Quarry Registration System

QRS2: Preparing a Quarry Assessment Report for a hard rock quarry

October 2024

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Contents

1 Introduction

QRS2 is part of the Quarry Registration System. It describes the content required in a Quarry Assessment Report (QAR) for a hard rock quarry. The QAR must be supplied by the Applicant as part of the Transport and Main Roads Quarry Registration System requirements.

2 Authorship and confidentiality of the Quarry Assessment Report

The QAR for the registration of new quarries must be prepared in accordance with QRS1, QRS2, QRS3 and QRS4 by a suitable qualified person, with at least 10 years' experience working as an engineering geologist / geologist registered at Australasian Institute of Mining and Metallurgy or Australian Institute of Geoscientists or Institute of Engineers Australia.

This person must also be independent of the Applicant's business, in order to provide an unbiased view of any potential issues the quarry is encountering.

The QAR for the reregistration of quarries must be prepared in accordance with QRS1, QRS2, QRS3 and QRS4 by a suitable qualified person, such as at least five years' experience working in quarry materials.

The submitted QAR is regarded as a confidential document and will not be released to external organisations, or persons without the permission of the Applicant.

3 Quarry Assessment Report content

The QAR content will be dependent on whether it is for a new quarry registration or a reregistration.

3.1 Quarry Assessment Report for new quarry registration

The QAR for a new quarry registration should contain information pertaining to the following elements:

- site details
- regional and site geology
- quarry development and production
- source rock description and product quality
- quality management, and
- nominated source rock testing frequency levels.

These are expanded upon in the following content. The degree of detail provided will depend on the size of the site, the stage of development and the products that the Applicant intends to provide.

For greenfield sites, all of the element details may not be available; however, sufficient investigations should be reported to enable an assessment of source rock material quality, variability and reserves.

Site details

The site details should include:

- site name
- location and access (provide maps and layout plans)
- real property description (Parish, County, Registered Property Numbers)

- local government authority (Council and Shire)
- ownership and tenure
- quarry manager and contact details, and
- other key management personnel and contact details.

This information shall also be included in the *Quarry registration application form*.

Regional and site geology

The QAR should describe the following geological features:

- **regional geology** defined in terms of the accepted stratigraphic unit for the geological formation, group or intrusive; for example, Neranleigh Fernvale Beds, North Arm Volcanics, Tertiary Volcanics, Quaternary alluvium
- **material types** defined in terms of rock types (for example, basalt, granite, and so on) or naturally occurring aggregates (for example, ridge gravels)
- **topographic features** including landforms, land use and vegetation
- **rock types** including the primary rock type and associated rock types or phases comprising the source should be nominated and mapped where appropriate (for example, metagreywacke with argillite beds, adamellite with dolerite dykes); terminology should be in accordance with AS1726 (Section 9), bearing in mind also the categorisation of source material groups in Transport and Main Roads Technical Specifications
- **geological features** of the rock mass (for example, stratification, flow, intrusion, dyke, vent, boundary or contact features, alluvial terrace, duricrust cap, and so on)
- **rock structures** and defects should be considered where appropriate (for example, foliation, bedding and joint orientation, spacing and condition – openness, infilling, discolouration, continuity – fault zones, altered and/or mineralised zones)
- **rock weathering** grades for each rock type described in terms of their effect on source material quality (refer AS1726 Appendix A), and
- other considerations, such as access, groundwater conditions, topographic constraints, overburden thickness and so on which may affect extraction from the source, should be documented.

Quarry development and production

The QAR should briefly describe the current or proposed extraction and production methods, including a proposed development plan and estimate of reserves. This section should include:

- a brief summary of quarry development
- overburden stripping methods
- extraction methods including normal shot sizes and blasting frequency
- scalping procedures
- crushing, processing and screening operations including crushing / screening equipment types, production circuit diagrams for either fixed or mobile crushing

- incorporation of imported materials (notably fines in pavement material – provide details of the source and percentage added) and blending methods
- details of loading facility, stockpile identification details and size, and
- 'nominated products' and annual production volumes.

