

Superseded

Technical Specification

**Transport and Main Roads Specifications
MRTS20 Cutback Bitumen**

November 2011

Superseded

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1 Introduction

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

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

This Technical Specification forms part of the Transport and Main Roads Specifications Manual.

2 Definition of terms

The terms used in this Technical Specification shall be as defined in Clause 2 of MRTS01 *Introduction to Technical Specifications*. Additional terms used in this Technical Specification 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 Specification.

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 Specification.

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

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 Specifications*.

The Hold Point applicable to this Specification 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 Specification shall be sampled and tested in accordance with Clause 9.

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

6 Material

6.1 General

The classes of cutback bitumen covered by this Specification 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 |
| 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.

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