TRANSPORT FOR NSW (TfNSW)

QA SPECIFICATION R112

SPRAYED BITUMINOUS SURFACING (FOR ENRICHMENT AND REJUVENATION)

REVISION REGISTER

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 1/Rev 0		First Issued	GM, RNIC	07.04.97
Ed 1/Rev 1	1.2 2.1.3 Annexure R112/3	New reference included Emulsion shall be slow setting Schedule of Identified Records added.	GM, RNIC	31.08.01
Ed 2/Rev 0	"Notice" Global	RTA PO Box and Fax numbers updated Specification reformatted. Text revised to direct imperative style. "Contractor" replaced by "you". "Superintendent" replaced by "Principal". "QUALITY PLAN" replaced by "PROJECT QUALITY PLAN". Some clauses moved to Annexures. Minor editorial changes to improve clarity. References updated.	GM, IC	26.03.09
Ed 2/Rev 1	Global	References to "Roads and Maritime Services" or "RMS" changed to "Transport for NSW" or "TfNSW" respectively.	DCS	22.06.20

GUIDE NOTES

(Not Part of Contract Document)

Using Specification R112

Specification TfNSW R112 is a QA Specification and the use of QA Specifications requires the implementation of a quality management system by the Contractor that meets the quality management system requirements specified in TfNSW Q. To comply with the intention of Government policy as well as TfNSW R112, sprayed bituminous surfacing works carried out using TfNSW R112 require adequate surveillance and audit by the Principal.

TfNSW R112 requires the TfNSW Project Manager to select appropriate parameters identified in TfNSW R112 and nominate them in Annexure R112/A.

Special attention must be taken after an enrichment or rejuvenation treatment, as these treatments will temporarily reduce the skid resistance of the pavement surface.

It is recommended that after a rejuvenation treatment has been applied, it should be followed by an application of enrichment or resealed within 3 months.

Information on test certificates and test results should be forwarded to Pavements & Geotechnical Section when requested or where important design and performance issues have arisen.

Suggestions for improvements by contractors or TfNSW staff should be forwarded to Pavements & Geotechnical Section or Commercial Services Branch.

Transport for NSW

QA SPECIFICATION R112

SPRAYED BITUMINOUS SURFACING
(FOR ENRICHMENT AND REJUVENATION)

IC-QA-R112

VERSION FOR: DATE:

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CLAUSE PAGE

FOREWORD

TFNSW COPYRIGHT AND USE OF THIS DOCUMENT

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REVISIONS TO PREVIOUS VERSION

This document has been revised from Specification TfNSW R112 Edition 2 Revision 0.

All revisions to the previous version (other than minor editorial and project specific changes) are indicated by a vertical line in the margin as shown here, except when it is a new edition and the text has been extensively rewritten.

PROJECT SPECIFIC CHANGES

Any project specific changes are indicated in the following manner:

(a) Text which is additional to the base document and which is included in the Specification is shown in bold italics e.g. ***Additional Text***.

(b) Text which has been deleted from the base document and which is not included in the Specification is shown struck out e.g. ~~Deleted Text~~.

TfNSW QA SPECIFICATION R112

SPRAYED BITUMINOUS SURFACING (FOR ENRICHMENT AND REJUVENATION)

1 GENERAL

1.1 SCOPE

The work to be executed under this Specification consists of the supply of all materials and the application of any or all of the following types of sprayed bituminous surfacing as required under the Contract:

(a) Enrichment: A light application of bituminous binder, without aggregate cover, for the purpose of increasing the binder content of a bituminous road surfacing.

(b) Rejuvenation: A light application of an emulsified bituminous material to replace part of the lost maltene fraction in oxidised bitumen.

The locations and required types of sprayed bituminous surfacings, including types of binders, must be as shown on the Drawings and as detailed in Annexure R112/A. For enrichment or rejuvenation treatments, the binder may be required to be sprayed in one or more separate applications.

1.2 STRUCTURE OF THE SPECIFICATION

This Specification includes a series of annexures that detail additional requirements.

1.2.1 Project Specific Requirements

Project specific details of work are shown in Annexure R112/A.

