# BRISBANE CITY COUNCIL

# REFERENCE SPECIFICATIONS FOR ENGINEERING WORK

# S300 QUARRY PRODUCTS

## Amendment Register

|  |  |  |  |
| --- | --- | --- | --- |
| Ed/Rev Number | Section Number | Description | Date |
| 1.0 |  | Original issue | Oct 2001 |
| 2.0 | 4.1, 4.2 and 4.3 | Requirements to verify permissible sulphur content of Class 1 and Class 2 materials defined. | Apr 2014 |
| 3.0 | 1.2 | Referenced documents list updated | May 2016 |
| 4.1, 4.2, 4.3 | ‘Resistance to Weathering’ test requirement replaced with ‘Degradation Factor’ test for Class 1, 2 and 3 gravels. |
| 4.0 | Generally | Recycled materials permitted except where restrictions applied | Nov 2018 |
| 1.3 | Deleted DTMR Test Methods removed |
| 4.0 | BCC Class 1, 2 and 3 materials are to be supplied to DTMR MRTS 05 and MRTS 35. |
| 4.5 | Alternative constituents may be considered in recycled material blends. Locations where recycled material blends cannot be used. |
| 4.6 | New section ‘GRANULATED GLASS AGGREGATE’ |
| 5.0 | General | Document name changed from ‘Reference Specifications for Civil Engineering Work’ to ‘Reference Specifications for Engineering Work’ | Mar 2021 |
| General | Deleted references to DTMR Specification MRTS 35 – Recycling Materials for Pavements |
| 2.1 | DTMR Quarry Registration System requirement added |

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## TABLE OF CONTENTS

1.0 GENERAL 1

1.1 Section content 1

1.2 Standards 1

1.3 References 1

1.4 Definitions 2

2.0 QUALITY 2

2.1 Quality system 2

2.2 Tests 2

2.3 Samples 2

2.4 Supplier's submissions 3

3.0 Grading limits 3

4.0 MATERIALS 4

4.1 Class 1 material 4

4.2 Class 2 material 4

4.3 Class 3 material 5

4.4 Filter material 5

4.5 Additional requirements for recycled materials 5

4.6 Granulated glass aggregate 5

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## GENERAL

### Section content

Supply of naturally occurring, recycled and processed rock and earthen materials used in earthworks and road construction.

Refer to appropriate Reference Specifications for requirements for incorporating these materials into projects.

### Standards

|  |  |  |
| --- | --- | --- |
| Australian Standard | AS 1141.19 | Methods for sampling and testing aggregates – Fine particle size distribution in road materials by sieving and decantation |
| Australian Standard | AS 1141.22 | Methods for sampling and testing aggregates – Wet/dry strength variation |
| Australian Standard | AS 1141.25.2 | Methods for sampling and testing aggregates – Degradation factor – Coarse aggregate |
| Australian Standard | AS 1289.3.1.1 | Methods of testing soils for engineering purposes – Soil classification tests – Determination of the liquid limit of a soil – Four point Casagrande method |
| Australian Standard | AS 1289.3.3.1 | Methods of testing soils for engineering purposes – Soil classification tests – Calculation of the plasticity index of a soil |
| Australian Standard | AS 1289.3.4.1 | Methods of testing soils for engineering purposes – Soil classification tests – Determination of the linear shrinkage of a soil – Standard method |
| Australian Standard | AS 1289.3.6.1 | Methods of testing soils for engineering purposes – Soil classification tests – Determination of the particle size distribution of a soil – Standard method of analysis by sieving |
| Australian Standard | AS 1289.6.1.1 | Methods of testing soils for engineering purposes – Soil strength and consolidation tests – Determination of the California Bearing Ratio of a soil – Standard laboratory method for a remoulded specimen |
| Australian Standard | AS 4969.1 | Analysis of acid sulfate soil – Dried samples – Methods of test – Pre-treatment of samples |
| Australian/New Zealand Standard, International Standards Organization | AS/NZS ISO 9001 | Quality management systems – Requirements |

### References

|  |  |  |  |
| --- | --- | --- | --- |
| Queensland Department of Transport and Main Roads | Technical Specification | MRTS 05 | Unbound Pavements |
| Queensland Department of Transport and Main Roads | Test Method | Q104A | Liquid limit of soil |
| Queensland Department of Transport and Main Roads | Test Method | Q105 | Plastic limit and plasticity index of soil |
| Queensland Department of Transport and Main Roads | Test Method | Q106 | Linear shrinkage of soil |
| Queensland Department of Transport and Main Roads | Test Method | Q113C | California Bearing Ratio of soil at nominated levels of dry density and moisture content |

Refer to the following other Reference Specifications for Civil Engineering Works:

|  |  |
| --- | --- |
| S110 | General Requirements |
| S120 | Quality: Quality control testing |
| S140 | Earthworks |
| S150 | Roadworks |

### Definitions

Crushed rock: Crushed material from a hard rock quarry.

