



Construction Specification for Civil Works

C246 Sprayed Bituminous Surfacing (Polymer Modified)

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This Specification includes a series of Annexures that detail Project Specific Requirements

GENERAL

C246.01 SCOPE

The work to be executed under this Specification includes all of the following:

Scope

- (i) Supply and delivery of all materials.
- (ii) Storage and handling of raw materials.
- (iii) Precoating of aggregate.
- (iv) Preparation of pavement surfaces.
- (v) Preparation of bitumen binder.
- (vi) Application of prime, primerbinder and binder.
- (vii) Application and incorporation of aggregate.
- (viii) Removal of loose aggregate.

Requirements for quality control and testing, including maximum lot sizes and minimum test frequencies, are cited in *CQC-Quality Control Requirements Sub-Annexure B8*.

Quality

C246.02 DEFINITIONS

The Works – Defined as follows:

The Works

- **Developer Infrastructure Works** - work includes subdivisions and any public infrastructure work associated with an approved Development in the TRC local government area requiring a construction certificate.
- **Contracted Works** – infrastructure work undertaken by a Principal Contractor or subcontractor formally appointed by TRC and supervised by TRC.
- **Internal Works** - infrastructure work undertaken by TRC's day labour workforce.

Constructor – Defined as the organisation responsible for construction of the Works and the Principal Contractor as defined in the *Work Health and Safety Act 2011*.

Constructor

TRC Representative – Defined as follows:

TRC Representative

- **Developer Infrastructure Works** – Nominated TRC officer(s) for the approved Development.
- **For Contracted Works** – the Superintendent.
- **For Internal Works** – TRC Asset Owner

Constructor's Representative – Defined as follows:

Constructor's Representative

- **Contracted Works** – the Principal Contractor's nominated representative as per the relevant contract.
- **Internal Works** – TRC officer responsible for delivery.

Developer's Representative– Defined as the person or organisation appointed by the Developer to administer the Constructor responsible for the delivery of **Developer Infrastructure Works**.

Developer's Representative

C246.03 REFERENCE DOCUMENTS

Documents referenced in this Specification are listed in full below whilst being cited in the text in the abbreviated form or code indicated. The Constructor shall possess, or have access to, the documents required to comply with this Specification.

Documents Standards Test Methods

Where not otherwise specified in the relevant Tamworth Regional Council (TRC) Construction Specifications or the approved design drawings, the Constructor shall use the latest versions of the Reference documentation, including amendments and supplements, listed in the TRC Construction Specifications at the time of the Works approval.

Currency

(a) Tamworth Regional Council (TRC) Specifications

C201 - Control of Traffic.

C242 - Flexible Pavements.

CQC - Quality Control Requirements.

(b) Transport for NSW (TfNSW) Specifications

TfNSW QA Specification 3151 – Cover Aggregate for Sprayed Bituminous Surfacing.

TfNSW QA Specification 3252 – Polymer Modified Binder for Pavements.

TfNSW QA Specification 3268 - Aggregate Precoating Agent (for Polymer Modified Binder).

TfNSW QA Specification 3269 - Bitumen Adhesion Agent (for Polymer Modified Binder).

(c) TfNSW Guides

RTA Sprayed Sealing Guide (Edition 2) 1997.

(d) TfNSW Forms

TfNSW Form 354 - Sprayer Certificate.

TfNSW Form 500E - Conventional SAM and SAMI (Including HSS) Daily Record

(e) TfNSW Test Methods

TfNSW T274 - Aggregate spread rate (field method).

(f) Australian Standards

References in this Specification or on the approved design drawings to Australian Standards are noted by their prefix AS or AS/NZS.

AS 3568 – Oils for reducing the viscosity of residual bitumen for pavements.

(g) Austroads Publications

Austroads Pavement Work Tip No. 27 (PWT27)

C246.04 CONTROL OF TRAFFIC

Control of traffic is to comply with the Traffic Control Plan, prepared in accordance with *C201 – Control of Traffic.*

Control of Traffic

MATERIALS

C246.05 SAMPLING AND TESTING OF MATERIALS

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

**NATA
Registration**

C246.06 BITUMINOUS MATERIALS AND ADDITIVES

(a) Bituminous Materials

Polymer modified binder materials for seals and reseals shall conform to TfNSW QA Specification 3252.

