



Sprayed Bituminous Surfacing

Road Building Model Specification

July 2022

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Date	Updates	Contents and purpose	Edition No.	Amended Modules

Each update will be listed above with the model specification, as amended, available from the WALGA website.

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1. SCOPE

This road building specification details the requirements for supply of material and application of sprayed bituminous surfacing including:

- primes;
- primerseals (including aggregate and sand/crusher dust);
- bitumen seals and reseals (including bitumen emulsion);
- polymer-modified bitumen seals and reseals;
- crumb rubber-modified bitumen seals and reseals; and
- geotextile reinforced seals.

Sprayed bituminous surfacing must be fit for purpose and provide a surface that is:

- well-bonded to the underlying pavement (granular, bituminous treatment or concrete);
- safe, durable and traversable for the anticipated traffic; and
- a moisture barrier and/or waterproofing membrane for the underlying pavement.

The location and type of sprayed bituminous surfacing, including binder type and aggregate size, must be as shown in ANNEXURE A or as presented in the Contract Drawings.

The application of bituminous surfacing shall include preparation of the existing surface, supply of material and application of the various treatments over the widths, lengths and areas as shown in ANNEXURE A or as presented in the Contract Drawings.

2. REFERENCES

Australian Standards, Austroads test methods, Main Roads Western Australia (Main Roads) test methods and ASTM test methods are referred to in abbreviated form (e.g. AS 1234, AGPT/T123, WA 123 or ASTM D 1234). For convenience, the full titles are given below.

Equivalent Australian Standard test methods may be substituted for the Main Roads test methods quoted in the Specification.

Australian Standards

AS 1141	Methods for Sampling and Testing Aggregates
AS 1152	Specification for Test Sieves
AS 1160	Bitumen Emulsions for the Construction and Maintenance of Pavements
AS 1726	Geotechnical Site Investigations
AS 2008	Bitumen for Pavements
AS 2106	Methods for the Determination of the Flash Point of Flammable Liquids (Closed Cup)
AS 2341	Methods of Testing Bitumen and Related Roadmaking Products
AS 2809	Road Tank Vehicles for Dangerous Goods
AS 3706	Geotextiles - Methods of Test

Austroads Test Methods

AG:PT/T103	Pre-treatment and Loss on Heating of Bitumen, Multigrade and Polymer Modified Binders
AG:PT/T108	Segregation of Polymer Modified Binders
AG:PT/T111	Handling Viscosity of Polymer Modified Binders
AG:PT/T112	Flash Point of Polymer Modified Binders
AG:PT/T121	Shear Properties of Polymer Modified Binders
AG:PT/T122	Torsional Recovery of Polymer Modified Binders
AG:PT/T125	Stress Ratio of Polymer Modified Binders using the Dynamic Shear Rheometer (DSR)

AG:PT/T131	Softening Point of Polymer Modified Binders
AG:PT/T132	Compressive Limit of Polymer Modified Binders
AG:PT/T531	Calibration of Bitumen Sprayers: Volumetric Calibration of Bitumen Pumping Systems
AG:PT/T532	Calibration of Bitumen Sprayers: Transverse Distribution by Fixed Pit Facility
AG:PT/T533	Calibration of Bitumen Sprayers: Transverse Distribution by Field Mat
AG:PT/T534	Calibration of Bitumen Sprayers: Transverse Distribution by Portable Trough

Main Roads Test Methods

WA 210.1	Particle Size Distribution of Aggregate
WA 212.1	Aggregate Moisture Content: Convection Oven Method
WA 212.2	Aggregate Moisture Content: Microwave Oven Method
WA 311.1	Texture Depth
WA 312.1	Ball Embedment
WA 340.1	Sprayed Binder Application Rate: Carpet Tile Method

ASTM Test Methods

ASTM C 295	Standard Guide for Petrographic Examination of Aggregates for Concrete
ASTM D 86	Standard Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure
ASTM D 276	Standard Test Methods for Identification of Fibres in Textiles
ASTM D 445	Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids
ASTM D 1319	Standard Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption
ASTM D 6140	Standard Test Method to Determine Asphalt Retention of Paving Fabrics used in Asphalt Paving for Full-width Applications

Austrroads Publications

AP-G41	Bituminous Materials Safety Guide
AP-T37	Geotextile Reinforced Seals
AP-T68	Update of the Austrroads Sprayed Seal Design Method
AP-T236	Update of Double / Double Design for Austrroads Sprayed Seal Method
AP-T262	Performance Requirements for Bitumen Sprayers

Main Roads Publications

Traffic Management for Works on Roads - Code of Practice

Main Roads Specifications

202	Traffic
511	Materials for Bituminous Treatments

WALGA Road Building Specifications

Aggregate and Cementitious Binders
 Earthworks and Pavement Construction
 Erosion Control and Foreshore Protection
 Granular Pavement Materials
 Pavement Rehabilitation
 Sprayed Bituminous Surfacing
 Supply and Laying of Asphalt Road Surfacing (IPWEA / AAPA)
 Supply of Recycled Road Base (IPWEA / WALGA)

Acts and Regulations

Aboriginal Heritage Act 1972
 Contaminated Sites Act 2003
 Dangerous Goods Safety (Road and Rail Transport of Non-explosives) Regulations 2007
 Environmental Protection Act 1986
 Environmental Protection Regulations 1987
 Environmental Protection (Clearing of Native Vegetation) Regulations 2004
 Health (Pesticide) Regulations 2011

Main Roads Act 1930
Occupational Safety and Health Act 1984
Occupational Safety and Health Regulations 1996
Rail Safety National Law (WA) Act 2015
Road Traffic Code 2000
Wildlife Conservation Act 1950

3. DEFINITIONS

The following definitions shall apply:

- "batch" shall be the quantity of a single bitumen or binder class derived from a continuous, uninterrupted production process and dispatched from a single storage vessel.
- "binder" shall be bitumen-based adhesive used in road building applications to hold aggregate together and/or bond to a surface including conventional bitumen, emulsified bitumen and modified bitumen.
- "Lot" [aggregate or sand] shall be the quantity of a single nominal size aggregate derived from a continuous, uninterrupted production process and dispatched from a single stockpile. Shall be limited to no more than 1,000 m³.
- "Lot" [surfacing] shall be a continuous section of sprayed bituminous surfacing with a uniform appearance that has been delivered using homogeneous materials and consistent processes. Shall be limited to no more than one work shift's production.
- "prime" shall be a low viscosity bituminous treatment applied to the surface of a nonbituminous layer to promote bonding between the layer and the subsequent seal or asphalt.
- "primerseal" shall be a prime applied at an increased rate to create a thin layer and into which aggregate is incorporated.
- "reseal" shall be a seal that is applied to a surface which has an existing seal.
- "seal" shall be a thin layer of bituminous binder applied to an unsealed surface (asphalt, concrete or granular) and into which aggregate is incorporated.
- "strain alleviating membrane (SAM)" shall be a seal containing high concentrations of polymer or rubber used to absorb strains and reduce reflective cracking.
- "strain alleviating membrane interlayer (SAMI)" shall be a SAM applied prior to an asphalt overlay.

4. PRODUCTS AND MATERIALS

4.1 Bitumen

4.1.1 General

All bitumen, whether residual or used in manufacturing cutback bitumen, bitumen emulsion, polymer modified binder or crumb rubber modified binder, shall be a straight run, slightly blown or blended product prepared by distillation from crude bituminous base oils.

Bitumen shall be homogeneous and it shall not foam when heated to 205°C. The formation of a thin layer of bubbles will not be regarded as foaming.

4.1.2 Properties

Bitumen shall conform to the properties shown in Table 1 at the time of manufacture and at any time until the bitumen is used.

Table 1 Bitumen Properties

Bitumen Property	Test Method	Class 170		Class 320	
		Min	Max	Min	Max
Viscosity @ 60°C (Pa.s)	AS 2341.2 or 2341.3	160	230	260	380
Viscosity @ 135°C (Pa.s)	AS 2341.2 or 2341.3 or 2341.4	0.30	0.50	0.40	0.65
Penetration @ 25°C, 100 g, 5 s (0.1 mm)	AS 2341.12	55	-	40	-
Density @ 15°C (kg/m ³)	AS 2341.7	1000	-	1000	-
Flash Point (°C)	AS 2341.14	250	-	250	-
Matter Insoluble in Toluene (%)	AS 2341.8	-	1.0	-	1.0
Rolling Thin Film Oven (RTFO)	AS 2341.10	-	-	-	-
Viscosity of Residue @ 60°C (% initial)	AS 2341.2 or 2341.3	-	300	-	300
Ductility @ 15°C (mm)	AS 2341.11	400	-	N/A ¹	
Durability Value	AS 2341.13	Report ²		N/A ¹	

Notes:

- 1) Not applicable for the indicated class of bitumen.
- 2) Determined in accordance with Main Roads Specification 511 and included with conformance certification.

4.1.3 Handling and Transport

The loading, transport, heating, circulation, blending, transfer and sampling of bitumen shall be done in accordance with the Austroads **Bituminous Materials Safety Guide** (2015) by appropriately trained and experienced personnel. The Contractor shall also ensure the provisions and licensure requirements to perform delivery and heating in accordance with the **Dangerous Goods Safety Regulations** (2007) are observed.

Bitumen shall be dispatched at temperatures between 185°C and 205°C or in accordance with the safe loading requirements of the facility at which the bitumen is being loaded.

Transport vessels shall be equipped with facilities to enable circulation, heating and mixing prior to unloading. The bitumen shall be delivered at a temperature suitable for its immediate use.

4.2 Bitumen Emulsion

4.2.1 General

Bitumen emulsion may be either cationic or anionic type, rapid or slow setting and manufactured with Class 170 or Class 320 bitumen. Bitumen used for the manufacture of the bitumen emulsion shall conform to the properties shown in Table 1. The bitumen emulsion shall be designed and manufactured to resist separating out into constituents.

