

ROADS AND MARITIME SERVICES (RMS)

QA SPECIFICATION R119

OPEN GRADED ASPHALT

NOTICE

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REVISION REGISTER

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 1/Rev 0		New specification. Previously, open graded asphalt was part of R116.	GM, IC	19.05.11
Ed 1/Rev 1	1.1 4.5	Performance period of asphalt clarified. Ride quality measurement clarified to be in accordance with T188 (quarter-car model).	GM, IC (W Stalder)	24.06.11
Ed 1/Rev 2	Annex A	Second table amended with respect to ride quality measurement.	GM, IC (M Andrew)	24.01.12

GUIDE NOTES (Not Part of Contract Document)

Using Specification R119

RMS R119 is a QA specification and the use of QA specifications requires the implementation of a quality system by the Contractor that meets the quality system requirements specified in RMS Q. To comply with the intention of government policy as well as RMS R119, asphalt works constructed using RMS R119 require adequate surveillance and audit by the Principal.

The RMS Project Manager must adapt the Model RMS R119, including its Annexures, to suit the project.

The requirements of open graded asphalt was previously incorporated as part of R116.

Clause 2.1.1 Coarse Aggregates

This specification relies on Materials Specification RMS 3152, and RMS Project Managers must complete Annexure 3152/A which addresses such matters as Minimum PAFV.



OPEN GRADED ASPHALT

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VERSION FOR: DATE:

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FOREWORD

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REVISIONS TO PREVIOUS VERSION

This document has been revised from RMS Specification R119 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 R119

OPEN GRADED ASPHALT

1 GENERAL

1.1 OVERVIEW

The Specification out the requirements for asphalt for use as a wearing course to reduce aquaplaning on high speed traffic roads. It is generally not recommended for high stress or low speed situations.

For all paving operations, a material transfer vehicle (MTV) must be used unless specified otherwise in Annexure R119/A.

During the first 12 months after the Date of Completion:

- (a) the asphalt must not ravel, rut, shove, strip or bleed; and
- (b) the asphalt must comply with the surface shape requirements specified in this Specification plus 3 mm.

1.2 SCOPE

The work to be executed under this Specification consists of:

- (a) the design of the asphalt mix(es);
- (b) the supply, production and transport of the asphalt;
- (c) the preparation and application of tackcoat on the surface on which the asphalt is to be placed;
- (d) the placement and compaction of asphalt;
- (e) all inspection and testing necessary to demonstrate that the quality requirements of this Specification have been achieved.

1.3 STRUCTURE OF THE SPECIFICATION

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

1.3.1 Project Specific Requirements

Project Specific Requirements are shown in Annexure R119/A.

1.3.2 Measurement and Payment and Disposition of Nonconformities

The method of measurement and payment must comply with Annexure R119/B1.

Acceptance of materials and work must be in accordance with Annexure R119/B2.

1.3.3 Schedules of HOLD POINTS and Identified Records

The schedule detailed in Annexure R119/C lists the **HOLD POINTS** that must be observed. Refer to Specification RMS Q for the definition of **HOLD POINTS**.

The records listed in Annexure R119/C are **Identified Records** for the purposes of RMS Q Annexure Q/E.

1.3.4 Planning Documents

The PROJECT QUALITY PLAN must include each of the documents and requirements shown in Annexure R119/D and must be implemented.

If the Contract does not require you to implement a PROJECT QUALITY PLAN, the documents shown in Annexure R119/D must be submitted to the Principal for consideration at least 5 working days prior to work commencing and must be implemented.

Include in the PROJECT QUALITY PLAN, all manufacturers' recommendations indicated in this Specification.

Adopt the following documents for procedure(s) not specifically addressed in this Specification:

- (a) AS 2150 "Hot mix asphalt - A guide to good practice"; and
- (b) AGPT04B/07 Austroads "Guide to Pavement Technology Part 4B: Asphalt".

1.3.5 Requirements for Technical Procedures

Include a detailed procedure in your PROJECT QUALITY PLAN to demonstrate how thickness requirements will be met.

1.3.6 Testing Procedures

Your Inspection and Test Plan must nominate the proposed testing frequency to verify conformity of the item, which must not be less than the frequency specified in Annexure R119/L.

Where a minimum frequency is not specified, nominate an appropriate frequency.

1.3.7 Referenced Documents

Unless otherwise specified or is specifically supplied by the Principal, the applicable issue of a reference document 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 1234). For convenience, the full titles are given in Annexure R119/M.

1.4 DEFINITIONS AND ABBREVIATIONS

1.4.1 Definitions

In this Specification:

- (a) the terms "you" and "your" mean "the Contractor" and "the Contractor's" respectively;
- (b) the term "asphalt" used in this Specification refers to open graded asphalt.

Other definitions are in accordance with the Glossary of Austroads Terms.

1.4.1 Abbreviations

The following abbreviations apply to this Specification:

AAPA	Australian Asphalt Pavement Association
AC or DG	Dense graded asphalt
OG	Open Graded Asphalt
IRI	International Roughness Index
MTV	Material Transfer Vehicle
MBV	Methylene Blue Value
NATA	National Association of Testing Authorities
N/A	Not Applicable
PAFV	Polished Aggregate Friction Value
PQP	Project Quality Plan
RAP	Reclaimed Asphalt Pavement
SSD	Saturated Surface Dry
TSR	Tensile Strength Ratio
VMA	Voids in Mineral Aggregate

2 SUPPLY OF ASPHALT

2.1 MATERIALS FOR ASPHALT

All materials used in the manufacture of asphalt must comply with the requirements of this Specification and maintain uniform appearance for the duration of the work.

2.1.1 Coarse Aggregate

Coarse aggregate must comply with Specification RMS 3152.

When aggregates from a specific source or type, or when aggregate with a high PAFV or other special characteristics are specified, 100% of the coarse aggregate in the asphalt must comply with this requirement.

