



WESTERN AUSTRALIA SPECIFICATION

244

SPRAYED BITUMINOUS SURFACING

Please use “National Sprayed Sealing Specification(current edition)” which is available on the Australian Asphalt Pavement Association website www.aapa.asn.au

Amendment Record for this Specification Part

This Specification is Council's edition of the AUS-SPEC generic specification part and includes Council's primary amendments.

Details are provided below outlining the clauses amended from the Council edition of this AUS-SPEC Specification Part. The clause numbering and context of each clause are preserved. New clauses are added towards the rear of the specification part as special requirements clauses. Project specific additional script is shown in the specification as italic font.

The amendment code indicated below is 'A' for additional script 'M' for modification to script and 'O' for omission of script. An additional code 'P' is included when the amendment is project specific.

Amendment Sequence No.	Key Topic addressed in amendment	Clause No.	Amendment Code	Author Initials	Amendment Date
1	Annexure 244c – Adhesion Agents		M	AW	July 2002
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SPECIFICATION 244 - SPRAYED BITUMINOUS SURFACING

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SPECIFICATION 244 : SPRAYED BITUMINOUS SURFACING

GENERAL

244.01 SCOPE

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

(a) Prime

The application of a primer of field or refinery prepared cutback bitumen without aggregate to provide penetration of the surface (preferably from 5 to 10 mm) and waterproofing.

(b) Primerseal

The application of a primerbinder of field or refinery prepared cutback bitumen to provide surface penetration (preferably from 2 mm to 5 mm) and incorporation of a light cover of aggregate to provide a temporary wearing surface.

(c) Seal or Reseal

The application of a bituminous binder into which aggregate is incorporated to provide a durable wearing surface.

NOTE: This Specification does not include bituminous emulsion seals or polymer-modified seals.

2. The locations and required types of sprayed bituminous surfacings, including types of binders and aggregate sizes, shall be as shown on the Drawings and/or as detailed in Annexure 244.A.

3. For multiple application treatments, the binder and aggregate may be required to be laid in one or more separate applications indicated in Annexure 244.A.

4. Requirements for adhesion agent in the bitumen and tolerances for binder application rates are set out in Annexure 244.B.

5. Requirements for quality control and testing, including maximum lot sizes and minimum test frequencies, are cited in the Specification Part for Quality Requirements.

Quality

244.02 REFERENCE DOCUMENTS

1. Documents referenced in this Specification are listed in full below whilst being cited in the text in the abbreviated form or code indicated.

**Documents
Standard Test
Methods**

(a) **Council Specifications**

201 - Control of Traffic

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(b) Australian Standards

- AS 1160 - Bituminous emulsion for construction and maintenance of pavements.
- AS 2008 - Residual bitumen for pavements.
- AS 2157 - Cutback bitumen.
- AS 2758.2 - Aggregate for sprayed bituminous surfacing.
- AS 3568 - Oils for reducing the viscosity of bitumen for pavements.

(c) MRWA Forms

Bituminous Surfacing - Contractors Daily Records
Bituminous Surfacing - Contractors Spraying Loading Record
MRD Forms 1220 - 1226 - Blending Charts

(d) WA State Legislation

Local Government Act 1995
Bush Fires Act

(e) Other

AUSTROADS - Design of Sprayed Seals (1990)
AUSTROADS - Bitumen Sealing Safety Guide (1996)

244.03 CONTROL OF TRAFFIC

1. The Contractor shall provide for control of traffic in accordance with the requirements of the Specification for CONTROL OF TRAFFIC while undertaking the work and shall take all necessary precautions to protect the work from damage until such time as the new seal coat has developed sufficient strength to carry normal traffic without disturbance of the aggregate.

***Contractor's
Responsibility***

2. Where early use of the new seal is required to facilitate the movement of traffic, vehicles may be allowed to run on the work after initial rolling has taken place provided that vehicles are controlled to such slow speeds that no lateral displacement of aggregate occurs. Where necessary, the Contractor shall use patrol vehicles to ensure that traffic travels at an acceptable speed.

Speed Control

3. The Contractor shall take all necessary steps to avoid or minimise delays and inconvenience to road users during the course of the work. Where adequate detours or side tracks are included in the Contract or are otherwise available, traffic shall be temporarily diverted while the work is in progress.

***Minimise
Traffic Delays***

4. If facilities for the diversion of traffic are not available, the Contractor may spray part width of the pavement in the one operation and make available to traffic the adjacent strip of roadway, except during the actual spraying operation when all traffic movement through the work shall cease. Traffic shall not be permitted to encroach upon the edge of the sprayed bituminous material until such time as it is covered with aggregate.

***Part Width
Spraying***

MATERIALS

244.04 SAMPLING AND TESTING OF MATERIALS

1. Sampling and testing of materials shall be arranged by the Contractor and carried out by a laboratory with appropriate NATA registration in accordance with the relevant material specifications cited in this Specification.

***NATA
Registration***

244.05 BITUMINOUS MATERIALS AND ADDITIVES

(a) Bituminous Materials

1. Bitumen shall conform to AS2008 - Residual Bitumen for Pavements. The binder for seals and reseals shall be Class 170 or class 320 bitumen.