1.2.2 Measurement and Payment and Resolution of Nonconformities

The method of measurement and payment must comply with Annexure R112/B.

Acceptance of materials and work must be in accordance with Annexure R112/B.

1.2.3 Schedules of HOLD POINTS, WITNESS POINTS and Identified Records

The schedules in Annexure R112/C list the **HOLD POINTS** and **WITNESS POINTS** that must be observed. Refer to Specification TfNSW Q for the definitions of **HOLD POINTS** and **WITNESS POINTS**.

The records listed in Annexure R112/C are **Identified Records** for the purposes of TfNSW Q Annexure Q/E.

1.2.4 Planning Documents

The PROJECT QUALITY PLAN must include each of the documents and requirements listed in Annexure R112/D and must be implemented.

In all cases where this Specification refers to the manufacturer's recommendations, include these in the PROJECT QUALITY PLAN.

1.2.5 Referenced Documents and Definitions

Unless specified otherwise, the applicable issue of a referenced document, other than a TfNSW Specification, must be the issue current at the date one week before the closing date for tenders, or where no issue is current at that date, the most recent issue.

Standards, specifications and test methods are referred to in abbreviated form (e.g. AS 2350). For convenience, the full titles are given in Annexure R112/M.

The terms "you" and "your" mean "the Contractor" and "the Contractor's" respectively.

2 MATERIALS

2.1 BITUMINOUS MATERIALS

2.1.1 Bitumen

Bitumen must conform to Specification TfNSW 3253.

The binder for enrichment must be Class 170 bitumen.

2.1.2 Refinery Cutback Bitumen

Refinery cutback bitumen must conform to Specification TfNSW 3261.

2.1.3 Bitumen Emulsion

Bitumen emulsion must be slow setting and must conform to Specification TfNSW 3254.

2.1.4 Rejuvenating agent

Rejuvenating agent must conform to manufacturer's specification.

2.2 OILS FOR REDUCING VISCOSITY OF BITUMEN

The oils for reducing the viscosity of bitumen must conform to Specification AS 3568.

2.3 SAND

Sand must consist of mineral matter passing a 2.36 mm AS sieve and retained on a 600 μm AS sieve. Sand must consist of clean, dry, tough, sound and moderately sharp grains, free of coatings or loose particles of clay, silt or other matter deleterious to bituminous surfacing.

2.4 WATER

Water used for the dilution of bitumen emulsion or rejuvenating agent must be compatible when tested in accordance with Test Method TfNSW T569 and must be potable and free from any deleterious material.

2.5 SAMPLING AND TESTING OF MATERIALS

Carry out sampling and testing of materials in accordance with the relevant material specifications in Clause 2. Testing must comply with Annexure R112/L.

3 NOMINATED MATERIALS AND DESIGN OF ENRICHMENT OR REJUVENATION

Carry out the design for enrichment or rejuvenation in accordance with TfNSW Form 395G. The design application rates are the "nominated application rates" and the materials the "nominated materials".

Submit your design details, including the following:

(a) Test results for all nominated materials.

(b) Bitumen - refinery source and class.

(c) Cutback bitumen - refinery source of bitumen and source of cutter oil.

(d) Oils for reducing viscosity of bitumen - source and types

(e) Bitumen emulsion - source, grade and class.

(f) Rejuvenating agent (where appropriate) - source, type, grade and manufacturer's specification and recommendations.

(g) Sand - source, type, nominated particle size distribution.

(h) Water - source.

HOLD POINT

Process Held:	Commencement of sealing operation using the proposed design.
Submission Details:	Proposed enrichment or rejuvenation design together with certification for the nominated materials and design verification documentation at least seven days prior to the commencement of enrichment or rejuvenation work.
Release of Hold Point:	The Principal will consider the submitted documents prior to authorising the release of the Hold Point.

4 APPLICATION OF ENRICHMENT OR REJUVENATION

4.1 GENERAL

The purpose of the enrichment or rejuvenation work is to:

(a) provide a uniform application of binder with adequate adhesion to the underlying surface; and

(b) provide a complete cover of sand particles for earlier trafficking or to restore skid resistance where appropriate.

