

# TRANSPORT FOR NSW (TfNSW)

## SPECIFICATION D&C 3252

### POLYMER MODIFIED BINDER FOR PAVEMENTS

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Transport  
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SPECIFICATION D&C 3252

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# POLYMER MODIFIED BINDER FOR PAVEMENTS

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## **FOREWORD**

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### **BASE SPECIFICATION**

This document is based on Specification TfNSW 3252 Edition 12 Revision 1.

# **TfNSW SPECIFICATION D&C 3252**

## **POLYMER MODIFIED BINDER FOR PAVEMENTS**

### **1 SCOPE**

This Specification sets out the requirements for polymer modified binders (including blended crumb rubber binders) for use in asphalt and sprayed bituminous surfacings.

### **2 STRUCTURE OF THE SPECIFICATION**

This Specification includes a series of annexures that detail additional requirements.

#### **2.1 (NOT USED)**

#### **2.2 SCHEDULE OF IDENTIFIED RECORDS**

The records listed in Annexure 3252/C are **Identified Records** for the purpose of Specification TfNSW D&C Q6 Annexure Q/E.

#### **2.3 FREQUENCY OF SAMPLING AND TESTING**

Frequency of sampling and testing must be in accordance with Clause 8.3 and Annexure 3252/L.

#### **2.4 REFERENCED DOCUMENTS**

Standards, specifications and test methods are referred to in abbreviated form (e.g. AS 1234). For convenience, the full titles are given in Annexure 3252/M.

### **3 DEFINITIONS**

The term “you” means either “the Contractor” or “the Supplier”.

“The Contractor” refers to the Contractor carrying out the asphaltting or sprayed sealing. “The Supplier” means the manufacturer of binder.

### **4 QUALITY MANAGEMENT SYSTEM**

Obtain materials only from suppliers who have implemented a Quality Management System conforming to AS/NZS ISO 9001 as a means of ensuring that the materials supplied conform to the requirements of this Specification.

## **5 MATERIAL REQUIREMENTS**

### **5.1 POLYMER MODIFIED BINDER PROPERTIES**

Polymer modified binder must comply with the requirements for its class as specified in Tables 3252.1, 3252.2 or 3252.3, as appropriate.

Crumb rubber used for the manufacture of modified binders, such as S45R, must comply with Specification TfNSW D&C 3256.

### **5.2 SEGREGATION AND EASE OF REMIXING REQUIREMENTS**

Where the binder fails to meet the “Segregation” requirement, carry out a “Ease of remixing” test. If the binder meets the “Ease of remixing” requirement, the following applies:

#### **(a) For sprayed sealing applications**

The binder may be used without any further conditions.

#### **(b) For asphalt applications**

The binder may be used provided that it can be demonstrated that the technique employed to agitate the binder at the asphalt plant effectively remixes the segregated binder.

Prior to the use of the binder for asphalt applications, verify that the binder meets requirements for the following tests:

- (i) Torsional recovery;
- (ii) Viscosity at 165°C;
- (iii) Softening point.

### **5.3 NOMINATED BINDER INFORMATION AND FORMULATION VERIFICATION**

#### **5.3.1 Nominated Binder Information**

Prior to supply of any nominated polymer modified binder, for each class of binder, submit the following information to the Principal:

- (a) unique identification for each formulation;
- (b) identification of the blending plant.

Include verification that the binder complies with the requirements of this Specification, and report the results (including test results) on NATA endorsed documents.

#### **5.3.2 Formulation Verification**

Undertake the formulation verification every 24 months and/or immediately upon any change of the constituent materials, the manufacturing process or the formulation, and report to the Principal within 14 days of the verification.

#### **5.3.3 Copy to Pavement Unit**

Submit also a copy of the reports specified under Clauses 5.3.1 and 5.3.2 directly to TfNSW Pavements Unit by email to: [pavements@rms.nsw.gov.au](mailto:pavements@rms.nsw.gov.au).



