

# ROADS AND MARITIME SERVICES (RMS)

## QA SPECIFICATION R109

### BITUMINOUS SLURRY SURFACING

#### NOTICE

This document is a Roads and Maritime Services QA Specification. It has been developed for use with roadworks and bridgeworks contracts let by Roads and Maritime Services or by local councils in NSW. It is not suitable for any other purpose and must not be used for any other purpose or in any other context.

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#### REVISION REGISTER

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 1/Rev 0		First Issued	GM, RNIC (W Ho)	07.04 97
Ed 1/Rev 1	Annexure R109/C	Schedule of Identified Records added.	GM, RNIC	31.08.01
Ed 2/Rev 0	“Notice”  Global        Annex M	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.  Reference documents updated	GM, IC	24.03.09

<p style="text-align: center;"><b>GUIDE NOTES</b> (Not Part of Contract Document)</p>
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**Using Specification R109**

Specification RMS R109 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 RMS Q. To comply with the intention of government policy as well as RMS R109, bituminous surfacing works carried out using RMS R109 require adequate surveillance and audit by the Principal.

RMS R109 requires the RMS Project Manager to select appropriate parameters identified in RMS R109 and nominate them in Annexure R109/A.

It should be realised that slurry surfacing provides a non-structural wearing surface and is therefore not an appropriate treatment for pavements which exhibit defects such as cracking and bleeding.

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

Suggestions for improvements by contractors or RMS staff should be forwarded to Pavement Surfacing Section or Contracts Quality Section.



## BITUMINOUS SLURRY SURFACING

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VERSION FOR: DATE:
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## FOREWORD

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This copy is not a controlled document. Observe the Notice that appears on the first page of the copy controlled by RMS. A full copy of the latest version of the document is available on the RMS Internet website: [www.rta.nsw.gov.au/doingbusinesswithus/specifications](http://www.rta.nsw.gov.au/doingbusinesswithus/specifications)

### REVISIONS TO PREVIOUS VERSION

This document has been revised from RMS Specification R109 Edition 1 Revision 1.

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 have been 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~~.





# **RMS QA SPECIFICATION R109**

## **BITUMINOUS SLURRY SURFACING**

### **1 GENERAL**

#### **1.1 SCOPE**

The work to be executed under Specification RMS R109 for bituminous slurry surfacing (slurry seal and microsurfacing) consists of:

- (a) component materials;
- (b) mix properties;
- (c) design responsibilities;
- (d) manufacturing and application requirements; and
- (e) sampling and testing.

In RMS R109, the term 'bituminous slurry' or 'slurry' must include 'slurry seal' and 'microsurfacing'. The nominal size of the slurry (e.g. size 5), refers to the largest nominal aggregate size (i.e. 5 mm) of the mix.

The location of corrective and wearing course is nominated in Annexure R109/A.

#### **1.2 STRUCTURE OF THE SPECIFICATION**

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

##### **1.2.1 Details of Work**

Details of work are shown in Annexure R109/A.

##### **1.2.2 Resolution of Nonconformities, Measurement and Payment**

The method of measurement and payment must comply with Annexure R109/B.

Acceptance of materials and work must be in accordance with Annexure R109/B.

##### **1.2.3 Schedules of HOLD POINTS, WITNESS POINTS and Identified Records**

The schedules list the **HOLD POINTS** and **WITNESS POINTS** that must be observed. Refer to Specification RMS Q for the definitions of **HOLD POINTS** and **WITNESS POINTS**.

The records listed in Annexure R109/C are **Identified Records** for the purposes of RMS Q Annexure Q/E.

#### **1.2.4 Reference Documents and Definitions**

Unless otherwise specified the applicable issue of a reference document, other than an RMS 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 R109/M.

“The terms “you” and “your” mean “the Contractor” and “the Contractor’s” respectively.”

### **1.3 PROJECT QUALITY PLAN**

The PROJECT QUALITY PLAN must include each of the documents and requirements listed in Annexure R109/D and must be implemented.

If the Contract does not require the implementation of a PROJECT QUALITY PLAN, the documents listed in Annexure R109/D must be submitted to the Principal for consideration at least 5 working days prior to work commencing and must be implemented.

In all cases where this Specification refers to the Manufacturer’s recommendations, these must be included in the PROJECT QUALITY PLAN.