4.2.2 Properties

Bitumen emulsion shall be manufactured in accordance with and conform to the properties in AS 1160 at any time until the bitumen emulsion is used.

4.2.3 Handling and Transport

Bitumen emulsion is not classified as a dangerous good. However, it is recommended that the loading, transport, heating, circulation, blending, transfer and sampling be done in accordance with the Austroads **Bituminous Materials Safety Guide** (2015) by appropriately trained and experienced personnel.

Bitumen emulsion shall be dispatched at a temperature that ensures the product remains stable and in accordance with the manufacturer's instructions.

Transport vessels shall be equipped with facilities to enable circulation, heating and mixing prior to unloading. The bitumen emulsion shall be delivered at a temperature suitable for its immediate use.

4.3 Polymer Modified Binder

4.3.1 General

Polymer modified binder (PMB) shall be of the elastomeric type and shall be manufactured using Class 170 bitumen. Bitumen used for the manufacture of PMB shall conform to the properties shown in Table 1. The PMB shall be designed and manufactured to resist separating out into constituents.

4.3.2 Properties

PMB shall conform to the properties shown in Table 2 at the time of manufacture and at any time until the PMB is used.

Table 2 Polymer Modified Binder Properties

Binder Property	Test Method	Binder Class			
		S10E	S20E	S25E	S35E
Stress Ratio @ 10°C [min.]	AG:PT/T125	Report ¹	Report ¹	Report ¹	Report ¹
Consistency 6% @ 60°C (Pa.s) [min.]	AG:PT/T121 ²	300	500	900	250
Stiffness @ 15°C (kPa) [max.]	AG:PT/T121	140	N/A ³	N/A ³	180
Stiffness @ 25°C (kPa) [max.]	AG:PT/T121	N/A ³	35	30	N/A ³
Viscosity @ 165°C (Pa.s) [max.]	AG:PT/T111 ⁴	0.55	0.60	0.90	0.55
Flash Point (°C) [min.]	AG:PT/T112	250	250	250	250
Loss on Heating (%) [max.]	AG:PT/T103	0.60	0.60	0.60	0.60
Torsional Recovery @ 25°C, 30s (%)	AG:PT/T122	22 - 50	38 - 70	55 - 80	16 - 32
Softening Point (°C)	AG:PT/T131	48 - 64	65 - 95	82 - 105	48 - 56
Segregation Value (%) [max.]	AG:PT/T108	8	8	8	8

Notes:

- 1) To be included with conformance certification.
- 2) S10E and S35E shall be determined using mould B (breakpoint of 5 mm and a test speed of 1.5 mm/s). S20E and S25E shall be determined using mould A (breakpoint of 10 mm and a test speed of 1.0 mm/s).
- 3) Not applicable for the indicated Class of binder.
- 4) L-series Brookfield is recommended together with spindle SC4-31. The shear rate involved in determining viscosity shall be calculated and recorded.

4.3.3 Handling and Transport

The loading, transport, heating, circulation, blending, transfer and sampling of PMB shall be done in accordance with the Austroads **Bituminous Materials Safety Guide** (2015) by appropriately trained and experienced personnel. The Contractor shall also ensure the provisions and licensure requirements to perform delivery and heating in accordance with the **Dangerous Goods Safety Regulations** (2007) are observed.

PMB shall be dispatched at temperatures not exceeding 195°C or the manufacturer's recommended maximum temperature, whichever is lower.

Transport vessels shall be equipped with facilities to enable circulation, heating and mixing prior to unloading. The PMB shall be delivered at a temperature suitable for its immediate use.

4.4 Crumb Rubber Modified Binder

4.4.1 General

Crumb rubber modified binder (CMB) shall be manufactured using Class 170 bitumen and recycled rubber from end-of-life vehicle tyres or other suitable sources. Bitumen used for the manufacture of CMB shall conform to the properties shown in Table 1. Crumb rubber used for the manufacture of CMB shall not contain uncured or devulcanised rubber, foreign material or greater than 20% elongated particles. The CMB shall be designed and manufactured to resist separating out into constituents.

4.4.2 Properties

CMB shall conform to the properties shown in Table 3 at the time of manufacture and at any time until the CMB is used.

Table 3 Crumb Rubber Modified Binder Properties

Binder Property	Test Method	Binder Class
		S45R
Stress Ratio @ 10°C [min.]	AG:PT/T125	Report ¹
Consistency 6% @ 60°C (Pa.s) [min.]	AG:PT/T121 ²	800
Stiffness @ 15°C (kPa) [max.]	AG:PT/T121	Report ¹
Compressive Limit @ 70°C, 2.0 kg (mm) [min.]	AG:PT/T121	0.20
Viscosity @ 165°C (Pa.s) [max.]	AG:PT/T111 ³	4.50
Flash Point (°C) [min.]	AG:PT/T112	250
Loss on Heating (%) [max.]	AG:PT/T103	0.60
Torsional Recovery @ 25°C, 30s (%)	AG:PT/T122	25 - 55
Softening Point (°C)	AG:PT/T131	55 - 65
Segregation Value (%) [max.]	AG:PT/T108	8
Process/Combining Oil Content (%)	-	Report ¹

Notes:

- 1) To be included with conformance certification.
- 2) S45R shall be determined using mould A (breakpoint of 10 mm and a test speed of 1.0 mm/s).
- 3) L-series Brookfield is recommended together with spindle SC4-31. The shear rate involved in determining viscosity shall be calculated and recorded.

4.4.3 Handling and Transport

The loading, transport, heating, circulation, blending, transfer and sampling of CMB shall be done in accordance with the Austroads **Bituminous Materials Safety Guide** (2015) by appropriately trained and experienced personnel. The Contractor shall also ensure the provisions and licensure requirements to perform delivery and heating in accordance with the **Dangerous Goods Safety Regulations** (2007) are observed.

CMB shall be dispatched at temperatures not exceeding 195°C or the manufacturer's recommended maximum temperature, whichever is lower.

Transport vessels shall be equipped with facilities to enable circulation, heating and mixing prior to unloading. It is recommended to hold CMB at the lowest practical temperature during transport. The CMB shall be delivered at a temperature suitable for its immediate use.

4.5 Aggregate

4.5.1 General

Aggregate used in sprayed bituminous surfacing shall be clean, hard, durable, angular fragments of natural stone produced by crushed sound, unweathered rock and shall not include materials which break up when alternately wetted and dried. Aggregate shall be free from vegetable matter, lumps of clay, overburden or any other deleterious matter.

4.5.2 Source Rock

Source rock shall be selected from an approved quarry site such that the feed to the primary crusher is fresh, hard and durable rock, free from clay, organic matter, weathered (except as allowed below) or friable material, and is consistent in appearance. A classification system for rock material weathering is defined in AS 1726. The proportions of weathered material in the source rock shall not exceed the limits in Table 4.

Table 4 Weathered Rock Inclusion Limits

AS 1726 Classification	Limit
Slightly Weathered Rock (%) [max.]	10.0
Distinctly Weathered Rock (%) [max.]	0.1
Extremely Weathered Rock (%) [max.]	0.1
Residual Soil (%) [max.]	0.0

Source rock shall also conform to the properties shown in Table 5.

Table 5 Source Rock Properties

Rock Property	Test Method	Limit
Polished Aggregate Friction Value (PAFV) [min.]	AS 1141.42	45

4.5.3 Cover Aggregate

Crushed and/or screened aggregate shall conform to the requirements shown in Table 6. The aggregate shall be of consistent quality, clean, hard and durable and shall be free from clay, organic matter and elongated particles. The aggregate shall be of a uniform colour and appearance for the whole of the works.

Table 6 Cover Aggregate Properties

Aggregate Property	Test Method	Limit
Moisture Content (%)	WA 212.1 or 212.2	Report ¹
Los Angeles Abrasion Value (%) [max.]		
Basalt	AS 1141.23 ²	25
All Other Rock Types	AS 1141.23 ²	35
Flakiness Index (%) [max.]	AS 1141.15 ²	35
Average Least Dimension	AS 1141.20.1 or 1141.20.2 ³	Report ¹
Water Absorption (%) [max.]	AS 1141.6.1 (coarse) AS 1141.5 (fine)	2.0
Wet Strength (kN) [min.]	AS 1141.22	100
Wet/Dry Strength Variation (%) [max.]	AS 1141.22	35
Stripping Test Value (%) [max.]	AS 1141.50 ⁴	10
Degradation Factor [min.]	AS 1141.25.2	50
Secondary Mineral Content (%) [max.]	AS 1141.26 ⁵	25

Aggregate Property	Test Method	Limit
Moisture Content (%)	WA 212.1 or 212.2	Report ¹
Petrographic Examination	ASTM C 295	Report ³

Notes:

- 1) To be included with conformance certification.
- 2) Not applicable for aggregate ≤ 5 mm nominal size.
- 3) Applicable to the mean of at least three results for each Lot (maximum Lot size 1000 m³).
- 4) The aggregate shall be clean, dry and without pre-coating. The binder shall include 0.5% by volume approved adhesion agent (Table 10).
- 5) Only applicable for basic igneous rock types (e.g. basalt).

The particle size distribution (PSD) of each nominal size aggregate shall conform to the requirements shown in Table 7.

Table 7 Cover Aggregate Particle Size Distribution Limits

AS 1152 Sieve Size (mm)	% Passing by Mass for Each Nominal Size Aggregate ¹						
	20 mm	16 mm	14 mm	10 mm	7 mm	5 mm	3 mm
26.50	100						
19.00	80 - 100	100					
16.00	0 - 20	80 - 100	100				
13.20	0 - 2	0 - 20	80 - 100	100			
9.50	-	0 - 2	0 - 20	80 - 100	100		
6.70	-	-	0 - 2	0 - 20	80 - 100	100	
4.75	-	-	-	0 - 2	0 - 25	80 - 100	100
2.36	-	-	-	-	0 - 2	0 - 30	80 - 100
1.18	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 1.0	0 - 30
0.60	-	-	-	-	-	-	0 - 5

Notes:

- 1) Applicable to the mean of at least three results for each Lot (maximum Lot size 1000 m³).

