Project Specific Technical Specification

Transport and Main Roads Specifications
PSTS107 High Modulus Asphalt (EME2)

June 2016

Pilot Specification

Pilot Specification

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1 Introduction

This Technical Specification applies to the construction of pavement layers comprising of 14 mm nominal size EME Class 2 (EME2) high modulus asphalt. Additionally, the requirements of dense graded asphalt in MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015) and its Annexure MRTS30.1 *Dense Graded and Open Graded Asphalt* (April 2015) shall apply unless they are specifically amended or amplified by this Technical Specification.

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 provides the requirements for EME Class 2 with a nominal aggregate size of 14 mm, which is abbreviated as EME2. It is intended that this Technical Specification be read in conjunction with MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015).

EME2 has recently become available in Australia. This Technical Specification is intended to facilitate the implementation of EME2 in project trials as part of the overall transfer of this technology into Queensland. It is anticipated that this Technical Specification will be developed further following increased local experience with its use, and as the results of trials become available. It is recommended that this Technical Specification be used in consultation with the Pavements, Research and Innovation unit of Engineering and Technology Division.

A risk based approach shall be used for EME2 designed using the Australian test methods outlined in this Technical Specification. A maximum of 10,000 tonnes is to be incorporated into Works that utilise Australian test methods for wheel tracking, flexural stiffness and fatigue. This is due to limited data verifying the relationship between these methods and EME2 performance. The limits outlined in this specification relating to the Australian methodology are tentative, and may be adjusted following increased experience with EME2.

EME2 performance in Europe using the European test methods (EN) outlined in this Technical Specification have been verified, and therefore no limit is imposed on the quantity that may be utilised in Works when employing the EN test methods.

EME2 mix design is performance based and the Marshall method is not suitable. More details and guidance on the mix design methodology and application can be found in *EME2 technology transfer to Australia: an explorative study, AP-T249/13* (Austroads 2013) and in *High modulus high fatigue resistance asphalt (EME) technology transfer, AP-T283/14* (Austroads 2014).

For EME2 application, two different classes of binder may be used in France. These are 15/25 and 10/20 hard penetration grade binder according to EN 13924-2006 Bitumen and bituminous binders, specifications for hard paving grade bitumens. The asphalt and bitumen industry in Australia currently supports the use of 15/25 grade binder, and this grade has been adopted in this Technical Specification.

2 Definition of terms

The terms used in this specification shall be as defined in Clause 2 of MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015), Clause 2 of MRTS31 *Heavy Duty Asphalt* and Table 2 of this Technical Specification.

Table 2 – Definition of terms

Term	Definition
Asphalt mix design registrar	Person(s) nominated by the Deputy Chief Engineer (Pavements, Materials and Geotechnical) to register mix designs for use on Department of Transport and Main Roads projects.

3 Referenced documents

Table 3 lists documents referenced in this Technical Specification.

Table 3 – Referenced documents

Reference	Title
Austroads	
AP-T219/13	Mastic performance assessment in stone mastic asphalt
AP-T249/13	EME2 technology transfer to Australia: an explorative study
AP-T283/14	High modulus high fatigue resistance asphalt (EME) technology transfer
AG:PT/T111	Handling viscosity of polymer modified binders (Brookfield thermosel)
AG:PT/T231	Deformation resistance of asphalt mixtures by the wheel tracking test
AG:PT/T232	Stripping potential of asphalt – tensile strength ratio
AG:PT/T274	Characterisation of flexural stiffness and fatigue performance of bituminous mixes
Australian Standards	
AS 1141.23	Methods for sampling and testing aggregates – Los Angeles value
AS/NZS 2341.2	Methods of testing bitumen and related roadmaking products – Determination of dynamic (coefficient of shear) viscosity by flow through a capillary tube
AS 2341.3	Methods of testing bitumen and related roadmaking products – Determination of kinematic viscosity by flow through a capillary tube
AS/NZS 2341.4	Methods of testing bitumen and related roadmaking products – Determination of dynamic viscosity by rotational viscometer
AS 2341.8	Methods of testing bitumen and related roadmaking products – Determination of matter insoluble in toluene
AS/NZS 2341.10	Methods of testing bitumen and related roadmaking products – Determination of the effect of heat and air on a moving film of bitumen (rolling thin film oven (RTFO) test)
AS 2341.12	Methods of testing bitumen and related road making products – Determination of penetration
AS 2341.18	Methods of testing bitumen and related road making products – Determination of softening point (ring and ball method)
AS/NZS 2891.2.2	Methods of sampling and testing asphalt: Sample preparation – Compaction of asphalt test specimens using a gyratory compactor
AS/NZS 2891.9.2	Determination of bulk density of compacted asphalt - Presaturation method
AS/NZS 2891.9.3	Determination of bulk density of compacted asphalt - Mensuration method