**Binder
Conformance**

The binder shall not be heated above the manufacturer's recommendations, whichever is the lesser. Binder that has either been overheated, or been stored in violation of the temperature and time combinations of the manufacturer's requirements cannot be incorporated into the Works.

Heat Tolerances

C246.07 AGGREGATE PRECOATING AGENT AND BITUMEN ADHESION AGENT

Aggregate pre-coating agents shall conform to TfNSW QA Specification 3268. Test results demonstrating the conformance of each lot shall be undertaken.

**Material
Requirements**

Bitumen adhesion agents shall conform to TfNSW QA Specification 3269. Test results demonstrating the conformance of each lot shall be undertaken.

C246.08 OILS FOR REDUCING VISCOSITY OF BITUMEN (CUTTER OIL)

Oils for reducing the viscosity of bitumen must conform to AS 3568. Test results demonstrating the conformance of each lot shall be undertaken.

**Material
Requirements**

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**

C246.09 AGGREGATE

The supply and delivery of aggregate must conform to TfNSW QA Specification 3151. Test results demonstrating the conformance of each lot shall be undertaken.

**Material
Requirements**

DESIGN OF BITUMINOUS SURFACING

C246.10 GENERAL

At least five (5) working days before commencing sprayed bituminous surfacing work, the Constructor shall submit to the TRC Representative for approval, details of the proposed polymer modified bituminous surfacing design for the work together with a certification that the nominated materials for the work meet the requirements of the Specification and the approved design drawings. **Annexure C246A** shall be completed by the Constructor to conform with this approval.

Proposed Design

The Constructor'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 the Constructor shall submit these design details to the TRC Representative. Design application rates shall be known as "nominated application rates" and materials as "nominated materials".

AUSTROADS
Design
Procedure

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) Polymer Modified Binder – type, grade, supplier and manufacturers recommendations.
- (e) Cutter Oil – source and type.

HOLD POINT

The nominated design and the test results for all constituent materials shall be submitted to the TRC Representative and/or the Developer's Representative (for Developer Infrastructure Works) at least five (5) working days prior to the proposed sealing. All of the test results nominated each of the material specifications and Australian Standards nominated shall be provided for each lot.

PROCESS HELD: Application of Sprayed Seal.

Hold Point

PRECOATING OF AGGREGATE

C246.11 GENERAL

Apply the precoating agent to the aggregate in a manner and at a rate and time that provides a complete, light, uniform, effective cover of all aggregate at the time of spreading.

Precoating
Requirements

Precoating shall not be undertaken when rain is imminent. Precoated aggregate shall be covered where rain is either imminent or forecast. Details shall be documented in the Constructor's Project Quality Plan (PQP) to avoid the settlement of dust and drying out of the precoating agent.

APPLICATION OF SPRAYED BITUMINOUS SURFACING

C246.12 GENERAL

The Constructor shall carry out polymer modified sprayed bituminous surfacing so as to:

Work Quality

- (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.

Details of equipment and methods to be used for polymer modified sprayed bituminous surfacing shall be submitted to the TRC Representative for approval prior to their use on the Works.

Equipment and Methods

C246.13 PLANT

The sprayer must have a current Sprayer Certificate in accordance with TfNSW Form 354 issued by TfNSW. The spray nozzles must be of the make and type endorsed on the Sprayer Certificate. Damaged, defective and worn nozzles shall be replaced with the same type and size.

Sprayer Requirements

Spreading equipment must be used to spread aggregate. The equipment shall be capable of achieving a uniform spread rate.

Spreading Equipment

Dual axle smooth pneumatic tyred multi-wheel rollers shall be used. The mass of the rollers shall exceed 7 tonnes, without ballast. The tyre pressure shall exceed 550kPa.

Roller Requirements

C246.14 PREPARATION OF PAVEMENT SURFACE

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 300mm beyond each edge of the area to be sprayed.

Pavement Sweeping

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

Foreign Matter on Pavement

C246.15 REVIEW OF NOMINATED APPLICATION RATES

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

Aggregate Lots

The Constructor shall review the bituminous surfacing design at each location based on the 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".

