

Roads

Master Specification

RD-PV-S1 Supply of Pavement Materials

Document Information

KNet Number:	13544166
Document Version:	4
Document Date:	July 2022

DEPARTMENT FOR
INFRASTRUCTURE
AND TRANSPORT



Government of South Australia
Department for Infrastructure
and Transport

Document Amendment Record

Version	Change Description	Date
1	Initial issue (formerly R15 - Supply of Pavement Materials)	28/06/19
2	Formatting for publishing	16/09/19
3	Superscript changes to Table 13-26; particle shape comment in Clause 4.2	August 2020
4	Added recycled crushed glass use in pavement material products. Changes to Recycled Materials and implementation. Minor correction to references for Australian Standard test methods.	July 2022

Document Management

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RD-PV-S1 Supply of Pavement Materials

1 General

1.1 This Part specifies the requirements for the supply and delivery of materials (including crushed quarry products, natural gravel, sand, and recycled materials) to be used in the construction of roadworks, bridgeworks, railways, and other applications associated with construction.

1.2 The following definitions apply to terms used in this Part:

Table RD-PV-S1 1-1 Definitions

Term	Definition
Pavement Materials	Includes: <ul style="list-style-type: none"> • Spalls; • Road Ballast; • Rail Ballast; • Class 3 Recycled Pavement Material; • Class 3 Quarried Pavement Material; • Class 2 Recycled Pavement Material; • Class 2 Quarried Pavement Material; • Class 1 Recycled Pavement Material; • Class 1 Quarried Pavement Material; • Stabilised Pavement Material; • Sealing Aggregate; • Sand; • Asphalt Aggregate; • Mineral Filler for Asphalt, other than Hydrated Lime; and • Arrestor Bed Material.
Traditional Recycled Materials	Includes: <ul style="list-style-type: none"> • Recycled Crushed Concrete; • Blast Furnace Slag; • Recycled Crushed Glass; • Recycled Asphalt Planings (RAP)
Alternative Recycled Materials	Includes recycled materials that are not Traditional Recycled Materials.
Process Control	A controlled documented system of practices and procedures used to monitor and control the product inputs, equipment, and manufacturing processes to ensure the product replicates the product design.
Secondary Mineral	A mineral which has formed as a consequence of the alteration or replacement (other than by the conditions of normal weathering) of a pre-existing material and without alteration to the form of the rock.

1.3 The following documents apply to this Part:

- a) AS 1141 Sampling and Testing Aggregates
- b) AS 1289 Methods for Testing Soils for Engineering Purposes
- c) AS 2758 Aggregates and Rock for Engineering Purposes
- d) AS 2891 Methods of Sampling and Testing Asphalt
- e) AS 1152 Specification for Test Sieves
- f) NATA National Association of Testing Authorities, Australia
- g) RMS Txxx Roads and Maritime Services NSW Test Procedure xxx.

- h) TP Department for Infrastructure and Transport Test Procedure (refer https://www.dit.sa.gov.au/materials_technology_documents/test_procedures2)
- i) AS 5101 Methods for Preparation and Testing of Stabilized Materials
- j) Austroads Technical Specification ATS 3050 "Supply of Recycled Crushed Glass Sand".
- 1.4 The products shall comply with the requirements specified in Appendix 1: Pavement Material Specifications.
- 1.5 If Recycled Materials as per Clause 6 are to be used for any purpose other than construction of Department roadworks, additional environmental and physical requirements may be necessary. This Part does not consider the suitability of Recycled Materials for any other purpose than for use in Department roadworks.

2 Quality Requirements

Quality Plan, Procedures and Documentation

- 2.1 Further to the requirements of PC-QA1 "Quality Management Requirements", the Contractor shall develop and implement a Quality Plan that includes the following procedures at a minimum:

Table RD-PV-S1 2-1 Quality Plan Procedure Requirements

Material	Quality Plan
All materials:	Random selection of sample increments (Clause 5 under "Sampling").
	Representative splitting of bulk samples (Clause 5 under "Sampling").
	Handling and storage of the product including the avoidance of intermixing, contamination, or deterioration which may affect the product properties.
	Inspection of bins, stockpile pads, and trucks for contamination and operational efficiency
	Requirements for inspection and testing of processes and products (including the Inspection and Test Plan, Clause G20.7 "Inspection and Testing").
Material sourced from Quarries:	Plant calibration and maintenance, including weighing equipment, flow meters, and proportioning systems (where installed).
	Primary, Secondary, and Tertiary Crusher inspection, wear adjustment, and maintenance.
	Screen Deck inspection, wear adjustment, and maintenance.
	Use and handling of explosives.
	Assessment of quarry face and shot rock.
	Moisture control of shot rock.
	Handling processes for shot rock.
Requirements for labelling of storage bays and silos.	
Sealing Aggregate:	Stripping performance (vide Clause 4 under "Aggregate Stripping (TP 705)").
Asphalt Aggregates:	Additional process control elements (Clauses 2 and 10).
Basic Igneous Source Rock:	Control of secondary mineralisation (Clause 4 under "Secondary Mineralisation").
Recycled Crushed Concrete:	Control of constituent materials, including supplementary materials (Clause 6 under "Recycled Crushed Concrete").
Recycled Crushed Glass:	Quality Control and Compliance Testing (Clause 6 under "Recycled Crushed Glass")
Stabilised Materials:	Control of binder content (Clause 8 under "Additive Content Determination").
	Use of retarder (Clause 8 under "Addition of Retarder").
	Working time for other binders (Clause 8 under "Time Requirements").

- 2.2 Where the Principal does not hold a copy of the current procedures, these procedures shall be submitted at least 28 days prior to the commencement of production and shall generate objective evidence that the specified quality requirements have been achieved.
- 2.3 Provision of the documentation listed in this Clause shall constitute a **Hold Point**.

Asphalt Aggregates

- 2.4 Where asphalt aggregates are to be produced, the Contractor shall develop and implement a Process Control System which includes:
- a description of the flow of materials and the processes carried out on them, from input materials to the plant through to delivery of aggregates to the customer;
 - a flow diagram and identification of the key elements of the manufacturing process requiring monitoring, measurement, or verification; and
 - constant monitoring and statistical analysis of records to verify process capability and product characteristics.

Identification

- 2.5 In addition to the requirements of PC-QA1 "Quality Management Requirements", Clause 5 "Product Identification and Traceability" under "Identification", the pavement materials shall be produced in identifiable Lots not greater than the following:
- Sealing and Asphalt Aggregates, Arrestor Bed Material: 500 tonnes.
 - Other Pavement Materials: 1 000 tonnes.
- 2.6 A Lot of the material shall be produced under uniform conditions from the same source material and / or the same constituent components and be essentially homogeneous with respect to composition and general appearance. Notwithstanding PC-QA1 "Quality Management Requirements", Clause 5 "Product Identification and Traceability" under "Definition", a Lot may be prepared from more than one day's production.

Dedicated Stockpiles

- 2.7 The Contractor shall establish dedicated stockpiles conforming to the following requirements:
- The location of each Lot shall be accurately identified until conformance of the Lot with the Specification requirements has been verified.
 - Any non-conforming Lots placed into these stockpiles shall be removed.
 - Where the stockpile contains more than one Lot, the stockpile shall be constructed in horizontal layers with each successive layer fully contained within the area of the upper surface of the preceding layer. Levelling of each layer shall be carried out in a manner to minimise segregation and material breakdown.
 - Once a dedicated stockpile has been completed, further material shall not be added to the stockpile.

3 Acceptance of Material

- 3.1 Acceptance of materials will be undertaken on a Lot basis and the total quantity of material in the Lot will be subject to acceptance or rejection.
- 3.2 The material in a Lot will be accepted if:
- the material has been produced and stockpiled in accordance with the Specification; and
 - the NATA endorsed test results for the bulk sample comply with the requirements specified.

4 Quality of Materials

General

- 4.1 All material shall be clean, sound, hard, and durable.
- 4.2 Mica, shale and similar laminated materials, adherent coatings, any foreign material, or nodular rounded (spherical) particles shall not be present in form or sufficient quantity to produce adverse effect upon the usage and performance of the material.
- 4.3 Products shall be produced from natural rock or sand deposits, as appropriate, except where otherwise permitted in this Part.
- 4.4 Recycled Materials shall conform to the requirements detailed in Clause 6, "Recycled Materials", which are specific to use in roadworks.
- 4.5 All materials shall be free from plant material (including seeds) from declared plants, declared under the Landscape South Australia Act 2019.

Properties

Additive contents shall be within the tolerances stated in Clause 8 under "

- 4.6 Additive Content Determination" in the case of Plant Mixed materials.
- 4.7 For all materials specifications, square aperture sieves conforming to AS 1152 "Specification for Test Sieves" shall be used for the determination of grading for particle sizes 75 mm and finer. Coarser sizes shall be determined by linear measurement.

Aggregate Stripping (TP 705)

- 4.8 The Contractor shall:
 - a) implement a design process to prevent the adverse stripping performance of sealing aggregates;
 - b) include a procedure for determining the stripping performance of the sealing aggregates in both wet and dry states in the Quality Plan;
 - c) include pre-coating agents and adhesion agents in the testing program; and
 - d) report the wet and dry test results.

Secondary Mineralisation

- 4.9 This clause applies where basic igneous source rock (as defined in AS 2758) is used for the production of a Pavement Material complying with this Part.
- 4.10 Secondary mineralisation shall not be present in the Pavement Material to the extent that it adversely affects the Pavement Material's durability and / or long term performance.
- 4.11 The Quality Plan shall:
 - a) indicate the level and nature of secondary mineralisation of the source rock, including a description of the potential of the secondary mineralisation to cause material degradation;
 - b) include procedures for monitoring the quality of the product and component materials during quarrying and production, addressing the control and monitoring of secondary mineralisation;
 - c) include rock type and durability classifications (i.e. Sound, Marginal or Unsound Rock) provided by VicRoads in accordance with VicRoads Specification 801 "Source Rock for the Production of Crushed Rock and Aggregates"; and
 - d) address any other information reasonably requested by the Principal.
- 4.12 VicRoads specifications are available from: <http://webapps.vicroads.vic.gov.au/VRNE/csdspeci.nsf/>.