(b) Refinery Cutback Bitumen

1. Refinery cutback bitumen shall conform to AS2157.

***Cutback
Bitumen***

(c) Bituminous Emulsions

1. Bituminous emulsion shall conform to AS 1160.

Emulsion

244.06 AGGREGATE PRECOATING AGENT AND BITUMEN ADHESION AGENT

1. Except for fine aggregates such as sand and crusher dust, all aggregate used as cover material shall be precoated. Precoating agent shall comply with Annexure 244D. The rate of precoating expressed in l/m³ shall be as detailed in Annexure 244D.

***Precoating -
Compliance
and Proportion***

2. The Contractor shall supply an adhesion agent selected from the list of approved adhesion agents given in Annexure 244C.

***Approved
Adhesion
Agent***

3. In cutback prime, primerseal and conventional seal binders the proportion of adhesion agent shall be 0.5 per cent of the binder volume at 15°C, or as directed by the Superintendent. In binders used for polymer modified seals the proportion of adhesion agent shall be as advised by the binder supplier and approved by the Superintendent.

Proportion

244.07 OILS FOR REDUCING VISCOSITY OF BITUMEN

(a) Cutter Oil

1. Cutter oil shall conform to the requirements of AS 3568, displaying an Abel flash point of not less than 38°C and a viscosity at 40°C not greater than 2.0 millipascal seconds, with the following qualifications to the properties for its classification as set down in AS 3568 Table 1:

***Cutter
Specification***

- (i) Either "Aniline point" or "Aromatic content" is acceptable.
- (ii) There shall be no "Density" requirement.
- (iii) The presence of water, assessed visually as an immiscible phase in any sample of the material, shall be grounds for its rejection.
- (iv) If the viscosity is calculated by the equation given in Table 1, Note 3 of AS 3568, "f" shall be taken to be 0.0009 per °C.

2. Delivery and storage procedures for cutter oil delivered in drums or in bulk shall ensure that all containers are free from any deleterious material prior to filling with cutter oil, and all drums are stored so as to ensure that entry of water through seals or welds in the drums is prevented.

***Delivery &
Storage***

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244.08 AGGREGATE

1. Aggregate shall conform to AS2758.2.

Specification

2. The Contractor shall obtain test results for each lot/stockpile of aggregate and certification of compliance with AS2758.2 from a laboratory with appropriate NATA accreditation, before aggregate from the lot is incorporated in the Works.

**Test
Requirements**

DESIGN OF BITUMINOUS SURFACING

244.09 GENERAL

1. At least 15 days before commencing sprayed bituminous surfacing work, the Contractor shall submit to the Superintendent for approval, details of the proposed bituminous surfacing design for the work together with a certification that the nominated materials for the work meet the requirements of the Specification.

**Proposed
Design**

2. The Contractor's design rates of application of binder and aggregate for bituminous surfacing shall be in accordance with the AUSTROADS design procedure for Sprayed Seals and shall submit these design details to the Superintendent. Design application rates shall be known as "nominated application rates" and materials as "nominated materials".

**AUSTROADS
Design
Procedure**

3. The following additional details are required to be submitted with the proposed bituminous surfacing design.

**Additional
Information
Sought**

- (a) Test results for all nominated materials.
- (b) Aggregates - source, geological type, nominated grading, average least dimension (ALD)
- (c) Precoating agent and bitumen adhesion agent - types, proportions and manufacturer (if applicable).
- (d) Bitumen - refinery source and certification of compliance with AS 2008.
- (e) Cutback bitumen - refinery source of bitumen, type of cutter, source of cutter, cutter oil fraction, certification of compliance with AS 2157.
- (f) Bitumen emulsion - refinery source of bitumen and proprietary product description in conjunction with certification of compliance with AS 1160 and nominated of type and grade (eg CRS).

4. Submission of the aforementioned documentation by Contractor shall constitute a **HOLD POINT**. Approval of details shall be granted by the Superintendent prior to release of the hold point.

HP

PRECOATING OF AGGREGATE

244.10 GENERAL

1. The aggregate precoating agent shall be applied to the aggregate in a manner and at a rate and time which will provide a complete, light, uniform, effective cover of all aggregate particles at the time of spreading.

Application

SPRAYED BITUMINOUS SURFACING

- | | |
|---|------------------------------------|
| 2. Precoating of aggregate shall not be carried out when rain is imminent. If aggregate has been precoated and rain appears imminent, the aggregate shall be adequately covered to prevent the precoating material being washed from the aggregate particles. | <i>Weather Conditions</i> |
| 3. The Contractor shall take precautions, such as covering stockpiles, to prevent settlement of dust, penetration of moisture or drying out of the precoating agent on the stockpiled aggregate. | <i>Cover for Stockpiles</i> |
| 4. Stockpiles precoated more than 7 days in advance of use shall be retreated unless otherwise approved by the Superintendent. | <i>Age of Precoating</i> |
| 5. Crushed aggregate for bitumen emulsion surfacing work shall not be precoated with precoating agents. However, the aggregate may be prewetted with water to assist adhesion of the binder. | <i>Prewetting</i> |

APPLICATION OF SPRAYED BITUMINOUS SURFACING

244.11 GENERAL

- | | |
|---|-------------------------------------|
| 1. The Contractor shall carry out sprayed bituminous surfacing so as to:

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

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

(c) achieve effective bond between binder and aggregate.

