TRANSPORT FOR NSW (TfNSW)

QA SPECIFICATION R113

SPRAYED BITUMINOUS SURFACING (WITH FIBRE REINFORCEMENT)

REVISION REGISTER

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 1/Rev 0		New specification.	GM, RNIC (W Ho)	07.04.97
Ed 1/Rev 1	1.2	New references added	GM, RNIC	31.08.01
	1.2, 5.8	RTA Form 500D deleted		
	3	Include type and length of fibre used		
	4	Include covering of stockpile		
	5.2	Include the use of other types of rollers. New Hold Point added		
	5.10	Additional requirement to sweep and remove loose aggregate		
	Annexure R113/2	Minimum testing frequencies for aggregate properties included		
	Annexure R113/3	Schedule of Identified Records added		
Ed 2/Rev 0	”Notice”	RTA PO Box and Fax numbers updated	GM, IC	23.03.09
	Global	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.		
	5.2	Equipment requirements updated.		
	5.5	Legislation updated.		
	Annex L	Frequency of testing updated.		
	Annex M	Referenced documents updated.		
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 TfNSW R113

Specification TfNSW R113 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 system requirements specified in TfNSW Q. To comply with the intention of government policy as well as TfNSW R113, sprayed bituminous surfacing with fibre reinforcement carried out using TfNSW R113 requires adequate surveillance and audit by the Principal.

R113 requires the TfNSW Project Manager to select appropriate parameters identified in TfNSW R113 and nominate them in Annexure TfNSW R113/A.

It is recommended that a scatter coat (or "rack in") be applied for fibre reinforced seals using aggregate with nominal size 10 mm or greater.

As fibre reinforced sprayed seals develop strength much more slowly than cutback bitumen seals, careful attention must be paid to ensure adequate after-care for up to 48 hours after sealing.

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 Service Branch.

Transport for NSW

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IC-QA-R113

VERSION FOR: DATE:

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CLAUSE PAGE

FOREWORD

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REVISIONS TO PREVIOUS VERSION

This document has been revised from Specification TfNSW R113 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 R113

SPRAYED BITUMINOUS SURFACING (WITH FIBRE REINFORCEMENT)

1 GENERAL

1.1 SCOPE

The work to be executed under this Specification comprises the supply of all materials and the application of a sprayed bituminous surfacing with fibre reinforcement as required under the Contract. The sprayed bituminous surfacing with fibre reinforcement consists of two applications of emulsion binder into which fibre reinforcement is incorporated prior to the application of cover aggregate.

In this Specification, the term "emulsion binder" refers to bitumen emulsion with polymer additives or polymer modified emulsion. Also the term "fibre reinforced emulsion binder" refers to sprayed emulsion binder which has fibre reinforcement incorporated into it.

The locations and required types of sprayed bituminous surfacing with fibre reinforcement, including types of emulsion binders and aggregate sizes, must be as shown on the Drawings and/or as detailed in Annexure R113/A.

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 R113/A.

1.2.2 Measurement and Payment and Resolution of Nonconformities

The method of measurement and payment must comply with Annexure R113/B.

Acceptance of materials and work must be in accordance with Annexure R113/B.

1.2.3 Schedules of HOLD POINTS, WITNESS POINTS and Identified Records

The schedules in Annexure R113/C list the **HOLD POINTS** and **WITNESS POINTS** that must be observed. Refer to Specification TfNSW Q for definitions of **HOLD POINTS** and **WITNESS POINTS**.

The records listed in Annexure R113/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 R113/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 R113/M.

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

1.3 PROCEDURES

When planning and carrying out work under this Specification, refer to and follow where appropriate the TfNSW Sprayed Sealing Guide. The TfNSW Sprayed Sealing Guide must be regarded as a guide and not a Specification.

2 MATERIALS

2.1 BITUMEN EMULSION

Polymer modified emulsion must conform to TfNSW 3254 and the binder residue must conform to TfNSW 3252.

For bitumen emulsion with polymer additives, the bitumen emulsion must conform to TfNSW 3254 and the polymer additives must conform to TfNSW 3252.