2.1.2 Fine Aggregate

Fine aggregate must comply with Specification RMS 3152.

2.1.3 Recycled Materials

2.1.3.1 Reclaimed Asphalt Pavement Material

Reclaimed asphalt pavement material must not be used.

2.1.3.2 Granulated Glass Aggregate

Granulated glass aggregate must not be used.

2.1.4 Filler

The total filler in asphalt is the combined fraction of fines produced from the crushing of aggregates and any added filler which passes the 0.075 mm AS sieve.

Filler must meet the following requirements:

- (a) Added filler must conform to Specification RMS 3211.
- (b) The dry compacted voids content of the total filler fraction in asphalt determined in accordance with AS 1141.17 must be 40% or greater.
- (c) The methylene blue value of the total filler in asphalt (excluding hydrated lime) determined in accordance with Test Method RMS T659 must not exceed 10 mg/g.

2.1.5 Binder

The class of binder used in the Works is specified in Annexure R119/A, and unless otherwise specified the binder must be Class A15E.

The binder must comply with the requirements of Specification RMS 3252. Provide documentary evidence of the binder conformity for each delivery used in the work.

2.1.6 Additives

(a) Bitumen Adhesion Agent

You may propose to use a bitumen adhesion agent complying with Specification RMS 3269 except:

- (i) Test Method AS 1141.50 is substituted for Test Method RMS T230; and
- (ii) in all cases, the test is conducted using the binder specified in Annexure R119/A or where not specified use Class A15E.

(b) Fibre Additive

Only cellulose fibre is permitted to be used.

You may propose and use, subject to approval by the Principal, an alternative fibre additive provided that you submit documented evidence of successful use or trial of such fibre additive under circumstances similar to those which exist under the Contract.

In all cases, the technical specification for the fibre additive and manufacturer's recommendations on the application, handling and incorporation of the fibre additive into asphalt must be attached to your PROJECT QUALITY PLAN.

2.1.7 Bitumen Emulsion Tackcoat

Bitumen emulsion for use as a tackcoat must be CRS/170-60 complying with AS 1160 unless otherwise approved by the Principal.

2.2 REQUIREMENTS FOR ASPHALT

2.2.1 Proportions of Constituents

The following constituents and proportions are permitted:

(a) Combined Particle Size Distribution of Aggregate

The combined particle size distribution of aggregate, when determined in accordance with AS 2891.3.1, must conform to Table R119.1.

Table R119.1 – Combined Particle Size Distribution Limits for Different Nominal Size of Open Graded Asphalt

AS Sieve Size	Combined Particle Size Distribution Passing Limits for Nominal Size of Asphalt (% by mass) (Asphalt Designation)	
	10 mm (OG10)	14 mm (OG14)
53.0 mm		
37.5 mm		
26.5 mm		
19.0 mm		100
13.2 mm	100	85 – 100
9.50 mm	85 – 100	65 – 95
6.70 mm	50 – 80	35 – 75
4.75 mm	25 – 55	15 – 45
2.36 mm	10 – 35	3 – 25
1.18 mm	0 - 19	0 – 20
0.600 mm	#	#
0.300 mm	#	#
0.150 mm	#	#
0.075 mm	0 – 4	0 – 4
<p>Note: Where the particle size distribution is shown as “#”, you must state the values of the Particle Size Distribution limits in your nominated mix design submission and in the trial and production mixes reporting.</p>		

(b) Binder

In the nominated mix design, the proportion of binder expressed as a percentage by mass of the total mix must comply with the requirements of Table R119.2.

Determine the binder content in accordance with AS 2891.3.1.

Table R119.2 – Binder Content

Nominal Size of Open Graded Asphalt (Asphalt Designation)	10 mm (OG10)	14 mm (OG14)
Binder Content (% by mass of total mix)	3.8 – 5.7	3.4 – 5.2
Note: The specified binder content range is applicable to commonly used natural sources of asphalt aggregates and sands. If you propose to use constituents of substantially different density, then you may propose and use, subject to the Principal's approval, a non-conforming binder content provided that you demonstrate volumetric proportions within the proposed nominated mix which are consistent with the intent of the Specification.		

(c) Hydrated Lime

Asphalt must contain, by mass of total aggregate, not less than 1.0% hydrated lime complying with Specification RMS 3211.

(d) Adhesion Agent

Asphalt may contain bitumen adhesion agent not exceeding 1.0% by mass of the binder.

(e) Fibre Additive

Asphalt may contain fibre. Nominate the amount of fibre used in the asphalt.

2.2.2 Volumetric Characteristics

For laboratory compacted asphalt, the air voids determined in accordance with Test Method RMS T662 (80 cycles of compaction), AS 2891.7.3, AS 2891.8 and AS 2891.9.3 must be $\geq 20.0\%$ and $\leq 25.0\%$.

The binder film index must be greater than 15 microns when determined in accordance with AS 2891.8 or Austroads AGPT/T237.

2.2.3 Moisture Content

For all mixes produced in a drum plant, the moisture content must be $< 0.5\%$ by mass of total mix when determined in accordance with Test Method RMS T660.

2.3 NOMINATED MIXES

The nominated mix design submission must:

- (a) satisfy the requirements of this Specification; and
- (b) be targeted during production of the asphalt.

The nominated mix design submission is:

- (i) materials specific, and substitution of constituents is not permitted;
- (ii) design specific, and variation to the design nominated mix submission is not permitted;
- (iii) asphalt plant specific, and except for component maintenance, changes in the components, configuration and/or location of the plant is not permitted;

- (iv) contract specific, and release of the Nominated Mix Hold Point under another contract is not applicable to this Contract.

For each new establishment of a mobile asphalt plant, a full nominated mix submission is required.

2.3.1 Submission of Nominated Mixes

Unless specified otherwise, all tests relating to the submission must be carried out within a three month period prior to the date of submission to the Principal. All phases of any particular test must be performed at the same laboratory.