**Table 3252.1 - Properties of Polymer Modified Binders for Sprayed Sealing Applications**

Binder Property	Test Method	Class				
		S15E	S20E	S35E	S45R <sup>(4)</sup>	
Viscosity at 165°C <sup>(1)</sup>	Pa.s	AG:PT/T111	0.55 max	0.55 max	0.55 max	4.5 max
Torsional recovery at 25°C, 30 s	%	AG:PT/T122	32 – 62	45 – 74	16 – 32	25 – 55
Softening point	°C	AG:PT/T131	55 – 75	62 – 88	48 – 56	55 – 65
Rubber content	% by mass	TfNSW T737	–	–	–	10 min
Consistency at 60°C <sup>(2)</sup>	Pa.s	AG:PT/T121	Report	Report	Report	Report
Consistency 6% at 60°C <sup>(2, 3)</sup>	Pa.s	AG:PT/T121	400 min	500 min	250 min	800 min
Elastic recovery at 60°C, 100 s <sup>(2)</sup>	%	AG:PT/T121	–	–	–	25 min
Stiffness at 15°C	kPa	AG:PT/T121	140 max	140 max	180 max	180 max
Compression limit at 70°C	mm	AG:PT/T132	–	–	–	0.2 min
Segregation <sup>(5)</sup>	%	AG:PT/T108	8 max	8 max	8 max	8 max
Flash Point	°C	AG:PT/T112	250 min	250 min	250 min	250 min
Loss of mass on heating	%	AG:PT/T103	0.6 max	0.6 max	0.6 max	0.6 max
Ease of remixing <sup>(5)</sup>	%	AG:PT/T109	2 max	2 max	2 max	2 max

**Legend:** min = minimum; max = maximum; Report = no conformity criteria exist, but test results must be reported

**Notes:**

- (1) Use a Brookfield series L, or mechanical equivalent. For all classes except for R class, the spindle must be SC4-31. For R class, use the spindle SC4-29. In every case, report the viscosity at the maximum rotation speed achievable and also this speed.
- (2) For "Consistency at 60°C", "Consistency 6% at 60°C" and "Elastic recovery at 60°C",  
 - use mould B (breakpoint of 5 mm and test speed of 1.5 mm/s) for class S35E;  
 - use mould A (breakpoint of 10 mm and a test speed of 1 mm/s) for other classes.
- (3) "Consistency 6% at 60°C" is derived from elastometer data (i.e. tested under the same conditions as consistency testing, refer to Note<sup>(2)</sup> above).
- (4) Manufacturer to provide user with cutting procedure for their product when used over a range of different pavement temperatures.
- (5) Apply the "Ease of remixing" requirement when a binder fails the "Segregation" requirement. Refer to Clause 5.2 (a) for further details.

**Table 3252.2 - Properties of Polymer Modified Binders for Asphalt Applications**

Binder Property	Test Method	Class					
		A5E <sup>(3)</sup>	A15E	A20E	A35P	A50C <sup>(3)</sup>	
Viscosity at 165°C <sup>(1)</sup>	Pa.s	AG:PT/T111	0.75 max	0.9 max	0.6 max	0.6 max	0.3 max
Torsional recovery at 25°C, 30 s	%	AG:PT/T122	25 – 38	55 – 80	38 – 70	6 – 21	17 – 35
Softening point	°C	AG:PT/T131	88 – 110	82 – 105	65 – 95	62 – 74	52 – 57
Consistency 6% at 60°C <sup>(2)</sup>	Pa.s	AG:PT/T121	2500 min	900 min	500 min	1200 min	250 min
Stiffness at 25°C	kPa	AG:PT/T121	120 min	30 max	35 max	120 max	100 max
Segregation <sup>(4)</sup>	%	AG:PT/T108	8 max	8 max	8 max	8 max	8 max
Flash Point	°C	AG:PT/T112	250 min	250 min	250 min	250 min	250 min
Loss on heating	%	AG:PT/T103	0.6 max	0.6 max	0.6 max	0.6 max	0.6 max
Colour of blond binder	%	TfNSW T743	–	–	–	–	3 max
Ease of remixing <sup>(4)</sup>	%	AG:PT/T109	2 max	2 max	2 max	2 max	2 max

**Legend:** min = minimum; max = maximum; Report = no conformity criteria exist, but test results must be reported

**Notes:**

- (1) Use a Brookfield or mechanical equivalent series L. For all classes, the spindle must be SC4-31.
- (2) "Consistency 6% at 60°C" is derived from elastometer data and must be tested using Mould A (breakpoint of 10 mm and a test speed of 1 mm/s).
- (3) Properties are experimental and to be considered as trial values for such period until manufacturing capabilities are proven.
- (4) Apply the "Ease of remixing" requirement when a binder fails the "Segregation" requirement. Refer to Clause 5.2 (b) for further details.

**Table 3252.3 - Properties of Field Blended Crumb Rubber Binders**

Binder Property	Test Method	Class	
		S15RF <sup>(1)</sup>	S20RF <sup>(1)</sup>
Nominal rubber concentration %		15	20
Rubber content % by mass	TfNSW T737	13 min	16 min
Torsional recovery %	AG:PT/T122	25 min	30 min
Softening Point °C	AG:PT/T131	55 min	62 min
Consistency at 60°C Pa.s	AG:PT/T121	Report	Report

**Legend:** min = minimum; max = maximum; Report = no conformity criteria exist, but test results must be reported

**Notes:**

<sup>(1)</sup> See also Clause 6.3.