Submit details of the plant and equipment and methods to be used for enrichment or rejuvenation as part of the PROJECT QUALITY PLAN.

Give the Principal seven days notice of your intention to commence sprayed bituminous surfacing.

WITNESS POINT	
Process Witnessed:	Placing of sprayed bituminous surfacing.
Submission Details:	At least seven days written notice of intention to commence.

4.2 PLANT

Use a mechanical sprayer to apply enrichment or rejuvenating agent. The sprayer must have a current Sprayer Certificate (TfNSW Form 354) issued or accepted by Transport for NSW.

The spray nozzles must be of the make and type endorsed on the Sprayer Certificate. Replace any nozzles which may be damaged or become unduly worn or defective with satisfactory nozzles of similar type. A sufficient number of nozzles for this purpose must be available at all times.

Mechanical spreading equipment must be used to spread sand and must be capable of achieving a uniform spreading rate.

Remove from the work any plant or equipment not fully operational or not in a satisfactory condition for carrying out work in accordance with this Specification.

4.3 PREPARATION OF PAVEMENT SURFACE

Before the application of enrichment or rejuvenating agent, sweep the pavement surface with a mechanically operated rotary road broom or suction broom to provide a uniformly clean surface. If necessary, carry out additional sweeping by hand, using stiff bass or similar brooms. Sweeping must extend at least 300 mm beyond each edge of the area to be sprayed.

Where enrichment or rejuvenation work is carried out on localised areas and or half pavement widths, remove any remaining loose material immediately adjacent to the swept areas from the pavement surface. Include detailed arrangements for the removal of loose material in the PROJECT QUALITY PLAN.

Remove adherent patches of foreign material from the surface of the pavement. Mask or remove raised pavement markers.

4.4 REVIEW OF NOMINATED APPLICATION RATES

Select the locations where each Lot of sand is to be incorporated in the Works.

Review the bituminous surfacing design at each location based on the actual TfNSW T582 test result instead of the nominated value, and using TfNSW 395G design form. The revised application rates must be known as “target application rates”.

HOLD POINT

Process Held:	Sprayed sealing work for each work location.
Submission Details:	Sand Lot details and target application rates.
Release of Hold Point:	The Principal will consider the submitted documents prior to authorising the release of the Hold Point.

4.5 BINDER TEMPERATURE REQUIREMENTS

Binder must be within the temperature range shown in Table R112.1 at the time of spraying.

Table R112.1 - Binder Spraying Temperatures

Type of Binder	Temperature Range (°C)
AMC00	10 - 30
AMC0	35 - 55
AMC1	60 - 80
AMC2	75 - 100
AMC3	95 - 115
Bitumen Emulsion	40 - 60
Rejuvenating agent	Manufacturer's recommendation

Measure and record the temperature, using a mercury-in-steel dial thermometer, a maximum recording mercury-glass thermometer or other suitable means. The thermometer must be accurate to within 2.5 percent of the correct temperature.

If the temperature of the bituminous material is below the applicable lower limit from Table R112.1, the bituminous material may be heated provided that safe heating practices are adopted. Do not use burners unless the level of the material in the heating tank is at least 250 mm above the tops of the heating tubes. Comply with the Rural Fires Act and the Local Government Act. Place two or more suitable fully-charged pressurised chemical fire extinguishers conveniently near to the heaters at all times while heating is in progress.

During heating, the temperature of the bituminous material must not exceed the applicable upper limit from Table R112.1. Check the temperature of the bituminous material just above the heating tubes at regular intervals to ensure that there is no local overheating.

Do not hold bituminous materials at temperatures within the ranges shown in Table R112.1 for periods in excess of ten hours.

Do not use any bituminous material which has been overheated in the work.

4.6 PAVEMENT TEMPERATURE AND WEATHER CONDITIONS

Measure and record pavement temperatures at regular intervals during the course of work. For this purpose, place a spirit or mercury-in-glass thermometer or other suitable type of thermometer in direct contact with the pavement and allowed to remain in position until the reading becomes steady. When

a spirit or mercury-in-glass thermometer is used to measure pavement temperature, cover the bulb of the thermometer from direct sunlight with a small heap of grit or similar material.