Submit to the Principal one nominated mix design for each asphalt mix specified in Annexure R119/A. Include the following details in the nominated mix design submission:

(a) Constituent materials

- (i) Coarse and fine aggregates – source, geological type.
Aggregate of different type or quality from the same quarry face or within a quarry will be regarded as a different source.
- (ii) Added filler – type, grade and source.
- (iii) Binder – source, class or grade.
- (iv) Additives – type, source, trade name and manufacturer’s recommendations.
- (v) Bitumen emulsion tackcoat – source, class of bitumen, any bitumen modification.

(b) Mix Design

- (i) Proportion of each constituent by percentage of mass of total mix.
- (ii) For each nominated mix design, the results nominating values and allowable tolerances, where required, for each requirement for the asphalt specified in Clause 2.2.
- (iii) Graphical representation of the nominated combined particle size distribution with control points as required by the limits of Table R119.1 and the production tolerances in accordance with Table R119.3.
- (iv) The type and identification number of the asphalt mixing plant.
- (v) The temperature range at which the asphalt is to be manufactured.

(c) Production Trial

All production trial tests on each nominated mix must be from one trial batch. The tests on the constituent materials must represent the materials used in this trial batch.

(d) Signed Statement

A signed statement confirming that each nominated and production trial mix including all constituents meet the requirements of Clauses 2.1 and 2.2. The statement must include NATA endorsed test results for all specified tests. Attach a copy of your completed verification checklist.

HOLD POINT

Process Held:	Submission of the nominated mix(es)
Submission Details:	Documents as detailed in Clause 2.3.1 at least 7 working days before the nominated mix(es) is (are) proposed to be placed.
Release of Hold Point:	The Principal will consider the submitted documents prior to authorising the release of the Hold Point.

2.4 PRODUCTION OF ASPHALT**2.4.1 Method of Production**

Adopt a method of production that:

- (a) controls the process and targets the nominated mix; and
- (b) supplies a homogeneous and consistent product at the nominated manufacturing temperature.

2.4.2 Production Tolerances**2.4.2.1 Proportions of Constituents**

The proportion of each constituent may be temporarily varied for the purpose of process control provided that:

- (a) the proportion of each constituent, with the exception of added filler, must not be varied by more than 10% of the value nominated; and
- (b) the proportion of each added filler must not be varied by more than 15% of the value nominated.

2.4.2.2 Combined Particle Size Distribution and Binder Content

The actual combined particle size distribution and actual binder content may vary from the nominated value within the limits shown in Table R119.3, provided that the actual values also remain within the limits of Tables R119.1 and R119.2 respectively.

Table R119.3 – Production Tolerances

Description	Tolerance
Permissible variation to nominated combined particle size distribution during production (% by mass of total aggregate, AS 2891.3.1) for each mix size:	
Pass 4.75 mm AS sieve and larger	± 7
Pass 2.36 mm and 1.18 mm	± 5
Pass 0.600 mm and 0.300 mm	± 4
Pass 0.150 mm	± 2.5
Pass 0.075 mm	± 1.5
Permissible variation to the nominated binder content during production (% by mass of total mix, AS 2891.3.1)	± 0.3

2.4.3 Asphalt Manufacturing Plant

Operate the asphalt manufacturing plant with adequate production process controls to produce asphalt of a consistent quality and conforming to the requirements of this Specification. The production control system must produce auditable records of key process parameters including individual aggregate and filler feed rates/batch masses, binder application rate/batch mass and various process temperatures.

Implement a documented procedure for the management and control of the moisture content of each constituent aggregate material. Moisture content must be determined at least daily, and the asphalt manufacturing process controls adjusted to suit.

The asphalt manufacturing plant must have sufficient capacity to supply asphalt for a continuous operation of the paver.

2.4.4 Storage and Handling

(a) Binder

Heating and storage of binder must comply with the temperature and time limits set out in Advisory Note 7 published by the Australian Asphalt Pavement Association.

Provide details in your PROJECT QUALITY PLAN of the procedures for acquisition, storage and handling of binder which identify and prevent segregation and/or contamination of the binder and implement them.

At the asphalt manufacturing plant, binder supplied in accordance with Specification RMS 3252 must be recirculated in delivery and/or storage tanks to a uniform consistency immediately prior to its use in the manufacturing process.

(b) Asphalt

Do not retain the asphalt in hot storage silos.

2.4.5 Manufacturing Temperatures

Control the temperatures of constituent materials in response to suitable thermometer elements placed in the flow of materials from the drier, and in the binder storage system or binder supply line. Thermometer registrations must be readable and accurate to within $\pm 2^{\circ}\text{C}$.

The difference in temperature between binder and aggregate must not exceed 30°C at the point of mixing.

Measure and record the temperature of the asphalt:

- (a) as the asphalt leaves the pugmill or mixing drum; or
- (b) in the trucks prior to leaving the plant.

The dispatch temperature of the asphalt must facilitate the specified density in the finished product. Provide details of the project specific process temperatures and the frequency of recording in your PROJECT QUALITY PLAN.

The temperature of asphalt must not at any time in the process exceed 175°C .

2.4.6 Sampling

Asphalt samples must be taken in accordance with AS 2891.1.1 at the frequency specified in Annexure R119/L.

2.5 TRANSPORT OF ASPHALT

The transport of asphalt must be in accordance with the requirements in AS 2150. State in your PROJECT QUALITY PLAN the method of application and control of release agent to ensure a uniform, light coating of the vehicle's tray without ponding of surplus release agent.

Facilitate continuous operation of the paving train by:

- (a) providing and allocating sufficient transport capacity; and
- (b) ensuring efficient on-site management of asphalt deliveries.

3 PLACING ASPHALT

3.1 GENERAL

Place and finish the asphalt so as to:

- (a) produce a homogeneous surface;
- (b) achieve a uniform bond to the surface below; and
- (c) achieve the finished pavement properties, specified in Clause 4, within the specified tolerances.

