

# TRANSPORT FOR NSW (TfNSW)

## SPECIFICATION GUIDE NR107

### GUIDE TO QA SPECIFICATION R107 SPRAYED BITUMINOUS SURFACING (WITH POLYMER MODIFIED BITUMEN)

#### REVISION REGISTER

<b>Ed/Rev Number</b>	<b>Clause Number</b>	<b>Description of Revision</b>	<b>Authorised By</b>	<b>Date</b>
Ed 1/Rev 0		New issue. Guide was previously incorporated within Specification R107.	GM, IC	30.09.10
Ed 1/Rev 1	Global  1  Annex B	Minor editing of text and tables to improve clarity or correct minor errors.  Table NR107.1 - omitted Note (1) re-inserted.  “NATA certificate” changed to “NATA endorsed certificate”.  Tabulated checklist rearranged to accord with NR106.	GM, IC	21.05.12
Ed 1/Rev 2	Global	References to “Roads and Maritime Services” or “RMS” changed to “Transport for NSW” or “TfNSW” respectively.	DCS	22.06.20





GUIDE TO QA SPECIFICATION R107  
SPRAYED BITUMINOUS SURFACING  
(WITH POLYMER MODIFIED BITUMEN)

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IC-QA-NR107

VERSION FOR: DATE:
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## **FOREWORD**

### **TfNSW COPYRIGHT AND USE OF THIS DOCUMENT**

Copyright in this document belongs to the Transport for NSW.

The Guide is not a contract document. It has been prepared to provide readers with guidance on the use of the specification.

### **BASE SPECIFICATION**

This document is based on TfNSW QA Specification R107 Edition 3 Revision 0.

**SPECIFICATION GUIDE NR107**  
**GUIDE TO QA SPECIFICATION R107**  
**SPRAYED BITUMINOUS SURFACING**  
**(WITH POLYMER MODIFIED BITUMEN)**

## **1 GENERAL**

R107 is a QA specification and the use of QA specifications requires the Contractor to implement a quality management system that meets the quality management system requirements specified in Specification TfNSW Q. To comply with the intention of government policy as well as R107, sprayed bituminous surfacing works carried out using R107 require adequate surveillance and audit by the Principal.

The traditional term for “Superintendent” has now been replaced by the “Principal” and “Principal Authorised Person” who may then assign a representative to audit or carry out surveillance on the project. In this document, only the term “Principal” is used, to provide consistency with the terminology in this and other TfNSW QA specifications.

The Annexures in this Guide provide checklists that may be used to assist surveillance and auditing of the contract.

As with other TfNSW specifications, the Contractor must prepare a Project Quality Plan (PQP) in accordance with Clause 1.2.4 for the works. The key elements in the PQP are covered in Annexure R107/D and the Principal should use the information in both the main body of the specification and the annexures when reading the Contractor’s PQP.

Other TfNSW specifications and Australian Standards used in conjunction with R107 are listed in Tables NR107.1 and NR107.2 respectively, and shown diagrammatically in Figure NR107.1. Always ensure that the latest edition of the specification is used in the preparation of the contract documents.

**Table NR107.1 - TfNSW Material Supply Specifications Used In Conjunction with R107**

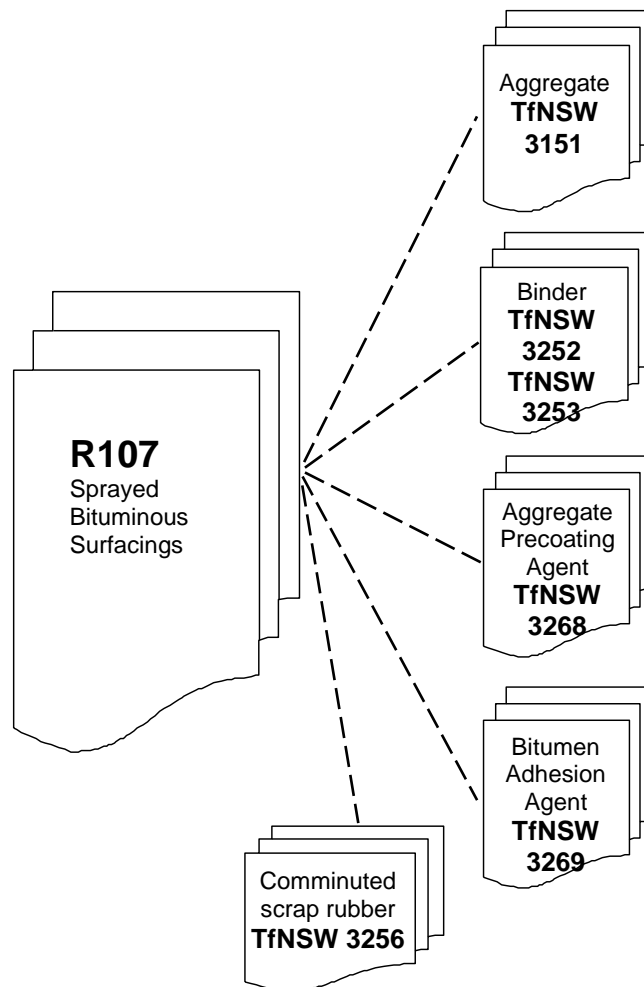
<b>Specification</b>	<b>Title</b>
R107	Sprayed Bituminous Surfacing (with Polymer Modified Bitumen)
3151	Cover Aggregate for Sprayed Bituminous Surfacing
3252	Polymer Modified Binder
3253	Bitumen for Pavements
3256	Comminuted Scrap Rubber
3261 <sup>(1)</sup>	Cutback Bitumen
3268	Aggregate Precoating Agent (Polymer Modified Bitumen)
3269	Bitumen Adhesion Agent (Polymer Modified Binder)

Note <sup>(1)</sup>: Cutback bitumen may be used with geotextile reinforced seals.