5 Sampling and Testing

Sampling

- 5.1 Unless specified otherwise, the Contractor shall arrange for sampling of material to be carried out by an appropriately NATA certified laboratory in accordance with TP 226 "Sampling of Soils, Aggregates and Rock".
- 5.2 The Contractor shall include in the Quality Plan procedures for the random selection of sample increments appropriate to the sampling method used and the process of splitting and recombining to produce two samples equally representative of the bulk sample.
- 5.3 Preparation of samples for testing will be undertaken in accordance with AS 1289.1.
- 5.4 Unless otherwise approved, the NATA laboratory shall split each bulk sample to produce an audit sample to be held by the NATA certified laboratory for a period no less than 14 days after submission of test results.
- 5.5 Audit samples for Sealing Aggregates shall be held until the end of the Defects Liability Period and the sample supplied to the Principal, if requested.

Testing

- 5.6 Notwithstanding TP 226 "Sampling of Soils, Aggregates and Rocks" and Clause 6.1.1 "General" therein, Quality Control testing for each product shall be undertaken on a sample representing each production Lot.
- 5.7 The Quality Control tests listed on each Product Specification Sheet (Appendix 1: Pavement Material Specifications) shall be performed on the sample representing each Lot in accordance with the testing frequency specified in Table RD-PV-S1 5-1.

Table RD-PV-S1 5-1 Assurance Minimum Testing Frequencies

Test Procedure	Property	Minimum Test Frequency
SPALLS		
AS 1141.11.1	Particle Size Distribution	One test per 5 Lots
ROAD BALLASTS		
AS 1141.11.1	Particle Size Distribution	One test per 5 Lots
AS 1141.23	Los Angeles Value	One test per 5 Lots
RAIL BALLAST		
AS 1141.4	Bulk Density	Two tests 1st Lot, One test per Lot thereafter
AS 1141.6.1	Particle Density	Two tests 1st Lot, One test per Lot thereafter
AS 1141.11.1 & AS 1141.12	Particle Size Distribution	Two tests 1st Lot, One test per Lot thereafter
AS 1141.22	Wet / Dry Strength	Two tests 1st Lot, One test per Lot thereafter
AS 1141.23	Los Angeles Value	Two tests 1st Lot, One test per Lot thereafter
AS 1141.14	Misshapen Particles	Two tests 1st Lot, One test per Lot thereafter
QUARRIED PAVEMENT MATERIALS		
TP134	Particle Size Distribution	One test per Lot
AS 1289 3.1.2 ,3.2.1, 3.3.1 & 3.4.1	Atterberg Limits	One test per Lot
AS 1141.23	Los Angeles Value	One test per Lot ⁽³⁾
TP183	Resilient Modulus / Deformation	One test per 100 Lots (Performance based only)
TP184	Triaxial Compression	One test per 100 Lots (Performance based only)

Test Procedure	Property	Minimum Test Frequency
RECYCLED PAVEMENT MATERIALS		
TP134	Particle Size Distribution	One test per Lot
AS 1289 3.1.2, 3.2.1, 3.3.1 & 3.4.1	Atterberg Limits	One test per Lot
RMS T276	Foreign Materials Content	One test per Lot
AS 2891.3.3	Bitumen Content	One test per Lot ⁽³⁾
AS 1141.23	Los Angeles Value	One test per Lot ⁽³⁾
TP183	Resilient Modulus / Deformation	One test per 100 Lots (Performance based only)
TP184	Triaxial Compression	One test per 100 Lots (Performance based only)
STABILISED PAVEMENT MATERIALS		
TP134	Particle Size Distribution	One test per Lot
AS 1289 3.1.2, 3.2.1, 3.3.1 & 3.4.1	Atterberg Limits	One test per Lot
AS 1141.23	Los Angeles Value	One test per Lot ⁽³⁾
Contractor Quality Plan	Binder Content	One test / 150 tons (refer Clause 8 “Additive Content Determination”)
AS 5101.4	UCS (Strength Control)	Two tests / 150 tons (refer Clause 8 “Strength Determination Testing”)
AS 5101.4	UCS (Binder Content Control)	One test per 10 000 tons
SEALING AGGREGATES		
AS 1141.11.1	Particle Size Distribution	One test per Lot
AS 1141.15	Flakiness Index	One test per Lot
TP244	% Flat Particles	One test per Lot
AS 1141.14	Misshapen Particles	One test per Lot
AS 1141.23	Los Angeles Value	One test per Lot ⁽³⁾
AS 1141.42, AS 1141.40	Polished Aggregate Friction	One test annually ⁽²⁾
TP705	Aggregate Stripping	One test annually ⁽²⁾
AS 1141.20.1 or 20.2	Average Least Dimension – direct	Three tests per Lot
AS 1141.20.3	Average Least Dimension - calculated	One test per Lot
ASPHALT AGGREGATES		
AS 1141.11.1	Particle Size Distribution	One test per Lot
AS 1141.15	Flakiness Index	One test per Lot
TP240	Elongation Index	One test per Lot
AS 1141.23	Los Angeles Value	One test per Lot ⁽³⁾
AS 1141.5, AS 1141.6.1 & AS 1141.6.2	Water Absorption & Densities	One test per 10 Lots
AS 1141.24	Sulphate Soundness	One test per 10 Lots ⁽³⁾
AS 1141.30	Unsound & Marginal Stone Contents	One test per Lot ⁽¹⁾⁽³⁾
AS 1141.42, AS 1141.40	Polished Aggregate Friction	One test annually ⁽²⁾ (refer Clause 10)
SANDS		
TP134	Particle Size Distribution	One test per Lot
AS 1289 3.1.2, 3.2.1, 3.3.1 & 3.4.1	Atterberg Limits	One test per Lot ⁽³⁾
AS 1141.34	Organic Impurities	One test per Lot ⁽³⁾

Test Procedure	Property	Minimum Test Frequency
MINERAL FILLER FOR ASPHALT, OTHER THAN HYDRATED LIME		
AS 1141.11.1	Particle Size Distribution	One per contract
AS 1141.17	Voids in Dry Compacted Filler	One per contract
AS 1289.B1.3	Moisture Content	One per week
AS 2350.8	Specific Surface	One per contract
AS 3583.3	Loss on Ignition	One per contract
AS 1141.8	Water Soluble Fraction	One per week
ADDITIONAL REQUIREMENTS FOR BASIC IGNEOUS SOURCE ROCK		
AS1141.26	Secondary Mineral Content	One test every two years
AS 1141.29	Accelerated Soundness Index	One test every two years
AS 1141.30	Unsound & marginal stone contents	Three tests per Lot
ARRESTOR BED MATERIAL		
TP134	Particle Size Distribution	One test per Lot
RMS T239	Fractured Faces	One test per Lot
AS 1141.14	Misshapen Particles	One test per Lot
WA 223.1	Crushing and Cracking	One test per contract
AS 1141.23	Los Angeles Value	One test per Lot
WA Specification 6706/02/1312 Attachment	Slump Angle	One test per Lot
AS 1141.4	Bulk Density	One test per contract

Notes:

- (1) Testing for Unsound & marginal stone contents under "Additional Requirements for Basic Igneous Source Rock", (if required) will include this test in the total number required per Lot.
 - (2) The Principal reserves the right to obtain material and undertake annual testing as necessary.
 - (3) Refer Clause 5 "Reduced Rate of Testing" for more information.
- * Refer to the Clause listed for further information about the testing frequency.

Reduced Rate of Testing

- 5.8 The Contractor may adopt a reduced frequency of testing where approval has been granted under Part 2 of the Guidelines for the Department's Prequalification Scheme for the Supply of Pavement Materials. Refer: https://www.dit.sa.gov.au/contractor_documents/prequalification.
- 5.9 Subject to Part 2 of the Guidelines for the Department's Prequalification Scheme for the Supply of Pavement Materials, the Contractor may apply for a reduced frequency of testing for this Contract.
- 5.10 Acceptance of a reduced rate of testing does not derogate from the Contractor's obligation to provide conforming Pavement Material.

6 Recycled Materials

- 6.1 Where Pavement Materials derived from natural quarried sources have been specified in the Contract Documents and / or drawings, the Contractor may (in accordance with this Clause 6):
 - a) use Recycled Pavement Materials derived from Traditional Recycled Material, or blends of Traditional Recycled Material and Quarried Pavement Materials;
 - b) submit a proposal to use Pavement Materials derived from Alternative Recycled Materials, or blends of Alternative Recycled Materials, Traditional Recycled Materials, and Quarried Pavement Materials;
- 6.2 Proposals to use Pavement Materials derived from Alternative Recycled Materials shall constitute a **Hold Point**. Proposals must be supported by the following information, in addition to the information required under Clause 7 "Performance Based Pavement Materials":
 - a) The source of the material and where it is processed;
 - b) Proposed location (within the corridor / project area as well as within the pavement profile);

- c) Proposed quantity (percentage replacement as well as overall tonnage);
 - d) Information necessary to demonstrate that the material does not present an unacceptable risk of environmental harm, including (as appropriate):
 - i) Classification against EPA Waste Fill criteria (or other criteria deemed appropriate for the source of the material and the proposed reuse);
 - ii) Findings of relevant research undertaken into any potential environmental issues associated with use of the material (including leaching potential, risk of micro-plastic pollution etc), and details of any proposed management strategies; and
 - iii) Report from suitably qualified contamination consultant verifying that the proposed re-use is acceptable.
 - e) End of pavement-life disposal options, including whether the material can be recycled effectively; and
 - f) Any available information on whole of life carbon footprint.
- 6.3 Where Performance Based materials are used and the constituent source materials vary (e.g., Recycled Crushed Concrete, and Recycled Crushed Concrete with Recycled Crushed Glass), a separate mix design for each proposed composition shall be prepared, in accordance with Clause 7.

Recycled Crushed Concrete

- 6.4 Recycled Crushed Concrete is a product sourced from reclaimed structural concrete from construction and demolition materials, and may include supplementary source materials (brick, tile, and asphalt).
- 6.5 Products comprising Recycled Crushed Concrete – or blends of naturally sourced quarried material, other Traditional Recycled Materials, and Recycled Crushed Concrete – shall comply with the designated quality requirements for Class 1, 2, or 3 Recycled Pavement Materials detailed in Appendix 1: Pavement Material Specifications.
- 6.6 No more than 20% by mass of supplementary source materials and / or Traditional Recycled Materials (other than Recycled Crushed Concrete or Blast Furnace Slag which may be added up to 100%) may be incorporated into Class 1, 2, or 3 Recycled Pavement Materials, and the constituent proportions shall remain unchanged during production.