Source rock description and product quality

The following information should be contained in this section of the QAR:

- Description of the source rock and its 'Material Group' classification which must be supported with interpretative petrographic analysis reports. Petrographic reports (conforming to ASTM C295) shall be carried out by an experienced petrographer specialised in thin section petrology, describing the sand composition and mineralogy, grain coatings, particle size and shape, weak and nondurable particles, free silica content (Transport and Main Roads *Test Method Q188*), potential for alkali silica reactivity (ASR) (Test Method AS1141.60.1).
  - Confirmation of the source rock classification in order to estimate the nature and extent of weak, unsound, deleterious minerals (such as secondary minerals and those likely to be ASR or sulphide reactive). Attention should also be directed to the presence of weak, unsound, deleterious minerals (for example, reactive and moisture sensitive secondary clay minerals, such as montmorillonite, smectite, illite, some micas and carbonates) and different volcanic glassy minerals in some igneous rocks.
  - Results shall be interpreted in terms of the rock suitability as a source of road construction materials including aggregates for use in concrete, asphalt and road base.
  - For ASR, departmental concrete Technical Specifications specify that rock used in concrete mixes containing <20% approved fly ash must be tested for ASR in accordance with Australian Standard AS1141.60.1.
  - For reactive sulphide rock, if the petrographic analysis indicates the rock is sulphide bearing, then a sample should be prepared and tested in accordance with AS1289.4.3.1 *Soil chemical tests – Determination of the pH of a soil – Electrometric Method* to determine the pH. A pH value of less than 4.5 indicates the rock has reactive sulphide and should not be used for rock products and aggregates.
  - For dolomitic and argillaceous limestones and other carbonate rocks, if the petrographic analysis indicates the source rock is a carbonate-bearing rock, then sample should be tested in accordance with ASTM C1105 for alkali-carbonate reactivity for source rock used in concrete.
- A list of 'nominated products' for which Transport and Main Roads registration is required and for which the Applicant is seeking registration.
- Test results for the properties of the source rock (strength, durability, density, water absorption, PAFV) for the 'nominated products', demonstrating full conformance with the respective departmental Technical Specification. These results should be no older than two years.

The source rock test results must have NATA endorsement and must demonstrate properties generally superior to the Technical Specifications or specification limits to allow for the variable nature of most material sources and ensure that products meet requirements following the extraction and production process.

It is desirable the Applicant should also include 'product' test results for the 'nominated products' in the submission. The product test results are those that describe properties of the crushed product after processing. They mainly include particle size distribution, particle shape (flakiness), California Bearing Ratio (CBR) strength and nature of fines.

It may not be possible to supply a full range of test results from greenfield or disused sources, but sufficient test results must be supplied to enable confirmation of the source material quality per registration requirements. At a minimum, the Applicant should have carried out a trial crush of the source rock to provide material for standard source rock testing for strength and durability.

The range of laboratory tests carried out and reported will depend on the source rock material group and material standards in the applicable departmental Technical Specifications for the 'nominated products' that the Applicant is seeking to register. To assist the Applicant in preparation of the QAR, refer to the summary in Tables in Appendices A1 to H2 for all source rock and product test requirements. Refer to the test / test methods used in each departmental Technical Specification to define the quarry material properties and test methods required for registration of a 'nominated product'. The limit value/s for each test are dependent on source rock material group and product type and so on and can be found in the relevant Technical Specification.

Use of other non-specification techniques (for example, X-ray diffraction (XRD)) may also be required to adequately characterise the source material properties if requested by the department; particularly if source material properties significantly affect product quality (for example, presence of reactive secondary minerals). **A quantitative XRD report** describing the type and composition of moisture sensitive and reactive clay minerals (such as montmorillonite / smectite, sericite, illite) may additionally be required for fine aggregate crushed or generated from some source rock types.

Quality management

Should the Applicant have a 'Third Party Certified' Quality Management System which complies with International and Australian Standard AS/NZS ISO 9001, then evidence of such certification should be attached as an Appendix to the QAR. Any quality system procedural documentation relevant to achievement and maintenance of product quality should also be included as appendices to the QAR.