## **2 SUPPLY OF BITUMINOUS SLURRY SURFACING**

### **2.1 MATERIALS FOR BITUMINOUS SLURRY SURFACING**

#### **2.1.1 Aggregate**

Aggregates must be uniform in quality and particle size distribution. When aggregates are mixed with filler and binder, the resultant slurry must be capable of achieving the properties specified in Clause 2.2.

Mineral aggregate must consist of crushed rock or crushed gravel and may include proportions of natural sand particle, which is clean, dry, hard, tough, sound and free from dust, clay, dirt or other matter deleterious to slurry.

The aggregate must conform to the requirements as set out in Table R109.1.

**Table R109.1 - Aggregate Properties**

<b>Property</b>	<b>Limit</b>	<b>Test Method</b>
Degradation Factor	50 minimum	AS 1141.25
Los Angeles Value		AS 1141.23
Slurry Seal	35 maximum	
Microsurfacing	30 maximum	
Wet Strength	150 kN minimum	AS 1141.22*
Wet/Dry Strength Variation	30% maximum	AS 1141.22*
Polished Aggregate Friction Value	45 minimum	AS 1141.41* and AS 1141.42*
Sand Equivalent		AS 1289.C7.1
Slurry Seal	45 minimum	
Microsurfacing	60 minimum	

\* Testing to be carried out on –13.2 to 9.5 mm fraction of the same material.

Do not use aggregates which deteriorate rapidly either in stockpiles or at the quarry face, even though the aggregates comply with the specified requirements when quarried. If there is any evidence that an aggregate may deteriorate, aggregate samples must be pre-treated in accordance with Test Methods RMS T102 and RMS T103 before testing to verify that the aggregate complies with the specified requirements.

The quantity of dry mineral aggregate (excluding filler) payable under Pay Item R109P2 will be determined by either Method A or Method B as specified in Annexure R109/A and detailed in Annexure R109/B.

### **WITNESS POINT**

Process Witnessed: Sampling and determination of Loose Unit Mass of the reference sample.

Submission Details: Details of time and place of sampling and testing the reference sample, with at least seven days written notice.

#### **2.1.2 Filler**

For the purpose of this Specification, filler is the material passing a 75 µm AS sieve.

All added filler must consist of an approved material such as Portland cement, hydrated lime or fly ash.

Filler must be dry, free from lumps, clay, organic and other deleterious material and must comply with RMS 3211 (or must be “fine grade” in Table 1 of AS 3582.1) .

#### **2.1.3 Binder**

The binders used in this process must be bitumen emulsion, which may be modified so that the mix design meets the performance requirements specified in Clause 2.2.

Where the binder is modified, provide sufficient information for the Principal to be able to verify that the binder supplied is the same as that nominated in the approved mix design.

Bitumen used in emulsion manufacture must comply with the requirements of AS 2008.

#### **2.1.4 Water**

Water added to the slurry must be compatible with the component materials. Water must be potable and free from any deleterious material.

#### **2.1.5 Additives**

Additives may be used to control the breaking and setting time of the mix, depending on ambient conditions and traffic requirements.

State in the mix design the likely range of additive levels expected to be used. Provide supportive test data with the details of the mix which shows that the wear loss, adhesion and excess binder content of the mix design comply with the requirements specified in Clause 2.2 for mixes containing additives at both extremes of the nominated design range.

#### **2.1.6 Tack Coat**

Where required by the process, tack coat must be cationic rapid setting bitumen emulsion conforming to the requirements of AS 1160.

### **2.2 MIX REQUIREMENTS**

The slurry must conform to the requirements shown in Tables R109.2 and R109.3.

**Table R109.2 - Particle Size Distribution Limits  
for Combined Aggregate/ Filler**

Sieve Size (mm)	Percent Passing by Mass				
	Size 3	Size 4	Size 5	Size 7	Size 10
13.2	100	100	100	100	100
9.50	100	100	100	100	95 - 100
6.70	100	100	100	85 - 100	85 - 90
4.75	100	90 - 100	90 - 100	70 - 90	60 - 85
2.36	90 - 100	65 - 90	50 - 70	45 - 70	40 - 60
1.18	65 - 90	45 - 70	30 - 50	28 - 50	28 - 45
0.600	40 - 65	30 - 50	20 - 35	19 - 34	19 - 34
0.300	25 - 42	18 - 30	12 - 25	12 - 25	12 - 25
0.150	15 - 30	10 - 21	7 - 18	7 - 18	7 - 18
0.075	10 - 20	5 - 15	4 - 10	5 - 15	4 - 8

When tested in accordance with AS 1141.11 and AS 1141.12, the aggregate (including filler) must conform to the particle size distribution limits shown above.