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**Table NR107.2 - Australian Standards For Minimum Material Supply Standards Used In Conjunction With R107**

Aust Std	Title
2008	Residual bitumen for pavements
2157	Cutback bitumen
3568	Oils for reducing the viscosity of residual bitumen for pavements



**Figure NR107.1 - TfNSW Material Specifications Used In Conjunction with R107**

The key reference material for this specification is the TfNSW Sprayed Sealing Guide.

For safe handling of hot bitumen, you should familiarise yourself with Austroads Bituminous Materials Safety Guide.

If you are not familiar with the terms used in this document, refer to the Austroads Glossary of Austroads Terms.

There are many industry and Austroads guides to good practice, for example:

- Austroads Guide to Pavement Technology Part 3: Pavement Surfacing



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- Austroads Guide to Pavement Technology Part 4F: Bituminous Binders
- Austroads Guide to Pavement Technology Part 4J: Aggregate and Source Rock
- Austroads Guide to Pavement Technology Part 4K: Seals

These guide notes do not replace training material and TfNSW offers training courses in the application of this specification. TfNSW staff should refer to the TfNSW “Learning@RMS” or “Pavements Community (& Resources)” websites for more information about the content and timing of training course.

## **2 PROJECT PARAMETERS**

R107 requires the TfNSW Project Manager to select appropriate parameters identified in R107 and nominate them in Annexure R107/A. These parameters are:

- Type and extent of seal and reseals
- Grade or class of binder
- Nominal aggregate size
- Whether a geotextile reinforced seal is being used
- The maximum allowable loose aggregate particles

## **3 SEAL DESIGN**

The principles behind the TfNSW design of sprayed sealing are well documented in the TfNSW Sprayed Sealing Guide. The following text summaries the key elements in the design of seals or reseals using TfNSW Form 395K. The sealing design information output from using this form is:

- Binder application rate in L/m<sup>2</sup>
- Aggregate spread rate in m<sup>2</sup>/m<sup>3</sup>

For sealing or resealing works in accordance with R107, the following design input parameters are required to complete TfNSW Form 395K:

- Type of seal/reseal
- Texture depth of surface to be sealed/resealed
- Ball penetration depth (for seal only; not required for reseal)
- Traffic volume in terms of vehicles per lane per day and percentage of heavy vehicles
- Nominal aggregate size, shape and ALD
- Proposed bitumen type or Class
- Whether geotextile is to be used, and its type

It is important that the surface texture depth is carried out in accordance with TfNSW Test Method T240 and the location of the testing takes into consideration changes in texture depth along wheel paths and between wheel paths. Refer to Annexure R107/L for the minimum number of texture depth measurements to be taken for seal and reseal design.

## **4 SEALING AGGREGATES**

Sealing aggregates must comply with Specification TfNSW 3151 and if not, specialist advice should be sought from the Pavement Surfacing Section.

Quarries supply aggregates to various road and building construction sources during the year and the supply of sprayed sealing aggregates are only one part of their business. As major projects in the region may impact on the supply of sealing aggregates, it is advisable to plan well in advance and investigate alternative sources to supply aggregates in the planned works program.

Also take into consideration the loss of material from the stockpile due to the thin sacrificial layer at the bottom of the stockpile which may represent up to 10 % of the volume required for the project.

Roadside stockpile management is an acceptable method to ensure reliable supply of aggregates for the works program. Ensure that the stockpile meets TfNSW guidelines, and consider covering the stockpiles to prevent moisture changes occurring after rain events and accumulation of dust.

All slag aggregates used in roadworks must be completely weathered before being used; otherwise there is significant potential for slag aggregates to damage the seal.



**Figure NR107.2 – Covered Stockpiles**

(Note that the covers should extend to the base of the stockpile as shown in the left photograph, in contrast to that in the right photograph, to avoid moisture draining into the stockpile)

## **5 SEALING BINDERS**

R107 only permits the use of polymer modified binder (PMB) for the seal. Typical PMBs used in NSW are:

- Styrene-butadiene-styrene (SBS) modified bitumen
- Polybutadiene (PBD) modified bitumen
- Crumbed rubber modified bitumen
- Polyethylene modified bitumen

When a geotextile fabric is used, Class 170 bitumen without cutback is typically applied for the tackcoat.

A TfNSW Guide, N3252, for the selection of Polymer Modified Binders in sealing and asphalt works has been published and provides useful background information to the selection of a PMB for a sealing project.

## 6 USE OF GEOTEXTILES

Nonwoven geotextile fabrics supplied to site must have a high melting point as the fabric will come in contact with hot bitumen during placing. In addition, the geotextile reinforced seal design will require an addition of up to at least 0.9 L/m<sup>2</sup> of Class 170 bitumen to fill the voids within the fabric. TfNSW is currently developing an empirical calculation to establish the additional binder required for the proposed fabric.

