

# DEVELOPMENT CONSTRUCTION SPECIFICATION

C244

# SPRAYED BITUMINOUS SURFACING

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### 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
SWR 77	Paragraph 2: Change "seven days" to "48 hours". Paragraph 3: Delete "unless otherwise determined by the Superintendent."  (LIMITS & TOLERANCES and amended for the above change)	C244. 17(b)	M	KM	21/11/97
SWR 78	Paragraph 2; 2nd sentence: Replace:- "50mm" with:- "in the range 50-100mm" 3rd Sentence: Replace:- "300mm" with:- "in the range 250-350mm".	C244. 17(d)	M	KM	21/11/97
SWR 79&168	Add after:-Design of Sprayed seals "(1990)".	244. 02(e)	M	KM	21/11/97 1/05/98
HC244.1	Addition of RTA - Sprayed Seal Guide	02(e)	A	KM	4/11/98
HC244.2	Addition of RTA - Sprayed Seal Guide	08.2	A	KM	4/11/98
HC244.3	Deletion of MR Form 466	16.(a).1	O	KM	4/11/98
HC244.4	Allow for Approved Contractors - Bituminous Surfacing Daily Record form	18.1	A	KM	4/11/98

HC244.5	Deletion of "two or more " rollers	20.6	O	KM	4/1198
HC244.6	Change backrolling requirement to 10 passes	20.8 & Table 2	M	KM	4/11/98
HC244.7	Removal of loose aggregate - Min = one day      Max = Three days	20.10.& Table 2	M	KM	4/11/98
HC244.8	Application of Geotextile	17(e)	A	KM	8/02/99



## SPECIFICATION C244 SPRAYED BITUMINOUS SURFACING

### GENERAL

#### C244.01 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:

(i) Prime

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

(ii) Primerseal

Consisting of the application of a primerbinder of field or refinery cutback bitumen to provide surface penetration (preferably from 2mm to 5mm), into which aggregate is incorporated to provide a temporary wearing surface prior to the application of the final wearing surface.

(iii) Seal or Reseal

Consisting of the application of a bitumen binder into which aggregate is incorporated to provide a durable wearing surface.

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 C244.A.

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

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

**Quality**

#### C244.02 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  
Standards Test  
Methods**

**(a) Council Specifications**

C201 - Control of Traffic

**(b) Australian Standards**

AS 2008 - Residual bitumen for pavements.  
 AS 2157 - Cutback bitumen.  
 AS 2341.9 - Determination of water content.  
 AS 3568 - Oils for Reducing the Viscosity of Bitumen for Pavements  
 AS 2758.2 - Aggregate for sprayed bituminous surfacing.

**(c) RTA Specifications and Forms**

- MR466 - Sprayed Bituminous Surfacing Cutback Chart
- 3253 - Bitumen for Pavements
- 3258 - Aggregate Precoating Agents
- 3259 - Bitumen Adhesion Agents
- 3261 - Cutback Bitumen
- RTA Form 23 - Bituminous Surfacing Daily Record

**(d) Government Legislation**

- Bush Fires Act, 1949
- Local Government Act, 1993

**(e) Other**

- AUSTROADS - Design of Sprayed Seals.(1990)
- RTA - Sprayed Seal Guide

**MATERIALS**

**C244.03 BINDERS**

**(a) Bitumen**

- 1. Bitumen shall be Class 170 conforming to AS2008.

**(b) Refinery Cutback Bitumen**

- 1. Refinery cutback bitumen shall conform to AS 2157.

**C244.04 ADDITIVES**

**(a) Cutter Oil**

- 1. Cutter oil shall conform to the requirements of AS3568, 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 AS3568 Table 1:

- (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. AS2341.9 shall not be demanded as a referee test if more than 0.1% of liquid water is found in any delivery or batch.
- (iv) If the viscosity is calculated by the equation given in Table 1, Note 3 of AS3568, "f" shall be taken to be 0.0009 per °C.

- 2. Delivery and storage procedures for cutter oil delivered in drums shall ensure that all containers are clean and 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.

**Bitumen**

**Cutback Bitumen**

**Cutter Specification**

**Delivery & Storage**

**(b) Adhesion Agent**

**Adhesion Agent**

1. Bitumen adhesion agents shall conform to RTA Specification 3259.

**C244.05 AGGREGATE**

1. Aggregate shall conform to AS 2758.2.
2. The Contractor shall obtain test results for each lot/stockpile of aggregate, and certification of compliance with AS 2758.2 from a suitably accredited NATA laboratory, before aggregate from the lot is incorporated in the Works.