Do not induce rapid cooling in the asphalt by the application of water at any stage in the process, including preparation for trafficking.

3.2 PREPARATION OF PAVEMENT

Prior to placing asphalt, prepare the surface to be paved in accordance with the requirements in AS 2150, including removal of raised extruded thermoplastic road markings and raised pavement markers.

3.3 PLANT AND EQUIPMENT

The asphalt must be placed by a self-propelled paving machine equipped and operated with automatic thickness control and automatic joint matching facility.

Hand placement must be kept to a minimum and is only permitted in areas approved by the Principal.

The type and number of compaction rollers must be in accordance with the requirements in AS 2150.

A Material Transfer Vehicle (MTV) must be used in the paving process, unless otherwise specified in Annexure R119/A. The MTV must be a self-propelled machine with independent controls which will receive asphalt from delivery vehicles, store, remix and transfer the asphalt to the paving machine without contact and be equipped with:

- (a) a receiving hopper compatible with delivery vehicles;

- (b) conveying mechanisms and anti-segregation devices for remixing asphalt;
- (c) conveying mechanisms capable of delivering asphalt to the paver at a minimum rate to suit the paving output;
- (d) a minimum nominal on-board storage capacity of 15 tonnes;
- (e) an additional holding bin in the paving machine hopper; and
- (f) sufficient power output from the motor to operate with full load on grades up to 6% and travel in tandem with the paver, either directly in front or in an offset position.

If specified in Annexure R119/A, place the asphalt by echelon paving using a minimum of two paving machines operating continuously in tandem. The paving run layout must be such that the hot joint is located to minimise cold joints within the trafficked carriageway, unless otherwise approved by the Principal.

State in your PROJECT QUALITY PLAN the method of compaction including roller type, number of passes and rolling pattern.

3.4 PROTECTION OF WORK

Provide for traffic in accordance with the requirements of Specification RMS G10 while undertaking the work.

Protect the work until the required thickness of asphalt has been placed, compacted and cooled sufficiently to carry traffic without damage to the work.

3.5 PROTECTION OF SERVICES AND ROAD FIXTURES

Do not allow asphalt or other material used on the work from entering or adhering to grates, hydrants or valve boxes, service covers, bridge joints and other road fixtures. Immediately after the asphalt has been placed, clean and remove all waste asphalt from the affected services and road fixtures .

3.6 COURSE THICKNESS

A course of open graded asphalt must comprise one layer only.

Notwithstanding the thickness specified in Annexure R119/A, the course thickness must be within the limits of 2.5 to 4.0 times the nominal mix size.

3.7 PAVEMENT TEMPERATURE AND WEATHER CONDITIONS

Measure and record the pavement surface temperature and wind velocity at the point of asphalt placing. Document the method of measurement and recording in your PROJECT QUALITY PLAN. Do not commence or continue placing asphalt, unless the pavement surface temperature complies with the requirements in Table R119.4.

Table R119.4 – Minimum Asphalt Laying Temperature

Wind Speed (km/h)	Minimum Pavement Surface Temperatures (°C)
0 – 5	13 and rising
6 – 10	20

11 – 15	25
> 15	30
Note: Wind speed should remain constant over a period of 15 minute	

Do not place tackcoat and/or asphalt when the pavement surface is wet and/or rain is imminent.

3.8 PAVING AND COMPACTION TEMPERATURES

The temperatures at which the asphalt is placed and compacted must be consistent with Austroads AGPT04B/07.

HOLD POINT

Process Held:	Placing of the nominated mix (including placement trial).
Submission Details:	Nominate in writing: <ul style="list-style-type: none"> (a) the minimum temperature at which asphalt is to be delivered to the paver; and (b) the minimum temperature at which initial compaction of the asphalt is to commence; and (c) the method of temperature measurement.
Release of Hold Point:	The Principal will consider the submitted documents prior to authorising the release of the Hold Point.

Asphalt that exhibits a temperature variation must not be included in the Works unless it has been remixed to a consistent and adequate temperature for compaction.

Measure and monitor paving and compaction temperatures as described in your PROJECT QUALITY PLAN with a hand held or machine mounted infrared thermometer readable and accurate to within $\pm 1\%$ at the discharge point from a tipper truck or at the distribution auger on the paver.

Verification of the accuracy of the infrared thermometer and the determination of a correlation factor must be undertaken daily at the commencement of work and at any other time at the request of the Principal.

3.9 TACKCOAT

The tackcoat must be applied at a rate of between 0.15 and 0.30 litres of residual bitumen per square metre. For joints and chases, the application rate must be approximately doubled.

The tackcoat must be evenly applied and effectively bonded to the surface. It must be intact at the commencement of asphalt placement.

You must:

- (a) nominate in writing to the Principal the proposed tackcoat application rate prior to applying the tackcoat;
- (b) endorse and provide to the Principal a daily record of the average tackcoat application rate applied to each Lot;

- (c) report the tackcoat application rate in terms of residual bitumen and state the percentage dilution of the tackcoat used during spraying.

3.10 JOINTS

Describe in your PROJECT QUALITY PLAN the procedure for the construction of joints. Your procedure must maximise joint density and include mechanised edge compaction or mechanised edge trimming. Hand tamping of edges is permitted where the use of a machine is impractical. Excess material resulting from hand preparation of edges is not to be spread on the surface of the work.

All loose, cracked and/or boney material at the edge of a paved mat must be removed prior to placing the adjacent mat. Asphalt resulting from clean-up of process trimmings is not to be used in the work.

Each joint must be finished with a smooth, planar surface coinciding with the surface of the rest of the mat and satisfying the surface shape requirements specified in Clause 4.2.

Longitudinal joints must be:

- (a) offset by 150 mm from the joint in the underlying layers;
- (b) coincident within 150 mm of the line of change in crossfall;
- (c) coincident with final traffic markings, unless otherwise approved by the Principal.