Recycled Crushed Glass

- 6.7 Recycled Crushed Glass (RCG) is recovered glass that has been processed to produce a sand-like glass material.
- 6.8 Recycled Crushed Glass for use as a granular material in Pavement Materials must satisfy the requirements of Austroads Technical Specification ATS 3050 “*Supply of Recycled Crushed Glass Sand*” and be free from asbestos.
- 6.9 Suppliers need to ensure that material is sufficiently clean for the intended use.
- 6.10 Quality Control documentation for Recycled Crushed Glass, as required by Clause 2.1, shall include:
- a) Source of raw materials and sensitivity of mix to input streams;
 - b) Production plant, method of production, and method of controlling the quality of the final product;
 - c) Evidence that the source and method proposed are suitable for the required quantity and quality of Recycled Crushed Glass;
 - d) Evidence (e.g., test results) that the Recycled Crushed Glass satisfies the requirements of Austroads Technical Specification ATS 3050 “Supply of Recycled Crushed Glass Sand”;
 - e) Management of test repeatability, uniformity (no segregation), and the method of mixing of the raw materials and blending with other source materials; and
 - f) Address any other information reasonably requested by the Principal.

- 6.11 Recycled Crushed Glass may be blended with asphalt aggregate; Class 1, 2, and 3 Recycled Pavement Materials; and Sands, in accordance with the requirements of this Clause 6, providing that the overall specification and quality requirements detailed in Appendix 1: Pavement Material Specifications are met.
- 6.12 Recycled Crushed Glass may be incorporated into Pavement Materials in the following proportions:

Table RD-PV-S1 6-1 Recycled Crushed Glass in Pavement Materials

Base Product	% Recycled Crushed Glass Permitted
Class 1 Recycled Pavement Materials	Max 5%
Class 2 Recycled Pavement Materials	Max 10%
Class 3 Recycled Pavement Materials	Max 15%
Asphalt Aggregates	Refer Part RD-BP-S2 "Supply of Asphalt"
Sand	Max 100%

- 6.13 For Class 1, 2, and 3 Recycled Pavement Materials, the total constituent proportions of supplementary source materials (brick, tile, and asphalt) and Recycled Crushed Glass combined (Refer Clauses 6.4 to 6.6) shall not exceed 20%, noting the limits on permissible Recycled Crushed Glass proportions in Table RD-PV-S1 6-1.
- 6.14 Cement shall not be used as a stabiliser or binding agent for materials containing Recycled Crushed Glass.

Blast Furnace Slag

- 6.15 Products comprising blast furnace slag or blends of quarried material, Traditional Recycled Materials, and blast furnace slag shall comply with the designated quality requirements for Class 1, 2, or 3 Recycled Pavement Materials detailed in Appendix 1: Pavement Material Specifications.
- 6.16 Blast furnace slag used in Recycled Pavement Materials referred to in this clause shall not be granulated or ground.
- 6.17 Blast furnace slag shall meet the requirements of the SA EPA Waste Derived Fill (Blast Furnace Slag) Specification 2015.
- 6.18 The Supplier shall provide the Principal with a written statement of compliance certifying that the Blast Furnace slag complies with the chemical criteria of the SA EPA Waste Derived Fill (Blast Furnace Slag) Specification 2015.

7 Performance Based Pavement Materials

- 7.1 This Clause specifies the requirements for Performance Based Materials, which are designed and manufactured to meet particular levels of in-service pavement performance. Performance Based Materials may only be used where permitted in Contract Documents.
- 7.2 Where a Contractor proposes to design a pavement material to meet pavement performance criteria, the following applies:
- The Contractor shall determine the Mix Design properties for the product based on the full suite of tests identified in the Mix Design Limits of the product specification. With the exception of Resilient Modulus / Deformation testing and Triaxial Compression testing, results from testing a minimum of ten samples of product shall be used to determine the average test value. This value will be the nominated Mix Design value for that test property or sieve size. Each sample shall be representative of a minimum of 100 tonnes of product.
 - Mix Designs shall comply with the limits specified in "Mix Design Limits" of each product specification.
 - The Contractor shall submit a reference sample of the product.
 - Resilient Modulus / Deformation testing and Triaxial Compression testing shall be performed in duplicate on a sample representative of the submitted mix design and reference sample.

- e) The Contractor may be requested to submit further evidence of conformance to Resilient Modulus and Triaxial Compression requirements on samples representative of the extremes of the permissible grading envelope for manufacturing, and / or field trial evidence of acceptable performance where the mix design is within one standard deviation of the Mix Design Limit for any specified sieve size.
- f) The Contractor shall submit supporting mix design and / or specification conformance documentation, including results for the full suite of tests identified in the Mix Design limits of the product specification. Subject to the product meeting all requirements of the Specification, the Department will register the mix design and apply the Manufacturing Tolerance to the Mix Design for Product Quality Control purposes.
- g) The Contractor shall not supply material under a Mix Design specification until written approval and the manufacturing tolerances have been received. Approval will remain current for a period not exceeding 2 years. The approval may be withdrawn in the event of unsatisfactory field performance of the material, or if the reference sample is no longer representative of delivered material.

8 Stabilised and Wet-Mixed Materials (Plant Mixed)

General

- 8.1 Stabilised materials (which includes the addition of cement, fly ash, lime, bitumen, other binders, or combinations of binders) and wet-mixed materials shall comply with this clause.

Stabilised materials are specified by class of pavement material, and by either binder content or strength. Materials specified by binder content basis shall be tested for binder content in accordance with Clause 8 under "

- 8.2 Additive Content Determination".

- 8.3 Materials specified on a strength basis shall be tested for Unconfined Compressive Strength in accordance with Clause 8 under "Strength Determination Testing".

- 8.4 The addition of cement, fly ash, bitumen, lime, or slag and water shall be described by a naming convention as given in the following examples:

- a) SPM2/20QGC4 20 mm Class 2, 4% Cement Stabilised Quarried Pavement Material.
- b) SPM1/30RMC4MPa 30 mm Class 1, 4 MPa Cement Stabilised Recycled Pavement Material.
- c) SPM2/40QGB3 40 mm Class 2, 3% Bitumen Stabilised Quarried Pavement Material.
- d) SPM2/20QGL1F2 20 mm Class 2 Stabilised Quarried Pavement Material with 1% Lime, and 2% Fly ash.
- e) SPM2/30QGL1S4 30 mm Class 2 Stabilised Quarried Pavement Material with 1% Lime and 4% Slag.

- 8.5 Wet-mixed material is a mixture of Class 1, 2, or 3 Pavement Material and water, produced at a central mixing plant to a controlled moisture content that is based on the modified optimum moisture content of the material. Wet-mixed materials are identified by the suffix "W" as illustrated in the following examples:

- a) PM1/20QGW 20 mm Class 1 Quarried Pavement Material Wet-Mix (Grading Based).
- b) PM1/20RMW 20 mm Class 1 Recycled Pavement Material Wet-Mix (Performance Based).

Recycled Material Products

- 8.6 Cement, fly ash, lime, slag, bitumen, or other binders shall not be added to recycled pavement material products without prior approval.

- 8.7 Where a Contractor proposes to produce a stabilised recycled product, the following applies:

- a) The Contractor shall submit evidence of compliance of the product to the full suite of tests detailed in the Product Specification Sheets (Appendix 1: Pavement Material Specifications) for Stabilised Pavement Material.
- b) The Contractor shall submit a reference sample of the untreated recycled material, which shall be representative of a minimum of ten samples of product, and a sample of the proposed binder.
- c) The Contractor shall undertake Unconfined Compressive Strength testing on three pairs of specimens at each binder content and curing age detailed in the Product Specification. Samples prepared for testing shall be representative of the reference sample.

Strength Based Stabilised Material

8.8 Where the use of a stabilised material meeting strength-based acceptance criteria is permitted under this Contract, the following applies prior to commencement of supply:

- a) The Contractor shall submit evidence of compliance of the product to the full suite of tests detailed in the Product Specification Sheets (Appendix 1: Pavement Material Specifications) for Stabilised Pavement Material (Strength Control).
- b) The Contractor shall submit a reference sample of the unestablished material, which shall be representative of a minimum of 10 samples of product, and a sample of the proposed binder.
- c) The Contractor shall undertake Unconfined Compressive Strength testing on 3 pairs of specimens at the binder contents and curing age required to meet the full range of strength targets detailed in the Product Specification. Samples prepared for testing shall be representative of the reference sample.

8.9 Strength based stabilised material shall not be supplied without the prior approval of the Principal.

Binders

8.10 Binders and Additives shall comply with Table RD-PV-S1 8-1.

Table RD-PV-S1 8-1 Binder Properties

Material	Properties
Bitumen	Class 170 residual bitumen to RD-BP-S1 "Supply of Bituminous Materials" or other approved special foam binder.
Cement	Blended cement complying with AS 3972 "Portland and Blended Cements".
Lime	Hydrated lime or quick lime complying with AS 1672 "Building Limes". Quick lime shall be fully slaked.
Fly ash	Fine, medium or coarse fly ash meeting the requirements of AS 3582 "Supplementary Cementitious Materials for use with Portland Cement – Part 1 Fly Ash".
Slag	Ground granulated blast furnace slag shall meet the requirements of AS 3582 "Supplementary Cementitious Materials for use with Portland Cement – Part 2 Ground Granulated Blast Furnace Slag".
Chemicals	Proprietary chemical binders may be used provided documented evidence as to their suitability is submitted. Procedures for the use, dosage and handling of the binder shall be included in the Contractor's Quality Plan.
Water	Water shall be potable

Additive Content Determination

Bitumen

8.11 The bitumen content of the treated material shall be as ordered, expressed as a target percentage of dry mass. The bitumen content may vary up to $\pm 0.25\%$ from that ordered. The bitumen content shall be determined in accordance with AS 2891.3.3 "Binder Content and Aggregate Grading – Pressure Filter Method".

Powder Form Binders

- 8.12 The binder content of the treated material shall be as ordered, expressed as a target percentage of dry mass. The binder content may vary up to $\pm 0.5\%$ from that ordered. The Contractor shall identify in the Quality Plan a methodology for control, measurement, and quality assurance of the specified binder content. Proposed procedures shall be subject to approval prior to the supply of material.

Liquid Binders

- 8.13 Liquid binders shall be ordered as a minimum percentage of the dry mass of untreated product or by loose volume of untreated product. The Contractor shall identify in the Quality Plan a methodology for control and quality assurance of the binder content.

Combination Binders

- 8.14 Combination binders shall be ordered as a minimum percentage of the dry mass of untreated product or by loose volume of untreated product. The Contractor shall identify in the Quality Plan a methodology for control and quality assurance of the respective binder contents.

Water

- 8.15 The moisture content of bitumen, cement, lime, and / or fly ash treated material when combined with water, and water by itself ordered as a wet mixed product, shall be ordered expressed as a percentage of dry mass. The moisture content may vary up to $\pm 1.0\%$ from that ordered.

Test Frequency

- 8.16 The Contractor shall include in the Quality Plan procedures for verifying the additive content for each 150 tonnes of treated material.