Quarries which do not have a 'Third Party Certified' Quality Management System as described previously should provide details of the type of Quality Management System in operation and how it is certified; for example, the system may be based on relevant elements of AS/NZS 9001 only. If the system is independently certified (by a registered auditor) or 'Second Party Certified', written evidence of this shall be attached as an Appendix to the QAR as well as the quality system procedural documentation relevant to the achievement and maintenance of product quality.

For those quarries that may only have a rudimentary Quality Management System in place, the written procedures or instructions used to achieve and maintain product quality shall be attached as an Appendix to the QAR, including a statement on whether the system is audited.

Source rock testing frequency levels

Testing frequency levels are assigned to a quarry as part of the quarry registration process. The process is described in QRS4 *Assigning quarry-specific testing frequencies for source rock tests.*

Normally, for a new quarry registration, the testing frequency is automatically set at the *Default* level.

After a period of 12 months, the quarry operator can apply to the Quarry Registration System (tmrquarryregistration@tmr.qld.gov.au) to move to a lower frequency level as per the procedure outlined.

3.2 Quarry Assessment Report for quarry reregistration

The QAR for a quarry reregistration need only be an abbreviated version of the report required for the initial quarry registration. It should contain the following information on basic report elements:

Site details

- Any changes to the quarry name, ownership, management or tenure.

Regional site geology

- Any changes or additions to the geological site description.

Quarry development and production

- Details of any changes to the quarry and its operations including materials, systems, equipment and key staff.

Source rock description and product quality

- A list of departmental projects (including job number / identifier) supplied by the quarry over the last two years including the 'nominated products' and tonnages.
- An annual total quarry production summary for the last two years that includes all customers.
- Details of any additions or deletions to the department's 'nominated products' list.
- All source rock test results and product compliance test results relevant to departmental projects for the period since last registration where the source rock test results referred to in this section should have already been delivered to the Quarry Registration System (tmrquarryregistration@tmr.qld.gov.au) in accordance with the requirement of QRS1 Section 9.5.

The following result formats are required:

- electronic PDF for individual NATA-endorsed test reports
- identification of each departmental project job number / identifier, test method, 'stockpile lot' identifier / number, lot identifier / number date tested, property tested, and 'nominated products'
- for each property of each 'nominated product', Microsoft Excel™ or similar spreadsheets for test result summaries as specified by the Manger (Quarry Materials), and
- control charts (optional) for each property or each 'nominated product'.

Quality management

Any changes made to the Quality Management System which affect product quality. These changes could be in procedures, methodologies or programs used to control production and material quality.

Source rock testing frequency levels

The Applicant at the time of reregistration may apply to change the quarry's existing levels on the registered Test Frequency Schedule.

The submission can be made as part of this QAR or sent under separate cover. It must show the quarry meets the criteria applicable to the proposed nominated level and be supported by relevant test results (as outlined in Section 6 of QRS4).

Any existing registered quarry that declines to self-assess its testing frequency levels will be assigned to the *Default* testing frequency level for all source rock testing.

Appendix A

Source rock and product compliance tests for:

MRTS04 General Earthworks

Relevant quarry 'nominated products' – rock fill and high permeability drainage material

Table A1 – Source rock tests

Source test property	Test Method
Petrographic analysis	ASTM C295
Wet strength[1,5]	AS1141.22
Wet / Dry strength variation[5]	AS1141.22
Degradation factor[2]	Q208B
Water absorption	AS1141.6.1
Point load strength index Is_{50}[3]	AS4133.4.1
Crushed particles[4]	AS1141.18

Notes:

1. Only applicable to materials used for high permeability drainage material.
2. Test is only required, if rock fill shall subject to inundation more than 12 hours.
3. Only applicable to materials used for rock fill material.
4. Only applicable to Type 1 High Standard Granular Base (HSG).
5. The test shall be carried out on the fraction from AS 13.2 mm to AS 9.5 mm.