## 7 HOLD AND WITNESS POINTS

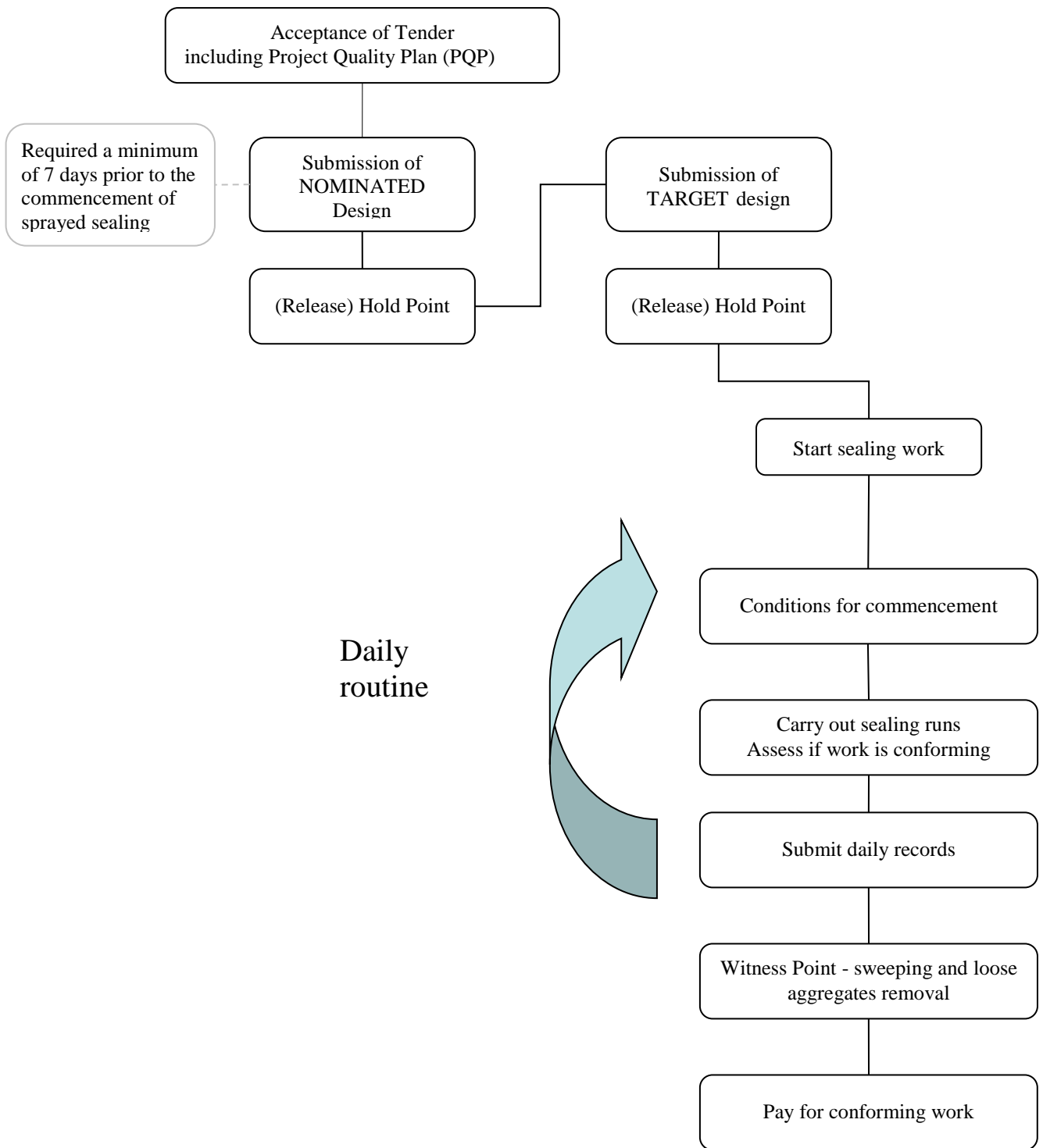
The Contractor is required to submit documents to the Principal at various stages of the work, and Table NR107.3 and Figure NR107.3 identifies the various documents that are required for submission.

**Table NR107.3 - Summary of Key Activities Under R107**

Clause	Activity	When
1.2.4	Submit Project Quality Plan	Required with tender documents
3.2	<p><b>Submission of Nominated Design (design details with nominated materials)</b></p> <p>Spray design calculations - TfNSW Form 395K</p> <p>Each constituent material:</p> <ul style="list-style-type: none"> <li>• Aggregate test report(s),</li> <li>• Binder test report(s)</li> <li>• Aggregate precoating and bitumen adhesion agent test report(s)</li> <li>• Cutter oils and flux oils test report</li> <li>• Geotextile report (if required)</li> </ul>	<p>Required at least 7 days prior to commencement of sprayed surfacing work.</p> <p>Incomplete information in the submission will delay the release of this Hold Point.</p>
3.2.2	<b>Verification</b> of each constituent material	
3.2.3	<b>Endorsement</b> for each constituent material	
3.2.3	<p><b>Hold Point - Sealing operation using the proposed design</b></p> <p>Submission and acceptance of aforementioned documents required before release of Hold Point.</p>	TfNSW commences review process on receipt of submission. Release of the Hold Point is dependent on the completeness of the submission.
3.3	<p><b>Review of Nominated Application Rates</b></p> <p>Required before work commences - nominated design is adjusted for ALD of actual stockpile and surface texture of length to be sealed.</p>	Typically provided between submission of nominated design and commencement of work. In many cases the target application rates are provided on the day of sealing.
3.3	<b>Hold Point – Sprayed sealing work for each location</b>	TfNSW commences review process on receipt of target application rates. Release of the Hold Point is dependent on the completeness of the submission.