4.5.4 Cover Sand

Crusher dust or natural sand used as cover material for primerseals shall be of consistent quality, clean, hard and durable and shall be free from clay, organic matter and elongated particles. The maximum particle size shall be 4.75 mm, with oversize material removed by screening. Cover sand shall also conform to the requirements shown in Table 8.

Table 8 Cover Sand Properties

Aggregate Property	Test Method	Limit
Moisture Content (%)	WA 212.1 or 212.2	Report ¹
Water Absorption (%) [max.]	AS 1141.5	2.0
% Passing 6.70 mm [min.]	AS 1141.11.1	100
% Passing 0.60 mm [max.]	AS 1141.11.1	20
% Passing 0.075 mm [max.]	AS 1141.11.1	4
Coefficient of Uniformity (C _u) [min.]	-	4

Notes:

- 1) To be included with conformance certification.

The coefficient of uniformity (C_u) shall be calculated as shown in Equation 1.

$$C_u = \frac{D_{60}}{D_{10}}$$

Equation 1

where: D_{60} is the particle size in millimetres at which 60% of the sample is smaller in size; and
 D_{10} is the particle size in millimetres at which 10% of the sample is smaller in size.

4.6 Cutting Oil

4.6.1 General

Cutting oil used for reducing the viscosity of bituminous binders shall be a petroleum product or distillate fuel oil of either medium or slow curing type. Cutting oil shall conform to the properties shown in Table 9 at the time of manufacture and at any time until added to a bituminous binder.

Table 9 Properties of Cutting Oils

Oil Property	Test Method	Oil Type	
		Medium Curing	Slow Curing
Distillation: Initial Boiling Point (°C)	ASTM D 86	132 - 160	170 - 195
Distillation: Final Boiling Point (°C)	ASTM D 86	265 [max.]	360 - 400
Distillation: Temperature @ 50% Recovery (°C)	ASTM D 86	220 [max.]	250 - 290
Flash Point (Pensky Martin Closed) (°C) [min.]	AS 2106	35	65
Viscosity @ 40°C (mm ² /s)	ASTM D 445	1.0 - 1.4	2.0 - 4.0
Density @ 15°C (kg/m ³)	AS 2341.7	780 - 820	N/A ¹
Miscibility with Equal Parts of Class 170 Bitumen	-	Complete/No precipitation	Complete/No precipitation
Water Content (%) [max.]	AS 2341.9	0.05	0.05
Percentage Aromatics (%vol.) [min.]	ASTM D 1319	15	N/A ¹

Notes:

1) Not applicable for the indicated Type of cutting oil.

4.6.2 Medium Curing Cutting Oil

Supply of certified Aviation Turbine Fuel-Jet A1 with a statement that it has been denatured and supplied without other change as medium curing cutting oil is acceptable.

4.6.3 Slow Curing Cutting Oil

Supply of certified Automotive Distillate with a statement that it has been supplied without change as slow curing cutting oil is acceptable.

4.7 Precoating Fluid

4.7.1 General

Cover aggregate used with bitumen, PMB or CMB shall be precoated with a distillate or bitumen-based precoating fluid. The type of precoating fluid, constituents and application rate shall be as detailed in ANNEXURE C.

Cover aggregate used with bitumen emulsion shall not be precoated with any precoating fluid. The cover aggregate shall be pre-wetted with water to assist adhesion of the binder.

4.7.2 Distillate Precoating Fluid

Unless otherwise approved by the Local Government, the distillate precoating fluid shall be slow curing cutting oil with 0.5% (by volume) of an approved adhesion agent.

4.7.3 Bitumen Based Precoating Fluid

Bitumen based precoating fluid shall be a blend of Class 170 bitumen, slow curing cutting oil and 0.5% (by volume) of an approved adhesion agent. The blend may contain between 15 and 30% (by volume) bitumen. Bitumen based precoating fluid shall not contain any material other than bitumen, slow curing cutting oil and an approved adhesion agent.

4.8 Adhesion Agent

Adhesion agent shall be added to bitumen, PMB and CMB in the proportions specified in ANNEXURE C using a product from the list of approved adhesion agents shown Table 10.

The adhesion agent shall be a clear liquid with no sediments, readily miscible with bituminous binder, easy to pour and not subject to deterioration in storage.

Table 10 Approved Adhesion Agents

Product Designation
Bitumite Concentrate
Redicote BE
Diamin TO-L
Rhodoval DA 410
Aggrebond PC
Evotherm PC 1770

4.9 Geotextile Fabric

Geotextile fabric shall be non-woven needle punched fabric manufactured from polyester. The fabric shall be free of any flaws that may impact upon performance in bituminous surfacing applications. Geotextile fabric shall comply with the requirements of Table 11. The required grade of geotextile fabric to be used is specified in ANNEXURE C.

Table 11 Properties of Geotextile Fabric

Fabric Property	Test Method	Fabric Type	
		Light Grade	Heavy Grade
Wide strip tensile strength (kN/m) [min.]	AS 3706.2	6.0	9.0
Mass per unit area (g/m ²)	AS 3706.1	130 - 160	170 – 200
Maximum Elongation (%)	AS 3706.2	40 - 60	40 - 60
UV Stabilisation - Retained Strength, after 672 hrs exposure (%) [min.]	AS 3706.11	50	50
Melting Point (°C) [min.]	ASTM D 276	200	200
Bitumen Retention, loaded (l/m ²) [min.]	ASTM D 6140 ¹	0.9	1.1
Thickness (mm)	AS 3706.1	1.2 - 1.6	1.6 - 2.0

Notes:

1) Test completed using Class 170 bitumen, as per Table 1.

Geotextile fabric shall be stored in accordance with the following:

a) wrapped with a waterproof opaque material including the ends of rolls;

- b) stored in a shed away from direct sunlight and rain; and
- c) kept off the ground and away from any source of moisture.

Rolls of geotextile fabric shall show the manufacturer’s name, type of geotextile, batch number and date of manufacture. Rolls of geotextile fabric shall be used within 2 years of the date of manufacture.

4.10 Protective Paper

Heavy-duty protective paper, such as a bitumen-laminated paper, shall be used for all start, taper and finish operations. The paper shall be secured in place during spraying operations and shall be of a sufficient standard to prevent overspray and spillage during removal. Protective paper shall be cut to length and shall be provided in widths not less than 900 mm.

4.11 Paving Tape

Where specified, paving tape shall be a product from the list of approved paving tapes shown Table 12. Paving tape shall be cut to length and shall be provided in widths between 200 and 300 mm.

Table 12 Approved Paving Tapes

Product Designation
Denso Paving Tape
Flexiseal Tape HD
Bitac DS Multi-laminate Tape

5. SEAL DESIGN

Unless otherwise specified, the bituminous surfacing shall be designed by the Local Government. Where ANNEXURE C (Table 17) specifies design by the Contractor, then the Contractor shall be responsible for and shall carry out the design for the specified sprayed bituminous surfacing.

5.1 Design Methods

Unless otherwise specified, the design of sprayed bituminous surfacing shall include:

- a) selection of bituminous binder;
- b) election of nominal aggregate size(s);
- c) calculation of binder application rate(s); and
- d) determination of aggregate spread rate(s).

Design of sprayed bituminous surfacing shall be in accordance with the following:

Prime

The prime design, bitumen composition and binder application rate (BAR) shall be in accordance with AP-T68.

Primerseal

The primerseal design, bitumen composition, BAR and aggregate spread rate shall be in accordance with AP-T68.

Single/single Seal and Reseal

The single/single seal design, binder type, binder composition, BAR and aggregate spread rate shall be in accordance with AP-T68.

Double/double Seal and Reseal

The double/double seal design, binder type, binder composition, BARs and aggregate spread rates shall be in accordance with AP-T236.

Geotextile Reinforced Seal (GRS)

The GRS design, bitumen composition, BARs and aggregate spread rate(s) shall be in accordance with AP-T37 and either AP-T68 or AP-T236.

5.2 Design Testing

Seal design testing (flakiness index, average least dimension, surface texture, ball embedment) shall be carried out by the party responsible for the design (ANNEXURE C - Table 17).

Where aggregate is supplied by the Contractor, the Contractor shall carry out the aggregate testing detailed in Table 6, Table 7 and/or Table 8 and supply the Local Government with National Association of Testing Authorities, Australia (NATA) endorsed test reports for each nominal size aggregate at least one (1) week prior to the scheduled delivery date.

5.3 Design by the Local Government

Where the sprayed bituminous surfacing design has been provided by the Local Government, where necessary, it will order any variations to the design.

Design amendments may include, but are not limited to:

- a) aggregate precoating rate;
- b) BAR(s);
- c) binder type and composition;
- d) aggregate spread rate; and
- e) rolling and sweeping requirements.

5.4 Design by the Contractor

5.4.1 General

Where the sprayed bituminous surfacing design is provided by the Contractor, the design shall be in accordance with the relevant procedure (Clause 5.1) and shall be carried out by appropriately trained and experienced personnel.

5.4.2 Design Traffic

Where the sprayed bituminous surfacing design is provided by the Contractor, the Local Government shall nominate the design traffic at the time of quotation and shall confirm at least one (1) week prior to the scheduled start of the works. The traffic data shall be supplied in terms of total volume, proportion heavy vehicles and number of lanes.