(d) comply with requirements for basecourse "dry back". | <i>Work Quality</i> |
| 2. Details of equipment and methods to be used for sprayed bituminous surfacing shall be submitted to the Superintendent for approval prior to their use on the Works. | <i>Equipment and Methods</i> |

244.12 PLANT

- | | |
|---|-----------------------------------|
| 1. A mechanical sprayer shall be used to apply primer, primerbinder and binder. The sprayer shall have current certificates and charts relating to the performance of the sprayer, as provided by the MRWA. | <i>Sprayer Certificate</i> |
| 2. The spray nozzles shall be of the make and type endorsed on the Sprayer Certificate. Any nozzles which may be damaged or become unduly worn or defective shall be replaced by satisfactory nozzles of similar type. A sufficient number of nozzles for this purpose shall be available at all times. | <i>Spray Nozzles</i> |
| 3. Mechanical spreading equipment shall be used to spread aggregate and shall be capable of achieving a uniform and accurate spreading rate. | <i>Aggregate Spreader</i> |
| 4. Rollers shall be utilised in accordance with Clause 244.19. | <i>Rollers</i> |
| 5. The Contractor shall remove from the site any plant or equipment considered by the Superintendent to be not fully operational or not in a satisfactory condition for carrying out work in accordance with this Specification. | <i>Faulty Equipment</i> |

244.13 PREPARATION OF PAVEMENT SURFACE

1. Before the application of primer, primerbinder or binder, the pavement surface shall be swept by the use of a mechanically-operated rotary road broom or suction broom to provide a uniformly clean surface. If necessary, additional sweeping shall be done by hand, using stiff brooms. Sweeping shall, where possible, extend at least 300 mm beyond each edge of the area to be sprayed.
2. Adherent patches of foreign material shall be removed from the surface of the pavement.
3. For the spraying of primer or primerbinder, the pavement surface shall be slightly damp so as to impede dust interfering with initial adhesion except where explicit instructions are provided with the seal design or issued by the Superintendent.

Pavement Sweeping

Foreign Matter on Pavement

Damp Pavement

244.14 REVIEW OF NOMINATED APPLICATION RATES

1. The Contractor shall select the locations where each lot of aggregate is to be incorporated in the Works.
2. The Contractor shall review the bituminous surfacing design at each location based on the actual average least dimension (ALD) test result for the lot of aggregate instead of the nominated ALD value of the aggregate adopted at design submission. The revised application rates shall be known as "target application rates".
3. The Contractor shall give the Superintendent at least five working days notice of the Contractor's intention to commence sprayed bituminous surfacing. This notice shall confirm spray rates, aggregate size and ALD. This action constitutes a **HOLD POINT**. The Superintendent's approval to proceed shall be required for release of this hold point.

Aggregate Lots

Target Application Rates

HP

244.15 BITUMEN TEMPERATURE REQUIREMENTS

1. Bituminous products shall be handled in accordance with the AUSTRROADS "Bitumen Sealing Safety Guide". Precautions set out in the following paragraphs are provided for ready reference however, all procedures shall follow the guidelines set out in the "Bitumen Sealing Safety Guide".
2. Bitumen shall be within the temperature range shown in Table 244.1 when mixed with cutter oil.

Incorporated with Cutter Oil

Class	Temperature Range (°C)
170	160 - 190
320	170 - 200

Table 244.1 - Bitumen Temperatures

3. Refinery cutback bitumen shall be within the temperature range shown in Table 244.2 at the time of spraying.

Spraying Temperature

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Grade	Temperature Range (°C)
AMC 00	10 - 35
AMC 0	35 - 55
AMC 1	60 - 80
AMC 2	75 - 100
AMC 3	95 - 115
AMC 4	110 - 135
AMC 5	120 - 150
AMC 6	135 - 160
AMC 7	150 - 175

Table 244.2 - Cutback Bitumen Spraying Temperatures

4. The Contractor shall measure and record the temperature of the binder, using a thermometer, which is accurate to within 2.5 percent of the correct temperature.

**Measurement
of
Temperature**

5. If the temperature of the bituminous material is below the applicable lower limit from Table 244.1 or Table 244.2, the bituminous material may be heated provided safe heating practices are adopted. Burners shall not be used unless the level of the material in the heating tank is at least 250 mm above the tops of the heating tubes. The Contractor shall comply with the statutory requirements related to the Bush Fires and the Local Government Acts. Two or more suitable fully-charged pressurised chemical fire extinguishers shall be placed conveniently to the heaters at all times while heating is in progress.

**Safe Heating
Practices**

6. During heating, the temperature of the bituminous material shall not exceed the applicable upper limit from Table 244.1 or Table 244.2. The temperature of the bituminous material just above the heating tubes shall be checked at regular intervals to ensure that there is no local overheating.

Heating Limits

7. Bituminous materials shall not be held at temperatures within the ranges shown in Tables 244.1 and 244.2 for periods in excess of ten hours.