Strength Determination Testing

Powder Form Binders, Liquid Binders and Combination Binders

- 8.17 The strength of the treated material shall be as ordered, expressed as a target Unconfined Compressive Strength in MPa. The average strength of the test cylinders for each test may vary up to $- 0.5$ MPa, $+ 1.0$ MPa from that ordered. Strength shall be determined in accordance with AS 5101.4 "Unconfined Compressive Strength of Compacted Materials".
- 8.18 A contingency representative sample of the untreated material used in the production of plant treated material shall be taken from each day's production.

Test Frequency

- 8.19 Samples of stabilised materials shall be tested for strength at a rate not less than 2 tests (4 test cylinders) per 150 tonnes. Where Contractor developed procedures are proposed, the Contractor shall include in the Quality Plan procedures for verifying the additive content for each 150 tonnes of treated material.

Addition of Retarder

- 8.20 A retarder shall be used with blended cement binders. The proposed retarder and usage rate shall be nominated in the Contractor's Quality Plan. The Contractor's mixing plant shall be fitted with a measuring device to allow accurate measurement of the amount of retarder being added to the mix.

Mixing

- 8.21 The quarry material, selected additive (if specified), and / or water shall be mixed at a central mixing plant of the pugmill type. The mixing plant may be either a batch or continuous type. The mass of charge in a batch mixer or the rate of feed to a continuous type mixer shall not exceed that which will permit complete mixing of all material.
- 8.22 Mixing of material shall be continued until the quarry material, binder, retarder, and water (as applicable) are evenly distributed through the mass and a uniform mixture of unchanging appearance

is obtained. Sufficient mixing capacity shall be provided to produce enough mixture to permit placing up to 200 tonnes of mixture on the road bed per hour.

Transporting

- 8.23 During transportation, the load shall be completely covered with a tarpaulin or similar heavy cover to protect the material against the effect of sun and rain. The cover shall not be removed until the load is about to be tipped.

Time Requirements

- 8.24 Cement treated material shall be delivered to the road bed or construction site within a time sufficient to enable all spreading, shaping, and compaction to be carried out within 2.75 hours of the introduction of cement to the untreated material.
- 8.25 Blends of lime and fly ash or lime treated material shall be delivered to the road bed or construction site on the same day as the introduction of lime and / or fly ash to the moist material.
- 8.26 Bitumen treated material may be stockpiled for a period not exceeding 4 weeks.
- 8.27 Wet mix material shall be delivered to the road bed or construction site and placed / compacted in a time that ensures that the moisture content of the material remains within the specified tolerance of that at which it was ordered.
- 8.28 Other binders shall be delivered to the site within time periods detailed in the Contractor's Quality Plan.
- 8.29 The time of binder addition shall be recorded on the cart-note for each load of stabilised material.

9 Rail Ballast

- 9.1 The production of rail ballast shall comply with this Clause 9.
- 9.2 The Contractor shall undertake petrographic analyses of the source rock to the extent that all mineralogical variations of the rock are examined.
- 9.3 Where basic igneous source rock is used for the production of ballast, the Contractor shall indicate in the Quality Plan the maximum acceptable level of secondary mineralisation of the source rock and procedures for monitoring the product during quarrying and production.
- 9.4 Notwithstanding that the rock may comply with other requirements of this Specification, ballast shall not contain minerals in a concentration that may be detrimental to the overall performance of the ballast in service.
- 9.5 The ballast shall be managed at all stages to prevent material contamination, segregation, and degradation. Unnecessary handling shall be avoided at all times, such as repeated mechanical handling and dropping of material.
- 9.6 Where the ballast is to be used under steel sleepers, the ballast shall comply with Classification RAIL60S.

10 Asphalt Aggregates and Sand

- 10.1 The production of asphalt aggregates and sand shall comply with this Clause 10.
- 10.2 The production process shall provide material to meet the grading requirements for the appropriate aggregate size to produce a particular asphalt type.
- 10.3 Once the design has been completed, the grading of the aggregate to be supplied shall be known as the "Nominated Grading". Production tolerances for the assessment of conformity to the design shall comply with Appendix 1: Pavement Material Specifications.

- 10.4 The associated properties of each aggregate type complying with the property limits as shown in Appendix 1: Pavement Material Specifications shall be determined and thereafter be referred to as the Nominated Property; for example, "LA Nominated Property".
- 10.5 Polished Aggregate Friction Value (PAFV) assessment of any size product from a particular source shall be undertaken on aggregates within the 6.7 mm to 9.5 mm (exclusive) size fraction of the same product source in accordance with AS 1141.40 Section 7.1.
- 10.6 Recycled Crushed Glass may be incorporated into asphalt aggregates and sand, in accordance with Clause 6.

11 Hold Points

11.1 The following is a summary of Hold Points referenced in this Part:

Table RD-PV-S1 11-1 Summary of Hold Points

Document Ref.	Hold Point	Response Time
2.3	Submission of Procedures (where the Principal does not hold a copy of the current procedures)	7 Working Days
6.2	Proposal to use Pavement Material derived from Alternative Recycled Material	14 Working Days

12 Verification Requirements and Records

12.1 The Contractor shall supply written verification that the testing undertaken demonstrates compliance with the requirements of this Part and supply the verification with the lot package.

13 Appendix 1: Pavement Material Specifications

Table RD-PV-S1 13-1 Pavement Material Specification – List of Products

Identification No.	Source	Mix Design	Product
SPALLS			
SP300	Quarry	No	300 mm Spalls
ROAD BALLAST			
RB100	Quarry	No	100 mm Road Ballast
RB65	Quarry	No	65 mm Road Ballast
RAIL BALLAST			
RAIL50	Quarry	No	50 mm Rail Ballast
RAIL60	Quarry	No	60 mm Rail Ballast
RAIL60S	Quarry	No	60 mm Rail Ballast (steel sleepers)
CLASS 3 RECYCLED PAVEMENT MATERIALS			
PM3/20RG	Recycled	No	20 mm Class 3 Recycled Pavement Material [Grading Based]
PM3/40RG	Recycled	No	40 mm Class 3 Recycled Pavement Material [Grading Based]
PM3/55RG	Recycled	No	55 mm Class 3 Recycled Pavement Material [Grading Based]
PM3/75RG	Recycled	No	75 mm Class 3 Recycled Pavement Material [Grading Based]
CLASS 3 QUARRIED PAVEMENT MATERIALS			
PM3/20QG	Quarry	No	20 mm Class 3 Quarried Pavement Material [Grading Based]
PM3/40QG	Quarry	No	40 mm Class 3 Quarried Pavement Material [Grading Based]
PM3/55QG	Quarry	No	55 mm Class 3 Quarried Pavement Material [Grading Based]
PM3/75QG	Quarry	No	75 mm Class 3 Quarried Pavement Material [Grading Based]
CLASS 2 RECYCLED PAVEMENT MATERIALS			
PM2/20RG	Recycled	No	20 mm Class 2 Recycled Pavement Material [Grading Based]
PM2/30RG	Recycled	No	30 mm Class 2 Recycled Pavement Material [Grading Based]
PM2/40RG	Recycled	No	40 mm Class 2 Recycled Pavement Material [Grading Based]
PM2/20RM	Recycled	Yes	20 mm Class 2 Recycled Pavement Material [Performance Based]
PM2/30RM	Recycled	Yes	30 mm Class 2 Recycled Pavement Material [Performance Based]
CLASS 2 QUARRIED PAVEMENT MATERIALS			
PM2/20QG	Quarry	No	20 mm Class 2 Quarried Pavement Material [Grading Based]
PM2/30QG	Quarry	No	30 mm Class 2 Quarried Pavement Material [Grading Based]
PM2/40QG	Quarry	No	40 mm Class 2 Quarried Pavement Material [Grading Based]
PM2/20QM	Quarry	Yes	20 mm Class 2 Quarried Pavement Material [Performance Based]
PM2/30QM	Quarry	Yes	30 mm Class 2 Quarried Pavement Material [Performance Based]

Identification No.	Source	Mix Design	Product
CLASS 1 RECYCLED PAVEMENT MATERIALS			
PM1/20RG	Recycled	No	20 mm Class 1 Recycled Pavement Material [Grading Based]
PM1/30RG	Recycled	No	30 mm Class 1 Recycled Pavement Material [Grading Based]
PM1/40RG	Recycled	No	40 mm Class 1 Recycled Pavement Material [Grading Based]
PM1/20RM	Recycled	Yes	20 mm Class 1 Recycled Pavement Material [Performance Based]
PM1/30RM	Recycled	Yes	30 mm Class 1 Recycled Pavement Material [Performance Based]
CLASS 1 QUARRIED PAVEMENT MATERIALS			
PM1/20QG	Quarry	No	20 mm Class 1 Quarried Pavement Material [Grading Based]
PM1A/20QG	Quarry	No	20 mm Class 1 Heavy Duty Quarried Pavement Material
PM1B/20QG	Quarry	No	20 mm Class 1 Heavy Duty Quarried Pavement Material
PM1/30QG	Quarry	No	30 mm Class 1 Quarried Pavement Material [Grading Based]
PM1/40QG	Quarry	No	40 mm Class 1 Quarried Pavement Material [Grading Based]
PM1/20QM	Quarry	Yes	20 mm Class 1 Quarried Pavement Material [Performance Based]
PM1/30QM	Quarry	Yes	30 mm Class 1 Quarried Pavement Material [Performance Based]
STABILISED PAVEMENT MATERIAL			
Refer Clause 8 "General" for examples of nomenclature for this class of pavement material.			
SEALING AGGREGATE			
SA20-14	Quarry	No	20 / 14 mm Sealing Aggregate
SA16-10	Quarry	No	16 / 10 mm Sealing Aggregate
SA14-10	Quarry	No	14 / 10 mm Sealing Aggregate
SA10-7	Quarry	No	10 / 7 mm Sealing Aggregate
SA7-5	Quarry	No	7 / 5 mm Sealing Aggregate
SA5-2	Quarry	No	5 / 2 mm Sealing Aggregate
SAND			
Sa – A	Recycled / Quarry / Pit	No	Type A Sand
Sa – B	Recycled / Quarry / Pit	No	Type B Sand
Sa – C	Recycled / Quarry / Pit	No	Type C Sand
Sa – D	Recycled / Quarry / Pit	No	Type D Sand
ASPHALT AGGREGATE			
Refer to the relevant Product Information Sheet for requirements of Source Materials and Product Quality Control.			
MINERAL FILLER FOR ASPHALT, OTHER THAN HYDRATED LIME			
Refer to the relevant Product Information Sheet for requirements of Product Quality Control.			
ADDITIONAL REQUIREMENTS FOR BASIC IGNEOUS SOURCE ROCK			
ARRESTOR BED MATERIAL			

Spalls

Source Materials

13.1 Source materials must be natural quarried material and must be free from laminations or weak cleavages and of such character that they will not disintegrate from the action of the sea, sand, or weather. No Recycled Material is permitted to be included.