Soil aggregate: Pit, ridge or creek gravels; either crushed, partially crushed or in their natural state; blended or unblended.

Recycled material: Various products derived from resource recovery of construction and demolition waste from building waste; reclaimed asphalt pavement (RAP) from maintenance and rehabilitation activities; and reclaimed glass from the glass disposal industry blended with approved fillers in a controlled process.

## QUALITY

### Quality system

The supplier must maintain a Quality Assurance System with third party accreditation to *AS/NZS ISO 9001*. The supplier must notify the Contractor and the Superintendent within two days of becoming aware that process control tests relevant to the material supplied have fallen outside the specified limits.

Class 1, Class 2 and Class 3 materials (including those sourced from recycled materials) shall be provided by a supplier registered and operated in accordance with the Department of Transport and Main Roads Quarry Registration System. The supplier must be registered to supply material of the appropriate Class.

### Tests

General

Methods: Use the specified Australian Standard or Queensland Department of Transport and Main Roads test methods.

Testing authority: Use a testing facility registered by NATA for the test required.

Process control tests

Perform tests of the type and frequency necessary to adequately control the materials. Comply with the minimum requirements specified in *S120 Quality Clause 6.1*. *Refer annexure*.

Compliance assessment tests

The Contractor or Superintendent may carry out compliance assessment testing using a testing laboratory registered with NATA for the particular test.

### Samples

General

On request, submit samples (50 kg) of each type of material supplied under the Contract. *Refer annexure*.

Identification

Attach a tag to each sample showing relevant information including description, source and nominal size of material, date sampled and by whom.

### Supplier's submissions

Test program

On request, submit details of the supplier's inspection and test program covering all specified properties of the materials. On request, submit details of recent test results demonstrating sustained compliance of the materials with the required properties. *Refer annexure*.

Material details

Source: State the source quarry and geology of the rock.

Recycled products: Notify the nature, source, proportions and method of incorporation of any added fillers or binders.

Deliveries

Delivery docket: Submit a delivery docket at the time and place of delivery for each truckload of material showing:

* Empty and loaded mass of vehicle.
* Date and time of batching.
* Supplier and location of mixing plant.
* Registration number of the vehicle.
* Nature of material.

## GRADING LIMITS

General

Test: To Queensland Department of Transport and Main Roads method *Q103A* or the appropriate Australian Standard method *AS 1141.19* or *AS 1289.3.6.1*.

Particle size distribution envelopes: Filter material to Table 3.1, screenings to Table 3.2. *Refer annexure*.

Grading smoothness: Grading curves must be reasonably smooth and free from abrupt irregularities and the material must be capable of ready compaction. The grading curve must not move from one outer third of the limits range on any sieve into the opposite outer third of the limits range on the next lowest sieve listed.

Table 3.1 – Filter material particle size distribution limits

|  |  |
| --- | --- |
| A.S. sieve size | % passing by weight |
| 26.5 mm | 100 |
| 19.0 mm | 95 - 100 |
| 13.2 mm | 50 - 70 |
| 6.7 mm | 30 - 55 |
| 2.36 mm | 20 - 30 |
| 0.15 mm | 0 - 5 |

Table 3.2 – Screenings particle size distribution limits

| A.S. sieve size | % passing by weight | |
| --- | --- | --- |
| 5 mm nominal size | 10 mm nominal size |
| 13.2 mm |  | 100 |
| 9.50 mm |  | 85 - 100 |
| 6.70 mm | 100 |  |
| 4.75 mm | 85 - 100 | 0 - 20 |
| 2.36 mm | 0 - 40 | 0 - 5 |
| 0.075 mm | 0 - 2 | 0 - 2 |

## MATERIALS

General

Binder: Cement, lime or chemically bound materials are not permitted.

Material properties: The specified properties of materials apply to their condition as installed in the completed works. If it is expected that properties will change significantly during compaction, adjust the delivered material accordingly.

