

# Main Roads Technical Standard

**MRTS22**

**Supply of Cover Aggregate**

SUPERSEDED

## **IMPORTANT INFORMATION**

The requirements of this document represent Technical Policy of the department and contain Technical Standards. Compliance with the department's Technical Standards is mandatory for all applications for the design, construction, maintenance and operation of road transport infrastructure in Queensland by or on behalf of the State of Queensland.

This document will be reviewed from time to time as the need arises and in response to improvement suggestions by users. Please send your comments and suggestions to the feedback email given below.

## **FEEDBACK**

Your feedback is welcomed. Please send to [mr.techdocs@tmr.qld.gov.au](mailto:mr.techdocs@tmr.qld.gov.au).

## **COPYRIGHT**

© State of Queensland (Department of Transport and Main Roads) 2009

Copyright protects this publication. Except for the purposes permitted by and subject to the conditions prescribed under the Copyright Act, reproduction by any means (including electronic, mechanical, photocopying, microcopying or otherwise) is prohibited without the prior written permission of the department. Enquiries regarding such permission should be directed to the Road & Delivery Performance Division, Queensland Department of Transport and Main Roads.

## **DISCLAIMER**

This publication has been created for use in the design, construction, maintenance and operation of road transport infrastructure in Queensland by or on behalf of the State of Queensland.

Where the publication is used in other than the department's infrastructure projects, the State of Queensland and the department gives no warranties as to the completeness, accuracy or adequacy of the publication or any parts of it and accepts no responsibility or liability upon any basis whatever for anything contained in or omitted from the publication or for the consequences of the use or misuse of the publication or any parts of it.

If the publication or any part of it forms part of a written contract between the State of Queensland and a contractor, this disclaimer applies subject to the express terms of that contract.

**June 09**

## Table of Contents

	Page
1 INTRODUCTION.....	1
2 DEFINITION OF TERMS .....	1
3 REFERENCED DOCUMENTS .....	1
4 STANDARD TEST METHODS .....	1
5 QUALITY SYSTEM REQUIREMENTS.....	2
5.1 Hold Points and Milestones.....	2
5.2 Construction Procedures.....	2
5.3 Conformance Requirements .....	2
5.4 Testing Frequency.....	2
6 QUARRY ASSESSMENT AND CERTIFICATION.....	2
7 MATERIAL .....	2
7.1 Cover Aggregate .....	2
7.1.1 General .....	2
7.1.2 Particle Size Distribution (Grading).....	3
7.1.3 Particle Quality .....	3
7.1.4 Precoating.....	3
7.2 Prime Cover Material.....	4
8 COMPLIANCE TESTING.....	4
8.1 General.....	4
8.2 Stockpile Locations.....	4
8.3 Stockpile Lot Sizes and Testing Frequency.....	4
8.3.1 General .....	4
8.3.2 Lot Sizes .....	4
8.3.3 Level of Testing.....	4
9 STOCKPILE SITES.....	4
9.1 Site Details .....	4
9.1.1 General .....	4
9.1.2 Location .....	4
9.1.3 Size.....	4
9.2 Construction Standard.....	4
9.2.1 General.....	4
9.2.2 Stockpile Site Standard A.....	4
9.2.3 Stockpile Site Standard B.....	4
9.3 Compliance Testing of Pavement in Stockpile Sites.....	4
10 DELIVERY OF AGGREGATE TO STOCKPILES.....	4
11 SUPPLEMENTARY REQUIREMENTS.....	4

SUPERSEDED

# Supply of Cover Aggregate

## 1 INTRODUCTION

This Technical Standard applies to the supply and delivery of cover aggregate and prime cover material for use in sprayed bituminous surfacing treatments, and the construction of stockpile sites for storage of cover aggregate.

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 3 of MRTS01 *Introduction to Technical Standards*.

## 3 REFERENCED DOCUMENTS

Table 3 lists documents referenced in this Technical Standard.