**Specification**

**Test Results**

**C244.06 PRECOATING AGENT**

1. Aggregate precoating agent(s) shall conform to RTA Specification 3258.

**Precoat**

**C244.07 SAMPLING AND TESTING OF MATERIALS**

1. Sampling and testing of materials shall be arranged by the Contractor and carried out by a NATA registered laboratory in accordance with the relevant materials specifications cited in this Specification.
2. All costs associated with sampling and testing shall be borne by the Contractor.

**Contractor's Responsibility**

**Contractor's Costs**

**DESIGN OF BITUMINOUS SURFACING**

**C244.08 GENERAL**

1. At least seven 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.
2. The Contractor shall carry out the design of bituminous surfacing in accordance with the procedure contained in AUSTRROADS Design of Sprayed Seals, or RTA - Sprayed Seals Guide, and shall submit these design details to the Superintendent. Design application rates shall be known as "nominated application rates" and materials as "nominated materials".
3. The following additional details are required:
  - (i) Test results for all nominated materials.
  - (ii) Aggregates - source, geological type, nominated grading, ALD.
  - (iii) Precoating agent and bitumen adhesion agent - types and proportions.
  - (iv) Bitumen - refinery source, certification of compliance with AS2008.
  - (v) Cutback bitumen - refinery source of bitumen, source of cutter, certification of compliance with AS2157.

**Proposed Design**

**AUSTRROADS Design Procedure**

**Additional Information Sought**

## APPLICATION OF SPRAYED BITUMINOUS SURFACING

### C244.09 GENERAL

1. The Contractor shall carry out sprayed bituminous surfacing so as to:
- (i) provide a uniform application of binder with adequate adhesion to the underlying surface;
  - (ii) provide a complete cover of interlocking aggregate particles, and
  - (iii) achieve effective bond between binder and aggregate.
2. The Contractor shall give the Superintendent two days notice of intention to commence sprayed bituminous surfacing, confirming spray rates, nominal aggregate size and ALD, and shall obtain the Superintendent's approval to proceed.

**Work Quality**

### C244.10 PRECOATING OF AGGREGATE

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.
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.
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.

**Application**

**Weather  
Conditions**

**Cover for  
Stockpiles**

### C244.11 PLANT

1. A mechanical sprayer shall be used to apply primer, primerbinder and binder. The sprayer shall have a current Sprayer Certificate (RTA Form 354) issued by the Roads and Traffic Authority of NSW.
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.
3. Mechanical spreading equipment shall be used to spread aggregate and shall be capable of achieving a uniform spreading rate.
4. Rollers shall be in accordance with Clause C244.20.
5. The Contractor shall remove from the work any plant or equipment not fully operational or not in a satisfactory condition for carrying out work in accordance with this Specification.

**Sprayer  
Certificate**

**Spray Nozzles**

**Aggregate  
Spreader**

**Rollers**

**Faulty  
Equipment**

### C244.12 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 bass or similar brooms. Sweeping shall extend at least 300mm beyond each

**Pavement  
Sweeping**



edge of the area to be sprayed.

2. Adherent patches of foreign material shall be removed from the surface of the pavement.

***Foreign Matter on Pavement***

3. For the spraying of primer or primerbinder, the pavement surface shall be slightly damp.

***Damp Pavement***

#### **C244.13 REVIEW OF NOMINATED APPLICATION RATES**

1. The Contractor shall select the locations where each lot of aggregate is to be incorporated in the Works.

***Aggregate Lots***

2. The Contractor shall review the bituminous surfacing design at each location based on the actual ALD test result for the lot of aggregate instead of the ALD value of the nominated aggregate, and using the AUSTRROADS Design of Sprayed Seals . The revised application rates shall be known as “target application rates”.

***Target Application Rates***

3. The Contractor shall submit details of the aggregate lot and target application rates of each work location to the Superintendent for approval before commencing sprayed sealing at that location.