**Table R109.3 - Mix Properties**

Property	Test Method	Value	
		Microsurfacing	Slurry Seal
Wear Loss	ISSA TB 100		
	1 hour 6 day	540 g/m <sup>2</sup> maximum <sup>(3)</sup> 800 g/m <sup>2</sup> maximum <sup>(1)</sup>	800 g/m <sup>2</sup> maximum <sup>(2)</sup> Not applicable
Traffic Time	ISSA TB 139		
	30 minutes 60 minutes	12 kN.m minimum 20 kN.m minimum	12 kN.m minimum 20 kN.m minimum
Adhesion	ISSA TB 114	≥ 90%	≥ 90%
	or ISSA TB 144	11 grade points minimum (AAA, BAA)	Not applicable
Excess Binder Content > 3000 v/l/d	ISSA TB 109	Not applicable	540 g/m <sup>2</sup> maximum

**Notes:**

v/l/d: vehicles/lane/day

- (1) Microsurfacing, > 3,000 v/l/d
- (2) As for Microsurfacing if application is for traffic volume > 3,000 v/l/d, otherwise not applicable
- (3) Microsurfacing, ≤ 3,000 v/l/d

**2.3 NOMINATED MIXES****2.3.1 Submission of Nominated Mixes**

Each slurry mix so submitted will be known as a 'nominated mix'.

**HOLD POINT**

Process Held: Commencement of placing of each slurry mix.

Submission Details: Nominated mixes and all relevant test results of the trial batch at least seven days prior to the commencement of bituminous surfacing work .

Release of Hold Point: The Principal will consider the submitted documents, prior to authorising the release of the HOLD POINT.

The aggregate particle size distribution (including filler) and binder content of a nominated mix will be known as the 'nominated aggregate particle size distribution' and the 'nominated binder content' respectively.

### 2.3.2 Variations to Nominated Mixes

#### 2.3.2.1 Variation to Production

During production, the actual combined aggregate/filler particle size distribution must continue to comply with Table R109.2 and variations will be permitted from the nominated aggregate particle size distribution within the limits shown in Table R109.4, without you having to submit a new nominated mix.

During production, the actual binder content may vary from the nominated binder content within the limits shown in Table R109.4 without you having to submit a new nominated mix.

#### 2.3.2.2 Variation to Mixes

If you propose to vary the proportions of the constituents in a nominated mix or propose to change the source of supply of any constituent, submit a new nominated mix in compliance with Clause 2.3.1.

**Table R109.4 - Maximum Permitted Variations from Nominated Mix Design**

Sieve Size (mm)	Maximum Permitted Variation of Aggregate Particle Size Distribution in Percent Passing (by Mass)				
	Size 3	Size 4	Size 5	Size 7	Size 10
13.2	Nil	Nil	Nil	Nil	Nil
9.50	Nil	Nil	Nil	Nil	± 7
6.70	Nil	Nil	Nil	± 7	± 7
4.75	Nil	± 6	± 6	± 6	± 6
2.36	± 5	± 5	± 5	± 5	± 5
1.18	± 5	± 5	± 5	± 5	± 5
0.600	± 4	± 4	± 4	± 4	± 4
0.300	± 3	± 3	± 3	± 3	± 3
0.150	± 2	± 2	± 2	± 2	± 2
0.075	± 1.5	± 1.5	± 1.5	± 1.5	± 1.5
Residual binder content (% by mass of total slurry mix)	-0.5 to +1.0	-0.5 to +1.0	-0.5 to +1.0	-0.5 to +1.0	-0.5 to +1.0

### 2.3.3 Duration of Acceptance

The required testing must have been carried out within the twelve month period prior to the date of submission to the Principal. Perform all phases of any particular test at one laboratory.

The Principal may consider a nominated mix previously approved subject to the following conditions:

- (a) The sources and quality of the component materials in the slurry remain unchanged from the nominated mix;

- (b) The proportions of the component materials in the slurry remain unchanged from the nominated mix;
- (c) The in-service performance of the slurry is acceptable to the Principal.