**Definition**

Class 1, Class 2 and Class 3 materials are defined by the appropriate material type produced to Queensland Department of Transport and Main Roads standard specification *MRTS 05 Unbound Pavements* and can be natural gravel, quarried or recycled materials (or combination of these). Recycled Material Blends may be used in all pavements unless directed otherwise. *Refer annexure*.

Additional requirements

Class 1 and Class 2 shall comply with the requirements of Table 4.1.

Table 4.1 – Additional requirements for Class 1 and Class 2 material

| Property | Test method | Soil aggregate | Crushed rock |
| --- | --- | --- | --- |
| Peroxide Oxidisable Sulphur | *AS 4969.1(1)* | <Acid Neutralising Capacity/2 | <Acid neutralising capacity/2 |

1. *Variation from Australian Standard test method – Samples for AS 4969.1 should be collected without removing coarse fragments that are greater than 2 mm and the whole sample should be crushed to less than 75 µm for testing in the laboratory.*

### Class 1 material

BCC Class 1 materials are the following materials produced to Queensland Department of Transport and Main Roads standard specification *MRTS 05 Unbound Pavements*:

* Type 1 (HSG) unbound material;
* Type 2 unbound material, Sub-type 2.1*.*

### Class 2 material

BCC Class 2 materials are the following materials produced and controlled to Queensland Department of Transport and Main Roads standard specification *MRTS 05 Unbound Pavements:*

* Type 2 unbound materials, Sub-types 2.1 or 2.2 or 2.3;
* Type 3 unbound material, Sub-types 3.1, provided the soaked CBR ≥45%.

### Class 3 material

BCC Class 3 materials are the following materials produced and controlled to Queensland Department of Transport and Main Roads standard specification *MRTS* *05 Unbound Pavements:*

* Type 2 unbound materials, Sub-types 2.1 or 2.2 or 2.3 or 2.4;
* Type 3 unbound material, Sub-types 3.1 or 3.2 or 3.3, provided the soaked CBR is ≥15%.

Sand: A fine grained material with more than 90% passing 0.425mm sieve may be used as a Class 3 material if the material is of uniform quality; meets the Atterberg limits of Class 2 soil aggregate and is at least CBR 15 (4 day soaked).

### Filter material

Material requirements

Filter material selection: Select the appropriate granular material or screenings to suit the application. At least 98% of the filter material must be retained on the A.S. sieve size equal to or immediately greater than 1.5 times the slot width or opening diameter of the slotted drainage pipe or proprietary drainage media.

Permeability: Achieve a permeability of 0.01-10 mm/s determined in accordance with *AS 1289.6.7.1.*

Granular material: Natural or manufactured granular material free from organic matter conforming to the grading specified in Table 3.1. Granular filter material shall consist of hard, durable and clean sand, gravel, recycled material or crushed rock, free from clay balls and organic matter, and shall have a pH value greater than 6.0 and less than 8.0.

Screenings: 5 mm or 10 mm nominal single size screenings conforming to the grading specified in Table 3.2.

Pavement drainage

Side drain: 5 mm or 10 mm screenings.

Mitre drain/ blanket course: Screenings or Class 1 material.

### Additional requirements for recycled materials

The crushed concrete must not contain any asbestos cement or asbestos fibre.

Reclaimed asphalt pavement shall not contain tar.

Do not use Recycled Material Blends in *MRTS* *05* in:

* Reinforced soil structures in accordance with S140 Earthworks where steel or polyester reinforcement is used.
* Direct contact with galvanised or aluminium pipes and fittings unless the pH value is less than 11.
* Drainage layers unless the pH value is greater than 6.0 and less than 8.0.

Maximum percentage limits of each constituent in recycled material blends contained in Table 7.2.1 – Constituents in Type 2 materials of Queensland Department of Transport and Main Roads Specification *MRTS* *05* *– Unbound Pavements* may be varied subject to evidence of acceptable performance of the proposed blend.

### Granulated glass aggregate

Requirement: Granulated glass aggregate means recycled glass cullet that has been processed and crushed to produce a ‘sand-like’ cubical glass material with a particle size diameter generally passing the 4.75 mm AS sieve, and that contains at least 98% recovered glass.

Glass cullet shall be primarily container glass and shall not include glass from ceramics, cathode ray tubes, fluorescent light fittings and laboratory glassware. It shall be cubical in shape, not sharp edged or elongated.

Foreign material: Granulated glass aggregate shall be generally free of contaminants such as paper, corks, metals, and other harmful materials (maximum limit of 2% by mass). It must be washed and free of any putrid odour.