

# **COMMENTARY TO AG:PT/T531 - CALIBRATION OF BITUMEN SPRAYERS PART 1: VOLUMETRIC CALIBRATION**

## **PREFACE**

This test method was prepared by Working Group 3, Sprayer Calibrations Working Group, of the Seal Design Project Group on behalf of Austroads. Representatives of Austroads, ARRB Group and the Australian Asphalt Pavement Association (AAPA), and the National Association of Testing Authorities (NATA) have been involved in the development and review of this test method.

## **SCOPE**

The procedure described in this test method generally follows the path detailed in NAASRA 1989. The method has been developed as a procedure against which alternative test methods can be verified. The protocol for developing and validating alternative methods is not presented at this stage.

This test method sets out the procedures for determining pump volumetric output plus the transverse distribution of bitumen sprayers and is based on the fixed facility approach using a trough capture system with a low temperature calibrating oil.

## **Further Development**

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

# **CALIBRATION OF BITUMEN SPRAYERS PART 1: VOLUMETRIC CALIBRATION**

## **1 REFERENCED DOCUMENTS**

The following documents are referred to in this method:

### **AS/NZS**

2341                      Methods of testing bitumen and related road making products

### **AUSTROADS**

Bitumen Sealing Safety Guide 1996

AG:PT/T536              Calibration of Bitumen Sprayers, Part 6

### **COPLEY ENTERPRISES**

Spraying nozzles

### **MAIN ROADS WA**

Report 0001R            Development of Improved Bitumen tankers and Distributors

### **NAASRA**

Review of Sprayed Seal Design 1988

Bitumen Sprayers 1989

## **2 APPARATUS**

The following apparatus is required:

### **2.1 Pump (sprayer)**

The type or condition of the sprayer pump is not prescribed in this test method. To obtain maximum value from the calibration procedure and its outputs, it is strongly recommended that the pump be in good condition and capable of maintaining a predictable output for the life of the calibration certificate.

## **3 PROCEDURES**

Sprayers presented for calibration shall carry an approved volumetric calibration certificate relating tank volume to dip stick measurements. Instruments which control the spraying operation shall have appropriate, traceable calibration certificates. The certificates shall be traceable to a recognised NATA accredited testing facility. Appendix A (AG:PT/T531) provides a checklist for calibration assessment and routine field set-up of the sprayer. This preliminary checklist will establish the condition of the sprayer prior to calibration. The sprayer must conform to the items specified in the checklist before the sprayer is accepted for calibration.

### **3.1 Pump Output Test**

With a working set of spray nozzles fitted in accordance with normal practice and the sprayer controls set to produce the rated nozzle output, spray testing oil into a trough for a suitable period. The quantity of oil sprayed is determined from dipstick readings before and after spraying. Perform a minimum of two output tests for each length of spray bar which can be fitted. Where the difference between the results vary by more than 15 Litre the test should be repeated until the subsequent repeats are within this limit. If this tolerance is found to be unobtainable then the sprayer should be examined to identify the cause of this variability.

An appropriate sequence is given in Table 1 with 600 mm increments for a metric distributor (to provide approximately 10 points for a regression calculation). Appendix A introduces a Spreadsheet based method of calibration data management and presentation.

Note: Through out this report, the use of the term nozzle and jet is used interchangeably.

The final version of the spreadsheet is being developed by Main Roads West Australian and will be available to calibration facilities.

Pump output tests may be undertaken in conjunction with output consistency and transverse distribution tests.

The following steps should be followed to ensure a uniform approach:

- a. The calibration oil (specified in Appendix A) shall be initially sprayed into the trough collection assembly to ensue a stable “wet” system is available for subsequent measurements.
- b. Align the sprayer distributor bar and troughs such that:
  - i. The face of the jets remain in the range 250 mm to 300 mm above the top of the trough for the duration of the test.
  - ii. LH or RH outer end jet (EAN18) is aligned above a trough division with a minimum of 4 troughs outside each of the LH and RH end jets.
- c. Timing of each test shall be accurate and readable to 0.1s.
- d. Oil temperature shall be in the range 20°C to 30°C and recorded to an accuracy of 1°C.

### **3.2 Consistency of Sprayer Output Test**

The object of this test is to determine the ability of the sprayer to maintain a consistent rate of output while the level of material in the tank varies and to repeat the same rate of output after the operating controls have been varied and re-set.

The sprayer tank is filled to no less than 60% of its nominal spraying capacity with the testing oil described in AG:PT/T536, and the sprayer is operated with the controls correctly set for the number of spray nozzles fitted. Oil is sprayed for approximately 60 seconds, then the engine is stopped and the setting of all controls varied. Dipstick readings before and after each spraying cycle and the actual time of spraying are recorded. For a dipstick resolution of 50 L per division, readings shall be obtained and recorded to 10 L resolution by interpolation. Readings shall be repeated and be within  $\pm 10$  L. Report both readings.

The procedure is repeated with the initial levels in the tank adjusted to approximately 30% capacity, or sufficient quantity to avoid the entrainment of air towards the end of the test.

At no stage during testing should the volume of calibrating oil fall below 1,000 L or 10% of its nominal capacity (whichever is the lesser).

The rate of output for each of the three tank levels is determined from the dipstick readings and the actual times of spraying. Timing shall exceed 60 seconds and the sprayed volume for each test shall exceed 500 L.

The test is repeated for a minimum of 2 spray bar widths, including the maximum operational width of the sprayer and a width corresponding to a single lane.

The test is repeated for each 6 jet interval to the minimum 0.5 m width. A typical test sequence from 72 jets to 6 jets is shown in Table 1. It is recommended that testing commence with the maximum bar width.

#### **4 INFORMATION TO BE REPORTED**

Report the results of the pump output calibration using the spreadsheet described in Appendix A.

#### **5 PRECISION**

No estimate of precision is currently available.

**APPENDIX A**  
**Spreadsheet based method**  
**for determining pump output calibration**

*Revised package to be provided by Main Roads West Australia*

## 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