Project Specific Technical Specification

Transport and Main Roads Specifications PSTS108 Aggregates for Asphalt

January 2015

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1 Introduction

This Technical Specification sets out the requirements for coarse and fine aggregates that are used in asphalt.

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.

2 Definition of terms

The terms used in this Technical Specification are as defined in Clause 2 of MRTS01 *Introduction to Technical Specifications*, 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 asphalt mix designs for use on Department of Transport and Main Roads projects.
QRS	Quarry Registration System as defined in MRTS50 *Specific Quality System Requirements*

3 Referenced documents

Table 3 lists the documents referenced in this Technical Specification.

Table 3 – Referenced documents

Reference	Title
Australian Standards	
AS 1141.3.1	Methods for sampling and testing aggregates – Sampling – Aggregates
AS 1141.5	Methods for sampling and testing aggregates – Particle density and water absorption of fine aggregate
AS 1141.6.1	Methods for sampling and testing aggregates – Particle density and water absorption of coarse aggregate – Weighing-in-water method
AS 1141.11.1	Methods for sampling and testing aggregates – Particle size distribution – Sieving method
AS 1141.12	Methods for sampling and testing aggregates – Materials finer than 75 µm in aggregates (by washing)
AS 1141.22	Methods for sampling and testing aggregates – Wet/dry strength variation
AS 1141.24	Methods for sampling and testing aggregates – Aggregate soundness – Evaluation by exposure to sodium sulphate solution
Roads and Maritime Services	
RMS T239	Fractured faces of coarse aggregate

Reference	Title
ASTM	
ASTM C295	Standard Guide for Petrographic Examination of Aggregate for Concrete

4 Standard test methods

The standard test methods listed 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	Test Method Number
Sampling of aggregates	AS 1141.3.1 or Q060
Coarse Aggregate	
Particle size distribution	AS 1141.11.1
Materials finer than 75 µm	AS 1141.12
Flakiness index	Q201
Fractured faces	RMS T239
Wet ten percent fines value	AS 1141.22
Wet/dry strength variation	AS 1141.22
Degradation factor	Q208B
Polished aggregate friction value (PAFV)	Q203
Water absorption	AS 1141.6.1
Particle density (dry basis)	AS 1141.6.1
Fine Aggregate	
Particle size distribution	AS 1141.11.1
Materials finer than 75 µm	AS 1141.12
Water absorption	AS 1141.5
Particle density (dry basis)	AS 1141.5
Total weighted loss	AS 1141.24

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 and Milestones

Clause	Hold Point	Milestone
6	1. Use of quarry	Submit Quarry Registration Certificate
8.1		Submit nominated aggregates
8.2		Submit aggregate production procedure

5.2 Conformance requirements

The conformance requirements that apply to this Technical Specification are summarised in Clause 7.

6 Quarry assessment and registration

Coarse aggregate and fine aggregate (other than natural sand) shall be supplied by a quarry registered and operated in accordance with the TMR *Quarry Registration System* requirements. The current Quarry Registration Certificate 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 days of any change to the Quarry Registration Certificate, including its Testing Frequency Schedule. Hold Point 1 shall be reapplied.

7 Materials

Each type and source of aggregate shall be tested separately.

All materials must maintain conformity and have a uniform appearance for the duration of the work.

Measures shall be taken to ensure that materials supplied to the work do not exhibit any expansive reactions resulting from the presence of free calcium oxide, magnesium oxide or other expansive materials.

7.1 Coarse aggregate

Coarse aggregates are materials having a nominal size greater than 5 mm and consisting of crushed rock gravel or metallurgical slag that is clean, dry, hard, tough, sound and free from dust, clay, dirt or other deleterious matter.

Coarse aggregates must not fracture under compaction equipment or deteriorate rapidly in stockpiles or at the quarry face.

Coarse aggregates must conform to the requirements of Table 7.1.

Table 7.1 – Coarse aggregate requirements

Coarse Aggregate Properties	Acceptance Criteria	Test Method
Petrographic analysis	Report	ASTM C295
Particle size distribution	Contractor's nominated grading envelope	AS 1141.11.1
Materials finer than 75 µm	Report	AS 1141.12
Flakiness index (for coarse aggregate combined in the asphalt mix proportions): Dense graded asphalt Open graded asphalt Stone mastic asphalt	 ≤ 30% ≤ 25% ≤ 20%	 Q201 Q201 Q201
Fractured face(s) for aggregates derived from gravels and meta-sediments[1]: at least two fractured faces at least one fractured face	 ≥ 85% ≥ 100%	 RMS T239 RMS T239
Strength and durability: Wet ten percent fines value Wet/dry strength variation Degradation factor	 ≥ 150 kN ≤ 35%[2] ≥ 40%	 AS 1141.22 AS 1141.22 Q208B
Polished aggregate friction value (PAFV)	Wearing course ≥ 48 (unless otherwise specified in Clause 1 of Annexure PSTS108.1) All other courses ≥ 44	Q203
Water absorption	≤ 2.5%[2]	AS 1141.6.1
Particle density (dry basis):	Report	AS 1141.6.1

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

[2] For Greenstone material only, noncompliance with the stated maximum Wet/Dry Strength Variation limit may be accepted, provided the Wet Ten Percent Fines Value is at least 210 kN.

7.2 Fine aggregate

Fine aggregates are materials having a nominal size of 5 mm or less and consisting of one or a combination of the following:

a) aggregate including secondary and/or tertiary crusher dusts (such crusher dusts may be washed and/or classified prior to use), resulting from the manufacture of the coarse aggregate.