Transverse joints must be:

- (a) located a minimum of 25 m apart;
- (b) offset by a minimum of 1 m from the joint in the underlying layer;
- (c) formed at the commencement of each paving run;
- (d) formed when a delay in paving causes asphalt temperature to fall below the initial compaction temperature nominated in Clause 3.8.

3.11 PLACEMENT TRIAL

If specified in Annexure R119/A and prior to commencing work, the plant and personnel proposed for use on the work must be subjected to a placement trial.

Each nominated mix must be subjected to a separate placement trial. Each placement trial must be located remote from the work, unless otherwise approved by the Principal. The size of the placement trial must be limited to one production shift. Design the trial to implement all the procedures described in your PROJECT QUALITY PLAN and demonstrate conformity to the Specification in respect of:

- (a) homogeneity;
- (b) course thickness;
- (c) course position;
- (d) surface shape;
- (e) joint quality; and
- (f) ride quality, where specified.

HOLD POINT

Process Held:	Placing of the nominated mix.
Submission Details:	Verification checklist and all relevant test results from the placement trial demonstrating conformity to the Specification at least 3 working days prior to further placing of your nominated mix on the work.
Release of Hold Point:	The Principal will consider the submitted documents prior to authorising the release of the Hold Point.

In the event of a nonconformity in the placement trial, or when the Principal determines that a previous trial is not representative of the materials, asphalt mix proportions, temperature, plant, rate of output and/or method of placement, a new trial must be implemented.

Where a placement trial forms part of the work, manage all nonconformity in respect of materials, process and finished pavement properties in accordance with Clause 5.

3.12 TEMPORARY RAMPS AND TIE-INS TO EXISTING PAVEMENT AND STRUCTURES

Temporary ramps that are constructed for the safe trafficking of the work, must be constructed by placement of dense grade asphalt complying with Specification RMS R116, or by cold milling of existing or new asphalt.

The length and grade of temporary ramps must be equivalent to those specified for treatment at edges and structures described in Specification RMS R101.

Construct permanent tie-ins to existing pavement by placement of dense grade asphalt complying with Specification RMS R116.

4 FINISHED PAVEMENT PROPERTIES

4.1 COURSE THICKNESS

4.1.1 Requirements for Course Thickness

The specified course thickness is detailed in Annexure R119/A.

(a) Where finished surface levels are not specified

The average compacted course thickness of each Lot must not be less than the specified course thickness nor greater than the specified course thickness plus the tolerance specified in Table R119.5.

Table R119.5 – Allowable Tolerances for Course Thickness

Nominal Size of Asphalt (mm) (Asphalt Designation)	Tolerance (mm)
10 (OG10)	+ 6

14 (OG14)	+ 8
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(b) Where finished surface levels are specified

Control the course thickness by maintaining the design levels and the surface shape requirements specified in Clause 4.2.2 provided that:

- (i) The average compacted course thickness of each Lot is consistent;
- (ii) The average compacted course thickness of each Lot is within 10% of the specified course thickness.

4.1.2 Determination of Course Thickness

Propose a methodology in your PROJECT QUALITY PLAN to determine course thickness and demonstrate that the specified course thickness is achieved. Include in your PROJECT QUALITY PLAN a statistical technique for verifying the consistency of the results.

4.2 SURFACE SHAPE

4.2.1 Determination of Surface Shape

Determine and report surface shape in accordance with Test Method RMS T183.

The maximum Lot size must be in accordance with RMS Q and extended to include the adjacent longitudinal joints, transverse joints and tie-ins. Testing must be carried out at the frequency as specified in Table R119/L.5 of Annexure R119/L.

4.2.2 Requirement for Surface Shape

The surface of the course including longitudinal, transverse joints and tie-ins must not deviate from the bottom of a straightedge laid in any direction by more than 3 mm.

Correct surface shape nonconformity before testing ride quality.

4.3 RIDE QUALITY

4.3.1 Determination of Ride Quality

If specified in Annexure R119/A, determine the ride quality (IRI_S) from measurements of longitudinal profile taken by a vehicular laser profilometer where the ride quality is the IRI_S determined in accordance with Test Method RMS T188 and the Lot is a Section within the test lane as defined in the Test Method.

Develop an Inspection and Test Plan (ITP) for ride quality that meets the requirements of the Specification. Define the Lots and the start and end locations for testing in your ITP.

Supply the Principal with copies of the RMS Accreditation Certificates for each vehicular laser profilometer driver and operator proposed for use in the Works.

4.3.2 Requirement for Ride Quality

The surface of the wearing course must have a smooth longitudinal profile, and

- (a) when construction of the underlying pavement forms part of the Contract; or

- (b) when asphalt is placed on any corrective course over a pavement constructed by others; or
- (c) when the scope of work targets a ride quality

the ride quality of each Lot must not exceed an International Roughness Index (IRI_S) of 1.56 m/km.

When asphalt is placed over pavement constructed by others, the ride quality of each Lot must not exceed the IRI_{Sa} values determined as follows:

$$IRI_{Sa} = 0.2 + (0.6 \times IRI_{Sb}), \text{ or } 1.56 \text{ m/km, whichever is the greater}$$

where: IRI_{Sa} is the IRI_S after placing the asphalt layer (m/km)

IRI_{Sb} is the IRI_S before placing the asphalt layer (m/km)

Where open graded asphalt is placed over a pavement constructed by others, determine and report the ride quality of the existing surface prior to the work. Lots of the existing surface must be selected such that they coincide with Lots of the finished work.

5 CONFORMITY

Verify conformity with the Specification by sampling and testing, and providing records of process control.

5.1 HOMOGENEITY

All asphalt must be homogenous in appearance.

Areas of asphalt that exhibit segregation, cracking, ravelling, bony or fatty material, or have been damaged during construction must be rectified or replaced.

Any proposal by you that the Principal accepts non-homogeneous and/or segregated material or work must be in writing and must show:

- (a) the technical reasons for acceptance;
- (b) compliance with the Specification; and
- (c) sub-Lotting that minimises performance risk to the surface and structure of the pavement.

