

Technical Specification

**Transport and Main Roads Specifications
MRTS36 Recycled Glass Aggregate**

November 2025

(ATS 3050 Supply of Recycled Crushed Glass Sand, Ed 2.0 December 2023)

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About this document

The document adopts and modifies Austroads Technical Specification ATS 3050 *Supply of Recycled Crushed Glass Sand* as part of national harmonisation. It sets out the requirements for the manufacture and supply of Recycled Crushed Glass (RCG).

How to use this document

This document includes the national guidance and Queensland-specific advice while following the structure established in Austroads Technical Specifications.

Queensland-specific advice includes practices which vary from national practice because of local environmental conditions (such as geography, soil types, climate); different funding practices; local research; local legislation requirements; and to expand instruction on particular issues.

This document:

- sets out how the Austroads Technical Specification ATS 3050 *Supply of Recycled Crushed Glass Sand* applies in Queensland
- has precedence over the Austroads Technical Specification ATS 3050 *Supply of Recycled Crushed Glass Sand* when applied in Queensland
- has the same clause numbering and headings as the Austroads Technical Specification ATS 3050 *Supply of Recycled Crushed Glass Sand*.

Transport and Mains Roads provides an ancillary document which outlines adopted national and modified Queensland-specific content with tracked changes. To access a copy click on the below link: [Ancillary documents for harmonised Technical Specifications.](#)

Terminology

The following general amended definitions apply when reading this document.

Reference to...	Means
Shall	Denotes mandatory requirements.
Must	Denotes mandatory requirements.
Principal	The State of Queensland acting through the Department of Transport and Main Roads.
Administrator	The Administrator will be responsible for the overall administration of this Contract.

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1 Scope

- 1.1 This Technical Specification sets out the requirements for the manufacture and supply of recycled crushed glass (RCG) as a sand aggregate replacement in the following applications:
- a) As a granular material, including:
 - i. bedding and haunching of pipes and conduits
 - ii. side fill and backfill of pipes and conduits
 - iii. drainage medium applications
 - iv. embankment fill and earthworks applications
 - v. landscaping applications, and
 - vi. partial aggregate replacement (mechanical stabilisation) for granular base and subbase material (Subtype 2.3, 2.4 and 2.5).
 - b) As a partial 'fine' aggregate replacement in some asphalt applications.
 - c) As a partial fine aggregate replacement in:
 - i. Normal Class Concrete used in general works.
 - d) As a partial fine aggregate replacement in concrete used in:
 - i. Lean Mix Concrete Sub-base for Pavements.
 - ii. Concrete Pavement Base.
- 1.2 All RCG must comply with Clause 6. Where RCG is used as a granular material or used in concrete, it must also comply with the properties specified in Clause 7 or Clause 8 respectively.
- 1.3 This Technical Specification shall be read in conjunction with MRTS01 *Introduction to Technical Specifications*, MRTS50 *Specific Quality System Requirements* and other Technical Specifications as appropriate.

1.4 This Technical Specification forms part of the Transport and Main Roads Specifications Manual.

2 Referenced documents

2.1 The requirements of the referenced documents listed in Table 2.1 below apply to this Technical Specification. Where there are inconsistencies between this Technical Specification and the referenced documents, the requirements in this Technical Specification shall take precedence.