***Contractor’s Responsibility***

#### **C244.14 BINDER TEMPERATURE REQUIREMENTS**

1. Bitumen and cutback bitumen shall be within the range shown in Table C244.1 when incorporated with cutter oil.

***Mixing Temperature***

2. Temperature ranges for spraying of primers, primer binders and binders shall be within the ranges shown in Table C244.1.

***Spraying Temperature***

3. The Contractor shall measure and record the temperature of the bituminous material, using a suitable means. The thermometer shall be verified as accurate to within 2.5 percent of the correct temperature.

***Measurement of Temperature***

4. If the temperature of the bituminous material is below the applicable lower limit from Table C244.1, the bituminous material may be heated providing 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 Bush Fires Act, 1949 and the Local Government Act 1993. 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***

5. During heating, the temperature of the bituminous material shall not exceed the applicable upper limit from Table C244.1. 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***

6. Bituminous materials shall not be held at temperatures within the ranges shown in Tables C244.1 for periods in excess of ten hours.

***Max Period of Heating***

7. Any bituminous material which has been overheated shall not be used in the work. The Contractor shall record disposal of such material confirming its exclusion from use under this contract.

***Overheated Bitumen***

#### **C244.15 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

***Measurement and Recording***

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.

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**

3. Spraying primers, primerbinders and binders shall be undertaken only if the pavement temperature has been at or above the minimum temperature shown in Table C244.1 for at least one hour before commencement of spraying and does not fall below the specified minimum pavement temperature 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**

TYPE OF MATERIAL	CLASS OR GRADE	EQUIVALENT % CUTTER	MAX HEATING TEMP (°C)	MIN PAVEMENT TEMP (°C)	SPRAYING TEMP (°C)
Bitumen	170		190	10	160 - 190
Cutback Bitumen	AMC 00	56)	30	10	10 - 20
	AMC 0	44)	55	10	35 - 55
	AMC 1	34)	80	10	60 - 80
	AMC 2	27) Conven-	100	10	75 - 100
	AMC 3	21) tional	115	10	95 - 115
	AMC 4	16) Cutter	135	10	110 - 135
	AMC 5	11)	150	10	120 - 150
	AMC 6	7)	160	10	135 - 160
Cutback Bitumen	AMC 7	3)	175	10	150 - 175
	FC2	25)	95	5	70 - 75
	FC3	20) Fast	95	5	80 - 90
	FC4	15) Evapo-	110	5	95 - 110
	FC5	10) rating	140	10	120 - 140
	FC6	7) Cutter	150	10	130 - 150
	FC7	3)	160	10	140 - 160

**Table C244.1 - Temperature Limits**

**C244.16 INCORPORATION OF CUTTER 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, 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) 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 fifteen minutes before spraying.

**Mixing  
Adhesion  
Agent**

#### **C244.17 APPLICATION OF PRIMER, PRIMERBINDER AND BINDER**

##### **(a) General**

**Limit on Spray  
Area**

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.

##### **(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.

**Application  
Rates**

2. After application of a primer, a period of at least 48 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.

**Curing Time  
for Primer**

3. After application of a primerbinder, a period of at least fourteen days shall elapse before the binder for a seal is applied.

**Curing time for  
Primer Binder**

##### **(c) Binder**

**Nominated and  
Target Rates**

1. 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.

2. 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.

**Adjustment of  
Application  
Rate**

3. The Contractor shall determine the hot application rate of total binder, including bitumen adhesion agent and/or cutter oil, using MR Form 466.

**Calculation of  
Hot  
Application**

4. 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 percentage cutter oil in the mixture as indicated in Table C244.1.

**Refinery  
Cutback  
Bitumen  
Variation**

##### **(d) Operation of the Sprayer**

1. The type of spray nozzles to be used on the spray bar of the sprayer shall be compatible with the nature of the binder to be sprayed and its application rate.

**Nozzle Type**

2. Where the longitudinal edges of spray runs are not required to overlap, either special type end nozzles or intermediate nozzles set with a jig as end nozzles may be used. Where an overlap is required, the overlap of spray between adjacent longitudinal runs shall be in the range 50-100 mm 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 250-350 mm.

**Spray Overlap**

3. 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. The sprayer shall commence moving at a sufficient distance in advance of the protective strip to ensure that the road speed for correct application is attained at the commencement of

**Protective  
Paper Strip**

spraying.