Product Quality Control

Table RD-PV-S1 13-2 Spalls Quality Control Tests

Product		300 mm Spalls SP300
Test Procedure	Manufacturing Tolerance	
	Sieve Size (mm)	Percent Passing
Particle Size Distribution AS 1141.11.1	300	100
	125	0 – 30
	75	0 – 2

Note:

For all materials specifications, square aperture sieves conforming to AS 1152 "Specification for Test Sieves" shall be used for the determination of grading for particle sizes 75 mm and finer. Coarser sizes shall be determined by linear measurement.

Road Ballast

Source Materials

13.2 Source materials must be natural quarried material. No Recycled Material is permitted to be included.

Product Quality Control

Table RD-PV-S1 13-3 Road Ballast Quality Control Tests

Product		100 mm Ballast RB-100	65 mm Ballast RB-65
Test Procedure	Manufacturing Tolerance		
	Sieve Size (mm)	Percent Passing	
Particle Size Distribution AS 1141.11.1	125	100	
	106	90 – 100	
	75		100
	63		95 – 100
	53		40 – 70
	37.5	0 - 5	0 – 15
	19		0 – 2
AS1141.23	LA Abrasion Grading 'A'	Maximum 45%	

Note:

For all materials specifications, square aperture sieves conforming to AS 1152 "Specification for Test Sieves" shall be used for the determination of grading for particle sizes 75 mm and finer. Coarser sizes shall be determined by linear measurement.

Rail Ballast

Source Materials

13.3 Source materials must be natural quarried material and must not include Recycled Materials. River gravel or crushed river gravel shall not be used as railway ballast because of the poor interlock between the rounded faces of the water worn rock. All testing shall be undertaken on representative ballast samples and not the source rock within the quarry. The sampling procedure must ensure that the samples are representative of the materials supplied and have not been affected by segregation during handling and transport.

Product Quality Control

Table RD-PV-S1 13-4 Rail Ballast Quality Control Tests⁽¹⁾

Product	RAIL50	RAIL60	RAIL60S (Used under steel sleepers)
Test Procedure	Manufacturing Tolerance		
	<i>Sieve Size (mm)</i>	<i>Percent Passing</i>	
Particle Size Distribution AS 1141.11.1	63	100	100
	53	100	85 – 100
	37.5	70 – 100	20 – 65
	26.5	-	0 – 20
	19	40 – 60	0 – 5
	13.2	-	0 – 2
	9.5	10 - 30	-
	4.75	0 - 20	0 - 1
	1.18	0 - 10	-
	0.075	0 - 1	0 - 1
AS 1141.4	Bulk Density	Minimum 1200 kg/m ³	
AS 1141.6.1	Particle Density	Minimum 2500 kg/m ³	
AS 1141.22	Wet / Dry Strength ⁽²⁾	Minimum 150 kN Wet Strength, Maximum 30 % Wet / Dry Strength Variation	
AS 1141.23	LA Abrasion Grading B ⁽³⁾⁽⁴⁾	Track carrying < 6 Mt (gross) per annum: Max 30% Track carrying >6 Mt (gross) per annum: Max 25%	
AS 1141.14 ⁽³⁾	Misshapen Particles % ⁽⁵⁾	Max 30 %	

Notes:

- (1) Refer to Clause 9 "Rail Ballast" for further details.
- (2) Samples must be prepared from an appropriately sized fraction of ballast from delivered lots. Wet / Dry Strength testing must be carried out on the fraction of material passing 26.5 mm sieve and retained on 19 mm sieve.
- (3) Los Angeles testing must be carried out on the fraction of ballast passing 19 mm sieve and retained on 9.5 mm sieve.
- (4) In accordance with AS 2758.7, the ballast itself may be crushed to provide an appropriately graded test within the size range for Los Angeles Testing only.
- (5) Misshapen particles must be determined on the fraction of ballast retained on the 9.5 mm test sieve using a 2:1 Calliper Ratio. The report must indicate each of % flat, elongated, and flat and elongated particles.

Class 3 Recycled Pavement Material [Grading Based]

Source Materials

13.4 Source materials may be natural quarried material, blast furnace slag, recycled crushed concrete, or any combination of them. Supplementary source materials may comprise brick, tile, and asphalt and / or Recycled Crushed Glass in accordance with Clause 6. Asbestos or asbestos fibre must not be incorporated into the product under any circumstances. No more than 20% by mass of total supplementary source materials may be incorporated and the constituent proportions must remain unchanged during production.

Product Quality Control

Table RD-PV-S1 13-5 Class 3 Recycled Pavement Material [Grading Based] Quality Control Tests

Product	20 mm Class 3 PM 3/20RG	40 mm Class 3 PM 3/40RG	55 mm Class 3 PM 3/55RG	75 mm Class 3 PM 3/75RG
Test Procedure	Manufacturing Tolerance			
Particle Size Distribution TP134	<i>Sieve Size (mm)</i>	<i>Percent Passing</i>		
	75			100
	53		100	100
	37.5		90 – 100	75 – 95
	26.5	100		50 – 75
	19	90 – 100	60 – 85	50 – 75
	13.2			
	4.75	40 – 65	25 - 50	20 – 45
0.075	5 – 15	3 - 11	3 - 11	3 - 11
AS 1289.3.1.2	Liquid Limit	Maximum 35%		
AS 1289.3.3.1	Plasticity Index	Maximum 15%		
AS 1289.3.4.1	Linear Shrinkage	Maximum 8%		
RMS T276	Type II Foreign Materials	Maximum 1%		
	Type III Foreign materials excluding bitumen	Maximum 0.5%		
AS/NZS 2891.3.3	Bitumen Content	Maximum 1%		
AS 1141.23	LA Abrasion Grading 'A'	N/A	Maximum 45%	
	LA Abrasion Grading 'B'	Maximum 45%	N/A	

Note: The recycled pavement material must have a uniform grading and must not be graded from the coarse limit of the grading envelope to the fine limit of the grading envelope, or vice versa.

Class 3 Quarried Pavement Material [Grading Based]

Source Materials

13.5 Source materials must be natural quarried material. No Recycled Material is permitted to be included.

Product Quality Control

Table RD-PV-S1 13-6 Class 3 Quarried Pavement Material [Grading Based] Quality Control Tests

Product	20 mm Class 3 PM 3/20QG	40 mm Class 3 PM 3/40QG	55 mm Class 3 PM 3/55QG	75 mm Class 3 PM 3/75QG
Test Procedure	Manufacturing Tolerance			
	<i>Sieve Size (mm)</i>	<i>Percent Passing</i>		
Particle Size Distribution TP134	75			100
	53		100	100
	37.5		90 – 100	75 – 95
	26.5	100		50 – 75
	19	90 – 100	60 – 85	50 – 75
	13.2			
	4.75	40 – 65	25 - 50	20 – 45
0.075	5 – 15	3 - 11	3 - 11	3 - 11
AS 1289.3.1.2	Liquid Limit	Maximum 35%		
AS 1289.3.3.1	Plasticity Index	Maximum 15%		
AS 1289.3.4.1	Linear Shrinkage	Maximum 8%		
AS 1141.23	LA Abrasion Grading 'A'	N/A	Maximum 45%	
	LA Abrasion Grading 'B'	Max 45%	N/A	

Note: The quarried pavement material must have a uniform grading and must not be graded from the coarse limit of the grading envelope to the fine limit of the grading envelope, or vice versa.

Class 2 Recycled Pavement Material [Grading Based]

Source Materials

13.6 Source materials may be natural quarried material, blast furnace slag, recycled crushed concrete, or any combination of them. Supplementary source materials may comprise brick, tile, and asphalt and / or Recycled Crushed Glass in accordance with Clause 6. Asbestos or asbestos fibre must not be incorporated into the product under any circumstances. No more than 20% by mass of total supplementary source materials may be incorporated and the constituent proportions must remain unchanged during production.

Product Quality Control

Table RD-PV-S1 13-7 Class 2 Recycled Pavement Material [Grading Based] Quality Control Tests

Product	20 mm Class 2 PM 2/20RG	30 mm Class 2 PM 2/30RG	40 mm Class 2 PM 2/40RG
Test Procedure	Manufacturing Tolerance		
Particle Size Distribution TP134	<i>Sieve Size (mm)</i>	<i>Percent Passing</i>	
	53		100
	37.5		100
	26.5	100	90 – 100
	19	90 – 100	77 – 95
	13.2	74 – 96	
	9.5	61 – 85	51 – 75
	4.75	42 – 66	35 – 57
	2.36	28 – 50	24 – 44
	0.425	11 – 27	9 – 22
0.075	4 – 14	4 – 12	3 - 11
AS 1289.3.1.2	Liquid Limit	Maximum 28%	
AS 1289.3.3.1	Plasticity Index	Minimum 1% - Maximum 8%	
AS 1289.3.4.1	Linear Shrinkage	Maximum 4%	
RMS T276	Type II Foreign Materials	Maximum 1%	
	Type III Foreign materials excluding bitumen	Maximum 0.5%	
AS/NZS 2891.3.3	Bitumen Content	Maximum 1%	
AS 1141.23	LA Abrasion Grading 'A'	N/A	
	LA Abrasion Grading 'B'	Maximum 45%	N/A

Note: The recycled pavement material must have a uniform grading and must not be graded from the coarse limit of the grading envelope to the fine limit of the grading envelope, or vice versa.

Class 2 Recycled Pavement Material [Performance Based]

Source Materials

13.7 Source materials may be natural quarried material, blast furnace slag, recycled crushed concrete, or any combination of them. Supplementary source materials may comprise brick, tile, and asphalt and / or Recycled Crushed Glass in accordance with Clause 6. Asbestos or asbestos fibre must not be incorporated into the product under any circumstances. No more than 20% by mass of total supplementary source materials may be incorporated and the constituent proportions must remain unchanged during production.