## **2.4 PRODUCTION OF SLURRY SURFACING**

### **2.4.1 Method of Production**

Your method of production must be such as to:

- (a) limit segregation of the slurry and loss of materials;
- (b) supply a homogeneous conforming product; and
- (c) result in the required workability and cohesion of the slurry, which is compatible with the capacity of the placing equipment, to achieve the specified surface texture and riding quality.

Submit details of the proposed methods of handling, storing and mixing materials for slurry together with details of proposed mixing equipment and mixing procedures as part of the PROJECT QUALITY PLAN.

Submit details of the plant and equipment and methods to be used for placing slurry surfacing, including tack coating and spreading of slurry as part of the PROJECT QUALITY PLAN.

### **2.4.2 Plant**

Prior to the commencement of work, provide evidence to the Principal that the equipment will perform the work as specified and that all metering devices are accurately calibrated.

Calibrate each paving unit to be used in performance of the work with the component materials of the approved mix design prior to the commencement of construction.

Previous calibration documentation covering the same approved mix design may be acceptable provided that the calibration was carried out within the previous 12 month period. The documentation must include an individual calibration for each component material at various settings which can be related to the paving unit's metering devices.

The mixing capacity must be sufficient to supply slurry for continuous operation of the paving unit.

### **2.4.3 Storage and Handling of Binder**

The procedures for storage and handling of binder must state the means to avoid contamination of the binder by flushing liquids or other materials.

## **2.5 SAMPLING AND TESTING OF SLURRY**

### **2.5.1 General**

Your testing program must be such that the lot sizes are not greater than 50 m<sup>3</sup> and the testing frequencies and number of tests must be as specified in Annexure R109/L.

### **2.5.2 Emulsion Sampling**

Take two 2 L samples of bitumen emulsion from each bulk delivery in accordance with AS 1160.

### **2.5.3 Slurry Sampling**

Obtain two 1.5 kg samples of slurry from each lot of random intervals to be representative of the lot. Take the samples at the point of discharge from the paving unit. Seal the sample containers immediately.

### **2.5.4 Testing**

Determine the quality of the slurry mix by testing in accordance with Table R109.3.

Determine the quality of the surface finish according to the requirements set out in Table R109.5.

Treat and test the sample of slurry obtained in accordance with Clause 2.5.3 as follows to ensure that the slurry complies with the requirements specified in Tables R109.2 and R109.4:

- (a) Dried to constant weight in an oven at 60°C for a minimum of 15 hours,
- (b) Binder content and aggregate particle size distribution determined by AS 2891.3.1 for conventional bitumen binder, or by the method specified in the PROJECT QUALITY PLAN for a polymer modified binder.

Each delivery of emulsion must be tested for residual binder content or accompanied by test certificates showing conformity to Specification and traceable to the relevant batch at your storage tank. If testing is required, then test one sample of emulsion obtained in accordance with Clause 2.5.2 for Residue from Evaporation by AS/NZS 2341.23 and retain a second sample for reference.

### **2.5.5 Texture Tests**

If the slurry is applied as a wearing course, undertake texture depth tests in accordance with Test Method RMS T240 in the wheel paths after one month of trafficking. Take a minimum of four tests per lot and the arithmetic mean must be the representative value used to determine the conformity with the appropriate specified limit given in Table R109.5. For this purpose, consider each individual run of the paving unit as a separate lot.

## **3 PREPARATION OF PAVEMENT**

### **3.1 SET OUT**

Set out the work so that the paving unit follows the required line while mixing and spreading the slurry.

Take care to produce straight lines along kerbs and shoulders and to ensure that no runoff of slurry onto these areas will occur. Keep lines at intersections straight to provide a good appearance. If necessary, use masking to provide straight lines.

### **3.2 CLEANING**

Do not commence laying of slurry until the pavement has been swept and the surface is free of loose material, stones, dirt, dust and foreign matter.



### **3.3 PROTECTION OF SERVICES AND ROAD FIXTURES**

Take all necessary precautions to prevent the slurry 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 the slurry has been spread, clean off or remove any such material and leave the services and road fixtures in a condition equivalent to that existing when you commenced the surfacing work.

### **3.4 SURFACE DEFECTS**

Where specified in Annexure R109/A, repair surface defects as shown on the Drawings prior to the commencement of work. This may include crack filling, pot-hole repairs and repairs to failed pavement.