2.2 AGGREGATE PRECOATING AGENT

Aggregate precoating agents must conform to TfNSW 3258.

2.3 AGGREGATE

The supply and delivery of aggregate must conform to TfNSW 3151.

Obtain test results for each Lot of aggregate, in accordance with TfNSW 3151, before any aggregate from the Lot is incorporated in the Works.

2.4 REINFORCING FIBRE

The reinforcing fibre must conform to the supplier's specification and must meet the requirements of Clause 3.

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 R113/L.

3 NOMINATED MATERIALS AND DESIGN OF FIBRE REINFORCED SPRAYED SEAL

Design the surfacing to provide a durable wearing surface with strain alleviating properties. In carrying out the design, be guided by Section 4 and the Annexure of the TfNSW Sprayed Sealing Guide. Where you propose departures, provide supporting technical details, including evidence of satisfactory previous performance.

The design emulsion binder application rates must include an allowance for the coating of the reinforcing fibres. The design application rates are the "nominated application rates" and the materials the "nominated materials".

Submit the design details including nominated application rates and details of the nominated materials.

The following additional details are required:

(a) Test results for all nominated materials, including stripping and initial adhesion for the combination of nominated materials.

(b) Aggregates - source, geological type, nominated particle size distribution.

(c) Precoating agent - type and proportion.

(d) Bitumen emulsion - source, type and grade.

(e) Polymer additives - source, type, class and grade.

(f) Polymer modified emulsion - source, type, class, grade and manufacturer's recommendation.

(g) Reinforcing fibre - type, length and binder absorption rate.

HOLD POINT

Process Held:	Commencement of fibre reinforced sprayed sealing work.
Submission Details:	Proposed fibre reinforced sprayed seal design, together with certification for the nominated materials and design verification documentation at least seven days prior to the commencement of sprayed bituminous surfacing work.
Release of Hold Point:	The Principal will consider the submitted documents prior to authorising the release of the Hold Point.

4 PRECOATING OF AGGREGATE

Apply the aggregate precoating agent to the aggregate in a manner and at a rate and time which will provide a complete, light, effective cover of all aggregate particles at the time of spreading.

Do not carry out recoating of aggregate when rain is imminent. If aggregate has been precoated and rain appears imminent, cover the aggregate adequately to prevent the precoating material being washed from the aggregate particles during stockpiling.

Take precautions, such as covering stockpiles, to prevent settlement of dust, penetration of moisture or drying out of the precoating agent on the stockpiled aggregate.

5 APPLICATION OF FIBRE REINFORCED SPRAYED SEAL

5.1 GENERAL

The purpose of the fibre reinforced sprayed sealing work is to:

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

(b) provide a uniform application of fibre reinforcing material into the emulsion binder layer;

(c) provide a complete cover of interlocking aggregate particles, and

(d) achieve an effective bond between the fibre reinforced emulsion binder and the aggregate.

Submit details of the plant, equipment and methods to be used for the fibre reinforced sprayed sealing work as part of the PROJECT QUALITY PLAN.

Give the Principal seven days notice of your intention to commence fibre reinforced sprayed sealing work.

WITNESS POINT

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

5.2 PLANT

Use only a mechanical sprayer which has been issued with a current Sprayer Certificate (TfNSW Form 354) certifying that it has been accepted by Transport for NSW and is fitted with equipment to uniformly apply the fibre reinforcement during the spraying operation.

The spray nozzles must be of the make and type endorsed on the Sprayer Certificate. Replace any nozzles which may have been 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.

Spray any emulsion binder having a residue binder content greater than 70% using AN27 nozzles.

Spread the aggregate using mechanical spreading equipment capable of achieving a uniform spreading rate.

Rollers must be in accordance with Clause 5.10. Use of other types of rollers will be considered if you can demonstrate that it is suitable for the purpose, by way of an onsite trial of the proposed roller with the combinations of the relevant materials to be used and actual pavement conditions (refer to Annexure R113/A) prior to sealing. The rollers must be able to effectively embed the aggregate into the binder while achieving mechanical interlock between the aggregate particles without breaking down/crushing of the cover aggregate.

