Technical Specification

Transport and Main Roads Specifications
MRTS22 Supply of Cover Aggregate

July 2018

Queensland Government

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1 Introduction

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

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
QRS	Quarry Registration System as defined in MRTS50 *Specific Quality System Requirements*

3 Referenced documents

Table 3 lists documents referenced in this Technical Specification.

Table 3 – Referenced documents

Reference	Title
AS 1141.6.1	*Methods for sampling and testing aggregates – Particle density and water absorption of coarse aggregate – Weighing-in-water method*
AS 1141.22	*Methods for sampling and testing aggregates – Wet/dry strength variation*
ASTM C295	*Standard Guide for Petrographic Examination of Aggregate for Concrete*
MRTS01	*Introduction to Technical Specifications*
MRTS04	*General Earthworks*
MRTS05	*Unbound Pavements*
MRTS11	*Sprayed Bituminous Treatments (Excluding Emulsion)*
MRTS12	*Sprayed Bituminous Emulsion Surfacing*
MRTS22	*Supply of Cover Aggregate*
MRTS50	*Specific Quality System Requirements*

4 Standard test methods

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

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

Table 4 – Standard test methods

Property to be Tested	Method No.
Average least dimension (ALD)	Q202
Bitumen Stripping Value – modified plate	Q212B
Crushed particles	Q215
Degradation factor	Q208B
Degree of aggregate precoating	Q216
Flakiness index	Q201
Particle size distribution	Q103B
Petrographic analysis	ASTM C295
Relative compaction	Q142A, Q141B, Q140A
Water absorption %	AS 1141.6.1 or Q214B
Weak particles	Q217
Wet ten percent fines value	AS 1141.22 or Q205B
Wet / dry strength variation	AS 1141.22 or Q205C

5 Quality system requirements

5.1 Hold Points, Witness Points and Milestones

General requirements for Hold Points, Witness Points and Milestones are specified in Clause 5.2 of MRTS01 *Introduction to Technical Specifications*. The Hold Points, Witness Points and Milestones applicable to this Technical Specification are summarised in Table 5.1.

Table 5.1 – Hold Points, Witness Points and Milestones

Clause	Hold Point	Witness Point	Milestone
6	1. Use of quarry		Submit Quarry Registration Certificate (7 days) Submit aggregate production procedure (7 days)
7.1.4			Submit precoating of aggregate procedure (7 days)
8.1			Submit sample of cover aggregate (14 days)
10	2. Use of stockpile	1. Covering aggregate stockpiles	

5.2 Construction procedures

Construction procedures which are required to be submitted by the Contractor to the Administrator in accordance with Clause 6 of MRTS50 *Specific Quality System Requirements* are listed in Table 5.2.

Table 5.2 – Construction procedures

Clause	Procedure
6	Aggregate production procedure
7.1.4	Precoating of aggregate procedure

5.3 Conformance requirements

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

5.4 Testing frequency

The minimum testing frequency for work covered by this Technical Specification is specified in Clauses 8.3 and 9.3.

6 Quarry registration

Cover aggregate shall be supplied by a quarry registered and operated in accordance with the Department of Transport and Main Roads Quarry Registration System requirements. The current Quarry Registration Certificate, including its Testing Frequency Schedule shall be submitted to the Administrator at least seven working days before a material's supply or use. **Milestone**

Material from a quarry shall be neither supplied, nor used in the Works without written permission of the Administrator. **Hold Point 1**

The Contractor shall notify the Administrator within three working days of any change to the Quarry Registration Certificate, including its Testing Frequency Schedule. **Hold Point 1** shall be re-applied.

For each quarry that will supply material(s) to be used in the Works, the Contractor shall prepare an aggregate production procedure and detail the following for each nominated material:

a) area (for example, face number, bench number and reduced level) of the quarry from which the material in the lot will be won

b) production process to be used including methods of winning the material

c) procedures for stockpile management and traceability as part of lot control and, as applicable, stockpile sublot control, and

d) quality control procedures.

The aggregate production procedures shall be submitted to the Administrator at least seven days prior to the commencement of aggregate production for the Works. **Milestone**

7 Material

7.1 Cover aggregate

7.1.1 General

Aggregate quality categories A, B and C refer to cover aggregate that is crushed aggregate. Aggregate quality category D refers to primarily uncrushed aggregate.

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. Where no indication is given in Clause 1 of Annexure MRTS22.1, aggregate quality category B shall be used.

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, it may be used, provided 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.

Table 7.1.3 – Cover aggregate properties

Property		Limit	Aggregate Quality Category			
			A	B	C	D
Cover Aggregate Source Rock	Wet Ten Percent Fines Value (kN)	Minimum	175	150	100	100
	Wet / Dry Strength Variation (%)	Maximum	35	35	40	40
	Degradation Factor[1, 2]	Minimum	45	40	40	35
	Water Absorption[2, 3] (%)	Maximum	2	2	2	2
Cover Aggregate Product	Flakiness Index	Maximum	30	35 (30)[5]	35 (30)[5]	35 (30)[5]
		Minimum	0 (10)[5]	0 (10)[5]	0 (10)[5]	0 (10)[5]
	Crushed Particles[4] (%)	Minimum	80	80	80	–
	Weak Particles (%)	Maximum	1	2	3	3

Notes:

1. Not applicable for sedimentary rock.
2. 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.
3. 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 are written for the cover aggregates for the Works.
4. Testing not required on material from a blasted face in a quarry.
5. For aggregates used in the bottom layer of double/double seals (e.g. I-D/D, D/D, HSS2-M, HSS2-H, XSS, and GRS-D/D), the limits in brackets shall apply.

The aggregate quality category will depend on the availability and cost of the aggregate and the traffic loadings.