Table 2.1 – Reference documents

Reference	Title
Australian / New Zealand Standards	
AS 1012.20.1	<i>Methods of testing concrete: determination of chloride and sulphate in hardened concrete and aggregates (nitric acid extraction method)</i>
AS 1141.3.1	<i>Methods for sampling and testing aggregates: aggregates</i>
AS 1141.4	<i>Methods for sampling and testing aggregates: bulk density of aggregate</i>
AS 1141.5	<i>Methods for sampling and testing aggregates: particle density and water absorption of fine aggregate</i>
AS 1141.11.1	<i>Methods for sampling and testing aggregates: particle size distribution (sieving method)</i>
AS 1141.12	<i>Methods for sampling and testing aggregates: material finer than 75 µm in aggregates (by washing)</i>
AS 1141.24	<i>Methods for sampling and testing aggregates: aggregate soundness: evaluation by exposure to sodium sulfate solution</i>
AS 1141.34	<i>Methods for sampling and testing aggregates: organic impurities other than sugar</i>
AS 1141.35	<i>Methods for sampling and testing aggregates: detection of sugar contamination in concrete aggregates</i>
AS 1141.60.1	<i>Methods for sampling and testing aggregates potential alkali-silica reactivity: accelerated mortar bar method</i>
AS 1141.60.2	<i>Methods for sampling and testing aggregates potential alkali-silica reactivity: concrete prism method</i>
AS 1141.66	<i>Methods for sampling and testing aggregates: methylene blue adsorption value of fine aggregate and mineral fillers</i>
AS 1289.4.1.1	<i>Methods of testing soils for engineering purposes: soil chemical tests – determination of the organic matter content of a soil: normal method</i>

Reference	Title
AS 1379	<i>Specification and supply of concrete</i>
AS 2758.1	<i>Aggregates and rock for engineering purposes: concrete aggregates</i>
AS/NZS ISO 9001	<i>Quality management systems: requirements</i>
SA HB 79	<i>Alkali aggregate reaction: guidelines on minimising the risk of damage to concrete structures in Australia</i>
Austrroads	
AP-C87-15	<i>Austrroads glossary of terms</i>
ASTM International	
ASTM C295	<i>Standard guide for petrographic examination of aggregates for concretes</i>
Queensland Department of Environment, Science and Innovation	
EOWC	<i>End of Waste Code – Glass Fines (EOWC010001051)</i>
Transport and Main Roads Technical Documents	
MRTS01	<i>Introduction to Technical Specifications</i>
MRTS04	<i>General Earthworks</i>
MRTS05	<i>Unbound Pavements</i>
MRTS30	<i>Asphalt Pavements</i>
MRTS39	<i>Lean-mix Concrete Subbase</i>
MRTS40	<i>Concrete Pavement Base</i>
MRTS41	<i>Concrete Pavement Base (Ancillary Works)</i>
MRTS50	<i>Specific Quality Systems – Requirements</i>
MRTS70	<i>Concrete</i>
MRTS101	<i>Aggregates for Asphalt</i>
QRS1-QRS5	<i>Quarry Registration System documents (QRS1-QRS5)</i>

3 Definitions

3.1 The terms used in this Technical Specification shall be defined in Clause 2 of MRTS01 *Introduction to Technical Specifications*. Additionally, terminology relevant to this Technical Specification is defined in Table 3.1 below.

Table 3.1 – Definitions of terms

Term	Definition
Backfill material	Material placed in confined excavations for culverts, structures, conduits, pits and so on, or in some instances, to fill excavations of unsuitable material. Backfill includes bedding material and materials placed in the foundation bedding, haunch, side and overlay zones during culvert backfill.
Bedding material	Material suitable for use in the foundation bedding zone of culverts, pipes, conduits, pits, and similar structures, and in the haunching of pipes and conduits.
Concrete applications	Includes low-risk applications such as footings and plinths (sign support for general works structures, lighting columns, traffic signals, etc.), kerbs and channel, paving for bicycle paths/shared paths, footpaths, medians, driveways, and aesthetic structures such as park benches, small planter boxes and garden reliefs.
Concrete pavement	A pavement structure made from concrete materials which may contain reinforcement. This is inclusive of the concrete base layer and lean mix concrete subbase.
Drainage medium	A free draining backfill material used in subsoil drainage applications material including, but not limited to subsoil drains, sheet filter drains and vertical/wick drains.
Embankment core zone	The central zone of an embankment adjacent to the embankment (outer zone) and overlying embankment (upper zone) and pavement structure.
Embankment fill material	Material placed in an embankment to subgrade level and used to backfill subgrade treatments or to replace unsuitable material. Includes both earth fill and rock fill.
Fine aggregates	Aggregate having a nominal size of less than 5 mm.
Haunch material	The material immediately above the foundation bedding zone for the installation of pipe culverts.
Recycled glass	Glass sourced from the collection of domestic or commercial waste. This includes glass collected from domestic commingled recycling collections.
Side fill	The material placed adjacent to the centre of pipe culverts.