5.4.3 Design Approach

The Contractor shall carry out design based on the following, as applicable:

- a) treatment type and nominal aggregate size specified by the Local Government;
- b) measured properties of the aggregate proposed for use;
- c) measured properties of the surface upon which the treatment is to be applied;
- d) design traffic data provided by the Local Government;
- e) visual assessment of the condition of the surface upon which the treatment is to be applied; and
- f) climatic data relevant to the Site.

Prior to the commencement of works, the Contractor shall provide the Local Government with evidence of application of relevant design method (Clause 5.1).

5.4.4 Design Amendment

Where the sprayed bituminous surfacing design is provided by the Contractor, it may vary the design to allow for changes to design factors, site conditions or construction observations. The modified design shall be documented and submitted to the Local Government at least one (1) week prior to implementation of the changes.

6. PLANT AND EQUIPMENT

6.1 General

Unless otherwise specified, the Contractor shall have all the following items of plant on site and in sound operating condition prior to the commencement of works:

- a) mechanical sprayer;
- b) pneumatic roller;
- c) road broom/sweeper;
- d) drag broom;
- e) precoater; and
- f) cover aggregate/sand spreader.

In addition to the minimum requirements above, the Contractor shall also ensure a binder storage tank or geotextile applicator is on site prior to commencing works, if storage of binder or application of a geotextile is included in the works.

6.2 Mechanical Sprayer

Bituminous binders shall be applied using a purpose built mechanical sprayer with a minimum capacity of 5,000 litres. The Contractor shall ensure the sprayer complies with the Austroads **Performance Requirements for Bitumen Sprayers** (2019). In addition to the Austroads requirements, the sprayer dipstick shall be calibrated in 50 litre increments and, unless the sprayer is of the air pressure type, the spray bar shall be fully circulating.

The mechanical sprayer shall have been calibrated in accordance with AG:PT/T531, T532, T533 or T534 within twelve (12) months of works commencing. The sprayer shall have passed the pump output and transverse distribution tests for the maximum allowable width of the bar. A NATA endorsed calibration certificate shall be provided for each sprayer used in the works that clearly indicates the relevant Austroads calibration method and the pass/fail status.

Prior to the commencement of works, or at any time during works, the Local Government may request the Contractor's sprayer be tested for uniformity of spray bar output in accordance with WA 340.1. The test will be conducted for the maximum spray bar width to be used in the Contract. The requirements for the spray bar output and distribution are outlined below:

- 1) The mean application rate of the width tested shall not exceed $\pm 10\%$ of the binder application rate at 15°C specified for the works.
- 2) Every tile used in the test which was fully coated shall have an application rate within 15% of the mean binder application rate for the width tested.
- 3) Not more than two consecutive tiles that have been fully coated shall have a binder application rate exceeding $\pm 10\%$ of the mean binder application rate for the width tested.

Mechanical sprayers that do not meet the requirements above shall not be used in the Contract. Subsequent tests to confirm conformity will be at the Contractor's cost. Any delays to site operations due to conducting these tests are not claimable as separate costs.

The Contractor shall use Copley EAN18 (W) end nozzles for spraying the edges of each run. Copley AN18, AN27 or AN36 nozzles shall be fitted to the remainder of the spray bar. Nozzles used in the works shall not be more than four (4) years old, as indicated by the date stamp on each nozzle.

6.3 Pneumatic Roller

Rollers shall be the multi-tyred type, shall be self-propelled, shall have a minimum mass of 11 tonnes and each wheel shall exert a minimum load of 10 kN. The wheels shall have smooth pneumatic rubber tyres inflated to at least 700 kPa. Pneumatic rollers used in the construction of GRS shall have a minimum mass of 18 tonnes.

6.4 Road Broom or Sweeper

The road broom/sweeper shall be a mechanically or power-driven rotary type, capable of removing excess cover material and/or other loose material from the pavement surface without damage to the surface.

6.5 Drag Broom

The drag broom shall consist of fixed brushes fitted to a frame capable of distributing loose cover material uniformly over the surface. The drag broom shall not dislodge particles embedded in the binder or damage the surface. Brooms shall be angled, height adjustable and suspended under pneumatic rollers.

6.6 Precoater

The precoater shall be capable of applying a thin film of precoat agent uniformly over the surface of aggregate particles at a consistent, specified rate. The precoater shall also be capable of screening dirt/foreign matter from the aggregate during operation.

6.7 Aggregate or Sand Spreader

Cover aggregate/sand spreading equipment, including truck mounted box spreaders, shall be capable of uniformly spreading both transversely and longitudinally at the specified rate. The spreader shall be fitted with removable cut-off attachments to allow the spread width to match the required width. A sufficient number of spreaders must be provided to enable the full width of sprayed binder to be covered in a single operation.

6.8 Binder Storage Tank

Mobile binder storage tanks shall comply with AS 2809.5. The storage tank shall be provided with heating tubes and pipework to allow circulation of the binder during heating. The storage tank shall have a fixed sampling point to facilitate collection of binder samples while undertaking works.

6.9 Geotextile Applicator

Geotextile fabric shall be applied using a purpose-built, machine mounted fabric spreader. The geotextile applicator shall keep the fabric taut, such that when laid atop the bond coat the width measured at any point is within 100 mm of the specified width.

7. STORAGE AND DISPOSAL OF BITUMINOUS MATERIALS

7.1 Storage Sites

The Contractor shall select suitable sites for bulk storage of bituminous materials and notify the Local Government at least one (1) week in advance of establishment.

The Contractor shall ensure site layout and safe handling procedures conform to requirements detailed in the Austroads **Bituminous Materials Safety Guide** (2015).

The Contractor shall provide and maintain the necessary equipment to receive, hold, heat, circulate, handle and protect bulk bituminous materials to prevent misuse, damage, deterioration or loss. Heating and storage tanks shall be fitted with dipsticks for volume measurement and suitable thermometers for temperature measurement. The Contractor shall also supply suitable equipment to facilitate collection and removal of liquid used to flush pumps and lines for disposal to authorised waste sites.

Storage tanks for cutting oil shall be fitted with dipsticks or flow meters for volume measurement and suitable thermometers for temperature measurement.

The accuracy of volume and temperature measurement equipment shall be sufficient to ensure that the binder constituent proportions are those ordered $\pm 0.5\%$.

7.2 Disposal Sites

The Contractor shall dispose of bituminous products and other disposable items, such as protective paper, at an authorised waste disposal site.

Any unauthorised location used for disposal without the prior approval of the Local Government shall be made good immediately at the Contractor's cost.

8. AGGREGATE STOCKPILES

8.1 General

Aggregate stockpile sites shall be constructed and maintained in a tidy condition and the Contractor's operations shall prevent contamination of aggregate in stockpiles. Surplus aggregate shall be removed from temporary stockpiles and the sites shall be cleaned and fully rehabilitated. The Contractor shall prepare a management plan for the aggregate stockpile sites detailing how contamination from precoating work is to be managed and clean-up of the site undertaken after completion of works.

Where aggregate is supplied in stockpile by the Local Government, the location of the stockpile sites are as detailed in ANNEXURE B. Where aggregate is supplied by the Contractor, temporary stockpile sites shall be prepared and maintained in good condition.

Prior to the stockpiling of aggregate, the Contractor shall submit the proposed location and associated management plan to the Local Government for approval no less than one (1) week prior to the planned transport of aggregate.

8.2 Site Preparation

The Contractor shall prepare aggregate stockpile sites such that they incorporate a firm, smooth, planar, well-drained surface. Stockpile areas shall be of sufficient size to allow a 4.0 m clear margin around each stockpile.

9. AGGREGATE PREPARATION

All aggregate, except that to be used with bitumen emulsion, shall be precoated with distillate or a bitumen based precoating fluid.

Aggregate precoated with a distillate precoating fluid shall be precoated at least 24 hours, but not more than seven (7) days before its intended use. Aggregate precoated with a bitumen based precoating fluid shall be precoated a minimum of four (4) days, but not more than twenty-eight (28) days before its intended use.

The rate of application of precoating fluid shall be limited to that sufficient to coat the entire surface area of all the aggregate, but shall not be less than the minimum rates of application stated in ANNEXURE C. At the time of spreading, the precoated aggregate shall not be covered with excess precoat fluid such that aggregate particles stick together, pick up on vehicle tyres or cause delay in adhesion.

Care shall be taken to minimise aggregate losses and to ensure dust does not blow back onto precoated aggregate.

10. BINDER PREPARATION

10.1 Bitumen and Modified Binder

Bitumen, modified binders and other specified or ordered constituents shall be mixed by circulation in the mechanical sprayer for not less than fifteen (15) minutes immediately prior to application or such longer periods as may be necessary to ensure a uniform and homogeneous mixture.

Adhesion agent shall be added to the sprayer on site, dissolved in the hot binder and thoroughly mixed prior to application. The binder shall be sprayed within twelve (12) hours of adding the adhesion agent to the binder. Where the binder has not been sprayed within twelve (12) hours, further adhesion agent shall be added to the remaining binder. The amount of adhesion agent shall be as specified in ANNEXURE C.

Adhesion agent shall be added at least to the minimum level specified or ordered. All other binder constituent proportions shall be those specified or ordered +/- 0.5%.

The binder spraying temperature shall be as specified in ANNEXURE C or as recommended by the manufacturer of the modified binder.

10.2 Bitumen Emulsion

Bitumen emulsion shall be mixed by circulation in the mechanical sprayer for not less than ten (10) minutes or such longer period as may be necessary to ensure a uniform and homogeneous mixture.

Where a pressurised sprayer is used, circulation in the site storage or road tanker shall be permitted as a substitute for circulation in the sprayer. Such circulation shall take place immediately prior to the loading of the sprayer.