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Reference	Title
AS/NZS 2891.8	Methods of sampling and testing asphalt – Voids and density relationships for compacted asphalt mixes
American Society for Testing and Materials	
ASTM D5 / D5M	Standard Test Method for Penetration of Bituminous Materials
European Standards	
EN 12594	Bitumen and bituminous binders: preparation of test samples
EN 12697-12	Bituminous mixtures: test methods for hot mix asphalt: part 12: determination of the water sensitivity of bituminous specimens
EN 12697-22	Bituminous mixtures: test methods for hot mix asphalt: part 22: wheel tracking
EN 12697-24	Bituminous mixtures: test methods for hot mix asphalt: part 24: resistance to fatigue
EN 12697-26	Bituminous mixtures: test methods for hot mix asphalt: part 26: stiffness
EN 12697-31	Bituminous mixtures: test methods for hot mix asphalt: specimen preparation by gyratory compactor
NF EN 13108-1	Bituminous mixtures: material specifications: part 1: asphalt concrete
EN 13179–1	Tests for filler aggregate used in bituminous mixtures: part 1: delta ring and ball test
EN 13924	Bitumen and bituminous binders, specifications for hard paving grade bitumens

4 Standard test methods

The standard test methods shall be as defined in Clause 4 of MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015) and as defined in Table 4.

Table 4 – Standard test methods

Property to be Tested	Test Method Number
Coarse Aggregate	
Los Angeles value	AS1141.23
Aggregate and Filler	
Particle density of the combined mineral aggregates	AS/NZS 2891.8 or Q317
Filler	
Delta ring and ball[1]	EN 13179–1[2] and AS 2341.18
Binder	
Penetration at 25ºC	AS 2341.12 or ASTM D5 / D5M
Softening point	AS 2341.18
Viscosity at 60ºC	AS/NZS 2341.2[2]
Mass change	AS/NZS 2341.10
Retained penetration at 25ºC after RTFO treatment	AS/NZS 2341.10 and AS 2341.12
Increase in softening point after RTFO treatment	AS/NZS 2341.10 and AS 2341.18
Viscosity at 135ºC	AS/NZS 2341.2, AS 2341.3

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Property to be Tested	Test Method Number
	AS/NZS 2341.4
Matter insoluble in toluene	AS 2341.8
Viscosity at 60ºC after RTFO	AS/NZS 2341.10 and AS/NZS 2341.2[3]
Percentage increase in viscosity at 60ºC after RTFO test	AS/NZS 2341.10 and AS/NZS 2341.2
Preparation of test samples	EN 12594
Asphalt	
Wheel tracking	EN 12697-22 or AG:PT/T231
Fatigue resistance	EN 12697-24 method A or AG:PT/T274
Flexural stiffness	EN 12697-26 method A or AG:PT/T274
Water sensitivity	EN 12697-12 or AG:PT/T232
Air voids in specimens compacted by gyratory compactor	EN 12697-31 or AS 2891.2.2[4]

[1] This test assesses the stiffening effect of the filler on the binder – filler mastic using the softening point test.

[2] More details on sample preparation are provided in AP-T219/13.

[3] Test shall be performed using an Asphalt Institute viscosity tube.

[4] Modified test parameters are used to align with EN 12697-31. Refer Table 10.3.1 for details.

5 Quality system requirements

The quality system requirements stated in Clause 5 of MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015) shall apply to this Technical Specification.

The Hold Point and Milestone in Cause 10.4 overrides the requirements of the Hold Point and Milestone in Clause 8.2 of MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015).

6 Intention of this specification

The intention of this Technical Specification is to facilitate the introduction of EME2 into TMR projects.