5.2 SAMPLING

Nominate all sampling locations, frequencies and test methods in your PROJECT QUALITY PLAN.

In addition to the requirements of Annexure Q/L of RMS Q, and unless otherwise specified or agreed with the Principal, boundaries of sub-Lots represented by a single tested sample are deemed to be the midpoints in production between the sample points for the purpose of Clause B2 in Annexure R119/B of this Specification.

When the Principal requests loose asphalt samples for testing, you must riffle and/or quarter the samples.

All samples, including core samples, must be delivered in sealed and labelled containers.

5.3 TESTING

5.3.1 Minimum Frequency of Testing

The minimum frequency of testing is specified in Annexure R119/L. Where a minimum frequency of testing is not specified, nominate an appropriate frequency.

You may propose in writing to the Principal that a reduced minimum frequency of testing be accepted in accordance with RMS Q. Support your proposal with a statistical analysis verifying consistent process capability and product characteristics.

In the event of a nonconformity, revert a reduced frequency of testing immediately to the specified minimum frequency of testing. You can request a reduction in the minimum frequency of testing when you can demonstrate again by statistical analysis that you have gained a consistent process capability and product characteristics.

5.3.2 Maximum Lot Size

The maximum Lot size must conform to Specification RMS Q.

5.3.3 Time for Submission of Test Results

Complete and report: to the Principal:

- (i) the tests for binder content, combined particle size distribution and air voids in laboratory compacted mix within one working day of placing the asphalt;
- (ii) the results of course thickness and course shape within three working days of placing the asphalt.

5.4 PROCESS CONTROL

Employ a capable process and implement process control in accordance with or exceeding the requirements of Australian Asphalt Pavement Association Implementation Guide IG-3.

5.5 NONCONFORMITIES

If a Lot fails to conform to the Specification, such failure must constitute a nonconformity under the Contract.

If a nonconformity is not accepted in accordance with Annexure R119/B2, the Lot must be rectified or replaced.

ANNEXURE R119/A – PROJECT SPECIFIC REQUIREMENTS

The requirements below apply to the project:

Course	Nominal Size of Asphalt (mm)	Class of Binder (Clause 2.1.5)	Specified Course Thickness (mm) (Clause 4.1.1)
Wearing		Class A15E	

Clause	Description	Requirement *
3.3	Material Transfer Vehicle required:	Yes / No
3.3	Paving in echelon required:	Yes / No
3.11	Placement trial required:	Yes / No
4.3.1	Measure ride quality of existing pavement required:	
	- Existing pavement	Yes / No
	- Finished pavement	Yes / No

* Delete as applicable

Measure the following pay items by area (Annexure R119/B): *(List pay items)*

Other Project Specific Requirements: *(List requirements)*

ANNEXURE R119/B – MEASUREMENT AND PAYMENT AND DISPOSITION OF NONCONFORMITIES

Refer to Clause 1.3.2.

B1 MEASUREMENT AND PAYMENT

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

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

Where an item of work required is not specifically covered by the measurement and payment descriptions for the pay items in the Schedule, due allowance must be made in one or more of the other pay items to allow for this item of work at the time of tendering.

Measurement and payment of asphalt is made on the basis of either mass or area as follows:

(a) Measurement by Mass

Unless specified otherwise in Annexure R119/A, the quantity of asphalt must be measured by mass and the unit of measurement must be a tonne.

The Principal may approve measurement by batch weights using certified scales. The quantity of asphalt in place in the final work must be mutually agreed using the RMS Contract Quantity Agreement Sheet using the tally of the weigh bridge dockets of delivered asphalt less the quantity of asphalt not incorporated in the Works.

Truck weighbridge dockets must be issued at a weighbridge certified by the NSW Office of Fair Trading and collected at the point of delivery.

(b) Measurement by Area

If specified in Annexure R119/A, the quantity of asphalt is measured by area and the unit of measurement is square metre.

The area will be determined from the dimensions shown on the Drawings or as specified for the work in Annexure R119/A.

The measurement of tackcoat sprayed is based on the quantity of residual bitumen. The unit of measurement is the litre determined from sprayer tanker dippings.

Pay Item R119P1 – Supply and Application of Tackcoat (Including Preparation of Surface)

Unless specified otherwise in Annexure R119/A, the quantity of tackcoat used in the work is determined by volume and the unit of measurement is a litre of residual bitumen.

Determine the volume by multiplying the nominated application rate of residual bitumen by the specified area of the road surface to be tackcoated.

Tackcoat applied to faces of joints, kerbs and other structures is deemed to be included in the rate.

Pay Item R119P2 - Open Graded Asphalt in Wearing Course

R119P2.1 10 mm Nominal Size

R119P2.2 14 mm Nominal Size

Pay Item R119P3 – Incentives and Deductions in accordance with Annexure R119/B

R119P3.1 All deductions, calculated as per Tables R119/B.1 and R119/B.2

R119P3.2 All incentives, calculated as per Table R119/B.3

Incentives and deductions under this pay item are not subject to rise and fall adjustments.

B2 DISPOSITION OF NONCONFORMITIES

B2.1 General

If the nonconformity is not acceptable in accordance with Annexure R119/B2.2, the nonconforming material must be replaced or the nonconforming section of 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. Materials removed from the site by you must be replaced with materials that conform to this Specification.

B2.2 Acceptance of Nonconformities

You may propose in writing to the Principal that pre-determined dispositions be applied to nonconformities in the following properties:

- (a) Combined particle size distribution and binder content in asphalt
- (b) Ride quality.

Deductions apply to the schedule rate for the quantity of asphalt represented by the test sample and will be recorded against Pay Item R119P2.1.