11. SURFACE PREPARATION

Prior to application of the bituminous surfacing, all receiving surfaces shall be swept clean of loose sand, stones, dust, petrochemicals and any other foreign matter. Adherent patches of foreign matter shall be removed using hand brooming and steel scrapers or similar methods. Loose material shall be swept a sufficient distance off the pavement to permit uninterrupted application of the bituminous surfacing.

11.1 Basecourse Surface

The Contractor shall set out and mark the edge of the sprayed surfacing at a position to achieve the specified tolerances and to suit the method of work. The interval of spotting of any line is given in ANNEXURE C. The Contractor shall provide such additional markers as are necessary to achieve the specified tolerances.

Application of a light water spray shall precede the application of either a prime or primerseal. The light water spray shall be consistent across the width of the proposed seal Works.

11.2 Bituminous Surface

Where encountered in resealing works, the Contractor shall remove and dispose of existing raised pavement markers, both permanent and temporary, prior to resealing. The pavement markers shall only be removed at the commencement of works for the day and shall be removed only from the section(s) to be sealed on that day. Any area of the existing pavement damaged by the Contractor shall be repaired at no cost to the Local Government.

11.3 Bridge Decks

The surface of the bridge deck shall be primed with a cationic emulsion (CSS/170-60 or CRS/170-60), diluted with water in the ratio of 1:1 emulsion to water. The Contractor shall ensure the emulsion is compatible with the water used for dilution. The rate of application of the dilute bitumen emulsion primer shall be 0.6 L/m² applied in a uniform film over the entire surface of the bridge deck. No binder shall be applied on the prime until the emulsion has broken and free moisture has evaporated.

Traffic shall be kept off the bridge deck until application of the bituminous surfacing is complete.

11.4 Protection Against Overspray

The Contractor shall take all necessary precautions to prevent any bituminous, or other materials used in the works, from entering or adhering to any adjacent road furniture or roadside facility, including masking items as a preventative measure. All masking/protective coverings shall be removed and disposed at an authorised waste disposal site immediately following application of the bituminous surfacing.

Where necessary, existing guideposts shall be removed and stored safely by the Contractor to allow bituminous surfacing operations to proceed. Where not being replaced with new guideposts, the Contractor shall reinstate removed guideposts in their original locations at the completion of bituminous surfacing operations. Any guideposts damaged during removal, storage or reinstatement shall be replaced at no cost to the Local Government.

12. PROVISION FOR TRAFFIC

The Contractor shall establish, implement and manage a Contract specific Traffic Management Plan complying with the Contract, the **Occupational Safety and Health Act (1984)**, **Occupational Safety and Health Regulations (1996)**, **Traffic Management for Works on Roads - Code of Practice (2021)** and AS 1742.3.

The Traffic Management Plan shall also address the impact of each Traffic Management Scheme on traffic flow and movements on the road network including adjacent properties.

The Contractor shall minimise delays and inconvenience to road users during the course of the work. Traffic shall not be allowed on the new work until sufficient rolling has taken place to prevent damaging the freshly applied bituminous surfacing.

The Contractor shall supply signs, lights, plus any other necessary equipment, and erect and maintain the same in good condition and in accordance with the Traffic Management Plan.

Signs inscribed "ROADWORKS IN PROGRESS FOR NEXT ... KM" shall be erected at each end of unswept work where the length of the work, intermittent or continuous, exceeds 1 kilometre.

Signs shall remain in position until after the seal is swept with no loose stones remaining on the surface. No item of plant will be permitted to operate outside the appropriate warning signs. All signs shall be free standing.

The Contractor shall provide at least two persons on a full-time basis as traffic controllers. Warning signs shall always be erected in conjunction with the use of traffic controllers. Each traffic controller shall be equipped with a portable two-way radio, plus a spare and wear a high visibility vest.

Prior to implementing any proposed traffic control measure for the Works, particularly temporary speed restrictions, the Contractor shall notify the Local Government of such proposed measures.

13. APPLICATION OF BINDER

13.1 Bitumen and Modified Binder

13.1.1 General

The receiving surface shall be dry before application of bitumen or modified binder. No binder shall be applied during wet or rainy conditions, or when adverse weather conditions may prevail at any time during such work. Where binder is applied when wet or rainy conditions are forecast within 24 hours, any damage or maintenance shall be immediately repaired or undertaken at no cost to the Local Government.

Binder shall not be applied until the temperature of the receiving surface is equal to or greater than:

- a) prime = 20°C;
- b) primerseal = 20°C;
- c) bitumen seal or reseal = 25°C;
- d) PMB seal or reseal = 20°C;
- e) CMB seal or reseal = 20°C; and
- f) GRS = 40°C during daylight hours or 25°C during night works.

The Contractor shall allow, or cause to allow, the Local Government ready access to the mechanical sprayer, storage tank and/or binder manufacturing site to inspect the works, verify quantities and/or collect material samples.

13.1.2 Application Rate

The BAR for quotation purposes shall be as detailed in ANNEXURE C. Where the Local Government orders a variation greater than 7.5% of the BAR detailed in ANNEXURE C, the Contractor may submit a revised quotation for approval by the Local Government no less than one (1) week prior to the planned date for application of the binder.

For the purpose of payment, the BAR at 15°C shall be calculated from the quantity of binder sprayed and the area covered, as directly measured.

13.1.3 Volume Conversion

Table 13 and Table 14, for primes and primerseals, seals and reseals respectively, detail factors to be used for converting binder volumes or spray rates at a given temperature to binder volumes or spray rates at 15°C. Temperature-volume adjustments shall be calculated as shown in Equation 2.

$$Vol_{15^{\circ}C} = Vol_{Temperature} \times Factor_{Temperature} \quad \text{Equation 2}$$

where: $Vol_{15^{\circ}C}$ is the volume of binder at a reference temperature of 15°C;

$V_{\text{Temperature}}$ is the volume of binder measured at a given temperature in °C; and

$\text{Factor}_{\text{Temperature}}$ is the factor from Table 13 or Table 14 for the temperature at which the volume of binder was measured in °C.

Table 13 Conversion Factors – Primes including up to 60% MC cutting oil

Temperature (°C)	Factor 1	Temperature (°C)	Factor 1	Temperature (°C)	Factor 1
15	1.000	80	0.9543	145	0.9105
20	0.9964	85	0.9509	150	0.9072
25	0.9929	90	0.9475	155	0.9039
30	0.9893	95	0.9441	160	0.9007
35	0.9857	100	0.9407	165	0.8974
40	0.9822	105	0.9373	170	0.8942
45	0.9787	110	0.9339	175	0.8909
50	0.9752	115	0.9305	180	0.8877
55	0.9717	120	0.9272	185	0.8845
60	0.9682	125	0.9238	190	0.8813
65	0.9647	130	0.9205	195	0.8781
70	0.9612	135	0.9171	200	0.8749
75	0.9578	140	0.9138		

Notes:

- 1) Factors for intermediate temperatures may be obtained by direct interpolation.

Table 14 Conversion Factors – Primerseals, seals and reseals

Temperature (°C)	Factor 1	Temperature (°C)	Factor 1	Temperature (°C)	Factor 1
15	1.000	80	0.9597	145	0.9207
20	0.9969	85	0.9567	150	0.9177
25	0.9937	90	0.9536	155	0.9148
30	0.9906	95	0.9506	160	0.9118
35	0.9875	100	0.9476	165	0.9089
40	0.9844	105	0.9446	170	0.9060
45	0.9813	110	0.9416	175	0.9031
50	0.9782	115	0.9385	180	0.9002
55	0.9751	120	0.9356	185	0.8973
60	0.9720	125	0.9326	190	0.8944
65	0.9689	130	0.9296	195	0.8915
70	0.9658	135	0.9266	200	0.8886
75	0.9628	140	0.9236		

Notes:

- 1) Factors for intermediate temperatures may be obtained by direct interpolation.

13.1.4 Spraying

The binder shall be bar circulated for at least three (3) minutes immediately prior to application.

The spraying of binder for each run shall start and finish on protective paper. The sprayer shall maintain its correct spraying speed over the full length of each run and shall cross the protective paper at this speed. All tapers and

fillets shall be sprayed after masking with protective paper. The paper so used and any spilt bitumen shall be removed and disposed of at an authorised waste disposal site.

The volume of binder applied shall be determined by dipping the tank after each run and recording the volume of binder in the tank to the nearest 50 litres. The sprayer must be dipped whilst parked on level ground.

Where the direct use of the mechanical sprayer is impracticable, the binder may be applied by using a hand lance fed from the mechanical sprayer.

The binder shall be sprayed onto areas as detailed in the Contract Drawings, or as otherwise specified in ANNEXURE A. The sprayed binder edge shall conform to the following requirements:

- a) the sprayed edge shall not deviate from the specified edge by more than 50 mm;
- b) the rate of deviation of the sprayed edge from the specified edge lines shall not exceed one in four hundred (1:400); and
- c) tapers to accommodate variations in specified width shall be at one in one (1:1), except at floodway exits, which shall be at one in twenty (1:20).

The Contractor shall take all necessary precautions to prevent binder from adhering to any adjacent road furniture or roadside facility. Any damage or defacement shall be made good immediately at no cost to the Local Government.

13.1.5 Application of Prime

Traffic shall not be allowed on newly sprayed areas until the prime has penetrated and the surface is no longer tacky. Public traffic shall not be allowed on primed areas at any time without the prior approval of the Local Government.

Where construction traffic must be permitted, the prime shall be dusted over with cover sand (Clause 4.5.4) and lightly rolled prior to trafficking. The Contractor shall repair any damage caused by construction traffic at no cost to the Local Government.

All tacky or slick spots shall be blinded with cover sand (Clause 4.5.4) prior to the application of the next specified bituminous treatment.

The prime shall be cured for a minimum period of three (3) to seven (7) days prior to the application of a subsequent bituminous treatment. Dependent upon the binder composition, climatic conditions and the basecourse porosity, a reduced curing time of not less than 24 hours may be approved by the Local Government.