**Temperature
Retention**

8. Any bituminous material which has been overheated or stored in temperatures in Tables 244.1 and 244.2 for more than 10 hours shall not be used in the work unless sampled, retested and confirmed to be within the conformance requirements of AS 2008 to the Superintendent's satisfaction. Non-conforming bituminous material shall be disposed of legally and responsibly.

**Overheated
Bitumen**

244.16 PAVEMENT TEMPERATURE AND WEATHER CONDITIONS

1. The Contractor shall measure and record pavement temperatures at regular intervals during the course of the work. For this purpose, a spirit or mercury-in-glass thermometer or other suitable type of thermometer shall be placed in direct contact with the pavement and allowed to remain in position until the reading becomes steady. When a spirit or mercury-in-glass thermometer is used to measure pavement temperature, the bulb of the thermometer shall be covered from direct sunlight with a small heap of grit or similar material. Suitably calibrated infra-red thermometers may be used if approved by the Superintendent.

**Measurement
and Recording**

2. If the pavement is partly in sun and partly in shade, the temperatures for both conditions shall be taken and recorded.

**Sun and
Shade
Conditions**

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3. Spraying primers, primerbinders and binders shall be undertaken only if the pavement temperature has been at or above 10°C for spraying for at least one hour before commencement of spraying and does not fall below 10°C for spraying during the period of spraying.

**Minimum
Pavement
Temperature**

4. Spraying shall not be carried out on a wet pavement, while rain appears imminent or during high winds or dust storms.

**Spraying
Conditions**

244.17 INCORPORATION OF CUTTER OIL, FLUX OIL AND ADHESION AGENT

(a) Cutting Back Bitumen

1. The Contractor shall determine and record the proportion of cutter oil required for each sprayer load, using MRD forms 1220 - 1226 and based on the measured pavement temperatures.

**Contractor's
Responsibility**

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

**Mixing Cutter
Oil**

3. If a part sprayer load of field cutback bitumen is unused on the date of mixing, and needs to be returned to the heater tanks, it shall be placed in an empty tank reserved for that purpose. No bitumen or cutter shall be added to the returned cutback bitumen unless the tank is fitted with an effective mechanical mixing system. When the returned cutback bitumen is subsequently used as part of a sprayer load, allowance shall be made for the cutter oil contained in the returned cutback bitumen.

**Unused
Cutback
Bitumen**

(b) Fluxing Bitumen

1. Where flux oil is to be included, it shall be added to the bitumen in the sprayer and the mixture circulated at a rate of at least 700 litres per minute for at least twenty minutes before spraying.

Mixing Flux Oil

(c) Bitumen Adhesion Agent

1. Where bitumen adhesion agent is to be included, it shall be added to the bitumen in the sprayer and the mixture circulated at a rate of at least 700 litres per minute for at least twenty minutes before spraying.

**Mixing
Adhesion
Agent**

244.18 APPLICATION OF PRIMER, PRIMERBINDER AND BINDER

(a) General

1. The area to be sprayed with primerbinder or binder shall be limited to the area which can be covered with aggregate at the target application rate within fifteen minutes of spraying bitumen or cutback bitumen.

**Limit on Spray
Area**

(b) Primer and Primerbinder

1. Nominated and target application rates and quantities of primer and primerbinder shall apply to the whole material, including cutter oil, measured at 15°C. Primer, Primerbinder and Binder application rates outside the tolerances indicated in Annexure 244.B constitute a non-conformance.