Table A2 – Product tests[3]

Product test property	Test Method
Particle size distribution[1]	AS1289.3.6.1
Maximum particle size[2]	AS1289.3.6.1 or Q230

Notes:

1. Refer to Table 18.2.4.2 for materials for high permeability drainage layer in MRTS04.
2. Only applicable to rock fill material.
3. Product tests are compulsory for new quarry registration or upon request by the Quarry Registration System for reregistration.

Appendix B

Source rock and product compliance tests for:

MRTS05 Unbound Pavements

MRTS07B Insitu Stabilised Pavements using Cement or Cementitious Blends

MRTS07C Insitu Stabilised Pavements using Foamed Bitumen

MRTS08 Plant-Mixed Stabilised Pavements

MRTS09 Plant-Mixed Pavement Layers Stabilised using Foamed Bitumen

MRTS10 Plant-Mixed Lightly Bound Pavements

Relevant quarry 'nominated product' – unbound paving materials (coarse component only)

Table B1 – Source rock tests

Source Test Property	Test Method
Petrographic analysis	ASTM C295
Wet strength[1]	AS1141.22
Wet / Dry strength variation[1]	AS1141.22
Degradation factor	Q208B

Notes:

1. The test shall be carried out on the fraction from AS 13.2 mm to AS 9.5 mm.

Table B2 – Product tests[3]

Product test property	Test Method
Flakiness index	AS1141.15
Crushed particles[1]	AS1141.18
Particle size distribution	AS1289.3.6.1
California Bearing Ratio (CBR)	Q113A, Q113C
Liquid limit	Q104A
Plastic limit and plasticity index	Q105
Linear shrinkage	Q106
Sulfate content[2]	AS1289.4.2.1

Notes:

1. Only applicable to materials used for High Strength Granular (HSG).
2. Only applicable to material to be stabilised.
3. Product tests are compulsory for new quarry registration or upon request by the Quarry Registration System for reregistration.

Appendix C

Source rock and product compliance tests for:

MRTS06 Reinforced Soil Structures

Relevant quarry 'nominated product' – reinforced fill materials

Table C1 – Source rocks tests

Source test property	Test Method
Petrographic analysis	ASTM C295
Wet strength[1,2]	AS1141.22
Wet / Dry strength variation[1,2]	AS1141.22
Degradation factor[1]	Q208B

Notes:

1. Applicable for friction fill material (all system) refer to Table 5.3 in MRTS06.
2. The test shall be carried out on the fraction from AS 13.2 mm to AS 9.5 mm.

Table C2 – Product tests[3]

Product test property	Test Method
Effective angle of friction at constant volume[1]	Q181C
Permeability[1]	AS1289.6.7.1
Particle size distribution[1]	AS1289.3.6.1
Relative compaction[1]	AS1289.5.4.1 or AS1289.5.7.1
Density index[1]	AS1289.5.6.1
pH[2]	AS1289.4.2.1
Electrical resistivity[2]	Q122B
Chloride content[2]	Q130B
Sulfate content[2]	Q131B

Notes:

1. Applicable for friction fill material (all system) refer to Table 5.3 in MRTS06.
2. Applicable for friction fill material for steel reinforced systems refer to Table 5.3 in MRTS06.
3. Product tests are compulsory for new quarry registration or upon request by the Quarry Registration System for reregistration.

Appendix D

Source rock and product compliance tests for:

MRTS13 Bituminous Slurry Surfacing

Relevant quarry 'nominated product' – slurry surfacing aggregate (coarse)

Table D1 – Source rocks tests

Source test property	Test Method
Petrographic analysis	ASTM C295
Wet strength[3]	AS1141.22
Wet / Dry strength variation[3]	AS1141.22
Polished Aggregate Friction Value (PAFV)[1]	Q203
Sand equivalent[2]	AS1289.3.7.1

Notes:

1. Where the typical PAFV of the aggregate is less than 2 greater than the specified value, the minimum testing frequency shall be increased to 1 per six months.
2. Applicable to fine aggregate only.
3. The test shall be carried out on the fraction from AS 13.2 mm to AS 9.5 mm.