EME2 is high performance asphalt material for use in heavy duty pavements, specifically suitable in the following situations:

a) pavements carrying large volumes of heavy vehicles, and

b) heavily trafficked areas, such as slow lanes, climbing lanes, bus lanes and airport pavements, where there is a need for increased resistance to permanent deformation.

The EME2 technology is predominantly used for structural asphalt layers, i.e. base layers; and is not suitable as a wearing course. When compared to current dense graded asphalt, and provided a suitable foundation exists, EME2 has superior resistance to plastic deformation and water sensitivity while maintaining high stiffness and very good fatigue resistance.

7 Contractor responsibilities

The Contractor's responsibilities as stated in Clause 7 of MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015) shall apply to this Technical Specification.

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8 Conditions for manufacture and laying asphalt

The conditions for manufacture and laying of asphalt as stated in Clause 8 of MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015) shall apply to this Technical Specification, except that mix design registration and acceptance shall be in accordance with Clause 10.

9 Quarry assessment and certification

The quarry assessment and certification requirements as stated in Clause 9 of MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015) shall apply to this Technical Specification.

10 Registered mix design

10.1 Design responsibility

The manufacturer shall be responsible for development of a mix design to comply with the requirements of Clauses 10.2 and 10.3.

10.2 Constituent material requirements

10.2.1 General

The asphalt mix shall incorporate coarse aggregate, fine aggregate, filler, and binder complying with the requirements of Clauses 10.2.2 to 10.2.5. It may also contain an additive complying with the requirements of 10.2.6.

10.2.2 Coarse aggregate

Coarse aggregate shall comply with the requirements stated in Clause 10.2.2 of MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015) except that the crushed particles and flakiness index of the combined coarse aggregate shall conform with the values listed in Table 10.2.2.

Testing for compliance shall be in accordance with Table 10.2.2 and Clause 11.3.1 of MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015)

Table 10.2.2 – Coarse aggregate requirements

Property	Unit	Limit	Value	Testing Frequency for Compliance (Clause 11)
Crushed particles[1]	%	Minimum	100	refer MRTS30 (April 2015)
Flakiness index	%	Maximum	25	refer MRTS30 (April 2015)

[1] Test only required where aggregate is obtained from other than a blasted face in a quarry.

10.2.3 Fine aggregate

Fine aggregate shall comply with the requirements stated in Clause 10.2.3 of MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015).

It is unlikely that EME2 mixes containing natural sand would meet the performance requirements for flexural stiffness and/or rutting, and other performance properties may also be negatively affected.

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10.2.4 Filler

The combined filler shall comply with the requirements stated in Clause 10.2.4 of MRTS30 *Dense Graded Asphalt and Open Graded Asphalt* (April 2015) except for the following:

a) The voids in dry compacted filler requirements stated in Table 10.2.4 shall take precedence over those stated in MRTS30 (April 2015), and

b) The delta ring and ball requirements stated in Table 10.2.4 shall apply.

Table 10.2.4 –Combined filler requirements

Property	Test Method	Unit	Limit	Value	Testing Frequency for Compliance (Clause 11)
Voids in dry compacted filler	AS 1141.17	%	Minimum Maximum	28 45	refer MRTS30 (April 2015)
Delta ring and ball[1]	EN 13179–1[2] and AS 2341.18	°C	Minimum Maximum	8 16	1 per month

[1] This test assesses the stiffening effect on the filler on the binder – filler mastic using the softening point test; however, the asphalt supplier need not have NATA accreditation for this EN test.

[2] More details on sample preparation are provided in AP-T219/13.

10.2.5 Binder

Binder complying with Table 10.2.5 shall be used. The requirements of Clauses 7 and 8 of MRTS17 *Bitumen* and the binder manufacturer's written instructions shall apply to binder incorporated into EME2.