13.1.6 Application of Geotextile Fabric

A bond coat consisting of Class 170 bitumen without any cutting oil shall be applied to the receiving surface before placement of the geotextile fabric.

The geotextile fabric shall be placed upon the bond coat as soon as practical. The edge of the fabric shall not deviate from the specified edge by more than 50 mm. Where the fabric is creased after placement, the creases shall be broomed out or cut and respread. Both sides of the crease shall be cut and then butt joined.

Longitudinal joints of the fabric shall be overlapped by 100 to 200 mm with the overlapped joint receiving additional binder at the rate of the bond coat for the first layer of fabric. The fabric in the joint area shall not be loose. Any area of loose fabric shall receive additional binder. Longitudinal joints shall not be located within a traffic lane and shall only be located along lane lines or centrelines. The overlapped fabric shall be nailed down every 10 m on the longitudinal joint and on the transverse joint. A minimum of five (5) flat head nails shall be used to hold down the fabric including each corner.

The fabric shall be rolled with a pneumatic roller immediately after the fabric has been placed. Rolling shall cover the entire area of fabric and continue until the bond coat has been absorbed into the fabric, as indicated by a darkening in colour of the fabric. Where the bond coat bleeds to the surface of the fabric, rolling shall be discontinued. Construction traffic must not stand on the fabric and public traffic shall not be allowed on the fabric.

Where the geotextile fabric is exposed to moisture it shall be air dried completely before use.

13.2 Bitumen Emulsion

13.2.1 General

The receiving surface shall be dry (bituminous treatment or concrete) or slightly damp (granular) before application of bitumen emulsion. No binder shall be applied during wet or rainy conditions, or when adverse weather conditions may prevail at any time during such work. Where binder is applied when wet or rainy conditions are forecast within 24 hours, any damage or maintenance shall be immediately repaired or undertaken at no cost to the Local Government.

Binder shall not be applied until the temperature of the receiving surface is:

- a) greater than 10°C; and
- b) less than or equal to 40°C.

The Contractor shall allow, or cause to allow, the Local Government ready access to the mechanical sprayer, storage tank and/or binder manufacturing site to inspect the works, verify quantities and/or collect material samples.

13.2.2 Application Rate

The BAR for bitumen emulsion shall be as detailed in ANNEXURE C. Where the Local Government orders a variation greater than 7.5% of the BAR detailed in ANNEXURE C, the Contractor may submit a revised quotation for approval by the Local Government no less than one (1) week prior to the planned date for application of the bitumen emulsion.

13.2.3 Spraying

The spraying temperature for emulsions with less than 60% bitumen shall be between 35°C and 50°C. The spraying temperature for emulsions with greater than 60% bitumen shall be between 50°C and 80°C. The spraying temperature for PMB emulsions shall be in accordance with the manufacturer's recommended temperature.

The spraying of binder for each run shall start and finish on protective paper. The sprayer shall maintain its correct spraying speed over the full length of each run and shall cross the protective paper at this speed. All tapers and fillets shall be sprayed after masking with protective paper. The paper so used and any spilt bitumen shall be removed and disposed of at an authorised waste disposal site.

The volume of binder applied shall be determined by dipping the tank after each run and recording the volume of binder in the tank to the nearest 50 litres. The sprayer must be dipped whilst parked on level ground.

The binder shall be sprayed onto areas as detailed in the Contract Drawings, or as otherwise specified in ANNEXURE A. The sprayed binder edge shall conform to the following requirements:

- a) the sprayed edge shall not deviate from the specified edge by more than 50 mm;
- b) the rate of deviation of the sprayed edge from the specified edge lines shall not exceed one in four hundred (1:400); and
- c) tapers to accommodate variations in specified width shall be at one in one (1:1), except at floodway exits, which shall be at one in twenty (1:20).

For double/double seals, the binder for the second coat shall not be applied until the binder in the first coat has completely broken and cured to form a stable film without water in the binder.

The Contractor shall take all necessary precautions to prevent binder from adhering to any adjacent road furniture or roadside facility. Any damage or defacement shall be made good immediately at no cost to the Local Government.

14. APPLICATION OF COVER MATERIAL

14.1 Single Coat Aggregate

14.1.1 General

The aggregate shall be dry (except emulsion) at the time of application and shall be uniformly spread over the binder area by means of an appropriate spreader. The aggregate shall be applied commencing at the low edge of the pavement and progress in successive parallel runs.

The time lag between application of binder and application of cover material shall be kept to a minimum, with all binder areas, except approved lapping strips, covered with aggregate within ten (10) minutes of spraying the binder. The Contractor may propose an alternate time lag, where required, for approval by the Local Government no less than one (1) week prior to the planned commencement date for the works.

14.1.2 Spread Rate

The aggregate shall be placed to form a uniform stone mosaic of single particle thickness, in almost continuous interlocked contact, generally orientated with their least dimension vertical. Specified aggregate spread rates (ANNEXURE C) are nominal and should be adjusted as required to give the correct stone mosaic. For the purpose of payment, the spread rate shall be calculated from the quantity of material applied and the area covered, as directly measured.

Surplus cover material shall be swept lightly to remove the loose particles without disturbing the aggregate embedded in the binder.

Where the Contractor overspreads (applies too much aggregate), or otherwise wastes material, the Contractor shall be liable for the cost of the overspread or wasted aggregate.

14.1.3 Additional Cover Material

Additional aggregate shall be applied to any bare or insufficiently covered areas as necessary to provide uniform and complete cover. Where the area to be covered with additional aggregate is not of uniform width, the additional aggregate may be spread by hand.

Additional aggregate shall be applied before the completion of four coverages of a pneumatic roller.

14.1.4 Rolling and Drag Brooming

Immediately after application of the cover material, the surface shall be rolled with pneumatic rollers for the minimum number of coverages stated in ANNEXURE C. No area of the surfacing shall be exempt from rolling. Rollers shall be operated at speeds less than 7 km per hour for the first four (4) complete coverages.

Drag brooming shall be carried out after every second coverage of rolling, except for GRS. If an emulsion seal has not broken and cured and dislodging aggregate cannot be prevented, the Contractor shall defer or eliminate drag brooming. Where drag brooming is eliminated, the Contractor shall substitute light hand brooming. On geotextile seals, only hand sweeping will be used to correct inconsistent spreading of aggregate.

14.1.5 Sweeping

Surplus cover material not incorporated in the seal after rolling shall be swept off the surface beyond the outer edge of each shoulder without damage to the surfacing, shoulder or guideposts, and shall then be dispersed such that no windrows of swept material remain.

Where the roadway to be sealed is kerbed, the excess cover material shall be picked up and removed.

Initial sweeping shall take place prior to completion of the day's work. Additional sweeping shall be carried out at the commencement of the following day's work. The Contractor shall carry out subsequent sweepings as necessary for the following seven (7) days to ensure that no loose aggregate remains on the surface.

The Contractor shall install symbolic “LOOSE STONES” signs and other temporary traffic management signs in accordance with Main Roads Specification 202. The signs shall remain in place on each section of the works for at least seven (7) days after completion of sealing.

14.2 Double Coat Aggregate

14.2.1 First Coat (Larger Aggregate)

Application of the first coat of aggregate shall be in accordance with Clause 14.1.

The aggregate spread rate for the first coat should result in more gaps between particles than would occur in a single/single seal of the same nominal size.

Traffic shall not be allowed on the first coat of a double/double seal.

14.2.2 Second Coat (Smaller Aggregate)

Application of the second aggregate coat shall not proceed until completion of rolling, drag brooming and removal of excessive aggregate from the first coat.

The second aggregate coat shall be spread, rolled and swept as specified for the first coat (Clause 14.1). This work shall be completed within fifteen (15) minutes of application of the second binder coat.

Emulsion seals shall not be swept or trafficked until the emulsion has completely broken leaving no free water and the binder has attained full strength, ensuring adequate stone retention.

14.3 Single Coat Sand

14.3.1 General

The sand shall be dry at the time of application and shall be uniformly spread over the binder area by means of an appropriate spreader.

The time lag between application of binder and application of cover material shall be kept to a minimum, with all binder areas, except approved lapping strips, covered with sand within ten (10) minutes of spraying the binder. The Contractor may propose an alternate time lag, where required, for approval by the Local Government no less than one (1) week prior to the planned commencement date for the works.

14.3.2 Spread Rate

Specified spread rates (ANNEXURE C) are nominal and should be adjusted as required to give the correct surface finish. Sufficient cover material (sand or crusher dust) must be spread and rolled in to fully absorb the free binder. For the purpose of payment, the spread rate shall be calculated from the quantity of material applied and the area covered, as directly measured.

Surplus cover material shall be swept lightly to remove the loose particles without disturbing the sand embedded in the binder.

Where the Contractor overspreads (applies too much sand), or otherwise wastes material, the Contractor shall be liable for the cost of the overspread or wasted sand.

14.3.3 Additional Cover Material

Additional sand shall be applied to any bare or insufficiently covered areas as necessary to provide uniform and complete cover. Sufficient sand shall be applied to fully absorb the binder and minimise pick-up under traffic.

14.3.4 Rolling

Immediately after application of the cover material, the surface shall be rolled with pneumatic rollers for the minimum number of coverages stated in ANNEXURE C. No area of the surfacing shall be exempt from rolling. Rollers shall be operated at speeds less than 7 km per hour for the first four (4) complete coverages.

14.3.5 Sweeping

Surplus cover material not incorporated in the primerseal after rolling shall be swept off the surface beyond the outer edge of each shoulder without damage to the surfacing or shoulder and shall be spread evenly down the batter slope. The Contractor shall not install guideposts prior to the sweeping of loose cover material down the batter slope.

