PART R25 SUPPLY OF BITUMINOUS MATERIALS

CONTENTS

1. GENERAL

This Part specifies the requirements for the supply and delivery of bitumen, primers, primer binders, polymer modified binders, emulsions, multi-grades and crumb rubber.

Documents referenced in this Part are listed below:

AS 1160	Bituminous Emulsions for the Construction and Maintenance of Pavements
AS 1289	Methods of Testing Soils for Engineering Purposes
AS 2008	Residual Bitumen for Pavements
AS 2341	Methods of Testing Bitumen and Related Road Making Products
AS 3530	Solvents – Mineral Turpentine and White Spirit
AS 3568	Oils for Reducing the Viscosity of Residual Bitumen for Pavements
AP-T41/06	Specification Framework for Polymer Modified Binder & Multigrade Bitumens

2. RESIDUAL BITUMEN

Residual bitumen must comply with AS 2008 with the following additional requirements for Class 170 & Class 320 bitumen:

TABLE 2.1 ADDITIONAL REQUIREMENTS FOR CLASS 170 BITUMEN

TEST	SPECIFIED PROPERTIES		TEST PROCEDURE
	min.	max.	
Durability, (days)	9	-	AS 2341.13 and AS 2341.5
Density at 15°C, (kg/L)	1.0	-	AS 2341.7

TABLE 2.2 ADDITIONAL REQUIREMENTS FOR CLASS 320 BITUMEN

TEST	SPECIFIED PROPERTIES		TEST PROCEDURE
	min.	max.	
Durability, (days)	*TBR	-	AS 2341.13 and AS 2341.5
Density at 15°C, (kg/L)	0.99	-	AS 2341.7
n-Heptane insolubles, (%)	TBR	-	ASTM D3279
Penetration at 35°C, 100g, 5s (pu)	-	TBR	AS 2341.12

*TBR - To Be Recorded

3. POLYMER MODIFIED BINDERS (PMBs)

Austroads Technical Report AP-T41/06 “Specification Framework for Polymer Modified Binders and Multigrade Bitumens” must apply, except that Table 5.1 “Properties of PMB’s for Sprayed Sealing Applications” and Table 5.2 “Properties of PMB’s for Asphalt Applications” be deleted, and replaced with Part R25 table 3.1 and 3.2.

PMB must be suitable for the purpose of retaining the screenings in the seal by initial wetting and subsequent bonding. The base binder used in the manufacture of PMB’s must conform to the requirements of clause 2 ‘Residual Bitumen’.

The product must be prepared in a manufacturing plant or blending plant of proven performance and must comply with the "Code of Practice: Manufacture, Storage and Handling of Polymer Modified Binders, First Edition", Australian Asphalt Pavement Association, June 2004.

TABLE 3.1 POLYMER Modified Binders for Sprayed Sealing								
Test Procedure	**Minimum Testing Frequency (1)**	**Class** / **Binder Property**	**S10E**	**S15E**	**S20E**	**S25E**	**S35E**	**S45R**
PERFORMANCE RELATED PROPERTIES								
AGPT/T121	Refer to Table 10.2 & 10.3	Consistency at 60°C (Pa.s)(3) min	250	700	700	6000	300	1000
AGPT/T121	Refer to Table 10.2 & 10.3	Underlying viscosity at 60°C (Pa.s)(4)	TBR(6)	TBR	TBR	TBR	TBR	TBR
AGPT/T121	Refer to Table 10.2 & 10.3	Stiffness at 15°C (kPa) (6) max	140	140	130	95	180	180
AGPT/T142(12)	Refer to Table 10.2 & 10.3	Rubber Content by Analysis, (%)	NA (7)	NA	NA	NA	NA	TBR
AGPT/T132	Refer to Table 10.2 & 10.3	Compression limit at 70°C, 2 kg (mm) min	NA	NA	NA	NA	NA	0.2
AGPT/T108	Refer to Table 10.2 & 10.3	Segregation Value (%) max	8	8	8	8	8	8
INDEX PROPERTIES								
AGPT/T121	Refer to Table 10.2 & 10.3	Elastic recovery at 60°c, 100s (%) (3) min	NA	NA	NA	85	NA	25
HANDLING PROPERTIES								
AGPT/T111	Each batch	Viscosity at 165°C (Pa.s) (5) max	0.55	0.55	0.55	0.8	0.55	4.5 (5)
AGPT/T112	Annually	Flash point (°C) min	250	250	250	250	250	250
AGPT/T103	Annually	Loss on heating (%mass) max	0.6	0.6	0.6	0.6	0.6	0.6
PRODUCTION CONTROL PROPERTIES								
AGPT/T122	Each batch (9)	Torsional recovery at 25°C, 30s (%)	22 - 50	32 - 62	45 - 74	54 - 85	16 - 32	25 – 55
AGPT/T131	Each batch (9)	Softening point (°C)	48 - 64	55 - 75	62 - 88	82 - 100	48 - 56	55 - 65
Other	Each batch	As proposed by supplier	TBR	TBR	TBR	TBR	TBR	TBR