## **6 PRODUCTION**

### **6.1 PROCESS CONTROL**

#### **6.1.1 Process Control System**

The Supplier must implement a documented process control system to produce polymer modified binder of a consistent quality conforming to the requirements of this Specification.

As a minimum, the process controls must include a method for determining and controlling the formulation during the production process, keeping records of the composition of the constituent materials for each batch and recording sampling frequencies and test results.

#### **6.1.2 Other Tests**

The Supplier may nominate other tests or different values from those specified in Tables 3252.1, 3252.2 or 3252.3 in its Quality Management System, which, if agreed to by the Principal, will form the basis for the production quality testing.

The Supplier must state in its Quality Management System the production control limits or target value of these tests.

#### **6.1.3 Nonconforming Test Results**

Where a production control test result does not comply with the nominated production control limits, the batch represented by the test may still be accepted if you can verify that it meets all the specified material property requirements under this Specification.

### **6.2 SAMPLING AND TESTING FOR BATCH RELEASE AND PRODUCT CERTIFICATION**

#### **6.2.1 General**

The Supplier must nominate in its Quality Management System the tests to be carried out for batch release of factory blended binders only.

Carry out sampling and testing for the nominated tests prior to each batch release from the Supplier. Results for nominated tests must conform to the requirements of Tables 3252.1 or 3252.2.

#### **6.2.2 Batch Release**

Prior to delivery, the Supplier must submit test results for the nominated tests demonstrating conformity of the polymer modified binder with the requirements for its class as specified in Tables 3252.1, 3252.2 or 3252.3.

Report test results on NATA endorsed test documents.

#### **6.2.3 Product Certification**

Every 3 months or whenever a change in constituent materials, source of production or formulation is made, the Supplier must provide a NATA endorsed certificate of conformity verifying that the polymer modified binder produced complies with all of the properties for its class as specified in Tables 3252.1, 3252.2 or 3252.3.

The certificate will relate only to the constituent materials, the source of production and the formulation of the product type on which the tests were made.

### **6.3 FIELD BLENDED CRUMB RUBBER BINDERS**

Unmodified bitumen may be used to produce modified (blended crumb rubber) binders, subject to compliance (including frequency of sampling and testing) with Clauses 5.1, 6.2.2 and 6.2.3.

## **7 DELIVERY**

### **7.1 CONTAINERS**

#### **7.1.1 General**

Use only delivery containers which are in good condition and do not contain contaminants which would cause the binder at the point of delivery to be non-complying with any of the requirements for its class as specified in Tables 3252.1, 3252.2 or 3252.3.

#### **7.1.2 Records of Deliveries**

The Supplier must, as part of its Quality Management System, maintain records of the deliveries made. These records include but are not limited to delivery dockets showing the history of the individual container's use over the last 5 deliveries, including the type of product that was transported in the container.

### **7.2 HANDLING TEMPERATURE**

Transport the polymer modified binder by road tanker or sprayer at a temperature within the manufacturer's recommended temperature range.

## **8 SAMPLING AND TESTING AT POINT OF DELIVERY**

### **8.1 FREQUENCY OF SAMPLING AND TESTING**

#### **8.1.1 Frequency of Sampling**

Carry out sampling of the binder at the point of delivery, at the frequencies stated in Annexure 3252/L.

Samples not used for testing must be retained for a minimum of 12 months after.

#### **8.1.2 Frequency of Testing**

Carry out testing of the binder samples taken under Clause 8.1.1, at the frequencies stated in Annexure 3252/L.

You may propose in writing to the Principal that a reduced minimum frequency of testing be accepted in accordance with TfNSW D&C Q6. Support your proposal with a statistical analysis verifying consistent process capability and product characteristics.

In the event of a nonconformity, a reduced frequency of testing must revert immediately to the specified minimum frequency of testing. You can request a reduction in the minimum frequency of testing when you can demonstrate again by statistical analysis that you have gained a consistent process capability and product characteristics.

## **8.2 METHOD OF SAMPLING AND TESTING**

### **8.2.1 Sampling Personnel**

Sampling must be conducted by a nominee considered to be competent for that sampling procedure, supported by documented training records of your nominee.

### **8.2.2 Test Methods**

Take samples of the polymer modified binder for testing in accordance with Test Method AG:PT/T101.

Handle and prepare the sample for testing in accordance with Test Method AG:PT/T102.

Test the samples in accordance with the Test Methods stated in Tables 3252.1, 3252.2 or 3252.3.