Table 10.2.5 – Binder requirements for EME2

Property	Test Method	Unit	Limit	Value
Penetration at 25°C (100g, 5s)	AS 2341.12 or ASTM D5 / D5M	pu[1]	Minimum Maximum	15 25
Softening point	AS 2341.18	°C	Minimum Maximum	56 72
Viscosity at 60°C[2]	AS 2341.2	Pa.s	Minimum	900
Mass change	AS/NZS 2341.10	%	Maximum	0.5
Retained penetration[3]	AS/NZS 2341.10 and AS 2341.12	%	Minimum	55
Increase in softening point after RTFO treatment[4]	AS/NZS 2341.10 and AS 2341.18	°C	Maximum	8

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Property	Test Method	Unit	Limit	Value
Viscosity at 135°C	AS/NZS 2341.2, AS 2341.3, AS/NZS 2341.4 or AGPT/T111	Pa.s	Minimum	0.6
Matter insoluble in toluene	AS 2341.8	% mass	Maximum	1.0
Penetration index[5]	N/A	N/A	N/A	Report
Viscosity at 60°C after RTFO[3]	AS/NZS 2341.10 and AS/NZS 2341.2	Pa.s	N/A	Report
Viscosity at 60°C, percentage of original after RTFO treatment	AS/NZ 2341.10 and AS/NZS 2341.2	%	N/A	Report

[1] One pu equals 0.1 mm.

[2] Test shall be performed using an Asphalt Institute viscosity tube.

[3] Retained penetration shall be calculated using the equation:

(Penetration at 25°C after RTFO x 100) / (Penetration at 25°C before RTFO).

[4] Increase in softening point after RTFO treatment shall be calculated using the equation:
Softening point after RTFO – softening point before RTFO.

[5] Refer to Clause 10.2.5.1 for details.

10.2.5.1 Penetration index

Penetration Index (PI) shall be calculated as follows (viz. Annexure A of EN 13924-2006):

$$PI = \frac{(20 \times SP) + (500 \times logPen) - 1952}{SP - (50 \times logPen) + 120}$$

where:

SP = Softening point determined in accordance with AS 2341.18

Pen = Penetration determined in accordance with AS 2341.12 or ASTM D5 / D5M

10.2.6 Additive

An additive may be proposed provided that full details of the type of additive are provided and the mix design complies with the requirements of Clause 10.3.

10.3 Design criteria

10.3.1 General

The design criteria for EME2 differ from the asphalt mix design criteria defined in Clause 10.3.1 of MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015). The mix design shall comply with the requirements of Table 10.3.1 and Clause 10.3.2.

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Table 10.3.1 – Mix design criteria

Property	Test Method	Unit	Limit	Value
Air voids in specimens compacted by gyratory compactor at 100 cycles	EN 12697-31 or AS/NZS 2891.2.2[2]	%	Maximum	6[1]
Water sensitivity	EN 12697-12 or AG:PT/T232[3]	% %	Minimum Minimum	70 80
Wheel tracking at 60°C and 30,000 cycles (60,000 passes)[4,5]	EN 12697-22 or AG:PT/231[6]	% mm	Maximum Maximum	7.5[7] 6.0
Minimum flexural stiffness at 50 ± 3 με, 15°C and 10 Hz[4,8,9]	EN 12697-26 method A or AG:PT/T274[6]	MPa MPa	Minimum Minimum	14,000 14,000
Fatigue resistance at 10°C, 25 Hz and 1 million cycles[4] at 20°C, 10 Hz and 1 million cycles[4,8]	EN 12697-24 method A or AG:PT/T274[6]	 με με	 Minimum Minimum	 130 150
Richness modulus[10]	N/A	–	Minimum	3.4

[1] Bulk density of gyratory compacted specimens shall be determined by mensuration in accordance with AS 2891.9.3. This property shall be determined from the average of three (minimum) test specimens.

[2] Test parameters for AS/NZS 2891.2.2 shall be as follows: Vertical loading stress of 600 ±18 kPa, gyratory angle (internal) of 0.82 ±0.02° and a rate of gyration of 30 ±0.5 revolutions per minute. Specimens should have a diameter of 150 mm and a thickness between 100 mm and 150 mm. Laboratory compaction temperature for preparing test specimens should be determined in accordance with AS 2891.2.2, Appendix A.

[3] The free/thaw moisture conditioning of specimens detailed in Section 5.2 of AG:PT/T232 is mandatory.

[4] Specimens shall be compacted to an air void content of 1.5 – 4.5% when the bulk density is determined in accordance with AS 2891.9.2 or Q306B.

[5] This property shall be determined from the average of two (minimum) test specimens.

[6] Mix designs that are assessed using AG:PT/T231 and AG:PT/T274 are restricted to use on projects involving less than 10,000 tonnes of EME2.