If the pavement is partly in sun and partly in shade, take and record the temperatures for both conditions.

Undertake spraying of rejuvenating agent only if the pavement temperature has been at or above 10°C for at least one hour before commencement of spraying and does not fall below the specified minimum pavement temperature for spraying during the period of spraying. For enrichment treatment, undertake spraying of binder only if the pavement temperature has been at or above 20°C for at least one hour before commencement of spraying and does not fall below the specified minimum pavement temperature for spraying during the period of spraying.

Do not carry out spraying on a wet pavement, while rain appears imminent or during high winds or dust storms.

4.7 INCORPORATION OF CUTTER OIL

For enrichment treatment using cutback bitumen, use TfNSW Form 395G to determine and record the proportion of cutter oil required for each sprayer load.

The cutter oil, without being previously heated, must be pumped into the sprayer, followed by the hot bitumen. Circulate the full sprayer load of cutback bitumen at a rate of at least 700 litres per minute for twenty minutes to ensure that the mixture is homogeneous.

If a part sprayer load of field cutback bitumen is unused on the date of mixing, and needs to be returned to the heater tanks, place it in an empty tank reserved for that purpose. Do not add bitumen or cutter oil to the returned cutback bitumen unless the tank is fitted with an effective mechanical mixing system. When the returned cutback bitumen is subsequently used as part of a sprayer load, make allowance for the cutter oil contained in the returned cutback bitumen.

4.8 APPLICATION OF ENRICHMENT OR REJUVENATION

4.8.1 General

Limit the area to be sprayed with enrichment or rejuvenating agent to the area where traffic can be kept off the new work for an extended period of time.

4.8.2 Enrichment

For cutback bitumen, the class of bitumen or grade of cutback bitumen must be as specified in Annexure R112/A. The nominated and target application rate and quantities of cutback bitumen must apply to the whole material, including cutter oil, measured at 15°C.

For bitumen emulsion, the types and grades must be as specified in Annexure R112/A. Determine the number of passes which will minimise run-off. The consecutive passes must be sprayed only if the emulsion has fully broken and must be sprayed in the opposite directions.

4.8.3 Rejuvenation

The class of binder used must be as specified in Annexure R112/A.

Base nominated and target application rates and quantities of binder on the volumes of binder measured at a temperature of 15°C.

4.8.4 Operation of the Sprayer

The type of spray nozzles to be used on the spray bar of the sprayer must be compatible with the nature of the binder to be sprayed and its application rate.

Where the longitudinal edges of spray runs are not required to overlap, either special end nozzles, or alternatively intermediate nozzles (with the angle set with a jig to act as end nozzles) may be used. Where an overlap is required, the overlap of spray between adjacent longitudinal runs must be 50 mm when using special end nozzles.

Commence the spraying of binder for each run of the sprayer on a protective strip of heavy paper weighing not less than 120 grams per square metre laid across and held securely to the pavement surface beforehand. The sprayer must commence moving at a sufficient distance from the protective strip to ensure that the road speed for correct application is attained at the commencement of spraying.

Maintain the sprayer at a constant road speed throughout the length of each sprayer run.

Terminate the spraying for each run on a protective strip of paper laid across and held securely to the pavement surface beforehand. The width of paper at the commencement and/or termination of each run must not be less than that endorsed on the Sprayer Certificate.

Cease spraying immediately if any defect develops in the spraying equipment and do not recommence spraying until the fault has been rectified.

Where any blockage or partial blockage of nozzles occurs, cease spraying immediately. If the blockage is due to the condition of the binder being sprayed, do not use that load together with any binder from the same bulk tanker or supply unit.

Areas not within 5 percent of the target application rate of binder constitute a ‘Nonconformity’ under the Contract.

Where a calibrated bitumen sprayer is not available for spraying binder other than cutback, provide evidence to the Principal to verify that the proposed equipment (a water tanker fitted with a pressurised spray bar) will perform the work as specified.