**Application
Rates**

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|--|--|
| <p>2. After application of a primer, a period of at least forty-eight hours, or such longer period as determined to be necessary for the primer to become completely dry, shall elapse before the binder for a seal is applied. All traffic shall be kept off the primed surface.</p> | <p><i>Curing Time for Primer</i></p> |
| <p>3. After application of a primerbinder, a period of at least fourteen days shall elapse before the binder for a seal is applied.</p> | <p><i>Curing time for Primer Binder</i></p> |
| <p>(c) Binder</p> | |
| <p>1. The class of bitumen or grade of cutback bitumen shall be as specified in Annexure 244A.</p> | <p><i>Class of Bitumen</i></p> |
| <p>2. Nominated and target application rates and quantities of binder shall be based on the volumes of bitumen measured at a temperature of 15°C and shall not include any bitumen adhesion agent and/or cutter oil. If flux oil has been added to the bitumen, the quantity of flux oil shall be included as part of the binder. Binder application rates outside the tolerances provided in Annexure 244B shall constitute a non-conformance.</p> | <p><i>Nominated and Target Rates</i></p> |
| <p>3. Where bitumen adhesion agent and/or cutter oil have been added to the binder, the application rate of the total binder at 15°C shall be adjusted to allow for the quantities of bitumen adhesion agent and/or cutter oil in the mixture.</p> | <p><i>Adjustment of Application Rate</i></p> |
| <p>4. The Contractor shall determine the hot application rate of total binder, including bitumen adhesion agent and/or cutter oil.</p> | <p><i>Calculation of Hot Application</i></p> |
| <p>5. Where refinery cutback bitumen is used as the binder, the target application rate of binder shall be increased by the Contractor to allow for the cutter oil in the mixture.</p> | <p><i>Refinery Cut-back Bitumen Variation</i></p> |
| <p>(d) Operation of the Sprayer</p> | |
| <p>1. Where the longitudinal edges of spray runs are not required to overlap, special type end nozzles must be used. Where an overlap is required, the overlap of spray between adjacent longitudinal runs shall be in the range 50-100mm for special type end nozzles. If intermediate nozzles are to be used to overlap adjacent longitudinal sprays the nozzles shall be set in the normal manner for intermediate nozzles and the overlap shall be in the range 250-350mm.</p> | <p><i>Spray Overlap</i></p> |
| <p>2. The spraying of primer, primerbinder or binder for each run of the sprayer shall commence on a protective strip of heavy paper weighing not less than 120 grams per square metre laid across and held securely to the pavement surface beforehand by addition of cover aggregate. The sprayer shall commence moving at a sufficient distance in advance of the protective strip to ensure that the road speed for correct application and correct alignment is attained at the commencement of spraying.</p> | <p><i>Protective Paper Strip</i></p> |
| <p>3. The sprayer shall maintain a uniform rate of application throughout the length of each sprayer run.</p> | <p><i>Rate of Application</i></p> |
| <p>4. The spraying for each run shall terminate on a protective strip of paper laid across and held securely to the pavement surface beforehand. The width of paper at the commencement and/or termination of each run shall not be less than that endorsed on the Sprayer Certificate.</p> | <p><i>Terminating Paper Strip</i></p> |
| <p>5. Spraying shall cease immediately if any defect develops in the spraying equipment and spraying shall not recommence until the fault has been rectified.</p> | <p><i>Equipment Defects</i></p> |
| <p>6. Where any blockage or partial blockage of nozzles occurs, spraying shall cease immediately. If the blockage is due to the condition of the binder being sprayed and is</p> | <p><i>Nozzle</i></p> |

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likely to re-occur, that load together with any binder from the same bulk tanker or supply unit shall not be used in the Works.

Blockage

7. Where a mechanical sprayer is not able to satisfactorily spray small areas or areas of irregular shape, such areas shall be sprayed by means of the hand spray equipment attached to the sprayer. The work shall be planned so as to minimise the area sprayed by hand spray equipment.

Hand Spraying

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

Application Rate Checks

9. Areas not within 5 percent of the target application rate of primer, primerbinder or binder shall constitute a 'nonconformance' under the Contract.

Nonconformance Application Rate

244.19 APPLICATION AND ROLLING OF AGGREGATE

1. The application of aggregate shall proceed immediately after spraying is commenced and shall be completed within fifteen minutes of spraying bitumen or cutback bitumen.

Time for Completion

2. Wet aggregate shall not be used.

Wet Aggregate

3. The Contractor shall apply the aggregate of the specified nominal size and at the target aggregate application rate. Sufficient loaded and measured trucks of dry aggregate shall be at the site to provide full cover for the area sprayed.

Planning

4. The aggregate shall be spread uniformly over the sprayed surface by means of suitable mechanical spreading equipment.

Uniform Application

5. Any bare or insufficiently covered areas shall be re-run by the mechanical spreader or covered by hand as necessary to give a uniform and complete coverage. Any aggregate spread in excess of the target aggregate application rate shall be removed before rolling is commenced if it is localised and can be efficiently removed by hand brooming.

Deficient or Excess Aggregate

6. After the aggregate has been applied to each section of the work, initial rolling shall be carried out with two or more dual axle smooth pneumatic tyred multi-wheel rollers of minimum load of one tonne per tyre and minimum tyre pressure of 550 kPa. A roller with a rubber surfaced drum providing equivalent compactive effort may be used in lieu of a multi-wheeled roller. Initial rolling shall continue until the aggregate is firmly embedded in the primerbinder or binder. Roller speed shall be 15-25km/h subject to safe working conditions.

Initial Rolling

7. If the aggregate is not evenly distributed over the surface of the pavement, the surface shall be traversed with a light drag broom after the initial rolling. If the broom has any tendency to dislodge aggregate particles bedded in the primerbinder or binder, the Contractor shall defer or eliminate the drag brooming. Where drag brooming is eliminated, the Contractor shall substitute light hand brooming.

Brooming of Surface

8. Backrolling shall then be carried out for a minimum period of one hour per 1000 square metres sprayed for roads having a traffic volume of less than 500 vehicles per lane per day and one hour per 1500 square metres sprayed for other roads, up to a maximum of twenty-four hours after the aggregate has been applied.

Backrolling

9. Where a bituminous surfacing is specified with separate applications of coarse and fine aggregate on a single application of binder, the coarse aggregate shall be

Two Aggregate

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applied first, rolled and any necessary brooming carried out as described above, before application of the fine aggregate and its subsequent rolling and brooming. In this case, the time limits for incorporation of aggregate shall apply only to the application of the coarse aggregate.

Application

10. When the aggregate has been evenly spread and embedded in the binder, any remaining loose particles of aggregate shall be removed from the pavement and disposed of responsibly by the Contractor.