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<b>Clause</b>	<b>Activity</b>	<b>When</b>
4.0	<b>Process Control</b> Contractor responsibility. Surveillance required	Ongoing after work commences.
4.4	Daily records using TfNSW Form 500E	Completed form by operator after each spray run. Contractors must submit all forms by the end of the day.
5.0	<b>Conditions for Commencement</b> <ul style="list-style-type: none"> <li>• Precoating of aggregate</li> <li>• Preparation of pavement surface</li> <li>• Pavement temperature &amp; weather conditions</li> <li>• Protection of services &amp; road fixtures</li> </ul>	On the day of sealing works and prior to commencement of work.  Monitor climatic conditions during sealing works.
6.0	<b>Application of Sprayed Bituminous Surfacing</b>	Ongoing during work
7.0	<b>Application of Polymer Modified Binder</b>	Ongoing during work
8.0	<b>Application and Incorporation of Aggregate</b>	Ongoing during work
9.0	<b>Witness Point - Sweeping and loose aggregate removal</b> Measurement required after final sweeping and before opening to pre-existing signposted speed limit	TfNSW reviews test results
<b>Annexures</b>		
107/B	Measurement and Payment and Disposition of Nonconformities	Payment can only be completed after daily record forms submitted and all nonconforming lots have been resolved



**Figure NR107.3 - Flowchart Representing Timing and Content of Reports to Principal**

## **8 BEFORE SEALING OR RESEALING**

A period of at least twelve months must elapse, or the hardness of the primersealed surface measured using Test Method TfNSW T271 must be less than 2.5 mm, before the subsequent seal is applied on a primersealed surface

Seals should not be applied over a primed surface unless it has been cured for a period of at least forty-eight hours or such longer period as is necessary for the primed surface has become completely dry.

Masking should be considered for large thermoplastic pavement markings such as pedestrian crossings prior to application of a sprayed seal or reseal.

Before sprayed sealing commences, the Contractor should give consideration to protect, mask or replace existing pavement markings.

## **9 MATERIAL SUPPLY CHECKLISTS**

The checklists provided in Annexures NR107/A to NR107/C are to assist those involved in the administration of sprayed sealing contracts.

The checklists are designed to improve efficiency in the supervision and to ensure the collection and collation of all appropriate documents during all stages of work. They serve as a checklist for obtaining the necessary documents and therefore, only the relevant parts of specifications are included.

They do not negate the Contractor's responsibility to provide other documents required in the contract even if they are not listed in the Annexures.

Before using the checklists, the Principal should establish:

- which bitumen supplier(s) is(are) likely to be supplying the bitumen to the project;
- whether a specialist spraying contractor will be used, and whether the specialist spraying contractor have calibrated sprayers;
- which quarry is likely to be supplying the aggregates, and whether the aggregates will be supplied precoated;
- whether adhesion agents and cutter and/or flux oils are likely to be incorporated into the bitumen.

Checklists for the supplied materials for spray sealing work are given in Annexures NR107/B and NR107/C, and Table NR107/4 summarises which checklists should be completed by the Principal.

Where a quarry has been supplying the sealing aggregates for several years, it is likely that precoating agents will remain the same, but the Principal should ensure that data provide by the quarries gives a true representation of the material properties, and that the formulation of the agent has not changed.

A separate copy of the checklist should be utilised for every individual sealing project or job.

**Table NR107.4 - Summary of Material Supply Checklists in Annexures**

<b>TfNSW Specification/ Aust Std</b>	<b>Annexure</b>	<b>Remarks</b>
R107	A	The Contractor must submit a seal design using either the estimated or tested road surface conditions and test the nominated aggregate and binder for adhesion (TfNSW T238) and stripping (TfNSW T230).  The adhesion and stripping test results may be used for subsequent sealing projects, provided the aggregates, binders and conditions of the test are the same for the project.
3151 Cover aggregates	B	Complete 3 sheets
3252 PMB	B	Complete 3 sheets
3253 Bitumen	B	Complete 2 sheets
3256 Crumbed rubber	B	Complete 1 sheet
3258 Precoating agent	C	Complete 1 sheet
3269 Adhesion agent	C	Complete 1 sheet
AS 3568 Cutter and flux oils	C	Complete sheets 1 to 3 as applicable

## **10 CHECKLISTS FOR PLACING**

*[Under development]*

## **11 TESTING REQUIREMENTS AND FREQUENCY OF TESTING**

Sprayed sealing requires the testing of materials and their compatibility with the road surface prior to sealing, including the assessment of loose material after sealing.

The test methods to undertake the testing are well documented in TfNSW specifications and the test results and the reporting of specific information is mandatory to ensure traceability of records and compliance of the binder or other products being used.

The checklists in the Annexures require that laboratory certificates include all the information requested in the test method. If there are gaps in the reported laboratory information, this is a noncompliance of the specification and may in turn delay the release of Hold Points.

The minimum frequency of testing for each specification is listed in Annexure NR107.L. These minimum frequencies of testing must be adhered to unless:

- it is a manufactured material that is packaged in containers, with specific batch numbers and other data required provided with each delivery of the product.
- it is reduced by agreement with the Principal

For aggregate precoating and bitumen adhesion agents, the specification allows the certification of an agent only to the formulation of the product on which the tests were carried out. New certification

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will be required every five or three years (depending on the product) or whenever a change in product formulation is made.

The Contractor should be aware that some tests take time for completion and reporting, and they should allocate sufficient time for laboratories to complete the test.

The aggregate spread rate must be determined using 1 m<sup>2</sup> mats in accordance with TfNSW Test Method T274 along the length being sealed or by other appropriate means approved by the Principal and in accordance with the Project Quality Plan.

## **12 DAILY RECORDS**

The contractor is required to submit daily records of the works by lot using TfNSW Form 500E - Conventional SAM and SAMI - Daily Record.

If Class 170 bitumen is used for the tackcoat with a geotextile seal, the contractor must also complete Form 500C to ensure the total residual bitumen binder applied to the seal is known.

