

Superseded

Technical Specification

**Transport and Main Roads Specifications
MRTS19 Cutter and Flux Oils**

July 2017

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1 Introduction

This Technical Specification applies to the material requirements for cutter oil and flux oil 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 |
|--------------|---|
| Cutter Oil | A light petroleum distillate used to temporarily reduce the viscosity of bitumen. |
| Flux Oil | A petroleum distillate used to produce a long term reduction in the viscosity of bitumen. |
| Manufacturer | An organisation which has the necessary plant and equipment to manufacture cutter and/or flux oils 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 |
|---------------|---|
| AS 2341.3 | <i>Methods of testing bitumen and related roadmaking products – Determination of kinematic viscosity by flow through a capillary tube</i> |
| AS 2341.9 | <i>Methods of testing bitumen and related roadmaking products – Determination of water content (Dean and Stark)</i> |
| AS 3568 | <i>Oils for reducing the viscosity of residual bitumen for pavements</i> |
| AS/NZS 2106.1 | <i>Methods for the determination of the flash point of flammable liquids (closed cup) – Abel closed cup method</i> |
| AS/NZS 2106.2 | <i>Methods for the determination of the flash point of flammable liquids (closed cup) – Determination of flash point – Pensky-Martens closed cup method</i> |
| ASTM D1319 | <i>Standard Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption</i> |
| ASTM D86 | <i>Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure</i> |
| MRTS17 | <i>Bitumen</i> |
| MRTS20 | <i>Cutback bitumen</i> |

4 Standard test methods

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

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

Table 4 – Standard test methods

| Property to be Tested | Method No. |
|--|-----------------------|
| Aromatic Content | Q383 or ASTM D1319 |
| Density | Q374 |
| Distillation | Q384 or ASTM D86 |
| Flash Point (Abel) – for cutter oil | Q381 or AS/NZS 2106.1 |
| Flash Point (Pensky – Martens Closed Cup) – for flux oil | Q382 or AS/NZS 2106.2 |
| Kinematic Viscosity | Q336 or AS 2341.3 |
| Miscibility with Bitumen | Q385 |
| Water Content | Q354 or AS 2341.9 |

5 Quality system requirements

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

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

6 Material

6.1 General

Cutter oil, when mixed with bitumen, shall be capable of producing homogeneous cutback bitumen which complies with the requirements of MRTS20 *Cutback Bitumen*.

6.2 Properties

Cutter oil and flux oil shall comply with the property requirements of Table 6.2

Table 6.2 – Properties of cutter oil and flux oil

| Property | Test Method | Unit | Cutter Oil* | | Flux Oil | |
|--|---|-------------|------------------|---------|------------------|---------|
| | | | Minimum | Maximum | Minimum | Maximum |
| Aromatic Content (%) | Q383 or ASTM D1319 | % by volume | 10 | – | 15 | – |
| Density at 15°C | Q374 | kg/L | 0.775 | 0.83 | 0.79 | 0.88 |
| Distillation range: Initial boiling point | Q384 or ASTM D86 | °C | 140 | - | 175 | 230 |
| % of original volume recovered at: | | | | | | |
| 150°C | | % | – | 10 | – | – |
| 200°C | | % | – | 80 | – | 10 |
| 250°C | | % | 80 | – | – | – |
| 300°C | | % | – | – | – | 80 |
| 350°C | | % | – | – | 80 | – |
| Final boiling point | | °C | – | 280 | – | – |
| Viscosity at 40°C | Q336 or AS 2341.3 | mPa.s | – | 2.0 | 1.6 | 4.6 |
| Flash Point | Q381 or AS/NZS 2106.1/ Q382 or AS/NZS 2106.2 | °C | 38 | – | 61.5 | – |
| Miscibility with Bitumen | Q385 | – | No precipitation | | No precipitation | |
| Water Content | Q354 or AS 2341.9 | % by volume | – | 0.1 | – | 0.1 |

* Jet A-1 aviation fuel shall be deemed acceptable as cutter oil where the corresponding properties tested to the international specifications covering that product provide test values complying with the cutter oil requirements tabulated herein.

7 Manufacture

Cutter oil or flux oil shall be manufactured or imported only by an approved Manufacturer.

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 bitumen cutter oil or flux oil which demonstrates compliance with this Specification. The inspection and test plan shall include testing of cutter oil/flux oil (especially materials stored at depots), 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 cutter oil and flux oil to the site

8.1 General

The delivery of cutter oil and flux oil to the Site shall be made in sound and clean bulk tanks, palletised containers or drums which are suitably sealed to prevent contamination by water or any other substances.

Bitumen cutter oil and flux oil shall be handled and transferred into bitumen sprayers or storage containers in accordance with the requirements stated in MRTS17 *Bitumen*.

8.2 Delivery dockets

Delivery of oil to the Site shall be accompanied by a delivery docket giving at least the following information:

- name of the Manufacturer
- place of manufacture
- location of depot source
- product type
- production batch number, and
- 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 Compliance sampling and testing

9.1 General

Sufficient sampling and testing shall be carried out to ensure that the cutter oil or flux oil complies with the property requirements of Clause 6.

Samples of cutter oil and flux oil for compliance testing shall be taken from production plants or depots in accordance with sampling procedures defined in AS 3568, Clause 5 (Sampling).

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

9.2 Sampling and testing by the Manufacturer

The minimum frequency for sampling and testing from production plant or depots to be performed by the Manufacturer shall be as stated in Table 9.2.

Table 9.2 – Bitumen cutter oil and flux oil testing schedule

| Properties to be Tested | Frequency of Testing | | |
|--|----------------------|--------------------|-----------|
| | Production Plant | All Depots | |
| | Each Batch | Every 5th Transfer | 6 Monthly |
| Aromatic Content (%) | ✓ | | ✓ |
| Density at 15°C (kg/L) | ✓ | ✓ | ✓ |
| Distillation Range (°C or % recovered) | ✓ | | ✓ |
| Viscosity at 40°C (mPa.s) | | | ✓ |
| Flash Point (°C) | ✓ | ✓ | ✓ |
| Miscibility with Bitumen | | | ✓ |
| Water Content (%) | ✓ | ✓ | ✓ |

10 Nonconformance

A major nonconformance means a departure from specified limits for flash point, miscibility with bitumen or water content. All other nonconformances shall be classified as minor.

All cutter oil or flux oil which is represented by samples from which a major nonconformance has been detected shall be rejected.

Cutter oil or flux oil for 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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