

SECTION 5

SAMPLING AND TESTING

BITUMEN AND RELATED PRODUCTS



Northern Territory Government

Department of Infrastructure, Planning and Environment

INDEX OF TEST METHODS

TEST METHOD	REVISED DATE	SECTION 5 - SAMPLING & TESTING BITUMEN AND RELATED PRODUCTS
NTTM 500.1	06 / 03	Certification of Bitumen Sprayers



CERTIFICATION OF BITUMEN SPRAYERS FOR USE ON NORTHERN TERRITORY ROAD PROJECTS DIVISION PROJECTS

1. SCOPE OF CALIBRATION

This test method sets out the tests and procedures for the calibration of bitumen sprayers.

This calibration method does not apply to the initial calibration of a bitumen sprayer. The calibration of an extensively modified bitumen sprayer is beyond the scope of this test method.

This test method must be carried out under the supervision of an authorised Departmental representative.

This test method uses selected tests from "Bitumen Sprayers", NAASRA 1989 (NOTE: 1). This method is an interim calibration method to be used until the Department adopts the Austroads SDT series test methods.

2. APPARATUS

i. Distribution Trough

The minimum requirements for the trough are:

- (a) The total volume of calibration fluid sprayed must be collected in the trough.
- (b) This trough must permit the sprayed calibration fluid to be separated transversely into 50mm sections, over the full width of spray.
- (c) The trough design must permit the measurement of the quantity of calibration fluid in each 50mm section by an approved means, e.g. Northern Territory Weights and Measures approved dipsticks and conversion tables, depth to volume.

ii. Stopwatch

A stopwatch with an accuracy of ± 1 sec.

iii. Torch

iv. Calibration Fluid

Fluid with:

- (a) a Kinematic viscosity of $80 \times 10^{-6} \text{ m}^2/\text{s}$ to $110 \times 10^{-6} \text{ m}^2/\text{s}$,
- (b) a density of 0.85 - 0.94 g/mL, and
- (c) a Dynamic Viscosity of 0.07 Pa.s to 0.1 Pa.s.



3. PREPARATION

(a) Calibration Fluid

Viscosity and density testing are to be carried out in accordance with AS 2341, by an organisation with a Quality Assurance Procedure (Q.A.P.) and/or NATA registration for these tests acceptable to the Department.

The calibration certificate for the calibration fluid is valid for one month from the date of calibration. Spray wagon calibration shall not proceed until the calibration fluid is within acceptable limits.

(b) Motor Vehicle Act 1985

- i. The Spray Wagon Owner shall supply a copy of the current Motor Vehicle Registration Certificate for inclusion in the calibration report.
- ii. Record the bitumen sprayer owner's plant identity number for inclusion in the calibration report.

(c) Temperature Gauges

- i. The Spray Wagon Owner shall supply a thermometer with a range 0 – 250 °C and readable to 5°C with a current calibration acceptable to the Department. The calibration should not be older than 2 years.

(d) Bitumen Sprayer Dipstick

Inspect the dipstick for any damage which would affect its calibration. Ensure that the owner's plant identity number is engraved on the dipstick.

(e) Bitumen Sprayer Tank

- i. Inspect the interior of the empty tank for any obvious damage which would affect the calibration of the dipstick (NOTE: 2).
- ii. Record the safe filling level tank capacity for inclusion in the calibration report.
- iii. Record the total tank capacity for inclusion in the calibration report.

(f) Spray Nozzles

- i. All spray nozzles shall comply with the requirements of "Bitumen Sprayers", (NAASRA) 1989.
- ii. Record the type of all spray nozzles for inclusion in the report.
- iii. Inspect all nozzles to identify if previously used or unused. Record the date and any other information stamped on nozzles.
- iv. Unused Nozzles: will be deemed to comply for 24 months after successful completion of all distribution tests. (NOTE: 3)
- v. Used Nozzles: may be used if calibrated by an Authority acceptable to the Department within the previous 6 months of the commencement of this calibration. These nozzles will be deemed to comply for 24 months after successful completion of all distribution tests. (NOTE: 3). A copy of the calibration certificate for the nozzles shall be supplied prior to the calibration of the spray wagon.



(g) Spraybar

- i. Ensure the spraybar is located over the centre line of the distribution trough.
- ii. Ensure the spraybar is level.
- iii. Ensure the front face of the spray nozzles is parallel to the centre line of the spraybar.
- iv. Record the spraybar type for inclusion in the calibration report.