## **13 BUSHFIRE IMPACT ON SEALING OPERATIONS**

Under the new bushfire danger classification system, sprayed sealing operations must cease or not commence when the Fire Danger Rating is listed as “catastrophic”. An exemption may apply for urgent or essential repairs if permission is obtained from the Rural Fire Service. For more information on the ratings in your area, refer to [www.rfs.nsw.gov.au](http://www.rfs.nsw.gov.au)

TfNSW has also published a Fact Sheet titled Working in the Fire Danger Season which provides more information about the new fire danger rating system and work limitations.



## **ANNEXURE A – HOLD POINTS AND WITNESS POINTS**

The following tables are provided in this annexure to serve as checklists for:

- Submission of nominated design and materials
- Review of nominated application rates
- Final sweeping and loose aggregate measurement

**Guide to R107 Sprayed Bituminous Surfacing (with Polymer Modified Bitumen)****NR107****R107 Submission of Nominated Design and Materials****Project Identification:****HOLD POINT 1** – Submission of Nominated Design and Materials (required a minimum of 7 days before work commencement)**Documents required: Seal Design (TfNSW Form 395A or 395K)**

	Status (Yes/No)	Action Required (e.g. request copy/information)
Submitted on time		
All essential data recorded in design form TfNSW 395		

**Documents required: Test Results**

Test Report Name	Received (Yes/No)	Certificate to Verify Conformance (to Cl. 2 & 3)		Action Required
		Received (Yes/No)	NATA Endorsed (Yes/No)	
Initial Adhesion (TfNSW T238)				
Resistance to Stripping (TfNSW T230)				
Aggregate (TfNSW 3151)				
Bitumen or Cutback Bitumen (TfNSW 3253)				
Polymer Modified Binder (TfNSW 3252)				
Comminuted Scrap Rubber (TfNSW 3256)				
Precoat and Adhesion Agent (TfNSW 3268 & 3269)				
Cutter Oils and Flux Oils (AS 3568)				
Geotextile (minimum density 130g/m <sup>2</sup> and minimum melting point 165°C)				
<b>RELEASE HOLD POINT 1</b>	<b>Yes or No</b>	<b>Reason:</b>		

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<b>HOLD POINT 2 – Review of Nominated Application Rates (review based on ALD from job stockpile and not nominated ALD)</b>		
<b>Seal Design (Form 395K)</b>		
Required Measurements	Status (Yes/No)	Action Required
All data recorded in TfNSW Forms 395K		
<ul style="list-style-type: none"> <li>ALD test report received for actual aggregate</li> </ul>		
<ul style="list-style-type: none"> <li>Road Surface Texture Results measured for actual seal location</li> </ul>		
ALD test report from job stockpile sites		
Surface texture results measured for actual seal location		
Design reviewed for actual ALD and surface texture		
Ball Penetration measured (only for seals over primes or primeseals)		
<b>RELEASE HOLD POINT 2</b>	<b>Yes or No</b>	<b>Reason:</b>

<b>WITNESS POINT – Final Sweeping and Loose Aggregate Measurement</b>		
<b>Contractor must notify Principal of time and location prior to commencement. It is Principal's decision to be present or not.</b>		
	Status (Yes/No)	Action Required
Client Witnessed		
Measurement of Loose Aggregate		
Measurement or Count Acceptable		

## **ANNEXURE B – MATERIAL COMPLIANCE FOR BINDER AND AGGREGATE**

The overall requirements for cover aggregates in TfNSW 3151 are listed in the table below with specific details on the subsequent page.

The supply of polymer modified binder is in accordance with TfNSW Specification 3252 and three sheets represent the checklist for completion. Only one of the first two checklists has to be completed.

Where scrap rubber is used it must comply with the Grade A requirements of TfNSW 3256 and a checklist is provided.

The bitumen test report checklists are only required to be completed if geotextile fabric is to be used.

### **Minimum Requirements for Cover Aggregates – Specification TfNSW 3151 – Sheet 1 of 3**

<b>Clause</b>	<b>Property</b>	<b>Test Value or Remark</b>
5.1	General - Are aggregates:	
	• well shaped?	Yes / No
	• clean?	Yes / No
	• sound?	Yes / No
	• free from dust, clay, dirt and other matter?	Yes / No
5.2	Uncrushed aggregated acceptable	Yes / No
6.1 (i)	Aggregate source	
	Aggregate geological type	
6.1 (iii)	Plant and methods of winning aggregate	
6.2 (i)	Polishing Aggregate Friction Value (PAFV)	
7	Stockpile sites to be prepared by	Principal / Contractor <i>(delete as applicable)</i>
10	Aggregates supplied precoated	Yes / No

**Minimum Requirements for Cover Aggregates – Specification TfNSW 3151 – Sheet 2 of 3**

Clause	Property and Test Method	Required Values			Reported Value		Date on NATA Report and Compliance with Specification (Yes/No)	
5.2	<b>Fractured Faces</b> TfNSW T239 - Fractured Faces of Coarse Aggregate (only for aggregates derived from gravels and metasediments)	Table 3151.1 - Fractured Face(s) Requirements			Particles with at least 2 fractured faces (% by mass)	Particles with at least 1 fractured face (% by mass)		
		Traffic Volume (vehicles/lane/day)	Particles with at least 2 fractured faces (% by mass)	Particles with at least 1 fractured face (% by mass)				
		< 500	75	-				
		≥ 500 and ≤ 2500	75	90				
		> 2500	80	98				
5.3	<b>Shape</b> AS 1141.14 - Particle Shape, by Proportional Calliper	Not greater than 35% where calliper ratio is 2:1 Or Not greater than 10% where calliper ratio is 3:1						
5.4	<b>Particle size distribution</b> TfNSW T201 - Sieve Analysis of Aggregates	Table 3151.2 – Aggregate Properties			Aggregate Size .....			
			Percentage Passing AS Sieve (by mass)					
			Nominal size of aggregate (mm)					
		Sieve	14	10	7	5		
		19.0	100					
		13.2	90 – 100	100				
		9.50	0 – 30	90 – 100	100			
		6.70	0 – 5	0 – 40	90 – 100	100		
		4.75		0 – 5	0 – 35	90 – 100		
		2.36			0 – 10	0 – 35		
1.18	0 – 1	0 – 1	0 – 2	0 – 5				
5.4	<b>Particles finer than 75µm</b> TfNSW T203 (by washing)	Not greater than 1.0%						

