

Main Roads Technical Standard

MRTS20

Cutback Bitumen

November 11

 **Queensland** Government

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November 11

Table of Contents

	Page
1 INTRODUCTION.....	1
2 DEFINITION OF TERMS	1
3 REFERENCED DOCUMENTS	1
4 STANDARD TEST METHODS	1
5 QUALITY SYSTEM REQUIREMENTS.....	2
5.1 Hold Points, Witness Points and Milestones	2
5.2 Conformance Requirements	2
6 MATERIAL	2
6.1 General	2
6.2 Bitumen and Cutter Oil.....	2
6.3 Foaming	2
6.4 Properties.....	2
6.5 Temperature of Supply	3
6.6 Manufacture at Site	3
7 MANUFACTURE.....	3
8 DELIVERY OF BITUMEN TO THE SITE	4
8.1 General	4
8.2 Handling.....	4
8.3 Storage and Transport.....	4
8.4 Heating.....	4
8.5 Transfer.....	5
8.6 Delivery Dockets	5
9 MATERIAL COMPLIANCE TESTING.....	5
9.1 General	5
9.2 Sampling	5
9.3 Sampling and Testing by the Manufacturer	5
10 NONCONFORMANCE	6

Cutback Bitumen

1 INTRODUCTION

This Technical Standard applies to the material requirements for medium curing cutback bitumen to be used in road construction, rehabilitation and maintenance.

This Technical Standard shall be read in conjunction with MRTS01 *Introduction to Technical Standards*, MRTS50 *Specific Quality System Requirements* and other Technical Standards as appropriate.

This Technical Standard forms part of the Main Roads Specifications and Technical Standards Manual.

2 DEFINITION OF TERMS

The terms used in this Technical Standard shall be as defined in Clause 2 of MRTS01 *Introduction to Technical Standards*. Additional terms used in this Technical Standard shall be as defined in Table 2.

Table 2 – Definition of Terms

Term	Definition
Cutback Bitumen	Bitumen, the viscosity of which has been reduced by the addition of a cutter oil.
Manufacturer	An organisation which has the necessary plant and equipment to manufacture cutback bitumen to this Standard. For supply only contracts, the Manufacturer shall be the Contractor.

3 REFERENCED DOCUMENTS

Table 3 lists documents referenced in this Technical Standard.

Table 3 – Referenced Documents

Reference	Title
AP-G41/08	Bituminous Materials Safety Guide – Austroads
AS 2157	Cutback bitumen
AS 2341.2	Methods of testing bitumen and related roadmaking products - Sample preparation
AS 2341.3	Methods of testing bitumen and related roadmaking products - Determination of kinematic viscosity by flow through a capillary tube
AS 2341.15	Methods of testing bitumen and roadmaking products - Distillation of cutback bitumen
AS 2341.16	Methods of testing bitumen and related roadmaking products - Determination of flashpoint of cutback bitumen
AS 2475	Threaded hose connection fittings for bituminous materials
AS 2809.5	Road tank vehicles for dangerous goods
AS/NZS ISO 9001	Quality management systems – Requirements
MRTS17	Bitumen
MRTS19	Cutter and Flux Oils

4 STANDARD TEST METHODS

The standard test methods listed in Table 4 shall be used in this Standard.

Further reference to test numbers and test descriptions is provided in Clause 4 of MRTS01 *Introduction to Technical Standards*.

Table 4 – Standard Test Methods

Property to be Tested	Method No.
Distillation Range	Q373 or AS 2341.15
Dynamic Viscosity (Vacuum Capillary Viscometer)	Q330 or AS 2341.2
Flash Point (Closed Cup) (Modified Abel Apparatus)	Q371 or AS 2341.16
Kinematic Viscosity	Q336 or AS 2341.3

5 QUALITY SYSTEM REQUIREMENTS

5.1 Hold Points, Witness Points and Milestones

General requirements for Hold Points, Witness Points and Milestones are specified in Clause 5.2 of MRTS01 *Introduction to Technical Standards*.

The Hold Point applicable to this Standard is summarised in Table 5.1.

Table 5.1 – Hold Points

Clause	Hold Point
6.6	1. Approval to manufacture at the Site

5.2 Conformance Requirements

Materials supplied to this Standard shall be sampled and tested in accordance with Clause 9.