## **8.3 SUBMISSION OF TEST RESULTS**

### **8.3.1 General**

Within 14 days after delivery, submit test results of samples taken at the point of delivery demonstrating conformity of the polymer modified binder with the requirements for its class as specified in Tables 3252.1, 3252.2 or 3252.3.

Report test results on NATA endorsed test documents.

### **8.3.2 Report of Nonconformities**

In the event of nonconformities occurring, submit a report of the nonconformities directly to TfNSW Pavements Unit within 14 days of the testing date. The report may be forwarded by email to [pavements@rms.nsw.gov.au](mailto:pavements@rms.nsw.gov.au).

## **8.4 THE PRINCIPAL REQUESTED SAMPLING**

When the Principal makes a request for additional samples to be taken at the point of delivery, take three samples. Retain two of the samples and deliver the third sample to a location nominated by the Principal.

Test one of the two samples retained by you to verify conformity of the batch delivered with Clause 6.2. Keep the other sample as a reference sample. The Principal may test the third sample to verify conformity with this Specification.

If the results of the samples tested by you or the Principal do not meet the acceptance criteria, the polymer modified binder represented by the sample is deemed to be nonconforming.

If the results of the samples tested by you or the Principal do not meet the acceptance criteria, you may request the Principal to test the third sample in your presence to verify conformity.

**ANNEXURES 3252/A TO 3252/B – (NOT USED)****ANNEXURE 3252/C – SCHEDULE OF IDENTIFIED RECORDS**

The records listed below are Identified Records for the purposes of TfNSW D&C Q6 Annexure Q/E.

Clause	Description of Identified Record
5.3	Preliminary submission of polymer modified binder details, including verification of conformity, prior to supply of any binder.
6.2.2	Test results of Supplier nominated tests demonstrating conformity of binder, for batch release.
6.2.3	Certificate of conformity, together with test results of all specified tests, demonstrating conformity of binder.
8.3	Test results of samples taken at point of delivery.

**ANNEXURES 3252/D TO 3252/K – (NOT USED)****ANNEXURE 3252/L – MINIMUM FREQUENCY OF TESTING**

Minimum frequency of testing must be in accordance with Table 3252/L.1.

**Table 3252/L.1 Minimum Frequency of Sampling and Testing**

Property	Sampling Frequency	Testing Frequency
<b>For polymer modified binders used in sprayed sealing applications</b>		
Viscosity at 165°C <sup>(1)</sup> Pa.s	One sample per shift whenever there is at least one delivery during the period <sup>(2)</sup>	1 per 200,000 litres (or part thereof)
Torsional recovery at 25°C, 30 s %		
Softening point °C		
<b>For polymer modified binders used in asphalt applications</b>		
Viscosity at 165°C Pa.s	One sample per 24 hours whenever there is at least one delivery during the period	The greater of: 1 per 500,000 litres (or part thereof); or 1 per 3 months
Torsional recovery at 25°C, 30 s %		
Softening point °C		

**Notes**

<sup>(1)</sup> This property does not apply to field blended crumb rubber.

<sup>(2)</sup> A "shift" is a period of continuous work not exceeding 12 hours.

## **ANNEXURE 3252/M – REFERENCED DOCUMENTS**

Refer to Clause 2.4.

### **TfNSW Specifications**

TfNSW D&C Q6	Quality Management System (Type 6)
TfNSW D&C 3256	Crumb Rubber

### **TfNSW Test Methods**

TfNSW T737	Recovery and Determination of Rubber Content of Scrap Rubber Mixes
TfNSW T743	Colour of Blond Binders for Asphalt

### **Australian Standards**

AS/NZS ISO 9001	Quality management systems – Requirements
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### **Austrroads Test Methods**

AG:PT/T101	Method of sampling polymer modified binders, polymers and crumb rubber
AG:PT/T102	Protocol for handling polymer modified binders in the laboratory
AG:PT/T103	Pre-treatment and loss on heating of bitumen, multigrade binders and polymer modified binders by roller modified rolling thin film oven (MRTFO) test
AG:PT/T108	Segregation of polymer modified binders
AG:PT/T109	Ease of remixing of polymer modified binders
AG:PT/T111	Handling viscosity of polymer modified binders (Brookfield Thermosel)
AG:PT/T112	Flash point of polymer modified binders
AG:PT/T121	Consistency, stiffness, elastic recovery and tensile modulus of polymer modified binders (ARRB Elastometer)
AG:PT/T122	Torsional recovery of polymer modified binders
AG:PT/T131	Softening point of polymer modified binders
AG:PT/T132	Compressive limit of polymer modified binders