4. PROCEDURE

- (a) Ensure the trough is empty.
- (b) Ensure all trough stopcocks are closed.
- (c) Ensure the spraybar is full.
- (d) Record the difference in height of the lowest point of the spray nozzles and the top of the trough.
- (e) Record the volume of calibration fluid within the bitumen sprayer tank prior to testing, with bar circulating.
- (f) Record over which 50mm sections the end spray nozzles are located.
- (g) Record the pump speed during bar circulation of the calibration fluid.
- (h) Record the manifold pressure during bar circulation of the calibration fluid.
- (i) Instruct the spraywagon operator to commence spraying.
- (j) Using the stopwatch, record the time of commencement of spraying.
- (k) Do not permit the bitumen sprayer operator to adjust the pump speed.
- (l) Record the pump speed during spraying.
- (m) Record the manifold pressure during spraying.
- (n) Record the time of cessation of spraying (approx. 50 seconds). (NOTE: 4)
- (o) After the settling of the calibration fluid (NOTE: 5) in the bitumen sprayer tank, record the volume of the remaining calibration fluid in the tank.
- (p) After the settling of the calibration fluid in the trough, record the height of calibration fluid in each 50mm section of the trough from the marked coloured plates located behind the viewing tubes.



5. REQUIREMENTS

(a) Transverse Distribution Test

i. For a bitumen sprayer with an 8.0m spraybar.

Carry out transverse distribution testing for the following effective spray widths. (NOTE: 6).

	Effective Spray Width	Nozzles A4	EA4I	Total Nozzles	Total Trough Sections
a)	For 8m effective spray width -	76	2	78	160
b)	For 6.2m effective spray width -	58	2	60	124
c)	For 3.7m effective spray width -	33	2	35	74
d)	For 3.8m effective spray width for twin tap -	34	2	36	75

Tank Levels:

1. 100 - 80% full
2. 80 - 50% full
3. < 50% full

ii. For a bitumen sprayer with a 4.0m spraybar.

Carry out transverse distribution testing for the following effective spray width.

a)	4.0m – only				
	Effective spray width -	Nozzles A4	EA4	Total Nozzles	Total Trough Sections
	For 4.0m effective spray width-	36	2	38	80

Tank Level:

1. 50-80% full

iii. For all spraybar widths.

(a) The acceptable effective spray width shall be:

8.0m spray bar-	7.95 - 8.05m
6.2m spray bar-	6.15 - 6.25m
4.0m spray bar-	3.95 - 4.05m
3.7m spray bar-	3.65 - 3.75m

- (b) No 50mm section is to differ from the mean by more than 20%, except sections **outside** the end jets, which shall be averaged separately.
- (c) Not more than two 50mm sections in any ten consecutive segments to differ from the mean by more than 15%.
- (d) Not more than four 50mm sections in any consecutive seven segments to differ from the mean by more than 10%.



iv. Testing Frequency

a)	Calibration Fluid	3 months
b)	T.D.T.	12 months
c)	Spray Nozzles (used Without Calibration Certificate)	12 months
d)	Spray Nozzles (used With Calibration Certificate)	24 months
e)	Spray Nozzles (unused)	24 months
f)	Thermometers	24 months
g)	Pressure Gauge	24 months

b) Dipstick Calibration Check

The output calculated from the bitumen sprayer tank dipstick readings must be within ± 50 litres of the total theoretical volume as calculated.

6. REPORTING

(a) Following successful completion of all tests, a report is to be presented to the Materials Testing Manager for endorsement.

(b) Report Layout

- i. Title Page.
- ii. Bitumen Sprayer Calibration Certificate.
- iii. Completed Quality Control Checklist.
- iv. Calibration fluid test report.
- v. Spray nozzle calibration certificate/s (used nozzles).
- vi. Bitumen Sprayer Registration Certificate copy.
- vii. Thermometer Calibration Certificate copies, if required.
- viii. Worksheet 500(a), (Depth recording of every 50mm section of trough).
- ix. Bitumen Sprayer Calibration Certificate

(c)

- i. All original recordings are to be compiled into a report and placed on file.
- ii. A copy of the Bitumen Sprayer Calibration Certificate is to be supplied to the bitumen sprayer owner. (Calibration Certificate to be endorsed by Materials Testing Manager).



NOTES ON TEST:

1. **NAASRA**

National Association of Australian State Road Authorities, now known as AUSTRROADS.

2. **Bitumen Sprayer Tank**

Obvious dents in the interior walls of the tank will affect the calibration of the dipstick. Where obvious damage is found the dipstick must be recalibrated by an organisation with a Q.A.P. for the recalibration of dipsticks, acceptable to the Department, prior to Transverse Distribution Test commencement.