HOLD POINT

Process Held:	Sealing operation using other types of rollers.
Submission Details:	Proposed type of roller to be used for bituminous surfacing and notification of the date, time and location of the trial at least seven days prior to the commencement of sprayed bituminous surfacing work.
Release of Hold Point:	The Principal will inspect the trial and conformity records, prior to authorising the release of the Hold Point.

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.

5.3 PREPARATION OF PAVEMENT SURFACE

Before the application of the fibre reinforced sprayed seal, sweep the pavement surface using 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 sealing work is carried out on localised areas and/or half pavement widths, the sweeping must also extend to a distance of 300 mm outside the area to be treated. Remove any remaining loose material immediately adjacent to the swept areas from the pavement surface. Include detailed arrangements for the removal of loose foreign materials in the PROJECT QUALITY PLAN.

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

Where the fibre reinforced sprayed seal is to be placed on an unsealed pavement, dampen the surface of the pavement slightly immediately before the application of fibre reinforced sprayed seal.

5.4 REVIEW OF NOMINATED APPLICATION RATES

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

Review the fibre reinforced sprayed seal design at each location based on the actual ALD test result for the actual aggregate to be used instead of the ALD value of the nominated aggregate, and using the appropriate TfNSW 395 design form. The revised application rates will be known as "target application rates".

HOLD POINT

Process Held:	Commencement of the fibre reinforced sprayed sealing work.
Submission Details:	Aggregate Lot and target application rates for each work location.
Release of Hold Point:	The Principal will consider the submitted documents prior to authorising the release of the Hold Point.

5.5 EMULSION BINDER TEMPERATURE REQUIREMENTS

Heat the emulsion binder slowly to a maximum spraying temperature of 90°C or a temperature recommended by the supplier.

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 emulsion binder is below 80°C or the minimum spraying temperature recommended by the supplier, the emulsion binder may be heated at a maximum rate 15°C per hour 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 to the heaters at all times while heating is in progress. Refer to the Austroads Bituminous Materials Safety Guide.

During heating, recirculate the emulsion. The temperature of the emulsion binder must neither exceed 90°C nor a temperature recommended by the supplier. Check the temperature of the emulsion binder just above the heating tubes at regular intervals to ensure that there is no local overheating.

5.6 PAVEMENT TEMPERATURE AND WEATHER CONDITIONS

Measure and record pavement temperatures at regular intervals during the course of work. For this purpose, a spirit or mercury-in-glass thermometer or other suitable type of thermometer must be placed 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 bitumen emulsions only if the pavement temperature has been at or above 10°C for at least one hour before the commencement of spraying and does not fall below 10°C during the period of spraying.

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

5.7 APPLICATION OF FIBRE REINFORCED SPRAYED SEAL

5.7.1 General

Limit the area to be sprayed with emulsion binder to the area which can be covered with a layer of aggregate at the target application rate within fifteen minutes of spraying the emulsion binder.

Determine the hot application rate of binder using TfNSW Form 500F.

5.7.2 Emulsion Binder

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

5.7.3 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. If intermediate nozzles are to be used to overlap adjacent longitudinal sprays, set the nozzles in the normal manner for intermediate nozzles and the overlap must be 300 mm.

Commence the spraying of emulsion 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 in advance of 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 emulsion binder constitute a 'Nonconformity' under the Contract.

Where a mechanical sprayer is not able to satisfactorily spray small areas or areas of irregular shape with a fibre reinforced sprayed seal, use the same emulsion/aggregate combination without the fibre.

After each sprayer run, check the quantity of emulsion 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 emulsion 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.

5.8 WORK RECORDS

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

5.9 TRAFFIC MANAGEMENT

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 such

time as the new fibre reinforced sprayed seal has developed sufficient strength to carry normal traffic without disturbance of the aggregate.