### **3.5 TACK COAT**

A tack coat is required where the surface is extremely oxidised and ravelled or comprises concrete or brick. If required, apply a tack coat of cationic rapid setting bitumen emulsion conforming to the requirements of AS 1160. The application rate of bitumen emulsion must be between 0.2 and 0.4 L/m<sup>2</sup>. Apply the tack coat in sufficient time for the bitumen emulsion to break before the commencement of slurry spreading.

### **3.6 WATER FOG SPRAY**

The surface may be pre-wet by applying a light spray of water (a fog spray) ahead of the spreader box. Spray water so that the entire surface is damp with no apparent water flowing ahead of the spreader box. Adjust the application rate of the fog spray to suit temperature, surface texture, humidity and dryness of the surface being covered.

## **4 PLACEMENT OF SLURRY SURFACING**

### **4.1 GENERAL**

The type and size of slurry surfacing and the thickness must be as shown on the Drawings or as listed in Annexure R109/A.

Place the slurry surfacing so as to:

- (a) limit segregation and loss of materials;
- (b) produce a homogeneous conforming product; and
- (c) provide the specified thickness of slurry surfacing.

Use hand placement of slurry surfacing only for minor correction of the existing surface and in areas where placement with a paving unit is impracticable.

**WITNESS POINT**

Process Witnessed: Placing of slurry surfacing.

Submission Details: At least seven days written notice of intention to commence.

**4.2 LOT IDENTIFICATION AND TRACEABILITY**

On request, provide the Principal with a list of all lots on which work commenced on each working day indicating the estimated quantities for the lot, scheduled items included in the lot and replacement lot numbers (for rejected lots).

**4.3 RUT-FILLING AND CORRECTION**

Where wheel ruts are 15 mm or more in depth, apply a rut-filling or correction course, prior to placing the wearing course. Carry out rut-filling and correction using a spreader box capable of laying slurry across the varying cross-sectional depth such that it fills the rut and is stable.

**4.4 SPREADING**

The slurry must be a homogeneous mixture when deposited in the spreading box. Do not add any further materials other than small amounts of water for the purpose of overcoming temporary build-up of slurry in the corners of the spreader box. The mixing time must be sufficient to produce a complete and uniform coating of the aggregate and the resulting mixture must be conveyed into the moving spreader box at a rate sufficient to always maintain an ample supply across the full width of the strike-off. Adjust the strike-off to provide an application rate which will completely fill the surface voids and a nominal application rate of slurry as scheduled.

**4.5 SURFACE FINISH**

Where improved surface texture is specified in Annexure R109/A, a fabric skirt may be trailed behind the spreader box.

Demonstrate the surface texture on a short test run prior to full scale manufacture and spreading of slurry, to verify conformity with Clause 5. This will be referred to as a “demonstrated trial” hereafter.

**WITNESS POINT**

Process Witnessed: Demonstrated trial.

Submission Details: At least seven days written notice of intention to commence the demonstrated trial.

**4.6 WEATHER CONDITIONS**

Do not place slurry if either the pavement or air temperature is below 10°C and falling. Slurry may be placed only when both pavement and air temperatures are above 7°C and rising. Spreading must not proceed during rain or when rain appears imminent.

**4.7 SHAPE**

For each section of 50 m length or part thereof, identify areas of greater than 15 mm rut depth. Determine the maximum rut depth in each of those areas. The finished surface must not deviate from the bottom of a 3 m long straight edge laid in any direction by more than two thirds of the original average maximum deviation measured on any existing or regulated surface.

**4.8 EDGES AND JOINTS**

Place the longitudinal joints of a wearing course at either the edge or the centre of a traffic lane. If necessary, lightly screed the edges and joints with a hand squeegee to achieve a smooth uniform appearance and to remove excess build-up of material.

At any cross section, the horizontal dimension from the design centreline to the edge of the slurry surfacing must not be less than that specified. The edges and joints must not deviate from their specified locations by more than one hundred (100) mm. The edges and joints must not deviate from a three (3) metre straight edge by more than fifty (50) mm.

**4.9 PROTECTION OF WORK**

Provide for traffic in accordance with the requirements of Specification RMS G10 while undertaking the work and protect the work until the slurry has cured sufficiently to carry traffic without permanent damage.

Slurry must be capable of carrying slow moving traffic (< 40 km/h) within one hour of application without damage such as rutting or ravelling. When the time before the slurry is capable of carrying traffic exceeds one hour, work must cease if so directed by the Principal.