Date report submitted: ..... (Note: Test certificates older than 3 months will be rejected and new testing carried out)

**Minimum Requirements for Cover Aggregates – Specification TfNSW 3151 – Sheet 3 of 3**

Clause	Property and Test Method	Required Values				Reported Value	Date of NATA Report and Compliance with Specification (Yes/No)	
5.5	<b>ALD</b> TfNSW T275 (10 mm and greater)      TfNSW T235 (5 mm and 7 mm)	<b>Aggregate</b>						
		Nominal Size (mm)	14	10	7	5		
		Min ALD (mm)	7.0	5.0	3.5	2.5		
5.6	<b>Durability</b> AS 1141.22 – Wet/Dry Strength Variation	Wet Strength > 150 kN and Variation ≤ 35%						
6.2(i)	<b>PAFV</b> AS 1141.41 – Polished Aggregate Friction Value – Horizontal bed machine	Min PAFV ≥ 44						
	<b>Source and Geological Type</b>	<i>To be recorded</i>						

Date report submitted: ..... (Note: Test certificates older than 3 months will be rejected and new testing carried out)

**Delivery Requirements for Polymer Modified Binder – TfNSW Specification 3252 – Sheet 1 of 3**

Clause	Property	Requirement	Record
7.1	Containers	Good condition	
7.2	Delivery procedures	Refer to Clause .....	
7.3	Handling temperature	Polymer modified binder temperature – refer to manufacturer's recommendations	
7.4(a)	Consignment information with each delivery	Manufacturer's name	
7.4(a)		Product name	
7.4(a)		Product class	
7.4(b)		Manufacturer's batch number	
7.4(c)		Documents that batch complied with material requirements <sup>(1)</sup>	
7.4(d)		Loading temperature	
7.4(e)		Delivery temperature	
7.4(f)		Document of compliance with Quality System delivery procedure	
7.4(g)		Weighbridge tickets (gross mass, mass of empty vehicle or container & net mass)	

Notes:

<sup>(1)</sup> Document to be delivered to purchaser within 14 days of delivery of binder.

## Polymer Modified Binder Test Report –Specification TfNSW 3252 – Sheet 2 of 3

Clause	Property	Test Method	Binder Class and Required Values					Reported Value (for Binder Class)	Compliance with Specification (Yes/No)
			S20E	S25E	S35E	S45R	S55R	..... (Write binder class here)	
5.2	Consistency at 60°C (Pa.s)	AG:PT/T121	≥ 2000	≥ 4500	≥ 355	≥ 1800	≥ 4000		
	Compression limit at 70°C, 2kg (mm)	AG:PT/T132	Not specified			≥ 0.2			
	Rubber content % by mass	TfNSW T737	Not applicable			To be recorded			
	Stiffness at 15°C (kPa)	AG:PT/T121	≤ 130	≤ 95	≤ 160	≤ 180	≤ 140		
	Toughness at 4°C, 100mm (Nm)	AG:PT/T124	To be recorded						
	Elastic recovery at 60°C, 100s (%)	AG:PT/T121	NA	≥ 85	NA	NA	≥ 35		
	Elastic recovery at 15°C, 100s (%)	AG:PT/T121	NA	65	NA	NA	50		
	Viscosity at 165°C (Pa.s)	AG:PT/T111	≤ 0.55	≤ 0.8	≤ 0.55	≤ 2.0	≤ 2.5		
	Flash Point (°C)	AG:PT/T112	≥ 250						
	Loss of mass on heating (%)	AG:PT/T103	≤ 0.6						
	Torsional recovery (%)	AG:PT/T122	≥ 50	≥ 52	≥ 16	≥ 25	≥ 30		
	Softening Point (°C)	AG:PT/T131	≥ 70	≥ 80	≥ 49	≥ 55	≥ 62		

NA: Not applicable

NATA endorsed certificate provided: Yes / No      Certificate current: Yes / No      Date verified: .....



**Polymer Modified Binder (Field Produced) Test Report – TfNSW Specification 3252 – Sheet 3 of 3**

Clause	Property	Test Method	Binder Class and Required Values		Reported Value (For Binder Class)	Compliance with Specification (Yes/No)
			S15RF	S20RF	..... (Write binder class here)	
4.2	Consistency at 60°C (Pa.s)	AG:PT/T121	≥ 1800	≥ 4000		
	Compression limit at 70°C, 2kg (mm)	AG:PT/T132	≥ 0.2	≥ 0.2		
	Rubber content (% by mass)	TfNSW T737	<i>To be recorded</i>	<i>To be recorded</i>		
	Stiffness at 15°C (kPa)	AG:PT/T121	≤ 180	≤ 140		
	Toughness at 4°C, 100mm (Nm)	AG:PT/T124	<i>To be recorded</i>	<i>To be recorded</i>		
	Elastic recovery at 15°C, 100s (%)	AG:PT/T121	<i>Not applicable</i>	50		
	Viscosity at 165°C (Pa.s)	AG:PT/T111	≤ 2.0	≤ 2.5		
	Flash Point (°C)	AG:PT/T112	≥ 250	≥ 250		
	Loss of mass on heating (%)	AG:PT/T103	≤ 0.6	≤ 0.6		
	Torsional recovery (%)	AG:PT/T122	≥ 25	≥ 30		
	Softening Point (°C)	AG:PT/T131	≥ 55	≥ 62		

NATA endorsed certificate provided: Yes / No

Certificate current: Yes / No

Date verified: .....