Where early use of the new fibre reinforced sprayed seal is needed to facilitate the movement of traffic, vehicles may be allowed to run on the work after initial rolling has taken place provided that vehicles are controlled to such slow speeds that no displacement of aggregate occurs. 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 the 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 fibre reinforced emulsion binder until it is covered with aggregate.

Provide rollers and a suction broom, with operators and traffic control personnel, for a minimum of five (5) hours after covering with aggregate of an emulsion seal which is to be subjected to early trafficking.

5.10 APPLICATION AND INCORPORATION OF AGGREGATE

Use only precoated aggregate.

The application of aggregate must proceed immediately after spraying is commenced.

Do not use aggregate saturated with water.

Apply the aggregate of the specified nominal size at the target aggregate application rate. Include detailed method to determine the actual aggregate spread rate in the PROJECT QUALITY PLAN. Sufficient loaded and measured trucks of aggregate must be at the Site to provide full cover for the area sprayed.

Spread the aggregate 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. Remove any aggregate spread in excess of the target aggregate application rate before rolling is completed.

Where a fibre reinforced sprayed seal is specified with a scatter coat, apply the cover aggregate firstly, followed by the scatter coat. Do not commence rolling of the seal until after the application of the scatter coat.

After the aggregate has been applied to each section of the work, carry out initial rolling with two or more dual axle smooth pneumatic tyred multi-wheel rollers of minimum load of one tonne per tyre and minimum tyre pressure of 550 kPa. Continue initial rolling until the aggregate is firmly embedded in the fibre reinforced emulsion binder.

Carry out backrolling subsequently for a minimum period of one hour per 400 square metres sprayed for roads having a traffic volume of less than 500 vehicles per lane per day and one hour per 600 square metres sprayed for other roads, within forty eight hours after the aggregate has been applied.

Use vacuum broom to remove excess aggregate during backrolling.

When the aggregate has been evenly spread and embedded in the binder, remove any remaining loose particles of aggregate from the pavement. During the progress of the work and within a period of 48 hours thereafter, sweep and remove any remaining loose aggregate. State in the PROJECT QUALITY PLAN the method, timing of removal and traffic management to protect persons and property.

5.11 PROTECTION OF SERVICES AND ROAD FIXTURES

Take all necessary precautions to prevent the emulsion binder, aggregate 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.

Immediately after aggregate has been spread over the fibre reinforced emulsion 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 R113/A – PROJECT SPECIFIC REQUIREMENTS

Section		Aggregate		
From	**To**	**Cover**	**Scatter**	**Binder**

Fibre length = ... (mm)

Fibre density = ...

Rolling trial required: Yes/No *(delete as applicable)*
(Clause 5.2)

ANNEXURE R113/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 otherwise specified, a lump sum price for any of these items will not be accepted.

Pay Item R113P1 - Supply and Spray Emulsion Binder (Including Preparation of Surface and Incorporation of Fibre Reinforcement)

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

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

Payment will be made on the target application rate exclusive of tolerances.

Pay Item R113P2 - Supply, Precoat, Apply, Incorporate and Sweep Aggregate

R113P2.1 5 mm Aggregate

R113P2.2 7 mm Aggregate

R113P2.3 10 mm Aggregate

R113P2.4 14 mm Aggregate

The unit of measurement must be the cubic metre.

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

A separate unit rate must be given for each nominal size of precoated aggregate as specified.

Pay Item R113P3 - Deduction in Accordance with Annexure R113/B2.2

R113P3.1 Bitumen Emulsion with Polymer Additives

R113P3.2 Polymer Modified Emulsion

Deductions will 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 R113/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 by you with materials which 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 Polymer Modified Emulsion or Bitumen Emulsion with Polymer Additives

In the case of polymer modified emulsion or bitumen emulsions with polymer additives, where the residual binder or the polymer additives has a Consistency at 60°C or Torsional Recovery outside the range specified in Table 3252.1 of TfNSW 3252, consideration will be given to acceptance of the material subject to deductions of the schedule rate for supply and spraying of polymer modified emulsion as follows:

For Consistency at 60°C:

lower than specified by up to 10%	-	2% deduction
between 11 & 20% lower than specified	-	10% deduction
between 21 & 40% lower than specified	-	20% deduction

For Torsional Recovery:

lower than specified by 1, 2 or 3 percentage points	-	2% deduction
lower than specified by 4, 5 or 6 percentage points	-	10% deduction
lower than specified by 7 or more percentage points	-	20% deduction

Deductions for Consistency at 60°C and Torsional Recovery must not be applied concurrently.