Target Application Rates

C246.16 BINDER TEMPERATURE REQUIREMENTS

The polymer modified binder temperature ranges shall be as prescribed in the manufacturer's recommendations.

Binder Temperature

If the polymer modified binder was not able to be sprayed, and no cutter oil or bitumen adhesion agent has been added, it may be stored at the manufacturers recommended storage temperatures for up to three (3) days.

C246.17 PAVEMENT TEMPERATURE AND WEATHER CONDITIONS

The pavement temperature shall be recorded at regular intervals during the course of work. The type of temperature gauge shall be submitted for approval with the nominated seal design. Spraying of polymer modified binders shall only occur if the pavement temperature has been at or above 20°C for at least one (1) hour prior to spraying.

***Pavement
Temperature***

Do not spray wet pavement or while rain appears imminent or during strong winds or dust storms.

Weather

C246.18 INCORPORATION OF CUTTER OIL AND ADHESION AGENT

The proportion of cutter oil shall be guided by the RTA Sprayed Sealing Guide and Austroads Work Tip No. 27. The cutter oil shall be added to the tank then circulated at a rate of at least 700 litres per minute for 15 minutes to create a homogeneous mix.

***Incorporating
Cutter Oil***

C246.19 APPLICATION OF POLYMER MODIFIED BINDER

(a) Application

Apply the class and grade of polymer modified binder at the nominated application rates. After application of a primer allow a period of at least 48 hours, or such longer period as determined to be necessary, for the primer to become completely dry, before the polymer modified binder is applied.

Application

Where a bitumen adhesion agent or cutter oil have been added to the binder adjust the total application rate of the total binder at 15°C, using TfNSW Form 500E to make allowances within the overall mixture.

(b) Operation of the Sprayer

The spray nozzles shall be compatible with the binder and the application rate.

***Sprayer
Operation***

Each sprayer run shall commence and end on a protective strip of heavy paper laid perpendicular to the direction of the seal. The protective strip shall be secured to the pavement to prevent movement.

The sprayer must be moving at sufficient speed prior to the commencement of the spray run to ensure correct application. A constant speed shall be maintained throughout the spray run.

If a resultant defect becomes evident (i.e. as a result of blocked nozzles) cease spraying until the defect is rectified. Approval to recommence, supported by evidence that the problem has been rectified, shall be sought from the TRC Representative and/or the Developer's Representative (for Developer Infrastructure Works).

C246.20 APPLICATION AND ROLLING OF AGGREGATE

Precoated aggregate shall be used for all seals and primerseals. The precoated aggregate shall be incorporated within 15 minutes of the application of the binder to the pavement surface. If the precoated aggregate has been contaminated, particularly by water, the affected material shall not be incorporated into the Works.

***Incorporation of
Aggregate***

The precoated aggregate shall be applied at the nominated size and application rate as determined in the approved seal design. The spreading equipment utilised shall ensure that the precoated aggregate is uniformly spread over the sprayed surface area. Aggregate shall be re-applied where a uniform cover is not achieved. Brooming may be required to improve the uniformity of the cover after the initial rolling. The actual spread rate shall be determined using TfNSW Test Method T274.

Once a uniform cover of precoated aggregate is achieved rolling shall commence using two or more dual axle pneumatic tyred multi-wheel rollers of mass greater than 7 tonnes with a minimum tyre pressure of 550kPa. A minimum of 8 passes shall be undertaken within one hour of the application of the binder.

Final sweeping shall be undertaken within 48 hours of the application of the seal. After final sweeping, and before removal of speed restriction and warning signs, the number of loose aggregate particles remaining on the surface of seals constructed with 10mm, or larger, aggregates not to exceed the values documented in Table C246.2 below.

Removal of Loose Particles

Road Type	Loose Stones
Urban areas	20 particles per m ²
Other medium to high traffic (>250 vehicles/lane/day)	30 particles per m ²
Other low traffic (<250 vehicles/lane/day)	40 particles per m ²

Table C246.2 - Loose Aggregate

WITNESS POINT

Inspection of loose aggregate by the TRC Representative and/or the Developer's Representative (for Developer Infrastructure Works) including evidence that the loose stones do not exceed specified limits. Linemarking and permanent signage installed where applicable.