After each sprayer run, check the quantity of binder sprayed against the area covered and make any necessary adjustments to ensure that the target application rate is achieved in subsequent runs. If the actual application rate of binder after three runs differs by more than 5 per cent from the target application rate, do not use the sprayer until a new Sprayer Certificate has been obtained.

4.9 WORK RECORDS

Record particulars of the work performed on TfNSW Form 500G, details of binder immediately after every sprayer run and details of sand applied after application. Your representative must sign each form as a true record of the work performed. Supply to the Principal a copy of each completed form.

4.10 CONTROL OF TRAFFIC

Provide for traffic in accordance with the requirements of Specification TfNSW G10 while undertaking the work and take all necessary precautions to protect the work from damage until the new binder has fully broken and has developed sufficient strength to carry normal traffic. Where necessary, use patrol vehicles to ensure that traffic travels at an acceptable speed.

Take all necessary steps to avoid or minimise delays and inconvenience to road users during the course of the work. Where adequate detours or side tracks are included in the Contract or are otherwise available, divert traffic temporarily while the work is in progress.

If facilities for diversion of traffic are not available, you may spray part width of the pavement in one operation and make available to traffic the adjacent strip of roadway, except during the actual spraying operation when all traffic movement through the work must cease. Do not permit traffic to encroach upon the edge of the sprayed bituminous material until the binder has cured.

4.11 APPLICATION AND INCORPORATION OF SAND

Do not use wet sand.

Apply the sand at target application rate for 30 minutes or more after spraying the binder. Sufficient loaded and measured trucks of dry sand must be at the site to provide full cover for the area sprayed.

Spread the sand uniformly over the sprayed surface by means of suitable mechanical spreading equipment. Any bare or insufficiently covered areas must be re-run by the mechanical spreader or covered by hand as necessary to give a uniform and complete coverage.

When the sand has been evenly spread across the binder, remove any remaining loose sand from the pavement. State in the PROJECT QUALITY PLAN the method, timing of removal and traffic management procedure to protect persons and property.

4.12 PROTECTION OF SERVICES AND ROAD FIXTURES

Take all necessary precautions to prevent the binder, sand or other material used on the work from entering or adhering to gratings, hydrants or valve boxes, manhole covers, bridge or culvert decks and other road fixtures.

After sand has been spread over the binder, clean off or remove any sprayed surfacing material and leave the services and road fixtures in a condition equivalent to that existing when you commenced the sprayed surfacing work.

ANNEXURE R112/A – PROJECT SPECIFIC REQUIREMENTS

Section		Type of Treatment			
		Enrichment		Rejuvenation	
From	To	Binder	Sand	Binder	Sand

ANNEXURE R112/B – MEASUREMENT AND PAYMENT AND RESOLUTION OF NONCONFORMITIES

B1 MEASUREMENT AND PAYMENT

Payment will be made for all costs associated with completing the work detailed in this Specification in accordance with the following Pay Items.

Where no specific pay items are provided for a particular item of work, the costs associated with that item of work are deemed to be included in the rates and prices generally for the Work Under the Contract.

Unless specified otherwise, a lump sum price for any of these items will not be accepted.

Pay Item R112P1 - Supply and Spray Refinery Cutback Bitumen (Including Preparation of Surface)

The unit of measurement must be the litre measured at 15°C.

The quantities (in litres) must be determined by multiplying the target application rate of the combined mixture of all materials (including any field or refinery incorporated cutter or flux) at 15°C (in litres per square metre) by the area of road surface sprayed for each sprayer run (in square metres).

A separate unit rate is to be given for each type of binder specified in Annexure R112/A, as follows:

R112P1.1 AMC00

R112P1.2 AMC0

R112P1.3 AMC1

R112P1.4 AMC2

R112P1.5 AMC3

Pay Item R112P2 - Supply and Spray Binder - Class 170 Bitumen (Including Preparation of Surface)

The unit of measurement must be the cold litre of Class 170 bitumen.

The quantities (in litres) must be determined by multiplying the target application rate of bitumen at 15°C (in litres per square metre) by the area of road surface sprayed for each sprayer run (in square metres).