4. The sprayer shall maintain a constant road speed throughout the length of each sprayer run. **Road Speed**

5. 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. **Terminating Paper Strip**

6. Spraying shall cease immediately any defect develops in the spraying equipment and spraying shall not recommence until the fault has been rectified. **Equipment Defects**

7. 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, that load together with any binder from the same bulk tanker or supply unit shall not be used. **Nozzle Blockage**

8. 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. **Hand Spraying**

9. 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**

10. Areas not within 5 percent of the target application rate of primer, primerbinder or binder shall constitute a 'Nonconformance' under the Contract. **Non-conformance**

**(e) Application of Geotextile** **Geotextile**

1. Where the use of a geotextile is specified, immediately after spraying the tack coat the geotextile shall be rolled out as close behind the sprayer as practical. All wrinkles shall be broomed out or cut. Where it becomes necessary on curves the geotextile shall be cut and butted at regular intervals along the inner side of the curve. Any overlap shall be hand sprayed with additional bitumen to ensure full ultimate saturation of the geotextile.

2. Immediately after laying, the geotextile shall be rolled to ensure adhesion to the road surface. Adjoining geotextile shall be lapped by 100mm. The tolerance of the outside edge of the Geotextile shall be +25mm. **Rolling**

3. Following application of the remaining binding and the aggregate, the surface shall be rolled with a heavy rubber tyred roller weighing approximately 20 tonnes and having a minimum tyre pressure of 550kPa. The rolling period shall be as per the requirements of Clause 244.20. The rolling sequence shall be from the middle towards the edges.

**C244.18 WORK RECORDS**

1. Particulars of the work performed shall be recorded by the Contractor on RTA Form 23 - Bituminous Surfacing Daily Record or approved Contractors - Bituminous Surfacing Daily Record form.. 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 supply to the Superintendent a copy of each completed form. **Sprayer Run Records**

**C244.19 CONTROL OF TRAFFIC**

1. The Contractor shall provide for 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 **Contractor's Responsibility**

coat has developed sufficient strength to carry normal traffic without disturbance of the aggregate.

2. Where early use of the new seal is needed to facilitate the movement of traffic, vehicles may be allowed to run on the work after initial rolling has taken place provided that vehicles are controlled to such slow speeds that no displacement of aggregate occurs. Where necessary, 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***

#### **C244.20 APPLICATION AND INCORPORATION OF AGGREGATE**

1. The application of aggregate shall proceed 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.

***Procedure***

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.

***Deficient or Excess Aggregate***

6. After the aggregate has been applied to each section of the work, initial rolling shall be carried out with dual axle smooth pneumatic tyred multi-wheel rollers of minimum load of one tonne per tyre and minimum tyre pressure of 550 kPa. Initial rolling shall continue until the aggregate is firmly embedded in the primerbinder or binder.

***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 or by light hand brooming 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.

***Brooming of Surface***

8. Backrolling shall then be carried out for a minimum of 10 passes.

***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 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 (paragraph 1 above) shall apply only to the application of the coarse aggregate. The application of fine aggregate will proceed in any case as soon as possible after satisfactory application and embedment of the coarse aggregate.

***Two 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 not prior to one day and not later than three days after sealing.

***Removal of Loose Particles***

**C244.21 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, manhole covers, kerb and gutter, 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**

**C244.22 GENERAL**

1. If any materials supplied fail to conform to the requirements in this Specification or if any section of sprayed bituminous surfacing work fails to conform to the requirements of this Specification - 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 - then such failure or failures shall constitute a 'Nonconformance' under the Contract.

***Nonconformance Conditions***

2. If the nonconformance is not acceptable in accordance with Clause C244.09, the nonconforming material shall be replaced or the nonconforming section of sprayed bituminous surfacing work shall be either replaced or corrected.

***Replace or Correct Nonconformance***

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.