Table D2 – Product tests[2]

Product test property	Test Method
Particle size distribution[1]	AS1141.11.1

Notes:

1. Only applicable for combined aggregate and filler.
2. Product tests are compulsory for new quarry registration or upon request by the Quarry Registration System for reregistration.

Appendix E

Source rock and product compliance tests for:

MRTS11 Sprayed Bituminous Treatments (Excluding Emulsion)

MRTS12 Sprayed Bituminous Emulsion Surfacing

MRTS22 Supply of Cover Aggregate

Relevant quarry 'nominated product' – cover aggregate

Table E1 – Source rocks tests

Source test property	Test Method
Petrographic analysis	ASTM C295
Wet strength[1,3]	AS1141.22
Wet / Dry strength variation[1,3]	AS1141.22
Degradation factor[1]	Q208B
Water absorption[1]	AS1141.6.1
Polished Aggregate Friction Value (PAFV)[2]	Q203

Notes:

1. Refer to Table 7.1.3 of MRTS22 for details.
2. There are no compliance requirements in MRTS11, MRTS12 and MRTS22 for this test; however, test results shall be provided for quarry registration purpose only.
3. The test shall be carried out on the fraction from AS 13.2 mm to AS 9.5 mm.

Table E2 – Product tests[2]

Product test property	Test Method
Flakiness index	AS1141.15
Crushed particles[1]	AS1141.18
Weak particles	AS1141.32
Particle size distribution	AS1141.11.1
Average least dimension	AS1141.20.3
Bitumen stripping value – modified plate	Q212B
Degree of aggregate precoating	Q216

Notes

1. Testing not required on material from a blasted face in quarry
2. Product tests are compulsory for new quarry registration or upon request by the Quarry Registration System for reregistration.

Appendix F1

Source rock and product compliance tests for coarse aggregate for:

MRTS30 Asphalt Pavement

MRTS32 High Modulus Asphalt (EME2)

MRTS101 Aggregates for Asphalt

Relevant quarry 'nominated product' – aggregates for asphalt (coarse)

Table F1.1 – Source rocks tests

Source test property	Test Method
Petrographic analysis	ASTM C295
Wet strength[2]	AS1141.22
Wet / Dry strength variation[1,2]	AS1141.22
Degradation factor	Q208B
Particle density (dry basis)	AS1141.6.1
Water absorption	AS 1141.6.1
Polished Aggregate Friction Value (PAFV)	Q203

Notes:

1. For greenstone material only, non-conformance with the stated maximum wet / dry strength variation limit may be accepted, provided the wet strength is at least 210 kN.
2. The test shall be carried out on the fraction from AS 13.2 mm to AS 9.5 mm.

Table F1.2 – Product tests[3]

Product test property	Test Method
Flakiness index	AS1141.15
Particle size distribution	AS1141.11.1
Materials finer than 75 µm	AS1141.12
Fractured face(s)[1,2]	RMS T239

Notes:

1. Testing only required where aggregate is obtained from other than a blasted face in a quarry.
2. For aggregates derived from gravels and meta-sediments.
3. Product tests are compulsory for new quarry registration or upon request by the Manager (Quarry Materials) for reregistration.

Appendix F2

Source rock and product compliance tests for fine aggregate for:

MRTS30 Asphalt Pavement

MRTS32 High Modulus Asphalt (EME2)

MRTS101 Aggregates for Asphalt

Relevant quarry 'nominated product' – aggregates for asphalt (fine)

Aggregates are sourced from a fine crushed rock or natural sand / gravel source.

Table F2.1 – Source rocks tests

Source test property	Test Method
Petrographic analysis	ASTM C295
Wet strength[1,2]	AS1141.22
Wet / Dry strength variation[1,2]	AS1141.22
Degradation factor[3]	Q208B
Particle density (dry basis)	AS1141.5
Water absorption[3]	AS1141.5
Weighted percent loss	AS1141.24

Notes:

1. Only applicable if the source rock for the fine aggregate is different to that used to produce the coarse aggregate.
2. The test shall be carried out on the fraction from AS 13.2 mm to AS 9.5 mm.
3. Testing shall be completed on material passing the 4.75 mm sieve and retained on the 0.075 mm sieve.