**5 FINISHED PAVEMENT PROPERTIES****5.1 SURFACE TEXTURE**

Measure the finished surface texture requirements of the pavement (See Clause 2.5.5) in terms of the texture depth after trafficking for at least one month in the wheel path when exposed binder films on the aggregate have been worn off. The texture depths must be not less than those specified in Table R109.5.

**Table R109.5 - Surface Finish Requirements for Wearing Course**

<b>Nominal Size of Slurry</b>	<b>Texture Depth (mm)</b>	<b>Test Method</b>
Size 3	Not applicable	
Size 4	0.4 minimum	RMS T240
Size 5	0.4 minimum	RMS T240
Size 7	0.8 minimum	RMS T240
Size 10	1.2 minimum	RMS T240

## **5.2 LAYER THICKNESS**

Check layer thickness tolerances given in Annexure R109/A by random sampling over the total length of the lot in accordance with RMS Q.

## **5.3 SHAPE**

The finished shape of the pavement must be as specified in Clause 4.7.

**ANNEXURE R109/A – PROJECT SPECIFIC REQUIREMENTS**

Pavement Type:

Location:

<b>Description</b>	<b>Corrective Course 1</b>	<b>Corrective Course 2</b>	<b>Wearing course</b>
Type and nom. size of Slurry			
Binder			
Nom. thickness			
Thickness tolerance	N/A	N/A	
Area (m <sup>2</sup> )			
Estimated Qty.(m <sup>3</sup> )			

Surface Defects Repairs  
(Clause 3.4)**Yes / No**Improved surface texture required  
(Clause 4.5)**Yes / No**\*Method of Measurement of Aggregate  
(Annexure R109/B1)**Method A / Method B****\*NB: Method B preferred by the ACT Government.**

**ANNEXURE R109/B – MEASUREMENT AND PAYMENT****B1 MEASUREMENT AND PAYMENT**

Payment for the activities associated with completing the work detailed in this Specification is made in accordance with the following Pay Items.

A lump sum price for any of these items will not be accepted.

If any item for which a quantity of work is listed in the Schedule of Rates has not been priced by you, it will be deemed that due allowance has been made in the prices of other items for the cost of the activity which has not been priced.

**Pay Item R109P1 - Surface Preparation**

Payment at the schedule rate must be full compensation for set out, cleaning, protection of services, correction of surface defects, tack coat and water fog spray as detailed in this Specification.

The unit of measurement must be the square metre.

The measurement must be the area of road surface shown on Drawings or as directed to be covered by slurry surfacing.

No account must be taken of area cleaned or where tack coat is applied to faces of joints, kerbs and other structures.

**Pay Item R109P2 - Supply of Slurry Surfacing Material**

Slurry seal and microsurfacing must be measured by the quantity used in the work, of dry mineral aggregate (excluding filler) used in completing the works as set out in this Specification. Payment at the schedule rate must be full compensation for supply of materials to the site.

The quantity of dry mineral aggregate (excluding filler), will be determined by either method A or B as set out below and given in Annexure R109/A.

**(a) Method A - Volume Measurement**

The quantity of the dry mineral aggregate will be determined from the dimensions of the stockpile(s).

For this purpose, shape the stockpile(s) to the following requirements:

<b>Section</b>	<b>Dimension</b>
Base	Rectangular or square in plan
Height	A constant height, maximum 2 m
Side Slopes	Between 1.5 horizontal to 1 vertical and 2 horizontal to 1 vertical
Top Surface	Trimmed Flat

If additional material is required for repairs of nonconformities, the stockpile must be reshaped and remeasured.

**(b) Method B - Mass Measurement**

The total mass of mineral aggregate will be determined from the tally of the masses on the weighbridge docket which represent the delivered material. The total dry mass of mineral aggregate must be determined by correcting of moisture content.

The dry mass must be converted to a volume by dividing the mass by the dry density (i.e. LUM), in tonnes per cubic metre, of the dry mineral aggregate. Loose Unit Mass (LUM) must be agreed by the Principal from a reference sample chosen at random from the delivered material.

**R109P2.1** 3 mm Nominal Size

**R109P2.2** 4 mm Nominal Size

**R109P2.3** 5 mm Nominal Size

**R109P2.4** 7 mm Nominal Size

**R109P2.5** 10 mm Nominal Size

The unit of measurement must be the cubic metre of dry mineral aggregate (not including filler).

A separate unit rate must be included in the Schedule of Rates for each nominal size of slurry specified.