3. **Spray Nozzles**

If a Bitumen Sprayer is presented for calibration with any uncalibrated used spray nozzles, replace these spray nozzles with new or calibrated spray nozzles.

Engrave the month and year of the commencement of the calibration period, on all spray nozzles. Stamps all engraved spray nozzles once, with the logo stamp punch. Engrave and stamp any new spare nozzles at the Bitumen Sprayer owner's request. Do not re-engage the spray nozzle during the currency of the calibration period.

4. **Duration of Spray**

The duration of spray is approximately 50 seconds. This is only to ensure the trough is used to near its maximum potential without risk of overflowing.

5. **Settling of Calibration Fluid**

The calibration fluid is deemed to be settled when air bubbles have departed from the surface of the calibration fluid.

6. **Effective Spraywidth** (E.S.W.)

The E.S.W. shall be the distance over which no individual (50mm section of trough) volume varies from the mean volume by more than 20%.

7. **Western Australian (W.A.) End Nozzles**

Western Australian end spray nozzles may be used. The reduced maximum effective width of spray (usually 0.3m less than the E.S.W. using "Copley" end spray nozzles) must be recorded on the calibration certificate. The mean volume of calibration fluid per 50mm section of trough will be determined by the total volume of fluid in the trough divided by the 'Total Trough Sections' figure presented in the Table in 5 (a) minus six (0.3m/50mm). Example 8.0m E.S.W. is reduced to 7.7m and the total volume of fluid is divided by (160-6) 154.

Or;

To maintain the effective spray width to 8.0m using WA end jets, increase the bar length by adding 3 X A4 type jets.



8. **Currency of Calibration Certificate**

Consecutive 12 month calibrations using the same spray nozzles shall be issued for a **maximum combined period of 2 years from the initial calibration of the nozzles. Calibration certificates for spray wagons using previously used nozzles will be issued for the remaining life of the nozzles, ie Nozzles that were calibrated and stamped 15 months previous will only be valid for 9 months from the consequent calibration, (total nozzle life 24 months).**

9. **Calibration Trough**

A suitable calibration trough is available at the CSR Depot at Tivendale Road, Berrimah.



**CALIBRATION OF BITUMEN SPRAYERS
 TEST RESULTS ON CALIBRATION FLUID**

TO:

REPORT NO:

ATTENTION:

Your request dated and signed by has been received at the laboratory together with the samples.

All the tests have been carried out as detailed in AS 2341, and the classification limits for cutback bitumen have been obtained from, AS2158.

The following information was supplied relating to the samples:

FEATURES:

CONTRACTOR:

SUPPLIERS IDENT.:

PROJECT:

SAMPLED BY:

LOCATION:

DATE SAMPLED:

LAB. REF. NO.

Test results and classification limits are set out below:

PROPERTY	TEST RESULTS	CLASS. MIN.	LIMITS MAX.
Dynamic Viscosity of 25°C Pa.s.			
Kinematic Viscosity mm ² /s		80	110
Density at 25°C		0.85	0.94

Prepared by:



NORTHERN TERRITORY

BITUMEN SPRAYER CALIBRATION CERTIFICATE

The sprayer described hereunder is hereby certified as complying with the Construction Division's requirements for Bitumen Sprayers and subject to the conditions endorsed on this Certificate, is authorised to be used for bituminous surfacing works undertaken by or for the Division.

The Division reserves the right to carry out any testing covered in NTTM 500.1 and or "Bitumen Sprayers" NAASRA 1989, during the currency of this certificate.

- Identification of Sprayer :
- Registered Owner of Sprayer :
- Vehicle Registration No. :
- Make of Vehicle on which Sprayer is mounted :
- Tank Capacity :
- Tank Capacity Safe Filling Level :
- Dipstick No :
- Spray Bar Type :
- Type and Size of Nozzles :
- End Jet Type :
- Spray Nozzle Stamp Date :
- New Spray Nozzle's will be required on :
- Thermometer 1 Serial Number :
- Thermometer 2 Serial Number :
- Height of Nozzle above Ground :
- Certificate No** :
- Maximum Effective Spray Width** :
- This Certificate Expires On** :

.....
 for Director Road Projects

This Certificate in no way removes the responsibility of the owner of the Sprayer to ensure compliance at all times with legal requirements, covering the vehicle and its equipment, applicable to the Territory and State in which the vehicle is operated and is issued subject to the Sprayer continuing to operate satisfactorily and may be cancelled at any time