Table F2.2 – Product tests[1]

Product test property	Test Method
Particle size distribution	AS1141.11.1
Materials finer than 75 µm	AS1141.12

Notes:

1. Product tests are compulsory for new quarry registration or upon request by the Quarry Registration System for reregistration.

Appendix G1

Source rock and product compliance tests for coarse aggregate for:

MRTS39 Lean Mix Concrete Sub-base in Pavements

MRTS40 Concrete Pavement Base

Relevant quarry 'nominated product' – concrete aggregate (coarse)

Can be produced from hard rock quarry sources and/or natural gravel sources.

Slag aggregate is not permitted.

Table G1.1 – Source rocks tests

Source test property	Test Method
Petrographic analysis	ASTM C295
Wet strength[1]	AS1141.22
Wet / Dry strength variation[1]	AS1141.22
Degradation factor	Q208B
Water absorption	AS1141.6.1
Particle density – dry	AS1141.6.1
Weak particles	AS1141.32

Notes:

1. The test shall be carried out on the fraction from AS 13.2 mm to AS 9.5 mm.

Table G1.2 – Product test[3]

Product test property	Test Method
Flakiness index	AS1141.15
Light particles[4]	AS1141.31
Crushed particles[1]	AS1141.18
Particle shape, 2:1 and 3:1 ratios	AS1141.14
Compacted bulk density	AS1141.4
Particle size distribution	AS1141.11.1
Material finer than 75 µm[4]	AS1141.12
Material finer than 2 µm	AS1141.13
Alkali silica reactivity[1]	AS1141.60.1
Alkali carbonate reactivity[2]	ASTM C1105

Notes:

1. Indicated tests are not always required (refers to MRTS39 and MRTS40 for details) and not applicable to MRTS39.
2. Applies to dolomitic and argillaceous limestones and other carbonate rocks.
3. Product tests are compulsory for new quarry registration or upon request by the Quarry Registration System for reregistration.
4. Limits in MRTS39 and MRTS40 apply to the total coarse aggregates in the mix.

Appendix G2

Source rock and product compliance tests for fine aggregate for:

MRTS39 Lean Mix Concrete Sub-base in Pavements

MRTS40 Concrete Pavement Base

Relevant quarry 'nominated product' – concrete aggregate (fine)

Source rock for crushed fine aggregate
(previously known as manufactured sand)

Table G2.1 – Source rocks tests

Source test property	Test Method
Petrographic analysis	ASTM C295
Water absorption	AS1141.5
Particle density – dry	AS1141.5
Soundness (sodium sulfate)	AS1141.24
Wet strength[1,2,3]	AS1141.22
Wet / Dry strength variation[1,2,3]	AS1141.22
Degradation factor[1]	Q208B

Notes:

1. Only applicable if the source rock for the fine aggregate is different to that used to produce the coarse aggregate.
2. There are no compliance requirements in MRTS39 or MRTS40 for these tests; however, test results shall be provided for quarry registration.
3. The test shall be carried out on the fraction from AS 13.2 mm to AS 9.5 mm.

Table G2.2 – Product test [5]

Product test property	Test Method
Light particles[4]	AS1141.31
Compacted bulk density	AS1141.4
Particle size distribution	AS1141.11.1
Material finer than 75 µm[4]	AS1141.12
Material finer than 2 µm[4]	AS1141.13
Alkali silica reactivity[1]	AS1141.60.1 or AS1141.60.2
Alkali carbonate reactivity[1,2]	ASTM C1105
Deleterious Fines Index (DFI)[3]	AS1141.11.1 (by washing) and AS1141.66
Methylene Blue value (MBV)[1]	AS1141.66
Organic impurities[4]	AS11.41.34, and if required AS1289.4.1.1
Sugar presence[4]	AS1141.35
Acid insoluble residue[4,6]	Tex-612-J
Micro-deval abrasion loss[4,6]	ASTM D728
Flow cone time[1]	RMS T279