**Pay Item R109P3 - Laying and Spreading of Slurry Surfacing**

Payment at the schedule rate must be full compensation for mix design, demonstrated trials, moisture content determinations, loading, mixing and spreading the slurry including finishing, joints treatment, rolling if required, hand work and clean up.

**R109P3.1** 3 mm Nominal Size

**R109P3.2** 4 mm Nominal Size

**R109P3.3** 5 mm Nominal Size

**R109P3.4** 7 mm Nominal Size

**R109P3.5** 10 mm Nominal Size

The unit of measurement must be the square metre.

The measurement must be the area of slurry surfacing in place. The dimensions must be as specified on the Drawings or as directed.

**B2 RESOLUTION OF NONCONFORMITIES**

**B2.1 General**

If the nonconformity is not acceptable in accordance with Annexure R109/B2.2, the nonconforming material must be replaced or the nonconforming section of slurry 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 which conform to this Specification.

**B2.2 Acceptance of Nonconformities**

The Principal may accept a nonconforming slurry if it is overlaid as agreed by the Principal and at no additional cost to the Principal.

Nonconformities may be accepted by the Principal subject to a percentage reduction in value (as shown in Table R109/B1) to the schedule rate applied to the quantity as slurry represented by the test sample for aggregate particle size distribution and binder content.

**Table R109/B1 - Reduction in Value**

Number of Lot Defects per 50 m <sup>3</sup> *	1-2	3	4	5	6	≥ 7
% Reduction in Value	2	5	10	15	20	Remove and replace

\* Rounded to the nearest whole number.

The determination of defects must be based on variations, in test samples, of the combined aggregate/filler particle size distribution and binder content from the nominated mix design.

When a test result value exceeds the maximum permitted variations for the nominated mix, it is regarded as a defect (refer Table R109/B2). The total number of defects in a lot is calculated as the number of defects in the two samples representing that lot.

In the case of a terminated lot, for which only one sample has been obtained, the number of defects must be twice the number of defects in the sample.

**Table R109/B2 - Defects Schedule**

Measurement	Variations *	Number of Defects
% Passing Sieve Size (mm)		
13.2 9.50 6.70 4.75 2.36 1.18 0.600 0.300 0.150	1 or 2 measurements  3 measurements	1  2
0.075	Each increment of 0.5%	1
Binder content (% mass)	Each increment of 0.25% outside range of +1.0% and -0.5% from nominated binder content	1

\* Where the percent passing each sieve is outside the maximum permitted variations from the nominated mix design.



## **ANNEXURE R109/C – SCHEDULES OF HOLD POINTS, WITNESS POINTS AND IDENTIFIED RECORDS**

Refer to Clause 1.2.3.

### **C1 SCHEDULE OF HOLD POINTS AND WITNESS POINTS**

<b>Clause</b>	<b>Type</b>	<b>Description</b>
2.1.1	Witness	Sampling and determination of Loose Unit Mass
2.3.1	Hold	Submission of nominated mixes
4.1	Witness	Notice of intention to commence placement
4.5	Witness	Notice of intention to commence demonstrated trial

### **C2 SCHEDULE OF IDENTIFIED RECORDS**

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

<b>Clause</b>	<b>Description of Identified Record</b>
2.1.1	Sampling and determination of Loose Unit Mass of reference sample
2.3.1	Nominated mixes and all relevant test results of the trial batch

**ANNEXURE R109/D – PLANNING DOCUMENTS**

Refer to Clause 1.3. 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.

<b>Item</b>	<b>Clause</b>	<b>Description of Document</b>
1	1.3	Manufacturer's recommendations referred to in this Specification
2	2.1	<p>Details of materials</p> <p>(a) Types and source of materials use</p> <p>(i) Aggregate (including geological type)</p> <p>(ii) Filler</p> <p>(iii) Binder (including class or grade)</p> <p>(iv) Water</p> <p>(v) Additives</p> <p>(vi) Tack coat</p> <p>(b) Technical specification for additives used</p> <p>(c) Relevant test results verifying material properties for all materials</p> <p>(d) Material Safety Data Sheets</p>
3	2.3.1	<p>Submission of nominated mix</p> <p>(a) For each mix design</p> <p>(i) Nominated size of mix design</p> <p>(ii) Combined aggregate/filler particle size distribution</p> <p>(iii) Emulsion content</p> <p>(iv) Nominated (residual) binder content</p> <p>(v) Intended proportion of each component material</p> <p>(vi) The range of application rate and average depth per layer</p> <p>(vii) The range of additive levels to be used and supportive data</p> <p>(b) Test results of a trial batch: for each nominated mix produced by the paving unit from which the slurry is to be supplied</p>
4	2.4	<p>Production of slurry surfacing</p> <p>Details of mixing equipment including calibration of all metering devices</p> <p>Details of the proposed method of mixing and placing of the slurry</p> <p>Documentary evidence from you that equipment has sufficient capacity to supply slurry for continuous operation of the paving unit</p> <p>Procedures for the storage and handling of binder</p> <p>Method to ensure preventions of segregation and contamination of the binder by flushing liquid or other materials</p> <p>Procedures for the storage and handling of slurry</p>