The conformance requirements which apply to this Standard are summarised in Clause 6.

6 MATERIAL

6.1 General

The classes of cutback bitumen covered by this Standard are AMC00, AMC0, AMC1, AMC2, AMC3, AMC4, AMC5, AMC6 and AMC7.

6.2 Bitumen and Cutter Oil

Bitumen shall comply with the requirements of MRTS17 *Bitumen* and cutter oil shall comply with the requirements of MRTS19 *Cutter and Flux Oils*.

6.3 Foaming

Cutback bitumen shall not foam when submitted to the distillation test.

6.4 Properties

Cutback bitumen shall comply with the property requirements of Table 6.4.

Table 6.4 – Properties of Cutback Bitumen

Property	Test Method	Cutback Bitumen Class								
		AMC00	AMC0	AMC1	AMC2	AMC3	AMC4	AMC5	AMC6	AMC7
Residue from distillation to 360°C (% by volume)	Q373 or AS 2341.15	40 min	50 min	58 min	66 min	73 min	79 min	88 min	92 min	96 min

Property	Test Method	Cutback Bitumen Class								
		AMC00	AMC0	AMC1	AMC2	AMC3	AMC4	AMC5	AMC6	AMC7
Viscosity at 60°C (Pa.s)	Q330 or AS 2341.2/ Q336 or AS 2341.3	0.008 to 0.016	0.025 to 0.05	0.06 to 0.12	0.22 to 0.44	0.55 to 1.1	2.0 to 4.0	5.5 to 11.0	13.0 to 26.0	43.0 to 86.0
Flash Point (°C)	Q371 or AS 2341.16	38 min	38 min	38 min	38 min	38 min	38 min	50 min	50 min	50 min
Application temperature (°C)	–	10 to 30	35 to 55	60 to 80	75 to 100	95 to 115	110 to 135	120 to 135	135 to 160	150 to 175

6.5 Temperature of Supply

The temperature of cutback bitumen at the time of supply to the Works shall be such as to minimise heating at the Works to enable the application of cutback bitumen within the temperature range given in Table 6.4 for the relevant class. However, when the cutback bitumen manufactured by an approved Manufacturer is delivered to the Site above the maximum temperature indicated in Table 6.4, spraying is permitted within the temperature range of the minimum given in Table 6.4 and the delivered temperature provided no further heating occurs.

6.6 Manufacture at Site

Cutback bitumen may be manufactured to a specification based on the number of parts by volume of cutter oil to 100 parts by volume of bitumen, subject to the approval of the Administration. **Hold Point 1**

Table 6.6 provides a guide to the categorisation of cutback bitumen into classes in relation to the parts by volume of cutter oil to class 170 bitumen (at 15°C).

Table 6.6 – Guide to Cutback Bitumen Classes

Class	Parts of Bitumen Cutter Oil to 100 parts of Class 170 Bitumen (at 15°C)
AMC00	127
AMC0	86
AMC1	61
AMC2	38
AMC3	28
AMC4	18
AMC5	12
AMC6	7
AMC7	3

7 MANUFACTURE

Cutback bitumen shall be manufactured only by an approved Manufacturer unless approved otherwise in accordance with Clause 6.6.

An approved Manufacturer shall –

- a) operate a quality system certified to AS/NZS ISO 9001;

- b) operate to an inspection and test plan acceptable to Transport and Main Roads for manufacturing and supplying cutback bitumen which demonstrates compliance with this Standard. The inspection and test plan shall include testing of cutback bitumen, analysis of results (including run charts) and a requirement for a copy of the results to be forwarded promptly to Transport and Main Roads; and
- c) ensure material supplied from depots can be traced to the production batch and associated test report.

8 DELIVERY OF BITUMEN TO THE SITE

8.1 General

Heating of cutback bitumen is potentially explosive, thus AMC00 and AMC0 shall generally not be heated. Other classes of cutback bitumen shall not be heated unless it can be established that the requirement could not reasonably have been anticipated. Heating, where necessary, shall be subject to compliance with approved heating procedures.

The operators of all heating and transfer equipment shall be classified as competent for these tasks in accordance with the relevant industry standards and any procedures or other requirements defined in the Contractor's Safety Plan or the Contract.