   Where the source rock is other than that used to produce the coarse aggregate, the source rock must meet the strength and durability requirements specified in Table 7.1.

b) clean natural quartz sands.

Fine aggregates must conform to the requirements of Table 7.2.

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

Table 7.2 – Fine aggregate requirements

Fine Aggregate Properties	Acceptance Criteria	Test Method
Particle size distribution	Contractor's nominated grading envelope	AS 1141.11.1
Materials finer than 75 µm	Report	AS 1141.12
Water absorption[1]: Quartz sands All other types of aggregates	 ≤ 1.5% ≤ 3.0%	AS 1141.5
Total weighted loss	≤ 12%	AS 1141.24
Particle density (dry basis)[1]:	Report	AS 1141.5

[1] Testing shall be completed on material passing the 4.75 mm sieve and retained on the 0.075 mm sieve.

7.3 Particle size distribution

The actual particle size distribution of each coarse and fine aggregate material may vary from the nominated value within the tolerances shown in Table 7.3. The Contractor may adopt wider tolerances where they can demonstrate to the satisfaction of the Administrator that the proposed tolerances will not impact on the quality of the asphalt. The nominated particle size distribution and associated nominated grading envelope for each material must form part of the Contractor's aggregate production procedure.

Table 7.3 – Permissible variation to nominated particle size distribution of coarse and fine aggregates (% by mass of aggregate)

Description	Tolerance
Passing 26.5 mm and larger	± 10
Passing 4.75 mm to 19.0 mm	± 8
Passing 1.18 mm and 2.36 mm	± 6
Passing 0.300 mm and 0.600 mm	± 5
Passing 0.150 mm	± 3
Passing 0.075 mm	± 2

8 Nominated aggregates

The nominated aggregate submission is the Contractor's statement of the quality of their aggregates that they:

a) consider will satisfy the requirements of this Technical Specification and

b) will target during production and supply.

8.1 Submission of details of nominated aggregates to the Asphalt Mix Design Registrar

The Contractor shall submit the following to the Asphalt Mix Design Registrar:

a) Quarry Registration Certificate and registered testing frequencies for each aggregate source.

b) Aggregate test results from a production trial for the quarry which will supply the aggregates. Test results must be provided for each nominated aggregate and for each aggregate requirement in Clause 7. All test results for each nominated aggregate must be from the same production trial.

c) Signed statement certifying that each nominated aggregate meets the requirements of Clause 7 Milestone. The statement must include NATA endorsed test results for all specified tests as well as a copy of the Contractor's completed verification checklist.

All tests relating to the submission must be carried out within the following periods prior to the date of submission to the Asphalt Mix Design Registrar:

- three months for all properties, except PAFV and
- twelve months for PAFV.

All phases of any particular test must be performed at the same laboratory.

8.2 Aggregate production procedure

For each quarry that will supply material(s) to be used in the Works, the Contractor shall prepare a construction procedure for aggregate production in accordance with Clause 6 of MRTS50 *Specific Quality System Requirements* and detail the following for each nominated material:

a) area of the quarry from which the material in the lot will be won

b) production process and method 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 construction procedures shall be submitted to the Administrator at least seven days prior to the commencement of aggregate production for the Works. Milestone

9 Material compliance

For all aggregates the conformity with this Technical Specification shall be verified by sampling and testing, and providing records of process control.

9.1 Homogeneity

Aggregate of segregated appearance shall be divided into sub-lots such that each sub-lot contains only that quantity of aggregate which is visually homogeneous. Each sub-lot must separately comply with the requirements of this Technical Specification.

9.2 Sampling

The Contractor shall nominate all sampling locations, frequencies and test methods in their construction procedure and inspection and test plan (ITP). Samples must be representative of materials used in asphalt production.

In addition to the requirements of Q060 or AS 1141.3.1, and unless otherwise specified or agreed with the Administrator, defined boundaries of sub-lots represented by a single tested sample are deemed to be the midpoints in production between the sample points.

When the Principal requests samples, the Contractor shall riffle and/or quarter the samples taken for testing, and deliver the samples in sealed and labelled containers.

9.3 Testing

9.3.1 Minimum frequency of testing

The Contractor must nominate in the inspection and test plan (ITP) the frequency of testing for coarse and fine aggregates which must not be less than the minimum specified in Clauses 2 and 3 of Annexure PSTS108.1. Where a minimum frequency of testing is not specified, the Contractor shall nominate an appropriate frequency in accordance with Clause 8.1.1 of MRTS50 *Specific Quality System Requirements*.

9.3.2 Maximum lot size

The maximum lot size must be nominated by the Contractor in accordance with the requirements of Clause 8.1.1 of *MRTS50 Specific Quality System Requirements*.

9.4 Nonconformities

If a lot fails to conform to this Technical Specification, such failure will constitute a nonconformance under the Contract.

Where it is deemed by the Administrator that a nonconformance in the aggregate supply will adversely affect asphalt performance, the aggregate must not be used in asphalt production.

> Grading nonconformities are typically acceptable provided the contract takes corrective action to address the non-conformance and the properties of the asphalt mix (such as combined grading and air voids) are not compromised by the nonconformance.

10 Supplementary requirements

The requirements of PSTS108 *Aggregates for Asphalt* are varied by the supplementary requirements given in Clause 4 of Annexure PSTS108.1.