Pay Item R112P3 - Supply and Spray Bitumen Emulsion (Including Preparation of Surface)

The unit of measurement must be the cold litre of residual bitumen.

The quantities (in litres) must be determined by multiplying the target application rate of residual bitumen at 15°C (in litres per square metre) by the area of road surface sprayed for each sprayer run (in square metres).

Pay Item R112P4 - Supply, Incorporate and Spray Cutter Oil in Binder

The unit of measurement must be the cold litre.

The quantities (in cold litres) must be determined from the target percentage of cutter oil to be added in the field to produce the binder for each sprayer run and applied to the road.

Pay Item R112P5 - Supply and Spray Rejuvenating Agent (Including Preparation of Surface)

The unit of measurement must be the cold litre of the rejuvenating agent.

The quantities (in litres) must be determined by multiplying the target application rate of the oils in the rejuvenating agent at 15°C (in litres per square metre) by the area of road surface sprayed for each sprayer run (in square metres).

Pay Item R112P6 - Supply, Apply and Incorporate Sand

The unit of measurement must be the cubic metre.

The quantity of sand required (in cubic metres) must be determined by dividing the area of road surface to be covered for each sprayer run (in square metres) by the target application rate (in square metres per cubic metre).

Pay Item R112P7 - Deductions in Accordance with Annexure R112/B

R112P7.1 Bitumen

R112P7.2 Refinery Cutback Bitumen

R112P7.3 Bitumen Emulsion

Deductions must be made on the actual application rate and will not be subject to adjustment for rise and fall in costs.

B2 RESOLUTION OF NONCONFORMITIES

B2.1 General

If the nonconformity is not acceptable in accordance with Annexure R112/B2.2, the nonconforming material must be replaced or the nonconforming section of sprayed bituminous surfacing work must be either replaced or corrected.

The cost of rectifying nonconformities, including any restoration work to any underlying or adjacent surface or structure, which becomes necessary as a result of such replacement or correction, must be borne by you. Replace materials removed from the site with materials that conform to this Specification.

B2.2 Acceptance of Nonconformities

Nonconformities may be accepted by the Principal subject to deductions to the schedule rate, as specified hereunder, applied to the quantity of material represented by the failed sample.

B2.2.1 Bitumen

In the case of bitumen having a viscosity at 60°C within the specified limits, but having any other property outside the limits specified in TfNSW 3253, a deduction of 2 per cent of the schedule rate for the supply and spraying of bitumen will apply**.**

In the case of Class 170 bitumen having a viscosity at 60°C outside the limits specified in TfNSW 3253, the deductions shown in Table R112/B.1 will apply.

Calculate viscosity to the nearest whole number.

Table R112/B.1 - Deduction for Actual Viscosity at 60°C (Pa.s)

Class 170	Deduction (Percent of Schedule Rate)
Under 120	50
120 - 124	25
125 - 129	10
130 - 134	5
135 - 139	2
140 - 200	Nil
201 - 210	2
211 - 220	5
221 - 230	10
231 - 240	25
Over 240	50

B2.2.2 Refinery Cutback Bitumen

In the case of a cutback bitumen having a viscosity at 60°C within the specified range according to Table 3261.1 of Specification TfNSW 3261 but having any property (other than viscosity at 60°C) outside the range specified by AS 2157, a deduction of 2 percent of the schedule rate for the supply and spraying of cutback bitumen will apply.

In the case of cutback bitumen having a viscosity at 60°C outside the range specified in Table 3261.1 of TfNSW 3261, the deductions shown below will apply:

Viscosity in range of next adjoining grade - deduction 10% of schedule rate

Viscosity in range of next but one adjoining grade - deduction 25% of schedule rate

Viscosity beyond next but one adjoining grade - deduction 50% of schedule rate

The viscosity as determined by any method allowed by AS 2157 must be rounded to two significant figures in the direction favouring you. The range allowed in TfNSW 3261 Table 3261.1 includes an allowance for the repeatability of the test. No attempt will be made to include another allowance for repeatability.

B2.2.3 Bitumen Emulsion

In the case of the residue from evaporation having a viscosity at 60°C within the specified limits, but having any other property outside the limits specified in TfNSW 3254, a deduction of 2 per cent of the schedule rate for the supply and spraying of bitumen will apply.