Notes:

(a) Not used.
(b) Not used.
(c) For Consistency and elastic recovery, Mould B must be used for S10E and S35E (breakpoint of 5 mm and a test speed of 1.5 mm/s). Other grades must be tested using Mould A (breakpoint of 10 mm and a test speed of 1 mm/s)
(d) Underlying viscosity is derived from the Elastometer data (i.e. tested under the same conditions as Consistency testing, refer to Note 3 above).
(e) The shear rate involved in determining viscosity by AGPT/T111 must be calculated and recorded. L series Brookfield is recommended together with spindle SC4-31, except in the case of S45R where spindle SC4-29 is recommended.
(f) 'TBR' throughout = to be reported.
(g) 'NA' throughout indicates that the property is considered not applicable for that PMB class.
(h) To assist users in determining the quantity of added cutter oil required for spraying, the manufacturer must report on the concentration and type of process oil used in the formulation.
(i) Not used.
(j) Applicable only to products failing to meet the requirements for segregation value.
(k) Properties for S15E are experimental, and are to be regarded as trial values for such period until manufacturing capabilities are proven.
(l) Alternatively a soxhlet with toluene may be used.

TABLE 3.2 POLYMER Modified Binders for Asphalt									
Test Procedure	**Minimum Testing Frequency (1)**	**Class** / **Binder Property**		**A5E**	**A10E**	**A15E**	**A20E**	**A30P**	**A35P (5)**
PERFORMANCE RELATED PROPERTIES									
AGPT/T121	3-monthly	Consistency at 60°C (Pa.s)	min	6000	6000	5000	600	1500	2000
AGPT/T121	3 monthly	Consistency 6% at 60°C (Pa.s)(2)	min	TBR	TBR	900	500	TBA	1200
AGPT/T121	3-monthly	Stiffness at 25°C (kPa)(2)	max	80 min	30	30	35	100	120
AGPT/T108	3-monthly	Segregation value (%)	max	8	8	8	8	8	8
HANDLING PROPERTIES									
AGPT/T111	Each batch	Viscosity at 165°C (Pa.s) (3)	max	0.8	1.1	0.9	0.6	0.7	0.6
AGPT/T112	Annually	Flash point (°C)	min	250	250	250	250	250	250
AGPT/T103	Annually	Loss on heating (% mass)	max	0.6	0.6	0.6	0.6	0.6	0.6
PRODUCTION CONTROL PROPERTIES									
AGPT/T122	Each batch	Torsional recovery at 25°C, 30s (%)	min	25 - 40	60 – 86	55 – 80	38 - 70	12 - 30	6 - 21
AGPT/T131	Each batch	Softening point (°C)	min	90	88 – 110	82 - 105	65 - 95	70 - 80	70 - 80
Other	Each batch	As proposed by supplier		TBR	TBR	TBR	TBR	TBR	TBR

Notes:

(a) Testing frequencies provided are suggested minima. Different testing frequencies may be agreed between the purchaser and the supplier.

(b) Consistency 6% at 60°C is derived from the Elastometer data (i.e. tested under the same conditions as Consistency testing). It must be tested using Mould A (breakpoint of 10 mm and a test speed of 1 mm/s).

(c) The shear rate involved in determining viscosity by AGPT/T111 must be calculated and recorded.

(d) "TBR' throughout = to be reported.

(e) Where A35P is produced through the addition of polymer as part of the asphalt produced process evidence must be provided that the resultant binder can meet these values

4. PRIMERS AND PRIMER BINDERS

The properties of cutback primes and primer binders must be in accordance with AS 2157 Cutback Bitumen
Where the use of field blended primers has been approved, the properties must be consistent with the properties of laboratory prepared samples using components complying with Clause 2 "Residual Bitumen" and Clause 8 "Bituminous Flux and Cutter".