TWML

TEST METHOD: NTTM 500.1
REVISED DATE: 06/03
SHEET 10 OF 11

**CALIBRATION OF BITUMEN SPRAYERS
TRANSVERSE DISTRIBUTION TEST**

COMPANY:	DATE:
IDENTIFICATION OF SPRAYER:	TIME:
REGISTRATION NO:	DIPE. REP:
VEHICLE MAKE:	COMPANY REP:
TANK CAPACITY:	SPRAYER OPERATOR:
DIPSTICK NO:	ON SITE:
BAR TYPE:	LEFT SITE:
SPRAY NOZZLES:	SPRAY WIDTH:

SEG.	DEPTH	SEG.	DEPTH	SEG.	DEPTH	SEG.	DEPTH	SEG.	DEPTH	SEG.	DEPTH
1.	_____	31.	_____	61.	_____	91.	_____	121.	_____	151.	_____
2.	_____	32.	_____	62.	_____	92.	_____	122.	_____	152.	_____
3.	_____	33.	_____	63.	_____	93.	_____	123.	_____	153.	_____
4.	_____	34.	_____	64.	_____	94.	_____	124.	_____	154.	_____
5.	_____	35.	_____	65.	_____	95.	_____	125.	_____	155.	_____
6.	_____	36.	_____	66.	_____	96.	_____	126.	_____	156.	_____
7.	_____	37.	_____	67.	_____	97.	_____	127.	_____	157.	_____
8.	_____	38.	_____	68.	_____	98.	_____	128.	_____	158.	_____
9.	_____	39.	_____	69.	_____	99.	_____	129.	_____	159.	_____
10.	_____	40.	_____	70.	_____	100.	_____	130.	_____	160.	_____
11.	_____	41.	_____	71.	_____	101.	_____	131.	_____	161.	_____
12.	_____	42.	_____	72.	_____	102.	_____	132.	_____	162.	_____
13.	_____	43.	_____	73.	_____	103.	_____	133.	_____	163.	_____
14.	_____	44.	_____	74.	_____	104.	_____	134.	_____	164.	_____
15.	_____	45.	_____	75.	_____	105.	_____	135.	_____	165.	_____
16.	_____	46.	_____	76.	_____	106.	_____	136.	_____	166.	_____
17.	_____	47.	_____	77.	_____	107.	_____	137.	_____	167.	_____
18.	_____	48.	_____	78.	_____	108.	_____	138.	_____	168.	_____
19.	_____	49.	_____	79.	_____	109.	_____	139.	_____	169.	_____
20.	_____	50.	_____	80.	_____	110.	_____	140.	_____	170.	_____
21.	_____	51.	_____	81.	_____	111.	_____	141.	_____	171.	_____
22.	_____	52.	_____	82.	_____	112.	_____	142.	_____	172.	_____
23.	_____	53.	_____	83.	_____	113.	_____	143.	_____	173.	_____
24.	_____	54.	_____	84.	_____	114.	_____	144.	_____	174.	_____
25.	_____	55.	_____	85.	_____	115.	_____	145.	_____	175.	_____
26.	_____	56.	_____	86.	_____	116.	_____	146.	_____	176.	_____
27.	_____	57.	_____	87.	_____	117.	_____	147.	_____	177.	_____
28.	_____	58.	_____	88.	_____	118.	_____	148.	_____	178.	_____
29.	_____	59.	_____	89.	_____	119.	_____	149.	_____	179.	_____
30.	_____	60.	_____	90.	_____	120.	_____	150.	_____	180.	_____

MANIFOLD PRESSURE (BC):	SPRAY TIME (SECS):
MANIFOLD PRESSURE (SP):	DIPSTICK BEFORE:
PUMP SPEED (BC):	DIPSTICK AFTER:
PUMP SPEED (SP):	OUTPUT (LTRS):
% ERROR:	THEORETICAL:



**CALIBRATION OF BITUMEN SPRAYERS
QUALITY CONTROL CHECKLIST
PLACE INITIAL BESIDE ITEM NUMBER**

1. Calibration fluid viscosity is acceptable & certificate supplied)
2. Sprayer is registered. (Copy of certificate has been supplied).
3. Sprayer tank has been inspected and is free of debris and dents.
4. Instrument calibration certificates supplied.
5. Trough free of debris and damage.
6. Nozzles unused and/or calibration certificate checked.
7. Spray bar set up correctly.
8. End jets checked. (Extra bar length added if W.A. end jets used)
9. Dipstick Serial Number matches plant identity number and has been recorded for inclusion on the certificate (Engrave number if none exists)
10. Trough depth - volume conversion cross-checked with contractor's representative (manual conversion only).
11. Tank output (dips) - trough quantities, compare within 50 L.
12. All transverse distribution tests completed.
13. All 50 mm section outputs meet requirements.
14. Unused or calibrated nozzles stamped and dated.