Removal of Loose Particles

244.20 WORK RECORDS

1. Particulars of the work performed shall be recorded by the Contractor on the MRWAs form - Bituminous Surfacing - Contractors Daily Records, or a record of at least equivalent detail. Details of primer, primerbinder, binder and aggregate applied shall be recorded immediately after every sprayer run. Each form shall be signed by the Contractor's representative as a true record of the work performed. The Contractor shall complete the MRWAs form, Bituminous Surfacing - Contractor's Spraying Loading Record, for each sprayer load. The Contractor shall supply to the Superintendent a copy of each completed form.

Sprayer Run Records

244.21 PROTECTION OF SERVICES AND ROAD FIXTURES

1. The Contractor shall take all necessary precautions to prevent primer, primerbinder, binder, aggregate or other material used on the work from entering or adhering to gratings, hydrants or valve boxes, access chamber covers, bridge or culvert decks and other road fixtures.

Contractor's Responsibility

2. Immediately after aggregate has been spread over the binder, the Contractor shall clean off or remove any sprayed surfacing material and leave the services and road fixtures in a condition equivalent to that existing when the Contractor commenced the sprayed surfacing work.

Services and Road Fixtures

NONCONFORMANCE OF MATERIALS AND WORK

244.22 GENERAL

1. If any materials supplied fail to conform to the requirements of the Contract or if any section of sprayed bituminous surfacing work fails to conform to the requirements of this Contract - whether failure of the work is due to bad workmanship, defective materials supplied by the Contractor or materials made defective by the method of operation adopted, or any other cause, then such failure or failures shall constitute a 'nonconformance' under the Contract.

Conditions

2. If the nonconformance is not acceptable to the Principal, the nonconforming material shall be replaced or the nonconforming section of sprayed bituminous surfacing work shall be either replaced or corrected as proposed by the Contractor, subject to the approval of the Superintendent being obtained.

Replace or Correct

3. The cost of rectifying nonconformances, including any restoration work to any underlying or adjacent surface or structure, which becomes necessary as a result of such replacement or correction, shall be borne by the Contractor. Materials removed from the site by the Contractor shall be replaced with materials which conform to this Specification.

Contractor's Cost

244.23 ACCEPTANCE OF NONCONFORMANCES

1. Nonconformances of materials and work may be accepted at the absolute discretion of the Superintendent subject to deductions to the scheduled rate of the Pay

Superintendent's

SPRAYED BITUMINOUS SURFACING

Items applicable to the quantity of work incorporating the nonconforming material and work in accordance with Clause "DEDUCTIONS". All nonconformances not listed within the deductions clause shall be rectified to comply with this Specification as a cost to the Contractor.

Authority

2. Nonconformance related to the achieved application rates for primer, primerbinder or binder as determined from the bituminous surfacing daily record shall be dealt with by the Superintendent strictly on the basis set out below:

- Variations will be considered as departures from the design target application rates after allowing for adjustments due to adhesion agent, cutting oil, flux oil and temperature. Adjustments made on site due to surface condition and stockpile ALD dimension will also be allowed for, subject to a record of their prior approval by the Superintendent being available.
- Variations up to ± 5 per cent of the adjusted design target application rate shall be deemed as conforming being within Tolerance Threshold, T1.
- Variations greater than Tolerance Threshold T1 and less than the Tolerance Threshold, T2 indicated in Annexure 244.B shall result in payment with deductions applied in accordance with Clause 244.30. Application rates outside Tolerance Threshold T2 shall be rejected.

SPECIAL REQUIREMENTS

244.24 RESERVED

244.25 RESERVED

244.26 RESERVED

244.27 RESERVED

244.28 RESERVED

LIMITS AND TOLERANCES

244.29 SUMMARY OF LIMITS AND TOLERANCES

1. The limits and tolerances applicable to the various clauses in this Specification are summarised in Table 244.3 below:

Item	Activity	Limits/Tolerances	Spec Clause
1.	Design of Bituminous Surfacing	Contractor to provide details of design to Superintendent at least 15 days before proposed commencement of work	244.09
2.	Commencement of Work	Contractor to give 5 days notice to the Superintendent of intention to commence work	244.11
3.	Sweeping of Pavement Surface	Sweeping shall extend at least 300mm beyond each edge of the area to be sprayed	244.13
4.	Bitumen Heating		
	(a) Bitumen Temperature	When incorporated with cutter oil, bitumen shall be in temperature ranges as per Table 244.1.	244.15
	(b) Refinery Cutback Bitumen Temperature	At the time of spraying shall be in temperature range as per Table 244.2.	244.15
	(c) Retention of Temperature	Bituminous materials shall not be held at temperatures within the ranges of Tables 244.1 or 244.2 for periods in excess of 10 hours.	244.15
5.	Spraying Temperature		
	(a) Pavement Temperature	Bituminous surfacing shall not be undertaken if the pavement temperature has not been at or above 10°C for at least one hour before commencement of spraying or if the pavement temperature falls below 10°C during the period of spraying.	244.16
6.	Cutting Back Bitumen	Circulation of hot bitumen and cutter oil mixture in the sprayer shall be at the rate of at least 700 litres per minute for 20 minutes.	244.17
7.	Fluxing Bitumen or adding Bituminous Adhesion Agent	Circulation of fluxing oil or bituminous adhesion agent with hot bitumen shall be at the rate of at	244.17