**Guide to R107 Sprayed Bituminous Surfacing (with Polymer Modified Bitumen)****NR107****Comminuted Scrap Rubber Requirements – TfNSW Specification 3256**

Clause	Property	Test Method	Requirement	Reported value	Compliance (Yes/No)
5	Moisture content (%)	TfNSW T731	≤ 1%		
5	Iron content	TfNSW T732	Nil		
5	Bulk density (kg/m <sup>3</sup> )	TfNSW T733 <sup>(1)</sup>	≤ 310		
5	Elastic recovery at 55°C of 20% in C170 bitumen to AS 2008 (%)	TfNSW T741 or TfNSW T735 <sup>(1)</sup>	≥ 25		
5	Torsional recovery at 25°C of 20% in C170 bitumen to AS 2008 (%)	TfNSW T739 or TfNSW T735 <sup>(1)</sup>	≥ 30		
5	Tenth percentile of length of particles retained on 0.6mm (mm)	TfNSW T738	≤ 7.5		
5	Particle size distribution (% passing)	TfNSW T730	2.36mm: ≥ 100%		
5		TfNSW T730	1.18mm: ≥ 80%		
5		TfNSW T730	0.6mm: ≤ 10%		
7.1	Packaging mass (kg)	TfNSW T733	25		
7.2	Moisture content (%)	Supplier quality system <sup>(2)</sup>	≤ 1		
7.3	Consignment details		Supplier's name Batch no. or Date of manufacture Product identification grade		

## Notes:

<sup>(1)</sup> One test only of these three will suffice for quality certification.<sup>(2)</sup> Supplier must implement delivery procedures to ensure that the moisture content at the point of delivery does not exceed 1%.

**Delivery Requirements for Bitumen - Specification TfNSW 3253 – Sheet 1 of 2**

Clause	Property	Requirement	Record
7.1	Containers	Good condition	
7.2	Delivery procedures	Refer to Clause	
7.3	Handling temperature	Bitumen temperature ( $\leq 200^{\circ}\text{C}$ )	
7.4(a)	Consignment information with each delivery	Manufacturer's name	
7.4(a)		Product name	
7.4(a)		Product class	
7.4(b)		Refinery batch number	
7.4(c)		Date of loading at refinery	
7.4(d)		Intermediate delivery site	
7.4(e)		Loading temperature ( $\leq 200^{\circ}\text{C}$ )	
7.4(f)		Delivery temperature ( $\leq 200^{\circ}\text{C}$ )	
7.4(g)		Weighbridge tickets (gross mass, mass of empty vehicle or container & net mass of bitumen)	
7.4(h)		Document of compliance with Quality System delivery procedure	
7.4(i)	Document that refinery batch complied		

## Bitumen Test Report – Specification TfNSW 3253 – Sheet 2 of 2

Clause	Property	Test Method	Binder Class and Required Values					Reported Value (For Binder Class)	Compliance With Specification (Yes/No)
			C50	C170	C320	C600	M500/170	..... (Write binder class here)	
6.2	Viscosity at 60°C (Pa.s)	AS 2341.2	40 – 60	140 – 200	260 – 380	500 – 700	400 – 600		
	Penetration at 25°C (10 <sup>-4</sup> m)	AS2341.12	≥ 130	≥ 62	≥ 40	≥ 20	≥ 65		
	Viscosity of RTFO residue as % of original (%)	AS 2341.10 & AS 2341.2	≤ 300				<i>Report</i>		
	Viscosity at 135°C (Pa.s)	AS 2341.3	0.2 – 0.3	0.25 – 0.45	0.4 – 0.65	0.6 – 0.85	≤ 1.0		
	Flash Point, open cup (°C)	AS 2341.14	≥ 250						
	Density at 15°C (kg/L)	AS 2341.7	<i>Report</i>						
	Sieve Residue (%)	AS 2341.20	≤ 1.0						

NATA endorsed certificate provided: Yes / No

Certificate current: Yes / No

Date verified: .....

## **ANNEXURE C – MATERIAL COMPLIANCE FOR PRECOATING AGENTS, ADHESION AGENT, CUTTER AND FLUX OILS**

Checklists have been provided for the supply of precoating agents to TfNSW 3268 and bitumen adhesion agents to TfNSW 3269.

Cutter Oils and Flux Oils are supplied in accordance with the requirements in AS 3568 and two checklist may be used for their compliance.

## NR107 Guide to R107 Sprayed Bituminous Surfacing (with Polymer Modified Bitumen)

### Precoating Agent - Specification TfNSW 3268

Supplied by: .....

Date on NATA endorsed certificate: ..... Certificate current: Yes / No

**Note: For polymer modified bitumen, product certification is required every 3 years or whenever a change in product formulation is made - refer Clause 6 of Specification 3268.**

Clause	Property	Test Value or Record
7(a)	Name of manufacturer/supplier	
7(b)	Trade name of product (if applicable)	
7(c)	Product Reference or Identification Number	
7(d)	Grade of PMB with which the precoating agent is compatible.	
7(e)	Date of manufacture	
7(e)	Batch number (on container)	
7(f)	"Use by date" of precoating agent	
8	Available MSDS	Yes / No
8(a)	Chemical and physical properties	
8(b)	Recommended application rate	
8(c)	Recommended diluent and rate of dilution (where applicable)	
8(d)	Recommended method of mixing	
8(e)	Storage life of precoating agent (months)	
8(f)	Effective life of precoating agent applied to aggregate and stockpiles (months)	
5.6	Storage temperature range of container (4 to 40°C)	
5.7	Concentration of active component:	
	• Average value of concentration	
	• Minimum value of concentration <sup>(1)</sup>	

Notes:

<sup>(1)</sup> Manufacturers recommendation of the minimum value of concentration at which the material is considered to be effective.