***Cost of Rectification***

**SPECIAL REQUIREMENTS**

**C244.23 RESERVED**

**C244.24 RESERVED**

**C244.25 RESERVED**

**C244.26 RESERVED**

**C244.27 RESERVED**

**C244.28 RESERVED**

## LIMITS AND TOLERANCES

### C244.29 SUMMARY OF LIMITS AND TOLERANCES

1. The limits and tolerances applicable to the various clauses in this Specification are summarised in Table C244.2 below:

Item	Activity	Limits/Tolerances	Spec Clause
1.	Design of Bituminous Surfacing	Contractor to provide details of design to Superintendent at least seven days before proposed commencement of work	C244.08
2.	Sweeping of Pavement Surface	Sweeping shall extend at least 300mm beyond each edge of the area to be sprayed	C244.12
3.	<b>Bitumen Heating</b>		
	(a) Bitumen Temperature	When incorporated with cutter oil, bitumen shall be in temperature ranges as per Table C244.1.	C244.14
	(b) Refinery Cutback Bitumen Temperature	At the time of spraying shall be in temperature range as per Table C244.1.	C244.14
	(c) Overheating of Bitumen	Bituminous material shall not be heated above the upper temperature limits of Table C244.1. Overheated material shall be rejected.	C244.14
	(d) Retention of Temperature	Bituminous materials shall not be held at temperatures within the ranges of Table C244.1 for periods in excess of 10 hours.	C244.14
4.	<b>Spraying Temperature</b>		
	(a) Pavement Temperature	Bituminous surfacing shall not be undertaken if the pavement temperature has not been at or above temperatures given in Table C244.1 for at least one hour before commencement of spraying.	C244.15
5.	Cutting Back Bitumen	Circulation of hot bitumen and cutter oil mixture in the sprayer shall be at the rate of 700 litres per minute for 20 minutes.	C244.16
6.	Bituminous Adhesion Agent	Circulation of bituminous adhesion agent with hot bitumen shall be at the rate of 700 litres per minute for 15 minutes.	C244.16

Item	Activity	Limits/Tolerances	Spec Clause
7.	<b>Application of Bituminous Material</b>		
	(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.	C244.17
	(b) Application Rates	Application rates and quantities shall apply to a temperature of 15°C.	C244.17
	(c) Primer	At least a 48 hour period shall elapse after spraying of primer before binder for a seal is applied.	C244.17
	(d) Primerbinder	At least a 14 day period shall elapse after spraying of primerbinder before application of binder.	C244.17
	(e) Nonconformance	Areas not within 5 percent of the target application rate of primer, primerbinder or binder shall constitute 'nonconformance' under the Contract.	C244.17
8.	<b>Application of Aggregate</b>		
	(a) Spreading Time	Application of aggregate shall be completed within 15 minutes of spraying bitumen or cutback bitumen on each section.	C244.20
9.	<b>Rolling</b>		
	(a) Roller Numbers and Type	Initial rolling shall be carried out with dual axle smooth pneumatic tyred multi-wheeled rollers. Minimum load of one tonne per tyre and minimum tyre pressure 550KPa.	C244.20
	(b) Backrolling	Backrolling shall be undertaken for minimum of ten passes.	C244.20

**Table C244.2 - Summary of Limits and Tolerances**



## MEASUREMENT AND PAYMENT

### C244.30 PAY ITEMS

1. Payment shall be made for all activities associated with completing the work detailed in this Specification in accordance with Pay Items C244(a) to C244(c) 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. Provision for traffic is measured and paid in accordance with the Specification for CONTROL OF TRAFFIC.

#### Pay Item C244(a) PRIME

1. The unit of measurement shall be the square metre of road surface.
2. The width and length shall be as specified on the Drawings or as directed by the Superintendent.
3. The schedule rate shall include preparation of the surface, and supply and spray primer including the supply and incorporation of cutter oil in the primer.

#### Pay Item C244(b) PRIMER SEAL

1. The unit of measurement shall be the square metre of road surface.
2. The width and length shall be as specified on the Drawings or as directed by the Superintendent.
3. The schedule rate shall include preparation of the surface, supply and spray primerbinder including the supply and incorporation of cutter oil in the primerbinder, and supply, precoat, apply, incorporate and sweep aggregate.

#### Pay Item 244(c) SEAL

1. The unit of measurement shall be the square metre of road surface for each particular type of seal nominated.
2. The width and length shall be as specified on the Drawings or as directed by the Superintendent.
3. The schedule rate shall include preparation of the surface, supply and spray binder including the supply and incorporation of cutter oil and adhesion agent in the binder, and supply, precoat, apply, incorporate and sweep aggregate.

ANNEXURE C244A - DETAILS OF WORK

Section		Prime	Primer Seal		Seal or Reseal	
From	To		Binder	Aggregate	Binder	Aggregate

**SPECIFICATION C244 - SPRAYED BITUMINOUS SURFACING**

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