Term	Definition
Total fine aggregates	The sum of the fine aggregates from all sources within the concrete fine aggregate mix.

4 Quality system requirements

- 4.1 RCG must be manufactured under a Quality Management System which conforms to AS/NZS ISO 9001.
- 4.2 The manufacturer of the RCG must have a current license or exemption for the recovery of resources from waste issued by the relevant state or territory environmental authority.
- 4.3 The Contractor must prepare and implement a Quality Plan that includes the documentation in Table 4.3. However, if the Quality Plan has previously been provided to the Administrator or the manufacturer has been approved / registered by the Administrator, it is not necessary to resubmit the Quality Plan, unless there has been a change to the manufacturing process or the source of the unprocessed materials.

Table 4.3 - Quality plan

Clause	Description of document
5.1	Details of the source of glass and manufacturing process
6	Complies with MRTS50 <i>Specific Quality System Requirements</i>
6.1	Applicable Legislative Requirements including but not limited to the <i>End of Waste Code (EOWC010001051) Queensland 2022</i>
8.1	Target material properties
9	Procedures for stockpile management, management of Lots and testing

- 4.4 Glass processing sites for asphalt and concrete fine aggregates (excluding fine aggregates for Normal Class concrete) shall be registered under Transport and Main Roads Quarry Registration System (QRS).

The use of recycled glass shall not commence until all relevant production procedures have been accepted by the Administrator. **Hold Point 1 Record**

HOLD POINT 1	
Process Held	Quality system conformance.
Submission Details	Where applicable, the documentation listed in Clause 4 must be submitted to the Administrator at least 7 working days prior to the commencement of the supply of the RCG to the Site.

5 Glass source

5.1 The Quality Plan must include details of:

- a) the source(s) of glass
- b) the production plant and processes
- c) methods to ensure that the level of contamination complies with this Technical Specification, and
- d) compliance with EOWC Glass Fines requirements and procedures for stockpile management and traceability as part of the lot control and as applicable, sub lot control.

5.2 RCG must be produced from food and beverage container glass, or window glass. The source material must be essentially free of glass from the following sources:

- a) cathode ray tubes
- b) fluorescent and incandescent lights
- c) glass recovered from electrical equipment
- d) glass recovered from a laboratory source
- e) porcelain products or cook tops
- f) glass from hazardous waste containers, and
- g) paper, cork, metals (including heavy metals), brick, plaster, plastic, rubber, wood, clay, paint, and other deleterious materials.

5.3 RCG must be free from any putrid odour.

6 Chemical and other material requirements

6.1 The Quality Plan must include:

- a) details of the applicable Legislative Requirements including End of Waste Code Glass Fines (EOWC010001051), and
- b) procedures for ensuring that the manufacture of RCG is carried out in accordance with the Legislative Requirements.

6.2 The Contractor must ensure that the chemical concentrations and other characteristics of the RCG comply with any applicable requirements specified in the Legislative Requirements.

6.3 Maximum concentration limits for chemicals and other attributes shall be as per Table 6.3.

Table 6.3 – Maximum concentration limits for chemicals and other attributes

Quality characteristics	Absolute maximum concentration (mg/kg 'dry weight' unless otherwise specified)
Arsenic	20
Cadmium	1.5
Chromium (total)	40
Copper	120
Lead	100
Mercury	1
Molybdenum	10
Nickel	20
Zinc	300
Electrical Conductivity	2 dS/m or 2000 µS/cm
Total Organic Carbon	2.00%

7 Properties for use as a granular material

7.1 This Clause 7 only applies where RCG is used as a granular material.

7.2 RCG particles must be cubic in shape and free from sharp edges and elongated particles verified through visual inspections.