Witness Point

PROCESS HELD: Removal of speed restriction and warning signs.

C246.21 WORK RECORDS

Records of the particulars of the work performed shall be recorded on TfNSW 500E. The Constructor may use an alternative form to record the work records provided the information recorded is either equivalent or exceeds the records required in the forms nominated.

Sprayer Run Records

C246.22 PROTECTION OF SERVICES AND ROAD FIXTURES

All necessary precautions shall be taken to prevent the binder, aggregate or other materials from adhering to or entering other nearby infrastructure including, but not limited to, gratings, hydrants, valve boxes, manhole covers, bridge or culvert decks and other road fixtures. Other related infrastructure shall be left in a condition equivalent to that existing when the Constructor commenced the sprayed surfacing work.

Protection of Other Infrastructure

NONCONFORMANCE OF MATERIALS AND WORK

C246.23 GENERAL

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 Constructor or materials made defective by the method of operation adopted or any other cause, then such failure or failures shall constitute a 'Non-conformance'.

Conditions

C246.24 ACCEPTANCE OF NONCONFORMANCES

Non-conformances of materials and work may be accepted at the absolute discretion of the TRC Representative.

**TRC
Representative's
Authority**

Non-conformance 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 TRC Representative strictly on the basis set out below:

- (a) Variations will be considered as departures from the design target application rates after allowing for adjustments due to adhesion agent, cutting 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 TRC Representative being available.
- (b) Variations up to $\pm 5\%$ of the adjusted design target application rate shall be deemed as conforming. Variations up to $\pm 10\%$ are permissible for polymer modified binders containing scrap rubber.
- (c) Variations greater than those specified above shall be rejected.

LIMITS AND TOLERANCES

C246.25 SUMMARY OF LIMITS AND TOLERANCES

The limits and tolerances applicable to the various clauses in this Specification are summarised in Table C246.3 below:

Item	Activity	Limits/Tolerances	Spec Clause
1	Design of Bituminous Surfacing		
	Design of Bituminous Surfacing	Constructor to provide details of design to TRC Representative at least 5 working days before proposed commencement of work.	C246.10
2	Sweeping of Pavement Surface		
	Sweeping of Pavement Surface	Sweeping shall extend at least 300mm beyond each edge of the area to be sprayed.	C246.14
3	Binder Temperature		
	(a) Bitumen Temperature	The binder temperature shall be in the range specified in the manufacturers recommendations.	C246.16
4	Spraying Temperature		
	(a) Pavement Temperature	Bituminous surfacing shall not be undertaken if the pavement temperature has not been at or above 20°C for at least 1 hour before commencement of spraying.	C246.17
5	Incorporation of Cutter Oil		
	Incorporation of Cutter Oil	Circulation of hot bitumen and cutter oil mixture in the sprayer shall be at the rate of 700 litres per minute for 15 minutes.	C246.18
6	Application of Bituminous Material		
	(a) Application Rates	Application rates and quantities shall apply to a temperature of 15°C and have tolerances of ±5%.	C246.19
	(b) Second Coat after Primer	At least a 48 hour period shall elapse after spraying of primer before binder for a seal is applied.	C246.19
7	Rolling		
	(a) Roller Numbers and Type	Initial rolling shall be carried out with 2 or more dual axle smooth pneumatic tyred multi-wheeled rollers. Minimum load of 1 tonne per tyre and minimum tyre pressure 550KPa.	C246.20
	(b) Duration	A minimum of 8 passes shall be undertaken within 1 hour of application of the binder.	C246.20
	(c) Loose Aggregate		
	(i) Urban areas	20 particles per m ²	C246.20
	(ii) >250 veh/lane/day	30 particles per m ²	
	(iii) <250 veh/lane/day	40 particles per m ²	

Table C246.3 - Summary of Limits and Tolerances

ANNEXURE C246A - DETAILS OF WORK

To be completed by the Designer for approval by the TRC Representative

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

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

- (i) Very Light Prime or Primer - equivalent cut back bitumen to grade AMCOO.
- (ii) Light/Medium Prime or Primer - equivalent cutback bitumen to grade AMCO or AMC1.
- (iii) Heavy Prime or Primer - equivalent cut back bitumen to grade AMC1 or AMC2.

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