If any other property is found to be nonconforming, consideration will be given to acceptance subject to a deduction of 5% to the relevant schedule rates.

ANNEXURE R113/C – SCHEDULES OF HOLD POINTS, WITNESS POINTS AND IDENTIFIED RECORDS

Refer to Clause 1.2.3.

C1 SCHEDULE OF HOLD POINTS AND WITNESS POINTS

Clause	Type	Description
3	Hold	Submission of details for nominated materials and fibre reinforced sprayed surfacing design.
5.1	Witness	Commencement of fibre reinforced sprayed sealing work.
5.2	Hold	Submission of details for proposed rollers
5.4	Hold	Submission of details of the aggregate 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 fibre reinforced sprayed seal design together with certification for the nominated materials and design verification documentation.
5.4	Aggregate Lot and target application rates for each work location.
5.8	Copy of completed forms showing details of emulsion binder and aggregate applied for every sprayer run, signed by your representative as a true record of the work performed.

ANNEXURE R113/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 sources of materials used: (i) Aggregate (including particle size distribution) (ii) Precoating agent (including application rate) (iii) Bitumen emulsion(including class and grade) (iv) Polymer additives (including class and grade) (v) Polymer modified emuslion (including class and grade) (vi) Reinforcing fibre (including length and binder absorption rate) (b) Technical specification for the reinforcing fibre (c) Relevant test results verifying material properties for all materials (d) Material Safety Data Sheets
3	Submission of nominated design (a) For each design: (i) Emulsion binder spray rate (ii) Aggregate spread rate (including scatter coat) (iii) Fibre length, density and application rate (b) Certification for the nominated materials (c) Design verification documentation
4	Precoating of aggregate (a) Procedures for precoating of aggregate (b) Precautions to prevent contamination of stockpiles of precoated aggregate
5	Application of fibre reinforced sprayed seal (a) Details of plant and equipment including calibration (b) Arrangements for demonstration trial for other type of rollers (c) Arrangements for the removal of loose foreign materials from the pavement surface (d) Details of aggregate Lot and target application rates (e) Details of the methods used for the fibre reinforced sprayed sealing work (f) Details of work performed, recorded in the appropriate TfNSW Forms (g) Procedures for determining the actual aggregate spread rate

Clause	Description
	(h) Arrangements for the removal of loose materials from the pavement surface (i) Procedures to protect services and road fixtures

ANNEXURES R113/E TO R113/K – (NOT USED)

ANNEXURE R113/L – MINIMUM FREQUENCY OF TESTING

Clause	Characteristic Analysed	Test Method	Minimum Frequencyof Testing
2.1	Properties of Bitumen Emulsion	AS 2341.2	As set out in AS 1160
		AS 2341.3	
		AS 2341.4	
		AS 2341.8	
		AS 2341.9	
		AS 2341.25	
		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	
		ASTM D244	
		BS 2586	
		TfNSW T560	
2.1	Properties of Polymer Additives or the Residue Binder of Polymer Modified Emulsion	AS 2341.12	As set out in TfNSW 3252
		AG:PT/T111	
		AG:PT/T122	
		TfNSW T741	
2.2	Resistance to Stripping	TfNSW T230	1 per 6 months and at change of quarry face
2.3	Aggregate Properties	TfNSW T230	1 per 6 months or change of quarry face
		TfNSW T238	1 per 6 months or change of quarry face
		TfNSW T239	1 per 250 m^3 of aggregate (1) (3)
		AS 1141.11	1 per 250 m^3 of aggregate (1)
		AS 1141.12	1 per 250 m^3 of aggregate (1)
		AS 1141.14	1 per 250 m^3 of aggregate (1)
		AS 1141.20.1	1 per 250 m^3 of aggregate (1)
		AS 1141.20.2	1 per 250 m^3 of aggregate (1)
		AS 1141.22	1 per 500 m^3 of aggregate (1), (2)
		AS 1141.41	1 per 6 months and at change of quarry face

Notes:

(1) Frequency of testing may be reduced in accordance with Specification TfNSW Q, subject to the Principal's agreement.