Nominated Mix Design Parameters

Table RD-PV-S1 13-8 Class 2 Recycled Pavement Material [Performance Based] Quality Control Tests – Mix Design Limits

Product	20 mm Class 2 PM 2/20RM	30 mm Class 2 PM 2/30RM
Test Procedure	Manufacturing Tolerance	
Particle Size Distribution TP134	<i>Sieve Size (mm)</i>	<i>Percent Passing</i>
	37.5	100
	26.5	100
	19	90 – 100
	2.36	30 – 60
	0.075	5 – 20
AS 1289.3.1.2	Liquid Limit	Maximum 30%
AS 1289.3.3.1	Plasticity Index	Minimum 1% – Maximum 10%
AS 1289.3.4.1	Linear Shrinkage	Maximum 5%
TP183	Resilient Modulus	Minimum 250 MPa
	Deformation	Maximum 10-7
AS 1141.23	LA Abrasion Grading 'B'	Contractor Nominated Value
TP184	Triaxial Compression	Cohesion Max 250 kPa, Friction Angle Min 40°
RMS T276	Type II Foreign Materials	Maximum 1%
	Type III Foreign Materials excluding bitumen	Maximum 0.5%
AS/NZS 2891.3.3	Bitumen Content	Maximum 1%

Product Quality Control

Table RD-PV-S1 13-9 Class 2 Recycled Pavement Material [Performance Based] Quality Control Tests

Test Procedure	Manufacturing Tolerance	
Particle Size Distribution TP134	<i>Sieve Size (mm)</i>	<i>Variation in Percent Passing</i>
	37.5	0
	26.5	0 (PM2/20), ± 6 (PM2/30)
	19	± 6
	9.5	± 9
	2.36	± 8
	0.075	± 3
AS 1289.3.1.2	Liquid Limit	+ 3
AS 1289.3.3.1	Plasticity Index	+ 2
AS 1289.3.4.1	Linear Shrinkage	+ 1
AS 1141.23	LA Abrasion Grading 'B'	+ 3

Note: Refer to the Contractor's current Mix Design certificate to assess compliance.

Class 2 Quarried Pavement Material [Grading Based]

Source Material

13.8 Source materials must be natural quarried material. No Recycled Material is permitted to be included.

Product Quality Control

Table RD-PV-S1 13-10 Class 2 Quarried Pavement Material [Grading Based] Quality Control Tests

Product	20 mm Class 2 PM 2/20QG	30 mm Class 2 PM 2/30QG	40 mm Class 2 PM 2/40QG
Test Procedure	Manufacturing Tolerance		
Particle Size Distribution TP134	<i>Sieve Size (mm)</i>	<i>Percent Passing</i>	
	53		100
	37.5	100	90 – 100
	26.5	100	90 – 100
	19	90 – 100	77 – 95
	13.2	74 – 96	
	9.5	61 – 85	51 – 75
	4.75	42 – 66	35 – 57
	2.36	28 – 50	24 – 44
	0.425	11 – 27	9 – 22
0.075	4 – 14	4 – 12	3 – 11
AS 1289.3.1.2	Liquid Limit	Maximum 28%	
AS 1289.3.3.1	Plasticity Index	Minimum 1% – Maximum 8%	
AS 1289.3.4.1	Linear Shrinkage	Maximum 4%	
AS 1141.23	LA Abrasion Grading 'A'	N/A	Maximum 45%
	LA Abrasion Grading 'B'	Maximum 45%	N/A

Note: The quarried pavement material must have a uniform grading and must not be graded from the coarse limit of the grading envelope to the fine limit of the grading envelope, or vice versa.

Class 2 Quarried Pavement Material [Performance Based]

Source Materials

13.9 Source materials must be natural quarried material. No Recycled Material is permitted to be included.

Nominated Mix Design Parameters

Table RD-PV-S1 13-11 Class 2 Quarried Pavement Material [Performance Based] Quality Control Tests – Mix Design Limits

Product	20 mm Class 2 PM 2/20QM	30 mm Class 2 PM 2/30QM
Test Procedure	Manufacturing Tolerance	
Particle Size Distribution TP134	<i>Sieve Size (mm)</i>	<i>Percent Passing</i>
	37.5	100
	26.5	100
	19	90 – 100
	9.5	80 – 95
	2.36	30 – 60
0.075	5 – 20	25 – 55
AS 1289.3.1.2	Liquid Limit	Maximum 30%
AS 1289.3.3.1	Plasticity Index	Minimum 1% – Maximum 10%
AS 1289.3.4.1	Linear Shrinkage	Maximum 5%
TP183	Resilient Modulus	Minimum 250 MPa
	Deformation	Maximum 10-7
AS 1141.23	LA Abrasion Grading 'B'	Contractor Nominated Value
TP184	Triaxial Compression	Cohesion Max 250 kPa, Friction Angle Min 40°

Product Quality Control

Table RD-PV-S1 13-12 Class 2 Quarried Pavement Material [Performance Based] Quality Control Tests

Test Procedure	Manufacturing Tolerance	
Particle Size Distribution TP134	<i>Sieve Size (mm)</i>	<i>Variation in Percent Passing</i>
	37.5	0
	26.5	0 (PM2/20), ± 6 (PM2/30)
	19	± 6
	9.5	± 8
	2.36	± 6
	0.075	± 2
AS 1289.3.1.2	Liquid Limit	+ 3
AS 1289.3.3.1	Plasticity Index	+ 2
AS 1289.3.4.1	Linear Shrinkage	+ 1
AS 1141.23	LA Abrasion Grading 'B'	+ 3

Note: Refer to the Contractor's current Mix Design certificate to assess compliance.

Class 1 Recycled Pavement Material [Grading based]

Source Materials

13.10 Source materials may be natural quarried material, blast furnace slag, recycled crushed concrete, or any combination of them. Supplementary source materials may comprise brick, tile, and asphalt and / or Recycled Crushed Glass in accordance with Clause 6. Asbestos or asbestos fibre must not be incorporated into the product under any circumstances. No more than 20% by mass of total supplementary source materials may be incorporated and the constituent proportions must remain unchanged during production.

Product Quality Control

Table RD-PV-S1 13-13 Class 1 Recycled Pavement Material [Grading based] Quality Control Tests

Product	20 mm Class 1 PM 1/20RG	30 mm Class 1 PM 1/30RG	40 mm Class 1 PM 1/40RG
Test Procedure	Manufacturing Tolerance		
Particle Size Distribution TP134	<i>Sieve Size (mm)</i>	<i>Percent Passing</i>	
	53		100
	37.5		95 – 100
	26.5	100	95 – 100
	19	95 – 100	79 – 93
	13.2	77 – 93	
	9.5	63 – 83	53 – 73
	4.75	44 – 64	36 – 56
	2.36	29 – 49	25 – 43
	0.425	13 – 23	10 – 21
0.075	5 – 11	4 – 10	3 – 9
AS 1289.3.1.2	Liquid Limit	Maximum 25%	
AS 1289.3.3.1	Plasticity Index	Minimum 1% – Maximum 6%	
AS 1289.3.4.1	Linear Shrinkage	Maximum 3%	
AS 1141.23	LA Abrasion Grading 'A'	N/A.	
	LA Abrasion Grading 'B'	Maximum 30%	N/A
RMS T276	Type II Foreign Materials	Maximum 1%	
	Type III Foreign Materials excluding bitumen	Maximum 0.5%	
AS/NZS 2891.3.3	Bitumen Content	Maximum 1%	

Note: The recycled pavement material must have a uniform grading and must not be graded from the coarse limit of the grading envelope to the fine limit of the grading envelope, or vice versa.

Class 1 Recycled Pavement Material [Performance Based]

Source Materials

13.11 Source materials may be natural quarried material, blast furnace slag, recycled crushed concrete, or any combination of them. Supplementary source materials may comprise brick, tile, and asphalt and / or Recycled Crushed Glass in accordance with Clause 6. Asbestos or asbestos fibre must not be incorporated into the product under any circumstances. No more than 20% by mass of total supplementary source materials may be incorporated and the constituent proportions must remain unchanged during production.

Nominated Mix Design Parameters

Table RD-PV-S1 13-14 Class 1 Recycled Pavement Material [Performance Based] Quality Control Tests – Mix Design Limits

Product	20 mm Class 1 PM 1/20RM	30 mm Class 1 PM 1/30RM
Test Procedure	Manufacturing Tolerance	
	<i>Sieve Size (mm)</i>	<i>Percent Passing</i>
Particle Size Distribution TP134	37.5	100
	26.5	100
	19	95 – 100
	9.5	65 – 85
	2.36	30 – 50
	0.075	5 – 15
AS 1289.3.1.2	Liquid Limit	Maximum 25%
AS 1289.3.3.1	Plasticity Index	Minimum 1% – Maximum 6%
AS 1289.3.4.1	Linear Shrinkage	Maximum 3%
TP183	Resilient Modulus	Minimum 300 MPa
	Deformation	Maximum 10-8
AS 1141.23	LA Abrasion Grading 'B'	Contractor Nominated Value
TP184	Triaxial Compression	Cohesion Max 150 kPa, Friction Angle Min 45°
RMS T276	Type II Foreign Materials	Maximum 1%
	Type III Foreign Materials excluding bitumen	Maximum 0.5%
AS/NZS 2891.3.3	Bitumen Content	Maximum 1%

Product Quality Control

Table RD-PV-S1 13-15 Class 1 Recycled Pavement Material [Performance Based] Quality Control Tests

Test Procedure	Manufacturing Tolerance	
	<i>Sieve Size (mm)</i>	<i>Variation in Percent Passing</i>
Particle Size Distribution TP134	37.5	0
	26.5	0 (PM1/20), ± 6 (PM1/30)
	19	± 6
	9.5	± 9
	2.36	± 8
	0.075	± 3
AS 1289.3.1.2	Liquid Limit	+ 3
AS 1289.3.3.1	Plasticity Index	+ 2
AS 1289.3.4.1	Linear Shrinkage	+ 1
AS 1141.23	LA Abrasion Grading 'B'	+ 3

Note: Refer to the Contractor's current Mix Design certificate to assess compliance.

Class 1 Quarried Pavement Material [Grading Based]

Source Materials

13.12 Source materials must be natural quarried material. No Recycled Material is permitted to be included.

Product Quality Control

Table RD-PV-S1 13-16 Class 1 Quarried Pavement Material [Grading Based] Quality Control Tests

Product		20 mm Class 1 PM 1/20QG	30 mm Class 1 PM 1/30QG	40 mm Class 1 PM 1/40QG
Test Procedure	Manufacturing Tolerance			
Particle Size Distribution TP134	<i>Sieve Size (mm)</i>	<i>Percent Passing</i>		
	53			100
	37.5		100	95 – 100
	26.5	100	95 – 100	79 – 91
	19	95 – 100	79 – 93	65 – 83
	13.2	77 – 93		
	9.5	63 – 83	53 – 73	44 – 64
	4.75	44 – 64	36 – 56	29 – 49
	2.36	29 – 49	25 – 43	20 – 38
	0.425	13 – 23	10 – 21	8 – 18
0.075	5 – 11	4 – 10	3 – 9	
AS 1289.3.1.2	Liquid Limit	Maximum 25%		
AS 1289.3.3.1	Plasticity Index	Minimum 1% – Maximum 6%		
AS 1289.3.4.1	Linear Shrinkage	Maximum 3%		
AS 1141.23	LA Abrasion Grading 'A'	N/A		Maximum 30%
	LA Abrasion Grading 'B'	Maximum 30%		N/A

Note: The quarried pavement material must have a uniform grading and must not be graded from the coarse limit of the grading envelope to the fine limit of the grading envelope, or vice versa.

