Table 1.

Table 1 Operating times and conversion factors

Hobart Mixer Model No.	Operating Time Mins and Sec	Conversion Factor m <sup>2</sup>
A - 120	6 min 45 ±2 s	29.9 x 1.17

- g. Remove the specimen from the pan after the abrasion cycle and wash off debris. Place the washed test specimen in the 60°C oven and dry to constant mass. The moulded specimen is deemed to be dry when the difference between successive determinations of mass of the moulded specimen after additional drying for not less than 30 mins differs by no more than 1 percent of the total of the previous moisture losses by drying.
- h. Determine the mass ( $m_2$ ) of the specimen after abrasion.

## 6 CALCULATION

Calculate the mass (G) of material lost during abrasion from:

$$G = m_1 - m_2 \text{ (g)}$$

where

G = the mass of material lost during abrasion, in grams

$m_1$  = the original mass of the specimen, in grams

$m_2$  = the mass of the specimen after abrasion, in grams

The Wear Value (WTAT) from:

$$\text{WTAT} = G \times F \text{ (g.m}^{-2}\text{)}$$

where

G = the mass of material lost during abrasion, in grams

F = conversion factor (see Table 1), in  $m^{-2}$

## 7 TEST REPORT

Report the following:

- a. Soaking period in Clause 5 (b).
- b. The Wear Value to the nearest  $5 g.m^{-2}$ .

## 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