SPRAYED BITUMINOUS SURFACING

Item	Activity	Limits/Tolerances	Spec Clause
		least 700 litres per minute for 20 minutes.	
8.	Application of Bituminous Material		
	(a) Spray Area	Area to be sprayed shall be limited to area which can be covered by aggregate at target application rate within 15 minutes of spraying.	244.18
	(b) Application Rates	Application rates and quantities shall apply to a temperature of 15°C and have T1 tolerances of ±5% as set out in Clause 244.23 and T2 tolerances as set out in Annexure 244.B.	244.18
	(c) Primer	At least a 48 hour period shall elapse after spraying of primer before binder for a seal is applied.	244.18
	(d) Primerbinder	At least a 14 day period shall elapse after spraying of primerbinder before application of binder.	244.18
9.	Application of Aggregate		
	(a) Spreading Time	Application of aggregate shall be completed within 15 minutes of spraying bitumen or cutback bitumen on each section.	244.19
10.	Rolling		
	(a) Roller Numbers and Type	Initial rolling shall be carried out with two or more dual axle smooth pneumatic tyred multi-wheeled rollers. Minimum load of one tonne per tyre and minimum tyre pressure 550KPa.	244.19
	(b) Backrolling	(i) For traffic volume of <500 vehicles per lane per day, backrolling for minimum of one hour per 1000 square metres sprayed.	244.19
		(ii) For traffic volume >500 vehicles per lane per day, backrolling for minimum of one hour per 1500 square metres sprayed.	244.19
11.	Nonconformance		
	(a) Bitumen	(i) Bitumen with viscosity at 60°C	244.30

SPRAYED BITUMINOUS SURFACING

Item	Activity	Limits/Tolerances	Spec Clause
		within the specified limits, but with other properties outside the limits specified in AS 2008, shall incur deductions.	
		(ii) For Class 170 bitumen or Class 320 bitumen having a viscosity at 60°C outside the limits specified in AS 2008, deductions shall apply.	244.30
(b)	Refinery Cutback Bitumen	(i) Cutback bitumen with viscosity at 60°C within the specified range according to Table 1 of AS 2157, but having any property outside the range specified by AS2157, shall incur deductions.	244.30
		(ii) For cutback bitumen having a viscosity at 60°C outside the range specified in Table 1 of AS 2157, deductions shall apply.	244.30

Table 244.3 - Summary of Limits and Tolerances

MEASUREMENT AND PAYMENT

244.30 DEDUCTIONS

1. Nonconformances of materials and work may be accepted at the absolute discretion of the Superintendent subject to deductions to the scheduled rate of the Pay Items applicable to the quantity of work incorporating the nonconforming material. **Superintendent's Authority**

(a) Bitumen

1. In the case of bitumen having a viscosity at 60°C within the specified limits, but having any other property outside the limits specified in AS 2008, a deduction of 2 per cent of the schedule rate for Pay Items 244(a), 244(b) and/or 244(c) shall apply. **Deductions other than Viscosity**

2. In the case of Class 170 bitumen or Class 320 bitumen having a viscosity at 60°C outside the limits specified in AS 2008, the deductions shown in Table 244.4 shall apply to Pay Items 244(a), 244(b) and/or 244(c). **Viscosity Variation Deductions**

Class 170	Class 320	Deduction (Per cent of Scheduled Rate)
Under 120	Under 220	50
120 - 124	220 - 229	25
125 - 129	230 - 239	10
130 - 134	240 - 249	5
135 - 139	250 - 259	2
140 - 200	260 - 380	Nil
201 - 210	381 - 400	2
211 - 220	401 - 420	5
221 - 230	421 - 440	10
231 - 240	441 - 460	25
Over 240	Over 460	50

Viscosity shall be calculated to the nearest whole number.

Table 244.4 - Deduction for Actual Viscosity at 60°C (Pa.s)

(b) Refinery Cutback Bitumen

1. In the case of a cutback bitumen having a dynamic viscosity at 60°C within the specified range according to Table 1 of AS 2157 but having any property (other than viscosity at 60°C) outside the range specified by AS 2157, 2 percent of the schedule rate for Pay Items 244(a), 244(b) and/or 244(c) shall apply. **Deductions other than Viscosity**

SPRAYED BITUMINOUS SURFACING

2. In the case of cutback bitumen having a dynamic viscosity at 60°C outside the range specified in Table 1 of AS 2157, the deductions shown below shall apply to Pay Items 244(a), 244(b) and/or 244(c):

Viscosity Variation Deductions

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

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

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

3. The dynamic viscosity as determined by any method allowed by AS 2157 shall be rounded to two significant figures in the direction favouring the Contractor. The range allowed in Table 1 includes an allowance for the repeatability of the test. No attempt shall be made to include another allowance for repeatability.