**Table 3 – Referenced Documents**

Reference	Title
Engineering Policy number EP108	Quarry Assessment and Certification - published by Transport and Main Roads

## 4 STANDARD TEST METHODS

The test methods given in Table 4 shall be used in 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 No.
Sample preparation	Q101
Particle size distribution	Q103B
Relative dry density	Q110A, Q111A, Q111C
Flakiness index	Q201B
Average least dimension (ALD)	Q202
Polished aggregate friction value (PAFV)	Q203
Ten percent fines value (wet)	Q205B
Wet/dry strength variation	Q205C
Degradation factor	Q208B
Bitumen Stripping Value – Modified Plate	Q212B
Water absorption	Q214B
Crushed particles	Q215
Degree of aggregate precoating	Q216
Weak particles	Q217

## 5 QUALITY SYSTEM REQUIREMENTS

### 5.1 Hold Points and Milestones

General requirements for Hold Points, Witness Points and Milestones are specified in Clause 5 of MRTS01 *Introduction to Technical Standards*. The Hold Points and Milestones applicable to this technical standard are summarised in Table 5.1.

**Table 5.1 – Hold Points and Milestones**

Clause	Hold Point	Milestone
6	1. Use of quarry	Quarry assessment and current certification
7.1.4	2. Precoating procedure	Precoating of aggregate
8.1		Submit sample of cover aggregate
10	3. Use of stockpile site	

### 5.2 Construction Procedures

Construction procedures which are required to be submitted by the Contractor to the Administrator in accordance with Clause 5 of MRTS50 *Specific Quality System Requirements* are listed in Table 5.2.

**Table 5.2 – Construction Procedures**

Clause	Procedure
7.1.4	Precoating of aggregate

### 5.3 Conformance Requirements

The conformance requirements which apply to lots of work covered by this Technical Standard are summarised in Clauses 7 and 9.

### 5.4 Testing Frequency

The minimum testing frequency for work covered by this Technical Standard is specified in Clauses 8.2 and 9.3.

## 6 QUARRY ASSESSMENT AND CERTIFICATION

A quarry assessment shall be undertaken and the department's certification obtained (or current certification held) for any quarry from which cover aggregate is to be supplied.

The quarry assessment and certification shall be conducted in accordance with Engineering Policy number EP108 "Quarry Assessment and Certification".

A copy of the current certificate for the quarry from which the cover aggregate has been obtained shall be forwarded to the Administrator at least 7 working days before material deliveries to the stockpile (or direct to the pavement if a stockpile is not required) are to commence. **Milestone**

Material from a quarry shall not be used until the quarry has been approved by the Administrator. **Hold Point 1**

## 7 MATERIAL

### 7.1 Cover Aggregate

#### 7.1.1 General

Aggregate quality categories A, B and C refer to cover aggregate being crushed rock or crushed gravel. For category D, prior to its use, the Administrator requires evidence that the aggregate shall meet the specified PAFV requirement, without 80% crushed faces. Otherwise, a requirement for 80% crushed faces shall be applied.

Aggregate shall be free from dust, clay, vegetable matter and other deleterious material.

### 7.1.2 Particle Size Distribution (Grading)

For each respective nominal size, the aggregate shall comply with the particle size distributions given in Table 7.1.2.

**Table 7.1.2 – Particle Size Distribution**

AS Sieve Size (mm)	Percentage Passing by Mass for Each Nominal Size					
	20 mm	16 mm	14 mm	10 mm	7 mm	5 mm
26.5	100					
19.0	85 – 100	100	100			
16.0		85 – 100				
13.2	0 – 20	0 – 60	85 – 100	100		
9.50	0 – 5	0 – 15	0 – 30	85 – 100	100	
6.70			0 – 5	0 – 30	85 – 100	100
4.75				0 – 8	0 – 30	85 – 100
2.36	0 – 1	0 – 1	0 – 1	0 – 1	0 – 10	0 – 30
1.18					0 – 5	0 – 5

### 7.1.3 Particle Quality

The aggregate quality category for the Works is given in Clause 1 of Annexure MRTS22.1.