Where emulsion primers are to be used the following information must be submitted by the contractor at least 14 days prior to application:

(a) Indicative application rates

(b) Material safety data sheets

(c) Minimum curing periods

(d) Handling procedures including circulation requirements, maximum and minimum spraying temperatures, minimum pavement temperatures

(e) Quality control limits including bitumen, cutter and water contents, maximum and minimum viscosity.

0.5 parts of an approved bitumen adhesion additive must be added to all primer binders.

5. EMULSIONS

Emulsions must comply with AS 1160.

6. MULTIGRADE BITUMENS

Multigrade Bitumens must comply with Austroads Technical Report AGPT/T190 “Specification Framework for Polymer Modified Binders and Multigrade Bitumens”.

7. CRUMB RUBBER BINDERS (CRB’S)

7.1. General

Crumb rubber binders must be blended on site in such a way to provide a homogenous product of consistent quality that can be sprayed to provide a uniform application of binder across the pavement. The contractor’s quality plan must include procedures related to mixing and storage processes together with minimum digestion times.

Field produced Crumb Rubber Binders must comply with the properties set out in Table 5.4 of AP-T41/06 “Specification Framework for Polymer Modified Binders and Multigrade Bitumens”. The Contractor must prepare and test samples of the crumb rubber binder using the proposed plant, constituent materials and digestion times. The samples may be sourced from work undertaken in the 3 months prior to the contract commencing or from the first batch of full scale production for this contract. Samples must be free of diluents or other contamination. Results must be supplied within 5 days of the contract commencing. Submission of test results shall constitute a HOLD POINT.

Manufacturing, blending and storage details for each batch of binder must be supplied by the contractor including:

(a) Traceability details of input materials

(b) Quantities of input materials added reported by weight/volume and parts.

(c) Digestion times and temperatures

(d) Storage times and temperatures

The Superintendent must be notified where the source of input material changes from that submitted at the commencement of the contract. Test results as required by Clause.10.3 must be supplied by the Contractor at to confirm the resultant Crumb Rubber Binder meets specification.

7.2. Materials

Base bitumen used in the manufacture of crumb rubber binder must consist of C170 complying with AS 2008.

Granular crumb rubber must comply with the following requirements:

(a) Must fall within the grading specified in Table 7.2

(b) Have a maximum bulk density of 350 kg/m3

(c) Particles less than 3 mm in length

(d) Not exceed a moisture content of one percent

(e) Be free of cord, wire fluff and other deleterious material

(f) Be free of lumps and capable of being poured freely.

TABLE 7.2				
Sieve Size AS (mm)	2.36	1.18	0.6	0.15
% Passing	100	100	70 - 100	0 - 5

8. BITUMINOUS FLUX AND CUTTER

8.1. General

Any Flux and cutter for use in the preparation of bituminous binder must be prepared by the refining of crude oil.

8.2. Flux (Distillate or Industrial Diesel Fuel)

Flux must comply with AS 3568.

8.3. Cutter

(a) Low flash point (Jet A-1 Fuel or Kerosene) must comply with AS 3568 with the exception that the minimum flash point must be 40°C.

(b) High flash point must comply with the requirements listed in Table 8.3.

TABLE 8.3 TABLE OF REQUIREMENTS - HIGH FLASH POINT CUTTER			
PROPERTY	REQUIREMENTS		TEST PROCEDURE
	MIN.	MAX.	
Density 15°C (kg/L)	0.78	0.84	AS 2341.6
Flash point (°C)	61.5	-	AS 2106
Viscosity 40°C (mm2/s)	1.2	2.2	ASTM D445
Aromatics (%)	15	-	ASTM D1319
Distillation I.B.P. (°C)	150		ASTM D86
% of original volume recovered at:			
200°C	-	80	
250°C	80	-	
F.B.P. (°C)	-	280	
Water content by volume (%)	-	0.1	AS 2341.9
Cleanliness and fluidity	to comply		AS 3568, Clause 4.2
Miscibility with Class 170 bitumen	Complete with no precipitation		AS 3568, Clause 4.3