B2.2.1 Combined Particle Size Distribution and Binder Content

Deductions in accordance with Table R119/B.1 must be applied to accepted nonconformities in combined particle size distribution and binder content provided that:

- (a) For any individual sieve size and the binder content, nonconformities greater than twice the production tolerance specified in Table R119.3 will not be accepted, and
- (b) Deductions are cumulative and nonconformities will not be accepted if combined deductions exceed 20%.

Table R119/B.1 – Deductions for Combined Particle Size Distribution and Binder Content

	% by which nonconformity exceeds production tolerance (Clause 2.4.2)	Deductions (in per cent of schedule rate)
Combined Particle Size Distribution Element	(% by mass of total aggregate)	
Pass 13.2 mm AS sieve	Each 2 or part thereof	1
Pass 9.50 mm AS sieve	Each 2 or part thereof	1
Pass 6.70 mm AS sieve	Each 2 or part thereof	1
Pass 4.75 mm AS sieve	Each 2 or part thereof	1
Pass 2.36 mm AS sieve	Each 1 or part thereof	1
Pass 1.18 mm AS sieve	Each 1 or part thereof	1
Pass 0.600 mm AS sieve	Each 1 or part thereof	1
Pass 0.300 mm AS sieve	Each 1 or part thereof	2
Pass 0.150 mm AS sieve	Each 0.5 or part thereof	2
Pass 0.075 mm AS sieve	Each 0.5 or part thereof	2
Binder Content	(% by mass of total mix)	
OG10 or OG14	Each 0.1 or part thereof	3

B2.2.2 Ride Quality

Deductions in accordance with Table R119/B.2 must be applied to accepted nonconformities in ride quality provided that, nonconformities must not be accepted when the ride quality exceeds the specified limit by more than 0.80 m/km.

Table R119/B.2 – Deductions for Ride Quality

Ride quality in excess of specified limit by (m/km)	Deduction (in per cent of value of Lot)
< 0.25	2
0.25 - 0.43	4
0.44 - 0.61	8
0.62 - 0.80	16

B3 INCENTIVES

It may be proposed in writing to the Principal that pre-determined incentives be applied in accordance with Table R119/B.3 to the ride quality of the asphalt wearing course, provided that:

- (a) the Lot conforms to all requirements of this Specification, and
- (b) for all three adjacent Lots in all directions, the ride quality is conforming.

Table R119/B.3 – Incentives for Ride Quality

Ride quality below specified limit by (m/km)	Incentive (in per cent of value of Lot)
< 0.44	0
0.44 - 0.61	1
0.62 - 0.80	2
> 0.80	3

Incentives apply to the schedule rate for the quantity of asphalt represented by the test sample and must be recorded against Pay Item R119P2.2.

ANNEXURE R119/C – SCHEDULES OF HOLD POINTS AND IDENTIFIED RECORDS

Refer to Clause 1.3.3.

C1 SCHEDULE OF HOLD POINTS

Clause	Description
2.3.1	Submission of the nominated mix(es)
3.8	Placing of the nominated mix (including placement trial)
3.11	Placing of the nominated mix

C2 SCHEDULE OF IDENTIFIED RECORDS

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

Clause	Description of the Identified Record
1.3.4	Project specific project quality plan
2.1.5	Documentary evidence of the binder conformity for each delivery
2.3.1	Documents as detailed for each nominated asphalt mix
2.4.3, 2.4.5	Asphalt manufacturing process parameters including process temperatures
2.4.4	Procedure for acquisition, storage and handling of binder
2.5	Method of application and control of release agent
3.7	Pavement temperature and weather conditions
3.8	Asphalt temperature at which initial compaction will be commenced
3.9	Notification of proposed application rates for tackcoat.
3.9	Daily record of the average tackcoat application rate in each Lot
3.10	Joint construction procedure
3.11	Verification checklist and all listed test reports of the trial section for each combination of materials, mix proportions, equipment, rate of paving and methods for placement, compaction and finishing
3.13	Method of compaction including roller type, number of passes and rolling pattern
4.1.2	Methodology to determine course thickness and statistical technique to verify consistency of the results
5.3.1	Test reports of all specified properties and characteristics at the minimum frequency of testing

ANNEXURE R119/D – PLANNING DOCUMENTS

Refer to Clause 1.3.4.

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

Clause	Planning Documents
1.3.4	Manufacturer's written recommendations.
2.1.6	Proposed additive.
2.2	Asphalt mix design procedure.
	Procedure to verify that the calculated percentage of binder absorbed by combined aggregate is between 0% and the weighted average water absorption of the combined aggregate. This procedure must also include a troubleshooting guide to resolve volumetric calculations in the event that the absorbed binder is either a negative value or higher than the weighted average water absorption of the combined aggregate.
2.3.1	Development and authorisation of the nominated mix submission.
2.4	Calibration of the asphalt manufacturing plant, including all weigh scales, flowmeters and thermometers.
	Process control, including plant operating instructions, key temperature targets and records, and response to process control charts.
	Acquisition, storage and handling of binder, including identification and prevention of segregation and/or contamination.
	Control of plant feed proportions, including regular checks on grading and moisture content.
	Daily asphalt manufacturing plan to ensure timely and uninterrupted progress on site.
	Storage and handling of binder
2.5	Loading, delivery and unloading procedures that maintain adequate mix temperature and do not interrupt progress of the paving train.
3	For each paving and related activity, method of defining each Lot and allocating a unique Lot Number.
	Calibration of all thermometers and other measuring equipment.
	Process control for surface preparation, tackcoating, placing, joint construction, compaction and cleanup, including plant operating instructions, key temperature targets and records, patterns for paving and compaction operations, and process monitoring.
3.3	Allocation of appropriate plant and equipment, including backup in case of breakdown.
3.7	Measurement and recording of pavement temperatures and weather conditions.
3.8	Paving and compaction temperature
3.10	Construction joints
3.11	Design, execution and quality verification of a placement trial.
3.13	Compaction

Clause	Planning Documents
4.1.1	Requirements for course thickness
4.1.2	Determination of course thickness
5.1, 5.2 & 5.3	Inspection and test plan, including methods and frequencies of sampling, methods and frequencies of testing, verification checklists, and timeframe for submission of test results.