The cover aggregate particles shall comply with the requirements of Table 7.1.3 where:

- a) With reference to Table 7.1.3, for Greenstone source material only (Metamorphic Group), Greenstone that does not comply with the specified maximum Wet/Dry Strength Variation limits may be used, provided that its Ten Percent Fines Value (Wet) is at least 60 kN greater than the specified maximum value for the relevant aggregate quality category.
- b) The Ten Percent Fines Value (Wet) and the Wet/Dry Strength Variation tests shall be carried out on predominant size fraction represented within the sample. Where the predominant size is not in the 13.2 mm to 9.5 mm fraction, the following shall apply:
  - i) The requirements of Table 7.1.3 shall apply to the 13.2 mm to 9.5 mm fraction for samples from the source rock of the cover aggregate; and
  - ii) Test results for the predominant size shall not be for conformance testing and shall be reported to the Administrator.

### 7.1.4 Precoating

Where so stated in Clause 1 of Annexure MRTS22.1, cover aggregate shall be precoated prior to spreading.

Where precoated cover aggregate is specified, at least 7 days prior to commencement of any precoating activity, the Contractor shall submit to the Administrator details of the procedure to be used for application of the precoating agent **Hold Point 2**. Precoating shall not commence until the procedure has been accepted by the Administrator. **Milestone**

The precoating agent shall be approved for use as detailed in the Transport and Main Roads Approved Product Listing – Aggregate Precoating Agents for the following Type/s as detailed in this approved product listing and as specified in Clause 3 of Annexure MRTS22.1:

- a) Solvent precoat (waste oil free);
- b) Emulsion precoat; and
- c) Solvent precoat (contains waste oil).

Precoating shall be carried out on surface dry aggregate unless the Administrator approves the precoating of non-dry aggregate subject to the precoated aggregate achieving less than 10% stripping value when tested in accordance with Q212B at the time of intended use.

**Table 7.1.3 – Particle Quality**

Property	Limit	Aggregate Quality Category			
		A	B	C	D
Flakiness Index	Maximum	30	35	35	35
Ten Percent Fines Value (Wet) (kN)	Minimum	175	150	100	100
Wet/Dry Strength Variation (%)	Maximum	35	35	40	40
Weak Particles (%)	Maximum	1	2	3	3
Crushed Particles <sup>2</sup> (%)	Minimum	80	80	80	- <sup>1</sup>
Degradation Factor <sup>3, 4</sup>	Minimum	45	40	40	35
Water Absorption <sup>4, 5</sup> (%)	Maximum	2	2	2	2
PAFV	Minimum	Refer to Clause 2 of Annexure MRTS22.1			

**Notes for Table 7.1.3**

- 1 Minimum crushed particles requirement does not apply if there is compliance with the minimum specified PAFV requirement, where a value for PAFV has been specified in Clause 2 of Annexure MRTS22.1
- 2 Testing not required on material from a blasted face in a quarry.
- 3 Not applicable for sedimentary rock.
- 4 For non-surface layers (excluding the lower layers of any multiple coat seal on the final surface) which will not be subject to in-service traffic, the maximum water-absorption shall be 2.5 % and the minimum Degradation Factor shall be 40.
- 5 For aggregates with water absorption greater than the specified limit, project-specific approval may be granted by the Administrator provided that, in the opinion of the Administrator, the Contractor provides:
  - written documentation of a history of satisfactory performance of the cover aggregate in similar application; and
  - where the water absorption exceeds 2.5%, suitable adjustments to the precoating rate and precoating procedures for the cover aggregates for the Works.

The precoated condition of stockpiled aggregate shall provide a Degree of Aggregate Precoating of at least 70% when tested in accordance with Q216.

After precoating there shall be no flow or drip of precoating agent from individual stones.

The requirements for time periods between precoating and spreading of precoated aggregate are stated in Table 7.1.4. The Administrator may approve a change to a minimum or maximum time period subject to the precoated aggregate achieving less than 10% stripping value when tested in accordance with Q212B and at the time of intended use.