[7] Rut depth measured as a percentage of the specimen height.

[8] Sinusoidal loading (instead of haversine loading) shall be used.

[9] Flexural stiffness shall be determined as the average stiffness between the 45th and the 100th load repetition.

[10] Refer to Clause 10.3.3 for details.

For flexural stiffness and fatigue resistance testing undertaken in accordance with AG:PT/T274 the appropriate strain levels must be selected. Noting in particular some software (using manually selected sinusoidal loading) define strain levels differently to AG:PT/T274. These software programs may only apply half the stain level indicated on the input screen. i.e. a 280 microstrain loading on the software input screen may equate to 140 microstrain loading according to AG:PT/T274.

10.3.2 Grading

EME2 shall have 100% of the aggregate particles by mass passing the 19.0 mm sieve. There are no other specified requirements for combined aggregate grading of the mix design.

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10.3.3 Richness modulus

The richness modulus (K) of the mix design shall be calculated as follows:

$$K = \frac{\left(\frac{100B}{100 - B}\right)}{\alpha \sqrt[5]{\Sigma}}$$

where:

B = Binder content (% by mass of the total asphalt mix)

α = 2.65 / ρ_a

ρ_a = Particle density of the combined mineral aggregate determined in accordance with AS/NZS 2891.8 or Q317 (t/m^3)

Σ = (0.25G + 2.3S + 12s + 150f) / 100

where:

G = Percentage of aggregate particles greater than 6.30 mm

S = Percentage of aggregate particles between 6.30 mm and 0.250 mm

s = Percentage of aggregate particles between 0.250 mm and 0.075 mm

f = Percentage of aggregate particles less than 0.075 mm

G, S and s may be interpolated using a linear relationship from the grading curve using Australian standard sieves.

10.4 Mix design submission

The registered asphalt supplier shall submit a copy of the mix design report to asphaltmixdesign@tmr.qld.gov.au not less than 28 days prior to the commencement of asphalt being incorporated into the Works. The following information shall be included in the mix design submission:

a) Details of the manufacturer and manufacturing plant where the mix will be produced.

b) Mix design summary including:

   i. design grading and binder content

   ii. maximum permitted variation according to Table 10.4.2 of MRTS30 (April 2015)

   iii. details of all constituents (including source and grading of each aggregate and filler component and, where applicable, additives) and their proportions

   iv. copy of current departmental quarry registration certificate for each quarry from which the coarse and fine aggregates are to be supplied.

c) Test results provided by a NATA registered laboratory demonstrating that the coarse aggregate, fine aggregate, filler and binder comply with the requirements of Clause 10.2.

d) Test results provided by a laboratory accredited according to ISO/IEC 17025:2005 and/or NATA registered laboratory demonstrating that the mix design complies with the requirements of Clause 10.3.

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e) A signed statement confirming that the submitted mix design complies with the requirements of Clauses 10.2 and 10.3.

The Asphalt Mix Design Registrar shall examine the Contractor's mix design submission and if satisfied that all specified requirements are met, advise the Contractor accordingly in writing within 14 working days of receipt of the submissions and issue a mix design registration certificate.

The Asphalt Mix Design Registrar may request the Contractor, during or after examination of the mix design submission(s), to supply individual mix components and/or asphalt mix, to carry out visual inspections and/or check testing.

At least 7 days before production asphalt is required to be produced, the Contractor shall submit to the Administrator the identity and address of the proposed asphalt manufacturer and a copy of the mix design certificate for the mix proposed for the job **Milestone**. Production asphalt shall not be delivered to the Works until written acceptance of the mix design has been obtained from the Administrator **Hold Point 1**.

The Contractor shall undertake a production trial in accordance with the requirements of Clause 10.4.3 of MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015). Clause 10.4.3.3.2 of MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015) does not apply to this specification.