The time lapse between the completion of rolling and final surface sweeping shall not be greater than one (1) week. The Contractor shall propose the appropriate time lag for Local Government approval not less than one (1) week prior to the planned commencement of works.

15. SURFACE DAMAGE

In the event of fuel or oil leaks, fluid/chemical spillages or any other damage to the sprayed bituminous surfacing prior to acceptance by the Local Government, the surface and or the underlying basecourse shall be reinstated to its pre-damage condition at no cost to the Local Government.

16. MATERIAL QUALITY

The Contractor shall implement a quality management system to ensure material and bituminous surfacing supplied under the Contract complies in all respects to the specified requirements for the material and/or bituminous surfacing purchased.

Testing shall be carried out in accordance with the relevant Main Roads or equivalent Australian Standard test method. Sampling methods shall be random and unbiased. Random site selection must be undertaken in accordance with WA 0.1.

The frequency of tests shall always be adequate to demonstrate that the material complies with the Specification. As a minimum, testing frequencies shall be as shown in Table 15. Prior to supply, the Contractor shall certify that the material complies in all respects with the specified requirements and shall provide NATA endorsed test certificates to demonstrate compliance.

Unless otherwise specified, all testing shall be performed by a Laboratory holding current NATA accreditation for the methods undertaken. NATA accreditation shall be maintained until the completion of the Contract. All test reports shall be NATA endorsed by a current approved signatory for the Laboratory conducting the testing.

The Contractor shall allow, or cause to allow, the Local Government ready access to the quarry, pit, production and/or manufacturing site to inspect the works and/or to collect material samples.

Table 15 Minimum Testing Frequency for Sprayed Bituminous Surfacing

Method	Material Type	Minimum Frequency
AG:PT/T103 Loss on Heating	PMB; CMB	1 : batch
AG:PT/T111 Viscosity @ 165°C ¹	PMB; CMB	1 : batch
AG:PT/T111 Viscosity @ 165°C ²	PMB; CMB	1 : transport vessel
AG:PT/T122 Compressive Limit @ 70°C	CMB	1 : batch
AG:PT/T122 Torsional Recovery	PMB; CMB	1 : batch

Method	Material Type	Minimum Frequency	
AG:PT/T131	Softening Point	PMB; CMB	1 : batch
AS 1141.5	Water Absorption	Cover Sand	3 : Lot
AS 1141.11.1	Particle Size Distribution	Cover Aggregate; Cover Sand	3 : Lot
AS 1141.15	Flakiness Index	Cover Aggregate	3 : Lot
AS 1141.20.1 or 1141.20.2	Average Least Dimension	Cover Aggregate	3 : Lot
AS 1141.23	Los Angeles Abrasion	Cover Aggregate	3 : Lot
AS 2341.2 or 2341.3	Viscosity @ 60°C ¹	Bitumen	1 : batch
AS 2341.2 or 2341.3	Viscosity @ 60°C ²	Bitumen	1 : transport vessel
AS 2341.2 or 2341.3 or 2341.4	Viscosity @ 135°C	Bitumen	1 : batch
AS 2341.8	Matter Insoluble in Toluene	Bitumen	1 : batch
AS 2341.12	Penetration @ 25°C	Bitumen	1 : batch
AS 2341.22	Particle Charge	Bitumen Emulsion	1 : batch
AS 2341.23	Residue from Evaporation ¹	Bitumen Emulsion	1 : batch
AS 2341.23	Residue from Evaporation ²	Bitumen Emulsion	1 : transport vessel
AS 2341.29	Setting Time	Bitumen Emulsion	1 : batch
WA 212.1 or 212.2	Moisture Content	Cover Aggregate; Cover Sand	1 : Lot
-	Miscibility with Class 170 Bitumen	Cutter Oil	1 : Lot

Notes:

- 1) Sampled at the point of manufacture.
- 2) Sampled on delivery.

17. SUPPLY OF MATERIALS

The Contractor shall nominate the source of the binder and/or cover material to be supplied with the quotation.

Unless otherwise specified, the Contractor shall deliver the materials to the nominated stockpile sites on the date and time specified. The Contractor shall confirm all necessary arrangements concerning load size, rate for supply, timing of the delivery and documentation prior to delivery. Different nominal size aggregate shall be placed in separate, clearly identified stockpiles.

Where the Contract includes cartage, the Contractor shall remove and replace any cover material that becomes contaminated during transport, delivery or stockpiling at no cost to the Local Government.

Where the Contract excludes cartage, the Contractor shall allow, or cause to allow, the Local Government or nominated third-party ready access to the quarry, pit, production and/or manufacturing site and shall provide any assistance necessary to ensure satisfactory load-out of the specified material.

18. REGULATORY REQUIREMENTS

The Contractor shall conform to all relevant statutory and regulatory requirements including environment, aboriginal heritage, wildlife conservation, dangerous goods, occupational safety and health, rail safety and road safety.

ANNEXURE A – SCHEDULE OF WORKS

Works Item (Section Nos)	From ₁ (SLK)	To ₁ (SLK)	Length (km)	Width (m)	Side ² (L,C,R)	Area (m ²)	BAR at 15°C (l/m ²)	Cover Material (Type)	Cover Size (mm)	Comments
Road Name 1										
1										
2										
Etc. etc.										
Road Name 2										
1										
2										
Etc. etc.										
Road Name 3										
1										
2										
Etc. etc.										

Note:

- 1) SLK denotes Straight Line Kilometre distance values for “From” and “To”. Alternatively, section limits may be described using chainages.
- 2) “L, C, R” denotes “Left”, “Centre”, or “Right”. Leave “Side” column blank if width value in previous column is entire seal width.

ANNEXURE B – LOCAL GOVERNMENT SUPPLIED COVER MATERIAL

Location details for aggregate supplied by the Local Government are shown in Table 16.

Table 16 Aggregate Dumpsite Locations

Location (SLK)	Offset (m)	Quantity Available (m ³)	Size (mm)	Type

ANNEXURE C – SCOPE OF WORK

RESPONSIBILITY FOR DESIGN

Table 17 Responsibility for Design

Seal Type	Location	Design Responsibility
Prime	All Works	
Primerseal	All Works	
Seal/Reseal	All Works	
SAM/SAMI	All Works	
Waterproof Bridge Deck Membrane	All Works	
Geotextile Seal	All Works	

BINDER AND AGGREGATE APPLICATION RATES

The percentage of each binder constituent and binder application rates for quotation purposes shall be as detailed in Table 18.

Table 18 Binder Composition and Application Rates

Surface Type	Binder Composition % by Volume			Binder Application Rate (BAR) @ 15°C (L/m ²)
	Class 170 Bitumen	Medium Curing Cutting Oil	Slow Curing Cutting Oil	
Prime	40	60		0.6
Primerseal				As per design
Seal/Reseal - Single coat	100			As per design
Seal/Reseal - Double coat				
First Coat	100			As per design
Second Coat	100			As per design
Polymer Modified Binder Seals:	PMB			
High Stress Seal coat	100			As per design
Bridge Deck	100			As per design
SAM	100			As per design
SAMI	100			As per design

Note:

- 1) Rates to be modified in accordance with Clauses 5.3 and 5.4.
- 2) Medium curing cutting oil shall be added to the seal/reseal coat binder in accordance with Figure C1 or Table 20. To compensate for the cutter added to the binder, the binder application rates shall be increased or decreased as advised or agreed by the Local Government to preserve the designated residual bitumen application rate.
- 3) The type of cover material, nominal size and spread rate for quotation purposes shall be as detailed in Table 19.

Table 19 Aggregate Nominal Size and Spread Rate

Surface type	Cover Material and Size (mm)	Aggregate Spread Rate (m ² /m ³)
Primerseal		

Surface type	Cover Material and Size (mm)	Aggregate Spread Rate (m ² /m ³)
Seal/Reseal - Single coat		
Seal/Reseal - Double/ Double:		
First coat		
Second coat		
High Strength Seal		
Bridge decks		
SAM		
SAMI		

Note:

- 1) Rates to be modified in accordance with Clauses 5.3 and 5.4.

SEALS AND CUTBACK PRIMERSEALS

Addition of Medium Curing Cutting Oil

Medium Curing Cutting Oil shall be added to Class 170 Bitumen used for seals, reseals and aggregate primerseals depending on pavement surface temperature at the time of sealing as shown in Figure C1 Addition of Medium Curing Cutting Oil. Medium Curing Cutting Oil shall be added to the binder for fine aggregate sand/crusher dust primerseals as required by design.

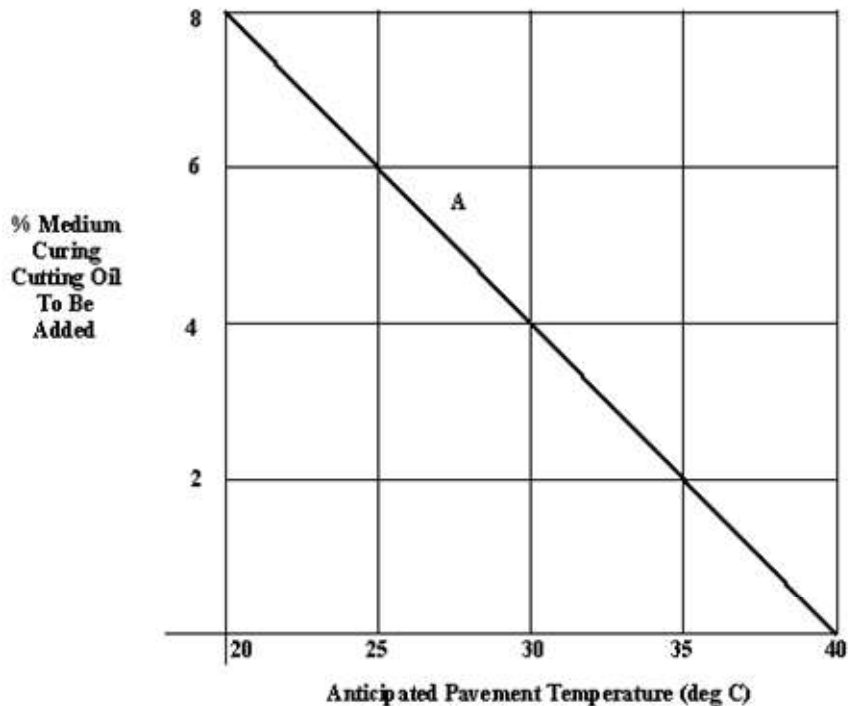


Figure C1 Addition of Medium Curing Cutting Oil

Note:

- 1) Line A = Class 170 bitumen (approximately 2% more cutting oil shall be added if Class 320 bitumen is used).
- 2) Minimum desirable pavement temperature for seals and reseals is 25°C.
- 3) If the anticipated pavement temperature is likely to rise, decrease the Medium Curing Cutting Oil percentage obtained from the chart.
- 4) If the aggregate is clean and freshly precoated, reduce the Medium Cutting Oil proportion by 1%.