**Table 7.1.4 – Time Period between Precoating and Spreading of Precoated Aggregate**

Type of Precoating Agent	Minimum (days)	Maximum (days)
Solvent/bitumen based (free of waste oil)	7	56
Bituminous emulsion based	7	56
Solvent/bitumen based (containing waste oil)	28	98

**7.2 Prime Cover Material**

Prime cover material shall consist of natural sand or crushed rock particles of size generally smaller than 4.75 mm but larger than 0.075 mm. The material shall be free from soluble salts, organic matter, clay and other deleterious matter.



## 8 COMPLIANCE TESTING

### 8.1 General

The Contractor is responsible for carrying out sufficient testing to ensure that the aggregate complies with the standards and requirements of this Technical Standard.

Compliance testing of cover aggregate shall be undertaken for each lot. Samples for compliance testing shall be randomly selected (random sampling) from the stockpile lot. A stockpile lot shall be an essentially homogeneous portion of aggregate from the same source and having the same nominal size and quality category. A new stockpile lot shall apply when there is a change in any of these characteristics.

If stated in Clause 4 of Annexure MRTS22.1, a preliminary sample of approximately 40 kg of each type of cover aggregate to be used in the Contract shall be supplied to the Administrator at least 15 working days before the material is to be used. **Milestone**

### 8.2 Stockpile Locations

Compliance testing for the following properties shall be completed on uncoated aggregates from stockpiles located at the quarry unless otherwise nominated in Clause 5.1 Annexure MRTS22.1:

- a) Ten Percent Fines Value (Wet);
- b) Wet/Dry Strength Variation;
- c) Degradation Factor;
- d) Water Absorption;
- e) Crushed Faces; and
- f) Weak Particles.

Degree of Precoating testing shall be carried out at one point only and shall be completed on precoated aggregates from stockpiles located at the quarry unless otherwise nominated in Clause 5.2 of Annexure MRTS22.1.

Testing for the following properties shall be completed on precoated aggregates from stockpiles to be used in the Works:

- i) Particle Size Distribution;
- ii) Flakiness Index; and
- iii) Average Least Dimension.

### 8.3 Stockpile Lot Sizes and Testing Frequency

#### 8.3.1 General

Each individual stockpile lot shall be clearly delineated by one of the alternative methods below –

- a) A separate stockpile shall be formed for each stockpile lot of the same material type; or
- b) Material of the same type shall be added to a single stockpile incrementally such that a portion representing a discreet stockpile lot is added, tested and found to be conforming before the next portion, representing the next stockpile lot, is added; nonconforming stockpile lots shall be removed from the stockpile prior to the addition of further portions.

Testing shall be undertaken for each aggregate source.

For each material property, a minimum of one test shall be completed for each lot.

#### 8.3.2 Lot Sizes

Lot sizes for compliance testing of the aggregate shall satisfy the requirements of both:

- a) MRTS30 *Dense Graded and Open Graded Asphalt* Table 11.3.1 - *Maximum Lot Size* for the following properties:
  - i) Ten Percent Fines Value (Wet);
  - ii) Wet/Dry Strength Variation;

- iii) Degradation Factor;
  - iv) Water Absorption;
  - v) Crushed Faces; and
  - vi) Weak Particles.
- b) The requirements of Table 8.3.2.

**Table 8.3.2 – Maximum Lot Sizes**

Property	Test Method	Maximum Lot Size (tonnes)		
		Normal Level	Reduced Level	Tightened Level
Particle Size Distribution	Q103B	2,500	5,000	1,000
Flakiness Index	Q201A	2,500	5,000	1,000
Average Least Dimension	Q202	2,500	5,000	1,000
Degree of Precoating	Q216	10,000	20,000	5,000

### 8.3.3 Level of Testing

Compliance testing shall initially be undertaken at the normal level, and shall change in accordance with the following criteria –

- i) After no nonconformances have occurred in four consecutive lots, the reduced level may be applied;
- ii) When a nonconformance has occurred, the tightened level shall be applied; and
- iii) When no nonconformances have occurred in two consecutive lots, the normal level may be reapplied.

