

Main Roads Technical Standard

MRTS19

Cutter and Flux Oils

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	2
5 QUALITY SYSTEM REQUIREMENTS.....	2
6 MATERIAL	2
6.1 General	2
6.2 Properties.....	2
7 MANUFACTURE.....	2
8 DELIVERY OF CUTTER OIL AND FLUX OIL TO THE SITE	3
8.1 General	3
8.2 Delivery Dockets	3
9 COMPLIANCE SAMPLING AND TESTING	4
9.1 General	4
9.2 Sampling and Testing by the Manufacturer	4
10 NONCONFORMANCE	4

Cutter and Flux Oils

1 INTRODUCTION

This Technical Standard applies to the material requirements for cutter oil and flux oil 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 Standard shall be as defined in Clause 2 of MRTS01 *Introduction to Technical Standards*. Additional terms used in this Standard 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 Standard.

Table 3 – Referenced Documents

Reference	Title
AS/NZS 2106.1	Methods for the determination of the flash point of flammable liquids (closed cup) – Abel closed cup method
AS/NZS 2106.2	Methods for the determination of the flash point of flammable liquids (closed cup) – Determination of flash point – Pensky-Martens closed cup method
AS 2341.3	Methods of testing bitumen and related roadmaking products – Determination of kinematic viscosity by flow through a capillary tube
AS 2341.9	Methods of testing bitumen and related roadmaking products – Determination of water content (Dean and Stark)
AS 3568	Oils for reducing the viscosity of residual bitumen for pavements
ASTM D1319	Standard Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption
ASTM D86	Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure
MRTS17	Bitumen
MRTS20	Cutback bitumen

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.
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 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

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

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 Standard. 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.

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.

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 –

- a) name of the Manufacturer;
- b) place of manufacture;
- c) location of depot source;
- d) product type;
- 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 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.