Viscosity Determination

4. In the case of nonconforming application rates for prime, primerbinder or binder, the deductions for variations outside the T1 Tolerance Threshold but within the T2 Tolerance Thresholds indicated in Annexure 244.B shall be applied to Pay Item 244(a), (b) and/or (c) as appropriate at 20 per cent of schedule rate.

244.31 PAY ITEMS

1. Payment shall be made for all activities associated with completing the work detailed in this Specification in accordance with Pay Items 244(a) to 244(f) inclusive.

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

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

4. The quantities shown in the Schedule of Rates are based on estimated quantities and are not to be taken as actual or correct quantities of work to be carried out.

5. Deductions to Scheduled Rates shall be applied in accordance with Clause 244.30.

6. Control of traffic is measured and paid in accordance with the Specification for CONTROL OF TRAFFIC.

Pay Item 244(a) Supply and Spray Primer, Primerbinder (Including Preparation of Surface)

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

2. The quantities (in litres) shall be determined by multiplying the target application rate of the above materials (less field incorporated cutter and flux) at 15°C (in litres per square metre) by the area of road surface sprayed for each sprayer run (in square metres).

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

SPRAYED BITUMINOUS SURFACING

4. A separate scheduled rate is to be given for each type of primer and primerbinder, as nominated in the project specific Annexure 244.A:

244(a).1	AMCOO
244(a).2	AMCO
244(a).3	AMC1
244(a).4	AMC2
244(a).5	AMC3
244(a).6	AMC4
244(a).7	AMC5
244(a).8	AMC6
244(a).9	AMC7
244(a).10	Field Cutback Bitumen (Nett Bitumen)

Pay Item 244(b) Supply and Spray Binder - Class 170 Bitumen (Including Adhesion Agent where required and Preparation of Surface)

1. The unit of measurement shall be the litre of Class 170 bitumen at 15°C.
2. The quantities (in litres) shall be determined by multiplying the target application rate of Class 170 bitumen at 15°C (in litres per square metre) by the area of road surface sprayed for each sprayer run (in square metres).

Pay Item 244(c) Supply and Spray Binder - Class 320 Bitumen (Including Adhesion Agent where required and Preparation of Surface)

1. The unit of measurement shall be the litre of Class 320 bitumen at 15°C.
2. The quantities (in litres) shall be determined by multiplying the target application rate of Class 320 bitumen at 15°C (in litres per square metre) by the area of road surface sprayed for each sprayer run (in square metres).

Pay Item 244(d) Supply, Incorporate and Spray Cutter Oil in Primer, Primerbinder Or Binder

1. The unit of measurement shall be litres of cutter oil at 15°C.
2. The quantity (in cold litres) shall be determined from the actual percentage of cutter oil to be added in the field to produce the primer, primerbinder or binder for each sprayer run and applied to the road.

Pay Item 244(e) Supply, Incorporate and Spray Flux Oil

1. The unit of measurement shall be litres of flux oil at 15°C.
2. The quantity (in cold litres) shall be determined from the nominated percentage of flux oil to be added in the field to the primer, primerbinder or binder and applied to the surface.

SPRAYED BITUMINOUS SURFACING

Pay Item 244(f) Supply, Precoat, Apply and Incorporate Aggregate

244(f).1	5mm Aggregate
244(f).2	7mm Aggregate (precoated)
244(f).3	10mm Aggregate (precoated)
244(f).4	14mm Aggregate (precoated)
244(f).5	20mm Aggregate (precoated)

1. The unit of measurement shall be the cubic metre.

2. The quantity (in cubic metres) shall be determined by dividing the target application rate (in square metres per cubic metre [m^2/m^3]) by the area of road surface covered for each sprayer run (in square metres).

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

ANNEXURE 244.A - DETAILS OF WORK

Section Road Name From To	Prime Binder Type	Primer Seal		Seal or Reseal	
		Binder Type	Aggregate Nom. Size	Binder Type	Aggregate Nom. Size

Note: Prime and Primer Seal Binder Type shall be indicated in this Annexure using the descriptive terms as follows:

Very Light Prime or Primer - equivalent cut back bitumen to grade AMCOO.

Light/Medium Prime or Primer - equivalent cutback bitumen to grade AMCO or AMC1.

Heavy Prime or Primer - equivalent cut back bitumen to grade AMC1 or AMC2.

ANNEXURE 244.B - BINDER DETAILS

BINDER TYPE	ADHESION AGENT (At 0.5% of binder) (YES/NO)

Primer, Primerbinder and Binder Application Tolerance Thresholds T2
(Refer to Clause 244.23)

Nominal Aggregate Size (mm)	Tolerance Thresholds T2 expressed as \pm percentages
0mm Prime	

ANNEXURE 244C - ADHESION AGENTS

(Council to refer to MRWA for current advice on adhesion agents)

The following proprietary adhesion agents are approved for use:

1. Adhegen 572/60
2. Bitumite
3. Bitumite Concentrate *
4. Megamine BA
5. Radiamine 6681 *
6. Radiamine 6681/40
7. Radiamine 6681/60
8. Redicote N422 *
9. Redicote 422/60
10. TAA 2500
11. Wetfix F

* Approved for use in bitumen scrap rubber seals.

ANNEXURE 244D - PRECOATING AGENTS