## 9 STOCKPILE SITES

### 9.1 Site Details

#### 9.1.1 General

If a position is stated in Clause 6.1 of Annexure MRTS22.1, the stockpile site shall be so located. If a position is not so stated, the stockpile site shall be located to suit the construction program and to comply with the requirements specified in Clauses 9.1.2 and 9.1.3.

#### 9.1.2 Location

The stockpile site shall be located within the road reserve on firm, well-drained, even ground and shall be located –

- a) at least 1 metre from any property boundary;
- b) at least 3 metres from any road, railway, structure or watercourse; and
- c) clear of any proposed works or accommodation works.

Additional restrictions to the location of the stockpile site shall apply as stated in Clause 6.2 of the Annexure MRTS22.1.

#### 9.1.3 Size

The size of the stockpile site shall depend on the quantity and nominal size of cover aggregate to be stored and shall comply with the requirements in Table 9.1.3.

**Table 9.1.3 – Stockpile Size Restrictions**

Requirements	Limits (metres)
Height of stockpile (maximum)	2
Distance between the edge of a stockpile and the edge of the stockpile site (minimum)	1
Distance between stockpile sites (minimum)	2

## 9.2 Construction Standard

### 9.2.1 General

Stockpiles shall be constructed to the standard stated in Clause 6.3 of Annexure MRTS22.1 and shall either be one of the standards listed in Clauses 9.2.2 or 9.2.3 or that described in Clause 6.3 of Annexure MRTS22.1.

### 9.2.2 Stockpile Site Standard A

Stockpile site Standard A shall consist of the following works –

- a) Clearing, grubbing, compacting and trimming of the natural ground over the full area of the stockpile site in accordance with MRTS04 *General Earthworks*;
- b) Installation of any necessary drains; and
- c) Construction of access tracks.

### 9.2.3 Stockpile Site Standard B

Stockpile site Standard B shall consist of those works specified for Standard A in Clause 9.2.2 plus the following additional works –

- a) A pavement over the full area of the site in accordance with MRTS05 *Unbound Pavements* and which shall –
  - i) have a minimum compacted thickness of 100 mm;
  - ii) be constructed from at least material of Subtypes 2.5 and 3.5, as appropriate; and
  - iii) be compacted to a minimum relative dry density of 97%.
- b) The pavement shall be surfaced with a bitumen seal with at least a sand cover material in accordance with either MRTS11 *Sprayed Bituminous Surfacing (Excluding Emulsion)* or MRTS12 *Sprayed Bituminous Emulsion Surfacing*, and with binder as specified in Table 9.2.3.

**Table 9.2.3 – Stockpile Site Seal Binder Requirements**

Technical Standard	Treatment	Binder	Rate (L/m <sup>2</sup> )
MRTS11	Primerseal	AMC1 cutback bitumen	0.8
MRTS12	Seal	CRS bitumen emulsion	1.0

## 9.3 Compliance Testing of Pavement in Stockpile Sites

Compaction testing of the pavement in stockpile sites constructed in accordance with Standard B shall be undertaken in accordance with the relative dry density test methods stated in Table 4. One test shall be undertaken for each 500 m<sup>2</sup> of stockpile area, with a minimum of 2 tests for each stockpile site.

## 10 DELIVERY OF AGGREGATE TO STOCKPILES

Prior to commencement of delivery of aggregate to any stockpile site, the Contractor shall obtain the Administrator's authorisation to place aggregates on the stockpile site. **Hold Point 3**

Placement of aggregate on stockpile sites shall be carried out in a manner which ensures that segregation of particles and other deleterious effects are avoided, and shall proceed in an orderly sequence which ensures that trimming and/or shaping of stockpiles for measurement purposes are minimised.

Stockpiles of aggregate, except for prime cover material, shall be covered with impermeable sheeting to prevent water wetting and entering the aggregate.

## 11 SUPPLEMENTARY REQUIREMENTS

The requirements of MRTS22 are varied by the supplementary requirements given in Clause 7 of Annexure MRTS22.1.