**Complete checklist:** Certificate compliant: Yes / No Date verified: .....

**Guide to R107 Sprayed Bituminous Surfacing (with Polymer Modified Bitumen) NR107****Adhesion Agent – Specification TfNSW 3269**

Supplied by: .....

Date on NATA endorsed certificate: ..... Certificate current: Yes / No

**Note: For polymer modified bitumen, product certification is required every 3 years or whenever a change in product formulation is made - refer Clause 6 of Specification 3269.**

Clause	Property	Test Value
7(a)	Name of manufacturer/supplier	
7(b)	Adhesion agent product name (if applicable)	
7(c)	Product Reference or Identification Number	
7(d)	Grade of PMB with which the adhesion agent is compatibility	
7(e)	Date of manufacture	
7(e)	Batch number (on container)	
7(f)	"Use by date" of adhesion agent	
8	MSDS available	Yes / No
8(a)	Adhesion agent form	Solid / Liquid / Paste
8(b)	Chemical and physical properties	
8(c)	Effectiveness of adhesion agent	
	• % loss of effectiveness of adhesion agent (table or graph)	
	• Maximum period of prolonged heating	
8(d)	Recommended method of handling and mixing	
8(e)	Recommended mixing time	
5.2	Homogeneity (Test Method TfNSW T590)	
	• Presence of segregation	Yes / No
	• Presence of lumpiness	Yes / No
	• Presence of skins	Yes / No
	• Presence of settlement	Yes / No
5.3	Concentration of adhesion agent	
5.3	Concentration to be used alone	Yes / No
5.5	Concentration of active component	
	• Average value of concentration	
	• Minimum value of concentration <sup>(1)</sup>	

Notes:

<sup>(1)</sup> Manufacturer's recommendation of the minimum value of concentration at which the material is considered to be effective.**Complete checklist:** Certificate compliant: Yes / No Date verified: .....

**Guide to R107 Sprayed Bituminous Surfacing (with Polymer Modified Bitumen)****NR107****Cutter Oils and Flux Oils – AS 3568 – Sheet 1 of 3**

Clause	Property	Test Method	Required Values						Reported Values			Compliance with Specification (Yes/No)
			Cutter oil		Flux oil		HFP cutter		Cutter oil	Flux oil	HFP cutter	
			Min	Max	Min	Max	Min	Max				
4.1	Aniline point (°C) <i>or</i>	ASTM D611 and/or ASTM D1319	-	65	-	75	-	-			-	
	Aromatic content (% by volume)	ASTM D1319	15	-	15	-	15	-				
	Density at 15°C (kg/m <sup>3</sup> )	ASTM D1298 AS 2341.6	775	830	790	880	780	840				
	Distillation range	ASTM D86										
	Initial boiling point, IBP (°C)		140	-	175	230	140	-				
	% of original volume recovered at: 150°C		-	10	-	-	-	10				
	200°C		-	80	-	10	-	80				
	250°C		80	-	-	-	80	-				
	300°C		-	-	-	80	-	-				
	350°C		-	-	80	-	-	-				
	Final boiling point, FBP (°C)	-	270	-	-	-	270					
	Flash point (°C)	AS 2106										
	• Abel apparatus		38	-	-	-	61.5	-				
• Pensky-Martens closed cup	-		-	61.5	-	-	-					

NATA endorsed certificate provided: Yes / No

Certificate current: Yes / No

Date verified: .....



**Guide to R107 Sprayed Bituminous Surfacing (with Polymer Modified Bitumen)**

**NR107**

**Cutter Oils and Flux Oils – AS 3568 – Sheet 2 of 3**

Clause	Property	Test Method	Required Values						Reported Values		
			Cutter oil		Flux oil		HFP cutter		Cutter oil	Flux oil	HFP cutter
			Min	Max	Min	Max	Min	Max			
4.2	Cleanliness and fluidity		Clean and free of particular matter								
4.3	Miscibility		Complete with no precipitation								
4.1	Water content (% by volume)	AS 2341.9	-	0.1	-	0.1	-	0.1			
	Viscosity at 40°C (mPa.s)	ASTM D445	-	2.0	1.6	4.6	-	2.0			

NATA endorsed certificate provided: Yes / No      Certificate current: Yes / No      Date verified: .....

**Heavy Flux Oils – AS 3568 – Sheet 3 of 3**

Clause	Property	Test Method	Required Values		Reported Value	Compliance with Specification (Yes/No)
			Min	Max		
4.1	Distillation	ASTM D86				
	• Initial boiling point (°C)		190	-		
	• Temperature at 50% recovery (°C)		320	-		
	Viscosity at 50°C (mPa.s)	ASTM D445	45	90		
	Flash point (°C) Pensky-Martens closed cup	AS 2106	61.5	-		
4.3	Miscibility		Complete with no precipitation			
4.1	Water content (% by volume)	AS 2341.9	-	0.5		
	Sulphur content (% by mass)	ASTM D1552	-	3.5		
	Sediment content (% by mass)	ASTM D473	-	0.15		
	Pour point (°C)	ASTM D97	-	6		

NATA endorsed certificate provided: Yes / No

Certificate current: Yes / No

Date verified: .....