9. TEST PROCEDURES

The Contractor must use the following test procedures (refer http://www.dpti.sa.gov.au/contractor_documents) to verify conformance with the Specification:

TEST	TEST PROCEDURE
Moisture Content: Oven Drying Method Microwave Method	AS 1289.2.1.1 AS 1289.2.1.4
Determination of Viscosity By Haake Viscobalance	TP 652
Determination of Softening Point	AS 2341.18
Calculation of Parts Cutter in Bituminous Binder	TP 667
Preparation of a Bituminous Binder Cutting Chart	TP 668
Determination of Segregation of Bituminous Binder	TP 678
Pre-treatment & Loss on Heating of Bitumen, Multigrade & Polymer Modified Binder (RTFO)	AGPR/T103
Handling Viscosity of Polymer Modified Binders (Brookfield Thermosel)	AGPT/T111
Elastic Recovery, Consistency and Stiffness of Polymer Modified Binders (ARRB Elastomer)	AGPT/T121
Torsional Recovery of Polymer Modified Binders	AGPT/T122
Toughness of Polymer Modified Binders (ARRB Extensiometer)	AGPT/T124
Softening Point of Polymer Modified Binders	AGPT/T131
Determination of Aggregate Stripping Value - One Day Plate Stripping Test	TP 705
Determination of Total Amine Value of Adhesion Agent and Percentage of Adhesion Agent in Precoat	TP 780
Recovery and determination of Rubber Content of Scrap Rubber Mixes	AGPT/T142
Bulk Density of Scrap Rubber	AGPT/T144
Sieve Analysis of Scrap Rubber	RTA T730

10. SAMPLING AND TESTING

10.1. General

The Contractor must conduct sampling and testing of products for control and verification purposes at the frequency shown in Table 10.2 during manufacture, and Table 10.3 at the point of delivery (for spray seals only).

For the point of delivery samples the Contractor must provide 3 hours notification of sampling. All samples must be clearly marked and traceable to the relevant Lot in accordance with Part G20 "Quality System Requirements". The sample size must not be less than ¾ litre in a 1 litre sample tin.

For contracts which include asphalt all binder samples must be delivered to the DPTI Materials Laboratory at 19 Bridge Road, Walkley Heights at a minimum of fortnightly intervals. The samples will be stored at the Principal's expense. The Contractor must provide documentation to confirm that the samples have been received at the DPTI Laboratory, and submit this as part of the Lot package.

10.2. Point of Manufacture (Spray Seals only)

The Contractor must undertake the following tests and supply results to demonstrate continual monitoring of product performance at point of manufacture. These test results may predate the award of this Contract. The time, date and sample temperature must also be recorded when the test samples are taken and the tests are conducted.

TABLE 10.2 PROCESS CONTROL TESTING REQUIREMENTS			
PRODUCT	**PROPERTIES**	**TEST FREQUENCY AT POINT OF MANUFACTURE**	**ACCEPTANCE LIMIT**
C170 Bitumen	As listed in AS 2008 & Table 2.1	3 months or after addition of bitumen into bulk storage	Clause R25.2
	Flashpoint, Durability	Annually	Clause R25.2
C320 Bitumen	As listed in AS 2008 & Table 2.2	3 months or after addition of bitumen into bulk storage	Clause R25.2
	Flashpoint, Durability	Annually	Clause R25.2
Cutback Binder	Viscosity at 60oC	Each production batch	Report value
Primers and Primer Binder	As listed in AS 2157	Each production batch	Clause R25.4
Multigrades	Viscosity at 60°C	Each Production batch	Clause R25.6
	Penetration at 25°C	Each Production batch	
	Viscosity at 135°C	Each Production batch	
	Viscosity at 60°C after RTFOT	Each Production batch	
	Penetration at 25°C after RTFOT 100g, 5s	Each Production batch	
	Matter Insoluble in Toluene	Each Production batch	
	Flashpoint & Loss on Heating	Annually	
Polymer Modified Binders* (refer Tables 3.1 & 3.2)	Performance Related & Index Properties	Monthly	Clause R25.3
	Flash Point & Loss on Heating	Annually	Clause R25.3
	Viscosity at 165°C	Each production batch	Clause R25.3
	Torsional Recovery at 25°C,	Each production batch	Clause R25.3
	Softening Point	Each production batch	Clause R25.3
Cutter	Viscosity at 40oC	Each production batch	Clause R25.9
Granular Crumb Rubber	Bulk Density	One per 100 tonne lot	Report value
	Grading	One per 100 tonne lot	Clause R25.7
Crumb Rubber Binder	Properties as per Table 10.3	Refer Table 10.3	Refer Table 10.3
Bitumen Emulsion	Sieve residue	Each production batch	Clause R25.5
	Residue from evaporation	Each production batch	Clause R25.5