In the case of the residue from evaporation having a viscosity at 60°C outside the limits specified in TfNSW 3254, the deductions shown in Table R112/B.2 will apply.

Table R112/B.2 - Deduction for Actual Viscosity at 60°C (Pa.s)

Viscosity as percentage of the nominal viscosity of the class of bitumen	Deduction (Percent of Schedule Rate)
Under 40	50
40 - 44	25
45 - 49	10
50 - 54	5
55 - 59	2
60 - 125	Nil
126 - 130	2
131 - 135	5
136 - 140	10
141 - 145	25
Over 145	50

Calculate viscosity to the nearest whole number.

ANNEXURE R112/C – SCHEDULES OF HOLD POINTS, WITNESS POINTS AND IDENTIFIED RECORDS

C1 SCHEDULE OF HOLD POINTS AND WITNESS POINTS

Clause	Type	Description
3	Hold	Submission of details for nominated materials and enrichment or rejuvenation design.
4.1	Witness	Commencement of sprayed bituminous surfacing work.
4.4	Hold	Submission of details of the sand Lot and target application rates for each work location**.**

C2 SCHEDULE OF IDENTIFIED RECORDS

The records listed below are Identified Records for the purposes of TfNSW Q Annexure Q/E.

Clause	Description of Identified Record
3	Proposed enrichment or rejuvenation design together with certification for the nominated materials and design verification documentation
4.4	Sand Lot details and target application rates
4.9	Copy of completed forms showing details of binder applied for every sprayer run and details of sand applied for every application, signed by your representative as a true record of the work performed.

ANNEXURE R112/D – PLANNING DOCUMENTS

Refer to Clause 1.2.4.

The following documents are a summary of documents that must be included in the PROJECT QUALITY PLAN. The requirements of this Specification and others included in the Contract must be reviewed to determine additional documentation requirements.

Clause	Description
1.3	Manufacturer's recommendation referred to in this Specification
2	Details of materials (a) Types and source of materials used (i) Bitumen (including class or grade) (ii) Cutback bitumen (including source of the cutter oil) (iii) Oils for reducing viscosity of bitumen (vi) Bitumen emulsion (including grade and class) (v) Rejuvenating agent (including grade) (vi) Sand (including particle size distribution) (vii) Water (b) Technical specification for the rejuvenating agent (c) Relevant test results verifying material properties for all materials (d) Material Safety Data Sheets
3	Submission of nominated design (a) For each mix design (i) Binder application rate (ii) Sand application rate (b) Certification for the nominated materials (c) Design verification documentation
4	Application of enrichment or rejuvenation Details of plant and equipment including calibration Arrangements for the removal of loose materials from the pavement surface Details to determine the sand Lot and target application rates Details of the methods used for blending the enrichment or rejuvenating agent Procedures for applying enrichment and rejuvenating agent Details of work performed recorded in the appropriate TfNSW Forms Procedures for the application of sand Arrangements for the removal of loose sand from the pavement Procedure to protect services and road fixtures Traffic management procedure

ANNEXURES R112/E TO R112/K – (NOT USED)

ANNEXURE R112/L – MINIMUM FREQUENCY OF TESTING

Clause	Characteristic Analysed	Test Method	Minimum Frequency of Testing
2.1	Properties of Residual Bitumen	AS 2341.2 AS 2341.3 AS 2341.4 AS/NZS 2341.5 AS 2341.6 AS 2341.7 AS 2341.8 AS/NZS 2341.10 AS 2341.11 AS 2341.12 AS 2341.14	As set out in TfNSW 3253
2.1	Properties of Cutback Bitumen	AS 2341.2 AS 2341.4 AS/NZS 2341.5 AS 2341.8 AS 2341.11 AS 2341.15 AS 2341.16	As set out in AS 2157
2.1	Properties of Bitumen Emulsion	AS 2341.2 AS 2341.3 AS 2341.4 AS/NZS 2341.5 AS 2341.8 AS 2341.9 AS 2341.25 AS 2341.28 AS 2341.29 AS/NZS 2341.30 AS 3568 AS/NZS 2341.22 AS/NZS 2341.23 AS/NZS 2341.24 AS/NZS 2341.26 AS/NZS 2341.27 ASTM D244 BS 2586 TfNSW T560	As set out in AS 1160
2.2	Properties of Cutter Oils and Flux Oils	ASTM D611 ASTM D1319 ASTM D1298 ASTM D86 AS 2106 AS 2341.9 ASTM D445	As set out in AS 3568