Depending on the anticipated road temperature, medium curing cutting oil shall be added to the binder in accordance with Table 20 and accompanying notes.

Table 20 Cutting Oil Proportions for Polymer Modified Binder (PMB)

Pavement Temperature (°C)	Traffic (vehicle/lane/day based on AADT)	Class of Polymer Modified Binder		
		S10E and S35E	S25 E	S20E
% by volume of total binder				
20 to 25	Less than 1000	6	8	8
	1000 or more	4	6 to 8	6 to 8
26 to 32	Less than 1000	4	6	4 to 6
	1000 or more	2	4 to 6	4
33 to 38	Less than 1000	2	4 to 5	4
	1000 or more	0 to 2	3 to 4	2
39 to 45	Less than 1000	0 to 2	Min 3	2
	1000 or more	0 to 2		
Above 45	All	0	Min 3	0 to 2

Note:

- 1) Assessment of pavement temperature shall take into account the presence of shaded areas and expected weather conditions in the 24 hours following completion of the Works
- 2) Where manufacturer's instructions vary from Table 20, the manufacturer's instructions shall be followed.
- 3) In strain alleviating membrane interlayer or bridge deck applications where the treatment is to be covered by asphalt within a short period, it is not desirable to add cutter oil. If cutter oil is considered necessary, it shall be limited to a maximum of 2% by volume of binder.

BINDER SPRAY TEMPERATURE

Binder Spraying Temperatures for seals and primerseals using Class 170 bitumen shall be in accordance with Table 21. Binder spraying temperatures for Class 320 bitumen may be increased by no more than 5°C from those shown in Table 21. Binder spraying temperatures for polymer modified binders as specified in Table 22 unless otherwise specified by the binder manufacturer. The manufacturer's instructions shall take precedence over Table 22.

Where bitumen or bitumen cutback is delivered to site at a temperature higher than the upper limit of the recommended spraying temperature range, the spraying of the product shall be delayed until such time as the temperature of the product has cooled to the recommended upper limit.

In certain circumstances, the Local Government may allow the spraying of binder at temperatures above those listed below. In such cases, the binder application rate will be adjusted as directed by the Local Government.

Table 21 Bitumen Spraying Temperature

Pavement Temperature (°C)	Binder Composition (Bitumen/MC Cutter)	Ideal Spraying Temperature Range (°C)
40 +	100/0	175-185
35	98/2	165-175
30	96/4	160-170
25	94/6	150-160
20	92/8	145-155

Table 22 Polymer Modified Binder Spraying Temperature

Percentage Medium Curing Cutter in Polymer Modified Binder	Spraying Temperature °C
0	180 to 190

Percentage Medium Curing Cutter in Polymer Modified Binder	Spraying Temperature °C
2	175 to 185
4	170 to 180
6	165 to 175
8	160 to 170

BITUMEN EMULSION PRIMERSEALS

Binder application rates for bitumen emulsion primerseals for quotation purposes shall be in accordance with Table 23.

Table 23 Bitumen Emulsion Binder Application Rates

Surface Type	Binder Application Rate (BAR) @ 15°C (L/m ²)
Primerseal - 1st coat - 10mm	0.9
Primerseal - 2nd coat - 5mm	1.1

ROLLING

Rolling of the seal or primerseal surface shall be to the minimum number of complete coverages shown in Table 24. A complete coverage is one pass of a roller over the entire area, i.e. the total length and width of a spray run being rolled.

Table 24 Minimum Roller Coverages

Type of Roller	Minimum No. of Complete Coverages
Rubber Tyred Roller	12

PRECOATING OF AGGREGATE

Precoating Fluid

Unless otherwise shown in Table 25, all aggregates shall be precoated with a distillate precoat fluid.

Application Rate

The precoating fluid application rate shall be as shown in Table 25.



Table 25 Precoat Fluid Type and Application Rate

Seal Type	Type of Precoat Fluid	
Primerseal	Distillate	
Seal/Reseal	Distillate	
Bridge Deck	Distillate	
Geotextile Seal	Distillate	
Polymer Modified Seal	Bitumen based	
Nominal Size Aggregate (mm)	Distillate Precoat Fluid	Bitumen Based Precoat Fluid
	Minimum Application Rate (litres/m ³ loose)	Minimum Application Rate (litres/m ³ loose)
7	6	11
10	5	10
14	5	8
16	4	6

Note:

- Note the rate of application of precoating fluid shall be just sufficient to coat each aggregate particle uniformly without an excess of fluid.

ADHESION AGENT

In cutback prime, primerseal and conventional seal binders the proportion of adhesion agent shall be 0.5% of the binder volume at 15°C, or as otherwise directed by the Local Government. In PMBs, the proportion of adhesion agent shall be 1.0% of the binder volume at 15°C, or as otherwise directed by the Local Government.

GEOTEXTILE REINFORCED SEALS (GRS)

Geotextile fabric grade, type of binder, binder application rate, aggregate size and aggregate spread rate for GRS shall be in accordance with Table 26.

Table 26 Geotextile Reinforced Seal (GRS) Application Details

	Fabric Grade	Type of Binder	BAR at 15°C (L/m ²)	Aggregate Size (mm)	Aggregate Spread Rate m ² /m ³
Single Coat Seal			As per design		
Bond Coat	Light OR Heavy	C170 Bitumen	As per design		
Seal Coat		C170 Bitumen	As per design		
Double Coat Seal			As per design		
Bond Coat	Light OR Heavy	C170 Bitumen	As per design		
1 st Seal Coat		C170 Bitumen	As per design		
2 nd Seal Coat		C170 Bitumen	As per design		

LINE SPOTTING

Prime, primerseal, seal and reseal sections shall be spotted at the intervals in Table 27.

Table 27 *Line Spotting Interval*

Road Feature	Spotting Interval (m)
Straight Sections	8
Curved Sections	5

ANNEXURE D – RECORD FORMS

The following records are attached:

- D.1 Bituminous Surfacing - Contractors Daily Surfacing Record
- D.2 Bituminous Surfacing - Contractors Sprayer Loading Record

D.2 BITUMINOUS SURFACING - CONTRACTORS SPRAYER LOADING RECORD

DATE : _____
 GRADE OF BITUMEN : _____
 TYPE OF BLEND : _____

ROAD : _____
 SPRAY RUN NUMBERS : _____

SPRAY LOAD No : _____
 CONTRACT No : _____

A. LOADING INTO EMPTY SPRAYER					
1	Pavement Temp	_____ °C	Design Blend	___ / ___ / ___	
2	Application Rate (Hot)	_____ L/M ²	Spray Temp (Hot)	___ °C	
3	Volume Required In Sprayer	_____ L @ _____ °C			
		_____ L @ 15°C			
4	Components To Be Added (15°C)				
	Component 1	_____ L	OR	_____ L @ _____ °C	
	Component 2	_____ L	OR	_____ L @ _____ °C	
	Component 3	_____ L	OR	_____ L @ _____ °C	
	Adhesion Agent	_____ L			

ACTUAL COMPONENTS ADDED					
A			B		
Component 1	_____ L @ _____ °C		Component 1	_____ L @ _____ °C	
Component 2	_____ L @ _____ °C		Component 1	_____ L @ _____ °C	
Component 3	_____ L @ _____ °C		Component 1	_____ L @ _____ °C	
Adhesion Agent	_____ L		Adhesion Agent	_____ L	
Actual Blend	___ / ___ / ___		Actual Blend	___ / ___ / ___	

SIGNATURES :

Contractor's Rep
 WALGA Member

B. LOADING INTO SPRAYER CONTAINING PRIMER					
1	Pavement Temp	_____ °C	Design Blend	___ / ___ / ___	
2	Application Rate (Hot)	_____ L/M ²	Spray Temp (Hot)	___ °C	
3	Volume Required In Sprayer	_____ L @ _____ °C			
		_____ L @ 15°C			
4	Components To Be Added (15°C)				
	Component 1	_____ L	OR	_____ L @ _____ °C	
	Component 2	_____ L	OR	_____ L @ _____ °C	
	Component 3	_____ L	OR	_____ L @ _____ °C	
5	Primer Remaining In Sprayer	_____ L		_____ °C	_____ L @ 15°C
6	Actual Primer Composition	___ / ___		___ / ___	
7	Components Remaining in Sprayer				
	Component 1	_____ L		Component 3	_____ L
	Component 3	_____ L			
8	Components To Be Added (15°C)				
	Component 1	_____ L	OR	_____ L @ _____ °C	
	Component 2	_____ L	OR	_____ L @ _____ °C	
	Component 3	_____ L			
	Adhesion Agents	_____ L	OR	_____ L @ _____ °C	

Description of Components	1	_____
	2	_____
	3	_____