

# Main Roads Technical Standard

**MRTS31**

**Heavy Duty Asphalt**

SUPERSEDED

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# Heavy Duty Asphalt

## 1 INTRODUCTION

This Technical Standard applies to the construction of dense graded asphalt layers for high load intensity low intervention pavements. Additionally, the requirements of MRTS30 *Dense Graded and Open Graded Asphalt* shall apply to the construction of such pavements unless they are specifically amended or amplified by this Technical Standard.

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 MRTS30 *Dense Graded and Open Graded Asphalt*.

## 3 REFERENCED DOCUMENTS

Table 3 lists documents referenced in this Technical Standard.

**Table 3 – Referenced Documents**

Reference	Title
AS 1672.1	Limes and limestones - Limes for building
AS 2891.12.1	Methods of sampling and testing asphalt - Determination of the permanent compressive strain characteristics of asphalt - Dynamic creep test

## 4 STANDARD TEST METHODS

The standard test methods given in Table 4 shall be used in this Technical Standard. In addition, the test methods listed in Clause 4 of MRTS30 *Dense Graded and Open Graded Asphalt* shall apply to this Technical Standard.

Further details of test numbers and test descriptions are given in Clause 4 of MRTS01 *Introduction to Technical Standards*.

**Table 4 – Standard Test Methods**

Property to be Tested	Test Method Number
Sensitivity to water	Q315
Dynamic creep	AS 2891.12.1

## 5 QUALITY SYSTEM REQUIREMENTS

The quality system requirements stated in Clause 5 of MRTS30 *Dense Graded and Open Graded Asphalt* shall apply to this Technical Standard.

## 6 INTENTION OF THIS TECHNICAL STANDARD

### 6.1 General

This Technical Standard is intended for dense graded asphalt pavements which will be placed on heavily trafficked roads in accordance with the Queensland Department of Main Roads Pavement Design Manual. The intention of this Technical Standard varies according to nominal mix size and type as described in Clauses 6.2, 6.3 and 6.4.

It is possible that an asphalt mix can meet the requirements of this Technical Standard but not satisfy its intentions. Where an asphalt mix does not perform in the intended manner, the mix shall still be accepted, provided the specified requirements stated in Clauses 10, 11 and 12 have been met. However, in such cases, the mix design registration status may be reviewed by the Department of Transport and Main Roads in accordance with the *Asphalt Supplier Registration System*.

## **6.2 DG14HS Mix**

DG14HS mix is intended to be used as a binder layer under the final surfacing or as a surfacing in a heavy duty asphalt pavement. DG14HS is intended to have –

- a) A high level of rut resistance;
- b) Life greater than 12 years when placed on a sound pavement;
- c) A texture depth above 0.4 mm when placed; and
- d) An average permeability of less than 15  $\mu\text{m/s}$  when initially placed, to minimise moisture damage of the layer and oxidation of the binder during service.

## **6.3 DG14HM Mix**

DG14HM mix is intended to be used as a structural layer in a heavy duty asphalt pavement with the ability to be trafficked (if need be) during construction. DG14HM is intended to have –

- a) A relatively high level of rut resistance; and
- b) An average permeability of less than 15  $\mu\text{m/s}$  when initially placed, to minimise moisture damage to the layer and oxidation of the binder during service.

## **6.4 DG20HM Mix**

DG20HM mix is intended to be used as a structural layer in a heavy duty asphalt pavement. DG20HM is intended to have –

- a) A relatively high level of rut resistance; and
- b) An average permeability of less than 15  $\mu\text{m/s}$  when initially placed, to minimise moisture damage to the layer and oxidation of the binder during service.

## **7 CONTRACTOR RESPONSIBILITIES**

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

## **8 CONDITIONS FOR MANUFACTURE AND LAYING OF ASPHALT**

The conditions for manufacture and laying of asphalt as stated in Clause 8 of MRTS30 *Dense Graded and Open Graded Asphalt* shall apply to this Technical Standard.

## **9 QUARRY ASSESSMENT AND CERTIFICATION**

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

## **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 and shall be designed in accordance with the requirements stated in Clause 10.3.

### 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*.

### 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*.

### 10.2.4 Filler

Filler shall comply with the requirements stated in Clause 10.2.4 of MRTS30 *Dense Graded and Open Graded Asphalt*, except that hydrated lime complying with AS 1672.1 shall comprise not less than 1.0% by mass of the mix for DG14HS, DG14HM and DG20HM mixes.