Class 1 Quarried Pavement Material [Performance Based]

Source Materials

13.13 Source materials must be natural quarried material. No Recycled Material is permitted to be included.

Nominated Mix Design Parameters

Table RD-PV-S1 13-17 Class 1 Quarried Pavement Material [Performance Based] Quality Control Tests - Mix Design Limits

Product	20 mm Class 1 PM 1/20QM	30 mm Class 1 PM 1/30QM
Test Procedure	Manufacturing Tolerance	
	<i>Sieve Size (mm)</i>	<i>Percent Passing</i>
Particle Size Distribution TP134	37.5	100
	26.5	100
	19	95 – 100
	9.5	65 – 85
	2.36	30 – 50
	0.075	5 – 15
AS 1289.3.1.2	Liquid Limit	Maximum 25%
AS 1289.3.3.1	Plasticity Index	Minimum 1% – Maximum 6%
AS 1289.3.4.1	Linear Shrinkage	Maximum 3%
TP183	Resilient Modulus	Minimum 300 MPa
	Deformation	Maximum 10-8
AS 1141.23	LA Abrasion Grading 'B'	Contractor Nominated Value
TP184	Triaxial Compression	Cohesion Max 150 kPa, Friction Angle Min 45°

Product Quality Control

Table RD-PV-S1 13-18 Class 1 Quarried Pavement Material [Performance Based] Quality Control Tests

Test Procedure	Manufacturing Tolerance	
	<i>Sieve Size (mm)</i>	<i>Variation in Percent Passing</i>
Particle Size Distribution TP134	37.5	0
	26.5	0 (PM1/20), ± 6 (PM1/30)
	19	± 6
	9.5	± 8
	2.36	± 6
	0.075	± 2
	AS 1289.3.1.2	Liquid Limit
AS 1289.3.3.1	Plasticity Index	+ 2
AS 1289.3.4.1	Linear Shrinkage	+ 1
AS 1141.23	LA Abrasion Grading 'B'	+ 3

Note: Refer to the Contractor's current Mix Design certificate to assess compliance.

Class 1 Heavy Duty Quarried Pavement Material [Grading Based]

Source Materials

13.14 Source materials must be natural quarried material. No Recycled Material is permitted to be included.

Product Quality Control

Table RD-PV-S1 13-19 Class 1 Heavy Duty Quarried Pavement Material [Grading Based] Quality Control Tests (20 mm Class 1A PM1A/20QG)

Product		20 mm Class 1A PM1A/20QG		
Test Procedure	Manufacturing Tolerance [Grading Based]			
Particle Size Distribution TP134	Percent Passing		Percent Retained	
	Sieve Size (mm)	%	Size Range (mm)	%
	37.5			
	26.5	100	26.5 – 19.0	0 – 5
	19.0	95 – 100	19.0 – 13.2	7 – 18
	13.2	78 – 92	13.2 – 9.5	10 – 16
	9.5	63 – 83	9.5 – 4.75	14 – 24
	4.75	44 – 64	4.75 – 2.36	10 – 20
	2.36	30 – 48	2.36 – 0.425	14 – 28
	0.425	14 – 22	0.425 – 0.075	6 – 13
0.075	7 – 11			
AS 1289.3.1.2	Liquid Limit	Maximum 25%		
AS 1289.3.3.1	Plasticity Index	Minimum 2% – Maximum 6%		
AS 1289.3.4.1	Linear Shrinkage	Maximum 3%		
AS 1141.23	LA Abrasion Grading 'B'	Maximum 25%		

Note: The quarried pavement material must have a uniform grading and must not be graded from the coarse limit of the grading envelope to the fine limit of the grading envelope, or vice versa.

OR

Table RD-PV-S1 13-20 Class 1 Heavy Duty Quarried Pavement Material [Grading Based] Quality Control Tests (20 mm Class 1B PM1B/20QG)

Product		20 mm Class 1B PM1B/20QG		
Test Procedure	Manufacturing Tolerance [Grading Based]			
Particle Size Distribution TP134	Percent Passing		Percent Retained	
	Sieve Size (mm)	%	Sieve Size (mm)	%
	37.5		37.5	
	26.5	100	26.5	100
	19.0	95 – 100	19.0	95 – 100
	13.2	78 – 92	13.2	78 – 92
	9.5	63 – 83	9.5	63 – 83
	4.75	44 – 64	4.75	44 – 64
	2.36	29 – 48	2.36	29 – 48
	0.425	13 – 21	0.425	13 – 21
0.075	5 – 9	0.075	5 – 9	
AS 1289.3.1.2	Liquid Limit	Maximum 25%		
AS 1289.3.3.1	Plasticity Index	Minimum 2% – Maximum 6%		
AS 1289.3.4.1	Linear Shrinkage	Maximum 3%		
AS 1141.23	LA Abrasion Grading 'B'	Minimum 25% – Maximum 30%		

Note: The quarried pavement material must have a uniform grading and must not be graded from the coarse limit of the grading envelope to the fine limit of the grading envelope, or vice versa.

Stabilised Pavement Material [Binder Control]

Source Materials

13.15 Source materials must be Quarried Pavement Material or, where approved, Recycled Pavement Material.

13.16 The Principal may specify Class 1 Quarried, Class 1 Recycled, or Performance Based Pavement Materials as an alternative to Class 2 Pavement Material (Grading Based).

13.17 When Class 1 materials are specified, Product Quality Control criteria for the appropriate Class 1 Pavement Material must apply.

Raw Feed Product Quality Control

Table RD-PV-S1 13-21 Stabilised Pavement Material [Binder Control] Quality Control Tests

Product	20 mm Class 2 PM 2/20*	30 mm Class 2 PM 2/30*	40 mm Class 2 PM 2/40*
Test Procedure	Manufacturing Tolerance [Grading Based]		
	<i>Percent Passing</i>		<i>Percent Retained</i>
	<i>Sieve Size (mm)</i>	<i>%</i>	<i>Size Range (mm)</i> <i>%</i>
Particle Size Distribution TP134	53		100
	37.5		100
	26.5	100	90 – 100
	19	90 – 100	74 – 96
	13.2	74 – 96	62 – 86
	9.5	61 – 85	51 – 75
	4.75	42 – 66	42 – 66
	2.36	28 – 50	35 – 57
	0.425	28 – 50	24 – 44
	0.075	11 – 27	9 – 22
	4 – 14	4 – 12	3 – 11
AS 1289.3.1.2	Liquid Limit	Maximum 28%	
AS 1289.3.3.1	Plasticity Index	Minimum 1% – Maximum 8%	
AS 1289.3.4.1	Linear Shrinkage	Maximum 4%	
AS 1141.23	LA Abrasion Grading 'A'	N/A	Maximum 45%
	LA Abrasion Grading 'B'	Maximum 45%	N/A

Notes:

*Raw feed material must be: PM2/20QG, PM2/30QG, PM2/40QG, or, with prior approval, PM2/20RG, PM2/30RG or PM2/40RG.

Stabilised Product Quality Control

Table RD-PV-S1 13-22 Stabilised Pavement Material [Binder Control] – Product Quality Control

Test	Product	Refer Clause 8 for nomenclature
Contractor Quality Plan	Target Binder Content (% dry mass)	Within the tolerance specified in Clause 8 "Additive Content Determination" of the binder content specified in the material description in accordance with Clause 8 "General".
AS 1141.51	Unconfined Compressive Strength (96% MDD - 7 days curing)	Reported Value
AS 1141.51	Unconfined Compressive Strength (96% MDD - 28 days curing)	Strength must not be less than the value specified in the material description in accordance with Clause 8 under "General".

Stabilised Pavement Material [Strength Control]

Source Materials

13.18 Source materials must be Quarried Pavement Material or, where approved, Recycled Pavement Material.

13.19 The Principal may specify Class 1 Quarried, Class 1 Recycled, or Performance Based Pavement Materials as an alternative to Class 2 Pavement Material (Grading Based).

13.20 When Class 1 materials are specified, Product Quality Control criteria for the appropriate Class 1 Pavement Material must apply.

Raw Feed Product Quality Control

Table RD-PV-S1 13-23 Stabilised Pavement Material [Strength Control] Quality Control Tests

Product	20 mm Class 2 PM 2/20*	30 mm Class 2 PM 2/30*	40 mm Class 2 PM 2/40*
Test Procedure	Manufacturing Tolerance [Grading Based]		
	<i>Percent Passing</i>		<i>Percent Retained</i>
	<i>Sieve Size (mm)</i>	<i>%</i>	<i>Size Range (mm)</i> <i>%</i>
Particle Size Distribution TP134	53		100
	37.5		100
	26.5	100	90 – 100
	19	90 – 100	74 – 96
	13.2	74 – 96	62 – 86
	9.5	61 – 85	51 – 75
	4.75	42 – 66	42 – 66
	2.36	28 – 50	35 – 57
	0.425	11 – 27	24 – 44
	0.075	4 – 14	9 – 22
AS 1289.3.1.2	Liquid Limit	Maximum 28%	
AS 1289.3.3.1	Plasticity Index	Minimum 1% – Maximum 8%	
AS 1289.3.4.1	Linear Shrinkage	Maximum 4%	
AS 1141.23	LA Abrasion Grading 'A'	N/A	Maximum 45%
	LA Abrasion Grading 'B'	Maximum 45%	N/A

Notes:

*Raw feed material must be: PM2/20QG, PM2/30QG, PM2/40QG, or, with prior approval, PM2/20RG, PM2/30RG or PM2/40RG.

Stabilised Product Quality Control

Table RD-PV-S1 13-24 Stabilised Pavement Material [Strength Control] Product Quality Control

Test	Product	Refer Clause 8 for nomenclature
Contractor Quality Plan	Target Binder Content (% dry mass)	Within the tolerance specified in Clause 8 "Additive Content Determination" of the binder content specified in the material description in accordance with Clause 8 "General".
AS 1141.51	Unconfined Compressive Strength (96% MDD - 7 days curing)	Reported Value
AS 1141.51	Unconfined Compressive Strength (96% MDD - 28 days curing)	Strength must not be less than the value specified in the material description in accordance with Clause 8 under "General".