* Preblended PMB's only

For Polymer Modified Binders the following additional sampling must be undertaken
One point of manufacture sample taken at the same time as the manufacturer's sample is to be provided to the principal. Contractor must also take one sample per transport bulker at the point of "load out" from the manufacturing yard to the bulker on request.

In accordance with the "Code of Practice: Manufacture, Storage and Handling of Polymer Modified Binders", AAPA June 2004, Clause 3.1, details including but not limited to the time, date and sample temperature must also be recorded when the test samples are taken.

10.3. Point of Delivery (Spray Seals only)

The Contractor must undertake the following tests and supply results to demonstrate continual monitoring of product performance at point of delivery. Unless indicated otherwise one sample for the Contractor and one sample for the Principal must be taken at the frequency shown in Table 10.3.

TABLE 10.3 DELIVERY, SAMPLING AND TESTING REQUIREMENTS

PRODUCT	PROPERTIES	SAMPLE FREQUENCY ON SITE	TESTING FREQUENCY	ACCEPTANCE LIMIT
*C170 & C320 Bitumen	As listed in Table 2.1	One Contractor sample per bulker	On request	Clause R25.2
Cutback Binder	Viscosity at 60oC	On request	On request	Report value
Primers and Primer Binder	As listed in Table 4.1	Sample per bulker	On request	Clause R25.4
*Polymer Modified Binders Plant Blended Crumb Rubber (refer Table 3.1)	Viscosity at 165°; Torsional Recovery at 25°C; and Softening Point	Sample from each bulker at the point of delivery. The samples must be taken at the time of discharge into the sprayer (for the first run) or at the time of discharge into the kettle/site storage	On request	Report value
*Field Blended Crumb Rubber Binder	Viscosity at 165° Consistency at 60°C	Sample from each batch	First batch of the contract then on request	Report value
	Torsional Recovery at 25°C; and Softening Point	Sample from each batch	First batch of the contract then on request	Clause R25.7
	Rubber Content	Sample from each batch	On request	Clause R25.7
*Multigrade	Viscosity at 60°C Penetration at 25°C Viscosity at 135°C Matter Insoluble in Toluene	Sample per bulker	On request	Clause R25.6
Cutter	Viscosity at 40oC	One per contract	One per contract	Clause R25.8
Bitumen Emulsion	As listed in AS 1160	Sample per bulker	On request	Clause R25.5
Adhesion Agent	Amine Value	One per contract	One per contract	Minimum 120

*Note: Samples must be taken prior to addition of adhesion agent/cutter.

All Principal samples must be delivered to the DPTI Materials Laboratory at 19 Bridge Road, Walkley Heights at a minimum of fortnightly intervals. The samples will be stored at the Principal's expense. The Contractor must provide documentation to confirm that the samples have been received at the DPTI Laboratory, and submit this as part of the Lot package.

Where immediate testing of samples is not required in accordance with Table 10.3, the Contractor must store the samples for not less than 12 months from the date of sampling.

11. HOLD POINTS

The following is a summary of Hold Points referenced in this Part:

CLAUSE REF.	HOLD POINT	RESPONSE TIME
7.1	Submission of test results for crumb rubber binder.	5 working days

12. VERIFICATION REQUIREMENTS AND RECORDS

12.1. General

The Contractor must supply written verification that the testing undertaken demonstrates compliance with the requirements of this Part and supply the verification with the lot package.

12.2. Binder Information to be Submitted Upon Delivery

At a minimum, the Contractor must provide the following information with each delivery on site of PMB and Multigrade binder:

(a) Contractor's batch number/identifier

(b) PMB Grade or Multigrade class

(c) Location of manufacturing plant

(d) Date and time of manufacture

(e) Date, time and temperature of dispatch into the bulker

(f) Delivery Details (delivery point, date, time and temperature)

(g) Product heating information (heating start time, finish time, total heating time and temperature).