Notes:

1. Indicated tests are not always required (refer to MRTS39 and MRTS40 for details).
2. Applies to dolomitic and argillaceous limestones and other carbonate rocks.
3. DFI is the product of MBV and the percentage of material passing the 75 µm sieve.
4. Limits in MRTS39 and MRTS40 apply to the total fine aggregate in the mix.
5. Product tests are compulsory for new quarry registration or upon request by the Quarry Registration System for reregistration.
6. Not applicable to MRTS39

Appendix H1

Source rock and product compliance tests for coarse aggregate for:

MRTS70 Concrete

Relevant quarry 'nominated product' – concrete aggregate (coarse) – both hard rock quarry and crushed natural gravel deposit

Table H1.1 – Source rocks tests

Source test property	Test Method
Petrographic analysis	ASTM C295
Wet strength[2]	AS1141.22
Wet / Dry strength variation[2]	AS1141.22
Degradation factor	Q208B
Water absorption	AS1141.6.1
Particle density – dry	AS1141.6.1
Weak particles	AS1141.32
Particle size distribution grading[1]	AS1141.11.1
Sulfate content	AS1012.20.1
Chloride content	AS1012.20.1
Weighted percent loss	AS1141.24

Notes:

1. Testing only applicable for coarse aggregate sourced from natural deposit.
2. The test shall be carried out on the fraction from AS 13.2 mm to AS 9.5 mm.

Table H1.2 – Product tests [4]

Product test property	Test Method
Flakiness index	AS1141.15
Particle size distribution[1]	AS1141.11.1
Material finer than 75 µm	AS1141.12
Alkali silica reactivity[3]	AS1141.60.1
Alkali carbonate reaction[2,3]	ASTM C1105

Notes:

1. Not required if coarse aggregate is to be from multiple sources.
2. Applies to dolomitic and argillaceous limestones and other carbonate rocks
3. Applies to combined aggregates of concrete mix design.
4. Product tests are compulsory for new quarry registration or upon request by the Quarry Registration System for reregistration.

Appendix H2

Source rock and product compliance tests for fine aggregate for:

MRTS70 Concrete

Relevant quarry 'nominated product' – concrete aggregate (fine) – hard rock quarry

Source rock for crushed fine aggregate
(previously known as manufactured sand)

Table H2.1 – Source rocks tests

Source test property	Test Method
Petrographic analysis	ASTM C295
Wet strength[2,3]	AS1141.22
Wet / Dry strength variation[2,3]	AS1141.22
Degradation factor[1,2]	Q208B
Water absorption	AS1141.5
Particle density – dry	AS1141.5
Micro-deval abrasion loss	ASTM D7428
Weighted percent loss	AS1141.24
Chloride content	AS1012.20.1
Sulfate content	AS1012.20.1

Notes

1. Testing only applicable for fine aggregate sourced from hard rock quarry and natural deposit.
2. Testing reports completed on coarse aggregate can be accepted if registration request is only for fine aggregate.
3. The test shall be carried out on the fraction from AS 13.2 mm to AS 9.5 mm.

Table H2.2 – Product tests [6]

Product test property	Test Method
Particle size distribution	AS1141.11.1
Material finer than 75 µm[4]	AS1141.12
Material finer than 2 µm[4]	AS1141.13
Alkali silica reactivity[1,5]	AS1141.60.1
Alkali carbonate reactivity[1,2,5]	ASTM C1105
Deleterious Fines Index (DFI)[3,4]	AS1141.11.1 (by washing) and AS1141.66

Notes:

1. Indicated tests are not always required (refer to MRTS40 for details).
2. Applies to dolomitic and argillaceous limestones and other carbonate rocks.
3. DFI is the product of MBV and the percentage of material passing the 75 µm sieve.
4. Not applicable for natural gravel deposit.
5. Applies to combined aggregates of concrete mix design.
6. Product tests are compulsory for new quarry registration or upon request by the Quarry Registration System for reregistration.