(2) Provided that all of the six previous tests have met specification requirements for both wet strength and wet/dry strength variation then the following reduced frequencies apply:

- where all wet/dry variation results < 25%: 1 per 6,500 m^3
- where all wet/dry variation results < 30%: 1 per 2,500 m^3
- where all wet/dry variation results < 35%: 1 per 1,250 m^3

(3) Aggregate sourced from "drill and blast" quarries may be exempted providing that all other tests have met Specification requirements.

ANNEXURE R113/M – REFERENCED DOCUMENTS

Refer to Clause 1.2.5.

TfNSW Specifications

TfNSW G10	Traffic Management
TfNSW Q	Quality Management System
TfNSW 3151	Aggregate for Sprayed Bituminous Surfacing
TfNSW 3252	Polymer Modified Binder for Pavements
TfNSW 3254	Bitumen Emulsion
TfNSW 3258	Aggregate Precoating Agent (for Bitumen)

TfNSW Test Methods

TfNSW T230	Resistance to Stripping of Cover Aggregates and Binders
TfNSW T238	Initial Adhesion of Cover Aggregates and Binders
TfNSW T239	Fractured Faces of Coarse Aggregate
TfNSW T560	Apparent Bitumen Content of Bitumen Emulsion and Recovery of Bitumen for Testing
TfNSW T741	Determination of Elastic Recovery and Viscosity of Polymer Modified Binders

TfNSW Forms

TfNSW 354	Sprayer Certificate
TfNSW 395D	Bitumen Emulsion Seal and Reseal – Design Calculation
TfNSW 395F	Bitumen Emulsion SAM and SAMI – Design Calculation
TfNSW 500F	Bitumen Emulsion SAM and SAMI – Daily Record

TfNSW Guides

TfNSW Sprayed Sealing Guide

American Society for Testing and Materials

ASTM D244	Test Methods for Emulsified Asphalts

Australian Standards

AS 1141	Methods for Sampling and Testing Aggregates
AS 1141.11	Particle Size Distribution by Dry Sieving
AS 1141.12	Materials Finer than 75 μm in Aggregates (by Washing)
AS 1141.14	Particle Shape, by Proportional Calliper
AS 1141.20.1	Average Least Dimension – Direct Measurement (Nominal Size 10 mm and Greater)

AS 1141.20.2	Average Least Dimension – Direct Measurement (Nominal Sizes 5 mm and 7 mm)
AS 1141.22	Wet/Dry Strength Variation
AS 1141.41	Polished Aggregate Friction Value – Horizontal Bed Machine
AS 1160	Bitumen Emulsions for Construction and Maintenance of Pavements
AS 2341	Methods of Testing Bitumen and Related Roadmaking Products
AS 2341.2	Determination of Dynamic Viscosity by Vacuum Capillary Viscometer
AS 2341.3	Determination of Kinematic Viscosity by Flow Through a Capillary Tube
AS 2341.4	Determination of Dynamic Viscosity by Rotational Viscometer
AS 2341.8	Determination of Matter Insoluble in Toluene
AS 2341.9	Determination of Water Content (Dean and Stark)
AS 2341.12	Determination of Penetration of Residual 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 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

Austroads Documents

AG:PT/T111	Handling Viscosity of Polymer Modified Binders (Thermosel)
AG:PT/T122	Torsional Recovery of Polymer Modified Binders
AP-G41/08	Austroads Bituminous Materials Safety Guide.

British Standards

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