<b>Item</b>	<b>Clause</b>	<b>Description of Document</b>
5	2.5	Sampling and testing of slurry Details of the sampling and testing frequency Procedures for testing binder content and particle size distribution
6	3	Placement of asphalt Details of the plant and equipment used for placing slurry Procedures for preparation of pavement including removal of existing markings Procedures for placing slurry including tack coating and spreading of slurry Procedures for protection of services and road fixtures Traffic control procedure Procedures for tack coat and water fog spray
7	5	Finished pavement properties Details for measuring the surface texture including timing and personnel employed Method used to verify the consistency of the layer thickness Method of measuring the shape of the pavement

**ANNEXURES R109/E TO R109/K – (NOT USED)**

**ANNEXURE R109/L – MINIMUM FREQUENCY OF TESTING**

<b>Clause</b>	<b>Characteristic Analysed</b>	<b>Test Method</b>	<b>Minimum Frequency of Testing</b>
2.5	Surface Texture	RMS T240	As set out in Clause 2.5.5
2.5	Binder Content	AG:PT/T108	As set out in Clause 2.5.4
2.5	Aggregate Particle Size Distribution	AS 1141.11 and AS 1141.12	As set out in Clause 2.5.4
2.5	Residual from Evaporation	AS/NZS 2341.23	As set out in Clause 2.5.4

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## **ANNEXURE R109/M – REFERENCE DOCUMENTS**

Refer to Clause 1.2.4.

### **RMS Specifications**

RMS G10	Traffic Management
RMS Q	Quality Management System
RMS 3211	Cements, Binders and Fillers

### **RMS Test Methods**

RMS T102	Pretreatment of Road Materials by Compaction
RMS T103	Pretreatment of Road Materials by Artificial Weathering
RMS T240	Texture Depth of Coarse Textured Road Surfaces

### **RMS Guides**

RMS Sprayed Sealing Guide

### **Australian Standards**

AS 1141.11	Particle Size Distribution by Dry Sieving
AS 1141.12	Material Finer than 75 µm in Aggregates (by washing)
AS 1141.22	Wet/Dry Strength Variation
AS 1141.23	Los Angeles Value
AS 1141.25	Degradation Factor - Source Rock
AS 1141.41	Polished Aggregate Friction Value - Horizontal Bed Machine
AS 1141.42	Pendulum Friction Test (PAFV)
AS 1160	Bitumen Emulsions for Construction and Maintenance of Pavements
AS 1289.C7.1	Determination of the Sand Equivalent of a Soil using a Power Operated Shaker
AS 2008	Residual Bitumen for Pavements
AS/NZS 2341.23	Determination of Residue from Residue
AS 2891.3.1 <sup>#</sup>	Bitumen Content and Aggregate Grading (Reflux Method)
AS 3582.1	Supplementary Cementitious Materials for Use with Portland and Blended Cements – Fly Ash

### **AUSTROADS Documents**

AG:PT/T108	Segregation of Polymer Modified Binders
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### **International Slurry Surfacing Association:**

ISSA TB 100	Test Method for Wet Track Abrasion of Slurry Surfaces
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ISSA TB 109	Test Method for Measurement of Excess Asphalt in Bituminous Mixtures by Use of a Loaded Wheel Tester and Sand Adhesion
ISSA TB 114	Wet Stripping Test for Cured Slurry Seal Mix
ISSA TB 139	Test Method to Classify Emulsified Asphalt/Aggregate Mixture Systems by Modified Cohesion Tester Measurement of Set and Cure Characteristics
ISSA TB 144	Test Method for Classification of Aggregate Filler-Bitumen Compatibility by Schulze-Breuer and Ruck Procedure