### 10.2.5 Binder

Unless otherwise stated in Clause 1 of Annexure MRTS31.1, the binder shall comply with the requirements stated in Table 10.2.5.

**Table 10.2.5 – Asphalt Binders**

Asphalt Mix Type	Binder	Nominal size (mm)
DG14HS	A5S	14
DG14HM	Class 600	14
DG20HM	Class 600	20

Binder shall comply with the requirements of MRTS17 *Bitumen* and MRTS18 *Polymer Modified Binder* as appropriate.

### 10.2.6 Additive

An additive (for example, fibre, wax, anti-stripping agent) may be proposed, provided that full details of the type of additive are provided and the mix design standards of Clause 10.3 are attained.

### 10.2.7 Reclaimed Asphalt Pavement (RAP) Material

RAP may be used in heavy duty asphalt non-surface layers which have bitumen binders or multigrade binders. A maximum RAP content of 15% by mass of mix shall apply. RAP shall comply with the requirements stated in Clause 10.2.3 of MRTS30 *Dense Graded and Open Graded Asphalt*.

## 10.3 Design Criteria

The design criteria for the asphalt mix shall be as defined in Clause 10.3 of MRTS30 *Dense Graded and Open Graded Asphalt*, except that the asphalt mix shall also comply with the asphalt performance requirements stated in Table 10.3.

**Table 10.3 – Asphalt Performance Requirements**

Property	Unit	Limit	Value by Asphalt Mix Type		
			DG14HS	DG14 HM	DG20HM
Sensitivity to water	%	Minimum	80	80	80
Indirect tensile resilient modulus <sup>1</sup>	MPa	Minimum	‡	5,000	5,000
Dynamic creep <sup>2,3</sup> (2% strain)	Pulses	Minimum	‡	‡	‡
Wheel tracking rut rate	mm/kcycle	Maximum	0.3	0.3	0.3
final rut depth <sup>3</sup>	mm		4.0	4.0	4.0

1 Samples compacted in accordance with AS 2891.2.2 to 120 cycles.

2 Samples compacted in accordance with AS 2891.2.2 to achieve air voids of  $5 \pm 0.5\%$ .

3 Class 320 bitumen shall be used as the binder for the test. For DG20HM mix, where the specified wheel tracking requirements cannot be achieved using Class 320 bitumen as the binder, the mix design will be accepted provided the rut rate is less than 0.2 mm/kC using Class 600 bitumen as the binder.

‡ To be recorded

#### 10.4 Mix Design Registration

The requirements for mix design registration shall be in accordance with those stated in Clause 10.4 of MRTS30 *Dense Graded and Open Graded Asphalt*.

### 11 MATERIAL AND PRODUCTION ASPHALT COMPLIANCE

The compliance requirements for material and production asphalt shall be in accordance with those stated in Clause 11 of MRTS30 *Dense Graded and Open Graded Asphalt*.

In addition, complete characterisation testing of the production asphalt shall be undertaken for each 15,000 tonnes, and at least once for each type of asphalt on the project where the total amount of asphalt is less than 15,000 tonnes. The production asphalt shall be tested for the following properties –

- a) Binder content;
- b) Grading;
- c) Maximum density;
- d) Free binder volume;
- e) Fixed binder fraction;
- f) Stability, flow and stiffness (Marshall);
- g) Air voids (Marshall);
- h) Voids in mineral aggregate;
- i) Voids filled with binder;
- j) Resilient modulus;
- k) Dynamic creep;
- l) Wheel tracking; and
- m) Sensitivity to water.

Test results are for reporting only and not for compliance. A copy of the test results shall be forwarded to the Administrator.



## 12 CONSTRUCTION

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* except that the layer thickness stated in Table 12 for DG14HS surfacing/binder layers shall apply.

**Table 12 – Layer Thickness Limits**

Asphalt Mix Nominal Size (mm)	Compacted Layer Thickness	
	Surfacing or Binder Layer	
	Minimum	Maximum
DG14HS	50	60

## 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*. In addition, all asphalt joints shall be tested in accordance with Clause 13.4.4 and at the frequency stated in Table 13.2 of MRTS30 *Dense Graded and Open Graded Asphalt*.

## 14 SUPPLEMENTARY REQUIREMENTS

The requirements of MRTS31 *Heavy Duty Asphalt* are varied by the supplementary requirements given in Clause 2 of Annexure MRTS31.1.

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