The following table can be used as a guide to the selection of the aggregate quality category with respect to the traffic volume.

Traffic (vehicle / lane / day)	> 2000	150 – 2000	< 150	< 150 (Note 1)
Aggregate Quality Category	A	B	C	D

Note 1:

Categories A, B and C refer to crushed aggregate. Crushed (angular) aggregate adheres more readily and more permanently than rounded aggregate for the same amount of bitumen. Angular shaped particles also provide the added advantage of aggregate interlock.

Category D refers primarily to uncrushed aggregate. This category should only be used where stripping tests and/or evidence from existing seals indicates that this category will be satisfactory.

For double/double seals (e.g. I-D/D, D/D, HSS2-M, HSS2-H, XSS, and GRS-D/D), the department's Technical Note TN175 *Selection and Design of Sprayed Bituminous Treatments* requires the bottom larger aggregate to have a flakiness index of 10 – 30% (and be pyramidal / angular as such shapes promote interlock with the top smaller aggregate). Use of very cubic shaped aggregate in the first (bottom) layer of aggregate of a double/double seal may lead to poor aggregate interlock with the subsequent layer of aggregate and should be avoided.

For the top smaller aggregate of double/double seals and aggregate of single/single seals, this tighter flakiness index limit is not considered necessary.

7.1.4 Precoating

Unless "unprecoated" is stated in Clause 1 of Annexure MRTS22.1, cover aggregate shall be precoated with precoating agent prior to spreading.

Where precoated cover aggregate is specified, at least seven days prior to commencement of any precoating activity, the Contractor shall submit to the Administrator details of the procedure to be used for the application of the precoating agent. **Milestone**

The precoating agent shall be on the current Transport and Main Roads approved product listing for aggregate precoating agents and shall also comply with the requirements stated in Clause 2 of Annexure MRTS22.1.

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, at the time of intended use, less than 10% stripping value when tested in accordance with Q212B.

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, at the time of intended use, less than 10% stripping value when tested in accordance with Q212B.

Table 7.1.4 – Time period between precoating and spreading of precoated aggregate

Type of Precoating Agent	Minimum (days)	Maximum (days)
Solvent precoat (waste oil free)	7	56
Emulsion precoat	7	56
Solvent precoat (contains 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 Specification.

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 3 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 14 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 4.1 Annexure MRTS22.1:

a) ten percent fines value (wet)

b) wet / dry strength variation

c) degradation factor

d) water absorption

e) crushed particles, 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 4.2 of Annexure MRTS22.1.

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

a) particle size distribution

b) flakiness index, and

c) average least dimension (ALD).

8.3 Stockpile lot sizes and testing frequency

8.3.1 General

Each individual stockpile lot shall be clearly delineated by one of the 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. Non-conforming stockpile lots shall be removed from the stockpile prior to the addition of further portions.

Testing shall be undertaken for each aggregate source.

8.3.2 Minimum frequency of testing

Testing frequencies for the cover aggregate source rock tests and product tests shall comply with the requirements of Table 8.3.2(a) and Table 8.3.2(b).

Table 8.3.2(a) – Minimum testing frequencies for cover aggregate source rock tests

Property	Test Method	Minimum Frequency of Testing
Petrographic analysis[1]	ASTM C295	Minimum testing frequencies shall be in accordance with Clause 8.1.1 of MRTS50 *Specific Quality System Requirements*.
Wet ten percent fines value[1]	AS 1141.22 or Q205B	
Wet / dry strength variation[1]	AS 1141.22 or Q205C	
Degradation factor[1]	Q208B	
Water absorption[1]	AS 1141.6.1 or Q214B	

Notes:

1. Testing is performed on uncoated materials.

Table 8.3.2(b) – Minimum testing frequencies for cover aggregate product tests

Property	Test Method	Minimum Frequency of Testing
Particle size distribution	Q103B	1 per 1000 tonnes
Flakiness index	Q201	1 per 1000 tonnes
Average Least Dimension	Q202	1 per 1000 tonnes
Crushed particles[1 2]	Q215	1 per 5000 tonnes
Weak particles[2]	Q217	1 per 1000 tonnes
Degree of precoating	Q216	1 per 1000 tonnes

Notes:

1. Testing is only required where aggregate is obtained from other than a blasted quarry face.
2. Testing is performed on uncoated materials.

8.3.3 Maximum lot size

The maximum lot size for source rock tests shall be in accordance with Clause 8.1.1 of MRTS50 *Specific Quality System Requirements*.

The maximum lot size for product tests is 5000 tonnes.

9 Stockpile sites

9.1 Site details

9.1.1 General

If a position is stated in Clause 5.1 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 one metre from any property boundary

b) at least three 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 5.2 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 5.3 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 5.3 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 compaction of 97%.

b) The pavement shall be surfaced with a bitumen seal in accordance with either MRTS11 *Sprayed Bituminous Treatments (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 Specification	Treatment	Binder	Rate (L/m²)
MRTS11	Initial Single/Single Seal	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 compaction test methods stated in Table 4. One test shall be undertaken for each 500 m² of stockpile area, with a minimum of two 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 2**

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.

Cover aggregate stockpiles shall not be exposed to contaminating agents, particularly dust, and shall be handled so as to avoid contamination and any other deleterious effects.

Except for prime cover materials, all cover aggregate stockpiles shall be protected with a light plastic or similar material to prevent the ingress of moisture and other contaminants unless otherwise stated in Clause 4.2 of Annexure MRTS11.1. The protective material shall be sufficiently anchored to ensure the optimal fixture that can be achieved consistent with the protective material properties.
Witness Point 1

11 Supplementary requirements

The requirements of MRTS22 are varied by the supplementary requirements given in Clause 6 of Annexure MRTS22.1.