Sealing Aggregate

Source Materials

13.21 Source materials must be natural quarried material. No Recycled Material is permitted to be included.

Product Quality Control

Table RD-PV-S1 13-25 Sealing Aggregate Quality Control Tests

Product	SA 20-14	SA 16-10	SA 14-10	SA 10-7	SA 7-5	SA 5-2	
Test Procedure	Manufacturing Tolerance [Grading Based]						
AS 1141.11.1	<i>Sieve Size (mm)</i>	<i>Percent Passing</i>					
	26.5	100					
	19	95 – 100	100				
	16	35 – 65	65 – 90	100			
	13.2	0 – 10	15 – 40	90 – 100	100		
	9.5	0 – 2	0 – 8	0 – 15	85 – 100	100	
	6.7		0 – 2	0 – 2	0 – 15	80 – 100	100
	4.75				0 – 3	0 – 20	80 – 100
	2.36					0 – 5	0 – 10
1.18	0 – 1	0 – 1	0 – 1	0 – 1	0 – 1	0 – 1	
AS 1141.15	Flakiness Index	Maximum 25%			Reported Value	N/A	
TP244	% Flat Particles	N/A			Maximum 35%	N/A	
AS 1141.14 ⁽³⁾	Misshapen Particles %	Reported Value		N/A			
AS 1141.23	LA Abrasion Grading H	Maximum 25%		N/A			
	LA Abrasion Grading J	N/A		Maximum 25%	N/A		
	LA Abrasion Grading K	N/A		Maximum 25%	Maximum 30%	Maximum 30% ⁽¹⁾	
AS 1141 42/40 ⁽¹⁾	PAFV	Minimum 48 ⁽²⁾	Minimum 45 ⁽²⁾				
TP705 ⁽¹⁾	Aggregate Stripping	Maximum 15% Wet and Maximum 5% Dry					
AS 1141.20.1	ALD – Direct	Reported Value			N/A		
AS 1141.20.2		N/A			Reported Value		
AS 1141.20.3	ALD – Calculated	Reported Value			N/A		

Note:

- (1) Sample must be prepared from an appropriately sized fraction of identical source rock.
- (2) A minimum value of 55 must apply to sites requiring high skid resistance.
- (3) Calliper Ratio = 2:1; report each of % flat, elongated, and flat and elongated particles.

Sand

Source Materials

13.22 Type A and B Washed or unwashed natural pit, river, or crushed quarry material.

13.23 Type C Crushed quarry product.

13.24 Type D Natural pit material, dune sand, or crushed quarry product.

13.25 Recycled Crushed Glass can be incorporated into, or replace, the above sand products in accordance with Clause 6. No other Recycled Material is permitted to be included. Where Sand includes Recycled Crushed Glass, the Product shall be described by a naming convention as given in the following example:

Sa-C-G15 Sa-C Sand blended with 15% Recycled Crushed Glass

Product Quality Control

Table RD-PV-S1 13-26 Sand Quality Control Tests

Product	Sa-A	Sa-B	Sa-C	Sa-D
Test Procedure	Manufacturing Tolerance			
Particle Size Distribution TP134	<i>Sieve Size (mm)</i>	<i>Percent Passing</i>		
	9.5	100	100	
	6.7			100
	4.75	95 – 100	95 – 100	70 – 100
	2.36	75 – 100	75 – 100	35 – 100
	1.18	55 – 90	45 – 90	
	0.600	35 – 70	30 – 70	
	0.425			25 – 70
	0.300	20 – 40	20 – 42	
	0.150	5 – 20	15 – 30	
0.075	0 – 10	5 – 20	8 – 23	0 – 10
AS 1289.3.1.2	Liquid Limit	Non-Plastic	Maximum 25%	
AS 1289.3.3.1	Plasticity Index		Maximum 6%	
AS 1289.3.4.1	Linear Shrinkage		Maximum 3%	
AS 1141.34	Organic Impurities	Satisfactory		

Asphalt Aggregate

Source Materials

13.26 Source materials must be natural quarried material, except for 'Quarry Sand' which may be blended, or substituted, with Recycled Crushed Glass in accordance with Clause 6. Highly micaceous materials such as granite and gneiss should not be used for Asphalt Aggregates unless the Contractor can provide evidence that the aggregate particles will maintain long term strength and not exfoliate when subject to processing through an asphalt plant (or equivalent). Materials of the same size from two or more sources must not be mixed.

Product Quality Control

13.27 Table RD-PV-S1 13-27 provides percentage tolerances for the assessment of conformity of aggregate and sand production.

Table RD-PV-S1 13-27 Asphalt Aggregate Percentage Passing Tolerances

Product	Small aggregate (D ≤ 20)*	Large aggregate (D > 20)*	Natural Sand	Quarry Sand
Sieve Size	Percentage Passing Tolerance			
One sieve less than D*	± 8	± 10		
Closest sieve to d*	± 2.5	± 5		
2.36 mm sieve	-	-	± 5	± 5
1.18 mm sieve	± 0.5	± 0.5	± 4	± 4
0.075 mm sieve			± 3	± 3

Note: *Where aggregate size D-d, e.g. 10-7

Table RD-PV-S1 13-28 Asphalt Aggregate Quality Control Tests

Product ⁽⁵⁾	Coarse Fraction (- 37.5 mm, + 19.0 mm)	Medium Fraction (- 19.0 mm, + 6.7 mm)	Fine Fraction (- 6.7 mm, + 2.36 mm)	Natural Sand	Quarry Sand	
Test Procedure	Manufacturing Tolerance					
AS 1141.24	Sulphate Soundness			Maximum 12		
AS 1141.30	Unsound & Marginal Stone Content			Maximum 5% (unsound stone) ⁽⁶⁾ Maximum 10% (marginal & unsound stone)		
AS 1141.15	Flakiness Index		Maximum 30	N/A	N/A	
TP 240	Elongation Index		Maximum 35	N/A		
AS 1141.23	LA Abrasion	Maximum 35%	Maximum 25%	Maximum 30%		
AS 1289.3.1.2	Liquid Limit	N/A			NP	Max 25
AS 1289.3.3.1	Plasticity index					Max 6 ⁽¹⁾
AS 1289.3.4.1	Linear shrinkage					Max 3
AS1141.34	Organic impurities	N/A			Satisfactory	
AS 1141 42/40 ⁽²⁾	PAFV ⁽⁴⁾	N/A	Minimum 48 ⁽³⁾	N/A		
AS1141.5, AS1141.6.1 & AS1141.6.2	Water absorption & densities	Report Only				

Notes:

- (1) Sand may be non-plastic.
- (2) Sample must be prepared from an appropriately sized fraction of identical source rock.
- (3) A minimum value of 55 must apply to all OG and SMA Asphalt mixes. A minimum value of 55 must also apply to specified sites requiring high skid resistance.
- (4) Aggregates within -9.5 mm to +6.7 mm fraction, prepared in accordance with AS 1141.40 Section 7.1.
- (5) 'Product' for asphalt aggregates refers to the fractions of individual asphalt aggregate products used in the asphalt mix; common asphalt aggregate products include 20/14 mm, 10/7 mm and 7/2 mm.
- (6) Refer to "Additional Requirements for Basic Igneous Source Rock" for criteria which takes precedence where basic igneous source rock is used.

Mineral Filler for Asphalt, Other Than Hydrated Lime

Product Quality Control

Table RD-PV-S1 13-29 Mineral Filler for Asphalt, Other Than Hydrated Lime Quality Control Tests

Test Procedure	Manufacturing Tolerance	
AS 1141.11.1	Gradings (0.60, 0.3, & 0.075 mm sieves) (%)	Report Only
AS 1141.17	Voids in Dry Compacted Filler (%)	Report Only
AS 1289.B1.3	Moisture Content (%)	3% maximum
AS 2350.8	Specific Surface (square metres per kilogram)	Report Only
AS 3583.3	Loss on Ignition (% by mass)	4% maximum
AS 1141.8	Water Soluble Fraction (% by mass)	20% maximum

Additional Requirements for Basic Igneous Source Rock

13.28 This clause applies where basic igneous source rock (as defined in AS 2758) is used for the production of a Pavement Material complying with this Part. The presence of Secondary Minerals must not have a deleterious effect of the Pavement Material's intended performance.

13.29 The Source Rock must be classified in accordance with the following:

Table RD-PV-S1 13-30 Basic Igneous Source Rock Classifications

Rock Classification	Secondary Mineral Content (%) AS1141.26	Accelerated Soundness Index AS 1141.29
Sound Rock	< 25	> 94
Marginal Rock	26-30	90-93
Unsound Rock	> 30	< 90

13.30 Unsound and marginal rock in that fraction of the product retained on a 4.75 mm AS sieve must not exceed the percentages specified below:

Table RD-PV-S1 13-31 Basic Igneous Source Rock Marginal and Unsound Rock Percentages

Material Class	Total of Marginal and Unsound Rock % (max)	Unsound Rock % (max)
PM 1	10	5
PM 2	10	7
PM 3	20	10
Sealing and Asphalt Aggregate	10	3

Arrestor Bed Material

Source Materials

13.31 Arrestor bed material shall have a smooth surface and be relatively spherical, well-rounded, hard, and durable. Source materials shall be from a natural source – such as river gravel – and be uncrushed, unblended, and from a single quarry.

13.32 No recycled material is permitted to be included. Arrestor bed material shall be free of deleterious inclusions such as concrete, bitumen, bricks, and organic matter.

Product Quality Control

Table RD-PV-S1 13-32 Arrestor Bed Material Quality Control Tests

Test Procedure	Manufacturing Tolerance	
Particle Size Distribution TP134	<i>Sieve Size (mm)</i>	<i>Percent Passing</i>
	19	100
	9.5	0 – 5
	0.075	Maximum 2
RMS T239	Fractured Faces	Maximum 10%
AS 1141.14 ⁽¹⁾	Misshapen Particles %	Maximum 10%
WA 223.1	Crushing	Maximum 5%
AS 1141.23	Los Angeles Value Grading B	Report Only
WA 223.1	Cracking	Maximum 5%
WA Specification 6706/02/1312 Attachment ⁽²⁾	Slump Angle	Maximum 30°
AS 1141.4	Bulk Density	Maximum 3.4 tonnes/m ³

Notes:

(1) Calliper Ratio = 2:1; report each of % flat, elongated, and flat and elongated particles.

(2) Also report measured radius points and height of slump; repeat the test for a non-inverted cone.