Clause	Characteristic Analysed	Test Method	Minimum Frequency of Testing
2.2	Properties of Rejuvenator	Manufacturer's recommendation	Manufacturer's recommendation
2.4	Compatibility of Emulsion or Rejuvenating Agent with Water	TfNSW T569	One each 10,000 litres of water

ANNEXURE R112/M – REFERENCED DOCUMENTS

Refer to Clause 1.2.5.

TfNSW Specifications

TfNSW G10	Traffic Management
TfNSW Q	Quality Management System
TfNSW 3253	Bitumen for Pavements
TfNSW 3254	Bitumen Emulsion
TfNSW 3261	Cutback Bitumen

TfNSW Test Methods

TfNSW T560	Apparent Bitumen Content of Bitumen Emulsion and Recovery of Bitumen for Testing
TfNSW T569	Compatibility of Emulsion with Local Water
TfNSW T582	Application Rate for Enrichment or Rejuvenation Treatments

TfNSW Forms

TfNSW 354	Sprayer Certificate
TfNSW 395G	Enrichment and Rejuvenation – Design Calculation Sheet
TfNSW 500G	Enrichment and Rejuvenation – Daily Record

TfNSW Guides

TfNSW Sprayed Sealing Guide

Australian Standards

AS 1160	Bitumen emulsion for construction and maintenance of pavements
AS 2106	Methods for the determination of the flash point of flammable liquids (Closed cup)
AS 2157	Cutback bitumen
AS 2341	Methods of testing bitumen and related roadmaking products
AS 2341.2	Determination of dynamic (Coefficient of shear) viscosity by flow through a capillary tube
AS 2341.3	Determination of kinematic viscosity by flow through a capillary tube
AS 2341.4	Determination of dynamic viscosity by rotational viscometer
AS/NZS 2341.5	Determination of apparent viscosity by ‘Shell’ sliding plate micro-viscometer
AS 2341.6	Determination of density using a hydrometer
AS 2341.7	Determination of density using a density bottle

AS 2341.8	Determination of matter insoluble in toluene
AS 2341.9	Determination of water content (Dean and stark)
AS/NZS 2341.10	Determination of the effect of heat and air on a moving film of bitumen (Rolling thin film oven (RTFO) test)
AS 2341.11	Determination of ductility
AS 2341.12	Determination of penetration
AS 2341.14	Determination of flashpoint of residual bitumen
AS 2341.15	Distillation of cutback bitumen
AS 2341.16	Determination of flashpoint of cutback bitumen
AS/NZS 2341.22	Determination of particle charge
AS/NZS 2341.23	Determination of residue from evaporation
AS/NZS 2341.24	Calculation of non-aqueous volatiles content (by difference)
AS 2341.25	Determination of consistency
AS/NZS 2341.26	Determination of sieve residue
AS/NZS 2341.27	Determination of sedimentation
AS 2341.28	Determination of stone coating ability and water resistance
AS 2341.29	Determination of breaking behaviour by setting time
AS/NZS 2341.30	Recovery of residual from bituminous emulsion
AS 3568	Oils for Reducing the Viscosity of Residual Bitumen for Pavements

American Society for Testing and Materials

ASTM D86	Method for Distillation of Petroleum Products
ASTM D244	Test Methods for Emulsified Asphalts
ASTM D445	Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)
ASTM D611	Test Method for Aniline Point and Mixed Aniline Point of Petroleum Products and Hydrocarbon Solvents
ASTM D1298	Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method
ASTM D1319	Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption

British Standards

BS 2586	Specification for Glass and Reference Electrodes for the Measurement of pH