ANNEXURES R119/E TO R119/K – (NOT USED)**ANNEXURE R119/L – MINIMUM FREQUENCY OF TESTING**

The minimum frequency of testing of the materials, production, placing and finished pavement are listed in Tables R119/L.1 to R119/L.5.

Table R119/L.1 – Minimum Frequency of Testing of Asphalt

Quantity of Asphalt Supplied in Each Shift	Minimum Frequency of Testing
Less than 100 tonnes	One per 50 tonnes or part thereof
101 to 300 tonnes	One per 100 tonnes or part thereof
301 to 600 tonnes	One per 150 tonnes or part thereof
Over 600 tonnes	One per 200 tonnes or part thereof
Note: A "shift" must be continuous work not exceeding a period of 12 hours.	

Table R119/L.2 – Constituents

Clause	Constituent	Minimum Frequency of Testing⁽²⁾ as per
2.1.1	Coarse Aggregates	RMS 3152
2.1.2	Fine Aggregates	RMS 3152
2.1.4	Added Fillers	RMS 3211
2.1.5	Binder	RMS 3252
2.1.6	Bitumen Adhesion Agent	RMS 3259 and RMS 3269
2.1.7	Bitumen Emulsion Tackcoat	AS 1160
Note:		
⁽¹⁾ The nominated mix design submission must also include complying test results for each specified characteristic of each constituent.		
⁽²⁾ The minimum frequency of testing must be in accordance with the specific RMS Test Method or Australian Standard.		

Table R119/L.3 – Asphalt Production

Clause	Characteristic	Test Method / Procedure	Minimum Frequency of Testing
2.1.4	Filler in asphalt – Dry compacted voids	AS 1141.17	One test with each nominated mix submission
2.1.4	Filler in asphalt – Methylene blue value	RMS T659	One test with each nominated mix submission
2.2.1	Binder content	AS 2891.3.1	As per Table R119/L.1
2.2.1	Combined particle size distribution	AS 2891.3.1	As per Table R119/L.1
2.2.2	Air voids in laboratory compacted mix (80 cycles)	AS 2891.7.3 AS 2891.8 AS 2891.9.3	As per Table R119/L.1
2.2.2	Binder film index	AS 2891.8 or AG:PT/T237	As per Table R119/L.1
2.2.3	Moisture content	RMS T660	As per Table R119/L.1
2.4.5	Production temperature of asphalt	Your documented procedure	As specified in PQP
2.4.5	Dispatch temperature of asphalt	Your documented procedure	Each delivered load

Table R119/L.4 – Asphalt Placing

Clause	Characteristic	Test Method / Procedure	Minimum Frequency of Testing
3.7	Pavement temperature	Your documented procedure	1 measurement every 2 hours
3.7	Wind velocity	Your documented procedure	1 measurement every 2 hours
3.8	Temperature at initial compaction	Your documented procedure	Each delivered load
3.9	Tackcoat application rate	Your documented procedure	Each paving Lot
5.1	Homogeneity	Visual assessment	Each paving Lot

Table R119/L.5 – Finished Pavement Properties

Clause	Characteristic	Clause / Test Method	Minimum Frequency of Testing
4.1	Course thickness	Clause 4.1.2	As specified for relative compaction > 100.0 in RMS Q L3.1
4.2	Surface Shape	T183	(a) Within lane: one measurement in longitudinal direction and 1 measurement in transverse direction every 60 m ² (b) Longitudinal joint excluding crowns: one measurement per 10 lineal metres (c) Transverse joint: one measurement in each wheel path in each lane except at the boundaries of the Contract
4.3	Ride quality	T188	Each Lot as defined in the Test Method T188

ANNEXURE R119/M – REFERENCED DOCUMENTS

RMS Specifications

RMS G10	Traffic Management
RMS Q	Quality Management System
RMS R101	Cold Milling of Road Pavement Materials
RMS R116	Heavy Duty Dense Graded Asphalt
RMS 3152	Aggregates for Asphalt
RMS 3211	Cements, Binders and Fillers
RMS 3252	Polymer Modified Binder
RMS 3259	Bitumen Adhesion Agent (Bitumen Classes 170 and 320)
RMS 3269	Bitumen Adhesion Agent (Polymer Modified Bitumen)

RMS Test Methods

RMS T183	Surface Deviation using a Straightedge
RMS T188	Project Ride Quality (Vehicular Laser Profilerometer)
RMS T230	Resistance to Stripping of Aggregates and Binders
RMS T659	Methylene Blue Adsorption Value of Road Construction Material
RMS T660	Moisture Content of Bituminous Mixes (Mass Loss Method)
RMS T662	Compaction of Asphalt Test Specimens (using a Gyrotory Compactor)

Australian Standards

AS 1160	Bituminous emulsions for construction and maintenance of pavements
AS 2150*	Hot mix asphalt - A guide to good practice

Note* Keep a copy of this Australian Standard on site

Australian Standard Test Methods

AS 1141.17	Voids in dry compacted filler
AS 1141.50	Resistance to stripping of cover aggregates from binders
AS 2891.1.1	Sampling - Loose asphalt
AS 2891.3.1	Bitumen content and aggregate grading - Reflux method
AS 2891.7.3	Determination of maximum density of asphalt - Methylated spirit displacement
AS 2891.8	Voids and density relationships for compacted asphalt mixes
AS 2891.9.3	Determination of bulk density of compacted asphalt - Mensuration method

Austrroads Test Methods and Guides

AG:PT/T237	Binder Film Index
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AGPT04B/07 Guide to Pavement Technology Part 4B: Asphalt

AAPA Guides

Advisory Note 7 Guide to the Selection, Heating and Storage of Binders for Sprayed Sealing and Hot Mixed Asphalt

IG-3 Asphalt Plant Process Control Guide