8.2 Handling

Where handling of cutback bitumen occurs, the procedures to be used shall be consistent with safe handling practices which apply to bitumen-based products as defined in the Austroads *Bituminous Materials Safety Guide*, AP-G41/08.

8.3 Storage and Transport

Cutback bitumen shall be stored and transported in purpose-built containers in such a way that contamination does not occur. Containers shall comply with the following Australian Standards and be fitted with apparatus for heating of the bitumen within appropriate limits –

- a) bitumen sprayers and tankers – AS 2809.5; and
- b) hose couplings – AS 2475.

If contamination is suspected, additional testing may need to be carried out to check for contamination.

If it is necessary to change the type or class of material in a container, the procedures within Section 9 of AP-G41/8 shall be used in such manner that the properties of the resultant stored product comply with the relevant standard and the performance of the stored product is not adversely affected.

8.4 Heating

Where heating is required for purposes of transfer of cutback bitumen between delivery vehicles and/or storage tanks, in no circumstances shall the temperature of the cutback bitumen be permitted to rise above the temperatures in Table 8.4. The rate of increase in temperature shall not be allowed to exceed 15°C per hour.

Table 8.4 – Maximum Heating Temperatures

Cutback Bitumen Class	Maximum Heating Temperature (°C)
AMC00	30
AMC0	55
AMC1	80
AMC2	100
AMC3	115
AMC4	135
AMC5	135
AMC6	160
AMC7	175

Before any heating has commenced, at least 250 mm of bitumen shall cover the heating tubes at all points. Where necessary, the lower heating tube may be used on its own in order to comply with this requirement.

8.5 Transfer

During transfer of cutback bitumen into and between storage and delivery vessels and into bitumen sprayers, the cutback bitumen shall not be contaminated by other materials. As necessary, storage and delivery vessels, sprayers and hoses shall be flushed and cleaned with appropriate solvents before transfer of cutback bitumen is commenced and all residues from flushing and cleaning solvent are removed.

8.6 Delivery Dockets

Delivery of cutback bitumen to the Site shall be accompanied by a delivery docket giving at least the following information –

- a) name of the Manufacturer;
- b) place of manufacture;
- c) location of depot source;
- d) class of cutback bitumen;
- e) production batch number; and
- f) certification that production has been sampled and tested as stated in Clause 9 and the properties comply with Clause 6.

Delivery dockets shall be made available for inspection by the Administrator and shall be included in the quality records.

9 MATERIAL COMPLIANCE TESTING

9.1 General

Compliance testing of cutback bitumen shall be undertaken on a lot basis. A lot shall consist of a homogeneous quantity of cutback bitumen of the same class manufactured in a particular batch.

The Manufacturer, whether approved or at the Site, shall be responsible for carrying out sufficient sampling and testing to ensure that the cutback bitumen complies with the property requirements of Clause 6.4.

9.2 Sampling

Samples of cutback bitumen for compliance testing shall be taken from the production plant or at Site in accordance with sampling procedures defined in AS 2157, Appendix B (Sampling).

Samples for compliance testing shall be randomly selected (random sampling).

9.3 Sampling and Testing by the Manufacturer

The minimum frequency of sampling and testing from production plant, depots or at the Site to be performed by the Manufacturer shall be as specified in Table 9.3.

In the event of any nonconformance being detected in any sample, additional tests shall be performed so that the sample is assessed in relation to other properties listed in Table 6.4, as appropriate.

Table 9.3 – Cutback Bitumen Testing Schedule

Properties to be Tested	Frequency of Testing	
	Production Plant	
	Every 10 th Batch	6 Monthly
Distillation Residue (%)		✓
Viscosity at 60°C (Pa.s)	✓	✓
Flash Point (°C)	✓	✓

10 NONCONFORMANCE

A major nonconformance means a departure from stated properties for foaming or flash point. All other nonconformances shall be classified as minor.

All cutback bitumen which is represented by samples from which a major nonconformance has been detected shall be rejected.

Cutback bitumen from which a minor nonconformance has been detected shall not be delivered to the Site unless it has been established that such nonconformance shall not materially affect the performance of the product. All relevant documentation used in this process shall be made available to the Administrator and shall be included in the quality records.