11 Material and production asphalt compliance

11.1 General

The requirements for materials and production compliance shall be in accordance with Clause 11 of MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015) except for the following:

a) The additional requirements stated in Clauses 10.2.2 for coarse aggregate, 10.2.3 for fine aggregate and 10.2.4 for filler shall apply, and

b) For conformance testing of the binder, samples shall be prepared in accordance with EN 12594. However, the asphalt supplier need not have NATA accreditation for this test. The following sampling and testing shall be undertaken as a minimum:

   i. Sampling and testing at the point of release from manufacture:

      - The maximum batch size shall comprise the discrete quantity of binder in the manufacturer’s storage tank. The binder in the storage tank shall represent a new batch when either:
        - Binder is added to the storage tank, or
        - Binder has been stored for a period of 14 days without the addition of new binder to the storage tank.
      - The minimum frequency of sampling and testing from the Manufacturer’s storage tanks shall be as follows:
        - Each batch - penetration and softening point, and
        - First batch for the Works, then 3 monthly and at change in feed stock thereafter – all other properties listed in Table 10.2.5.

   ii. Sampling and testing at the point of delivery (binder storage tank at the asphalt plant) shall be undertaken at a frequency not less than once every 150 tonnes. Additional

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samples shall be taken and tested when the binder has been stored for a period of more than 14 days without the addition of new binder to the binder storage tank. Samples shall be tested for penetration and softening point and shall comply with the requirements of Table 10.2.5.

c) Asphalt production mix shall be tested for binder content and grading in accordance with the requirements of MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015).

d) Maximum density shall be determined on each production mix sample and the average value for each lot shall be used for calculation of relative compaction.

12 Construction

12.1 General

The requirements for construction of asphalt pavement shall be in accordance with those stated in Clause 12 of MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015) except for the following:

- The target thickness of the compacted layer shall not be less than 70 mm and not more than 130 mm.
- The minimum characteristic value of relative compaction shall not be less than 94.5%. Joints shall have a minimum characteristic value of relative compaction not less than 91.5%. No upper compaction limit applies.

The temperature of the loaded asphalt shall not exceed 190°C.

The minimum temperature at the time of discharge into the receiving hopper of the paver shall be nominated by the Contractor in their construction procedure.

The minimum temperature at the time of commencement of rolling shall be nominated by the Contractor in their construction procedure.

- Unless otherwise approved by the Administrator, a material transfer vehicle shall be used for paving operations.
- The Contractor shall undertake a placement trial in accordance with the requirements of Clause 12.2.6.12.2 of MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015).

12.2 Surface gritting

Only the areas nominated by the Administrator shall be gritted. The Administrator shall advise the Contractor in writing of the areas to be gritted following a review of the Contractor's traffic management plan and asphalt laying program. The Contractor shall allow not less than 7 days for the Administrator to review these plans. Paving shall not commence until these plans have been reviewed by the Administrator.

A purpose built spreader box shall be used to spread the grit. The spreader box shall be attached to the steel-wheeled roller used to compact the asphalt.

Gritting shall be completed before the surface temperature of the compacted asphalt falls below 70°C. The initial spread rate shall be 0.2 – 0.5 kg/m². After consultation with the Administrator, the spread rate and temperature range for gritting may be adjusted to ensure an adequate coverage of grit is achieved and the grit is adequately adhered to, and partially coated by, the binder in the asphalt mix.

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The grit shall be spread in a uniform manner over the hot asphalt surface to provide an even distribution of grit bonded to the asphalt after rolling is completed. Every attempt shall be made to achieve the required spread pattern on the first spreading pass. Bare or insufficiently covered areas shall be re-treated as soon as possible with a further light spreading run or hand spreading. Overspreading or underspreading shall be avoided.

Prior to the pavement section being opened to traffic, any loose grit material shall be removed from the road surface.

The material used for gritting shall consist of natural sand particles having a grading complying with the requirements shown in Table 12.2, or other material as approved by the Administrator.

The grit shall be dry, clean, hard, angular, durable, and free from clay and other aggregations of fine material, soil, organic matter and any other deleterious material.

Table 12.2 – Grading limits for grit

AS Sieve Size (mm)	% Passing by Mass
4.75	100
2.36	90 – 100
0.600	0 – 20
0.075	0 – 1.0

13 Construction compliance testing

The requirements for construction compliance testing shall be in accordance with those stated in Clause 13 of MRTS30 *Dense Graded and Open Graded Asphalt* (April 2015).

14 Supplementary requirements

The requirements of PSTS107 *High Modulus Asphalt (EME2)* are varied by the supplementary requirements given in Clause 14 of Annexure MRTS30.1 (April 2015).

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