7.3 The particle size distribution for RCG must be determined in accordance with AS 1141.11.1.

7.4 Table 7.4 provides application of RCG and relevant departmental Technical Specifications.

Table 7.4 – Grading Classification Type

Application	Technical Specification
Bedding and haunch of drainage pipes, conduits, and services	MRTS04
Side zone and backfill of drainage trenches	MRTS04
Bedding for segmental or block paving	MRTS03
Joint filling (i.e. filling the voids between individual segmental or block pavers)	MRTS04
Drainage medium	MRTS04
Embankment (core zone) fill ⁽¹⁾	MRTS04
Landscaping	MRTS04 MRTS16
Partial aggregate replacement in asphalt	MRTS101
Pavements – Unbound Granular	MRTS05

Notes:

⁽¹⁾ RCG must be used as Class A2 material in the core zone of embankments, provided it meets the coefficient of uniformity requirements specified in MRTS04 *General Earthworks*. RCG must not be placed within upper or outer zones of the embankment.

8 Properties of RCG used in concrete

General

8.1 This Clause 8 only applies where RCG is used in the manufacture of concrete.

8.2 RCG used as a partial replacement of fine aggregate in the manufacture of concrete must:

- a) comply with AS 2758.1
- b) comprise of particles which are predominantly cubic in shape, free from sharp edges and elongated particles verified through visual inspections, and
- c) have a maximum nominal size of 5 mm.

8.3 The RCG must be tested for compliance with Table 8.3(a) and Table 8.3(b).

Table 8.3(a) – Requirements for Recycled Crushed Glass Used in Concrete – Source testing

Property	Standards and test methods	Minimum test frequency	Requirements
Durability	AS 2758.1, Clause 9.2.2.3	1 test per Lot	AS 2758.1, Clause 9.2.2.3
Water absorption	AS 1141.5	1 test per Lot	≤ 1.0%
Weighted percent loss (sodium sulphate)	AS 1141.24	1 test per Lot	6.0% max weighted average loss
Particle density	AS 1141.5	1 test per Lot	≥ 2.1, < 3.2 t/m ³

Table 8.3(b) – Requirements for Recycled Crushed Glass Used in Concrete – Product testing

Property	Standards and test methods	Minimum test frequency	Requirements
Sampling of aggregates	AS 1141.3.1	1 test per Lot ⁽¹⁾	
Particle size distribution	AS 1141.11.1 and AS 1141.12	2 tests per Lot ⁽¹⁾	The limits of deviation for manufactured fine aggregate in Table 2 of AS 2758.1
Sugar in aggregate	AS 1141.35	1 test per Lot	Less than one part in 10 000
Sulphate content	AS 1379 AS 1012.20.1	1 test per Lot	Report if exceeds 0.01%
Chloride content	AS 1379 AS 1012.20.1	1 test per Lot	Report if exceeds 0.01% Max 0.04% for embedded steel reinforcement concrete Max 0.15% for plain concrete
Organic impurities (vegetable matter and wood particles)	AS 1141.34 AS 1289.4.1.1	1 test per Lot	Test fails if colour is darker than reference colour (AS 1141.34) max 0.5% (AS 1289.4.1.1)
Methylene Blue Absorption Value (MBV) ⁽²⁾	AS 1141.66	1 test per Lot	≤ 5.0%

Property	Standards and test methods	Minimum test frequency	Requirements
Deleterious fines index (DFI) ⁽³⁾	AS 2758.1	1 test per Lot	≤ 150
Bulk density (compacted)	AS 1141.4	1 test per Lot	1 200 kg/m ³ minimum
Percent Abrasion (Micro-Deval) Loss ⁽⁴⁾	ASTM D7428 Q229A	1 test per Lot	≤ 15%

Notes:

- (1) If the lot size is between 500 and 1000 tonnes, the minimum test frequency is 3 tests per Lot.
- (2) Required if material finer than 2 µm is more than 1.0% of grading.
- (3) DFI is the product of the MBV and the passing 75 µm value.
- (4) When intended for use in concrete wearing surface directly trafficked by vehicles not including footpaths or cycleways.

8.4 The particle size distribution for RCG must be determined in accordance with AS 1141.11.1 and AS 1141.12. The particle size distribution must not deviate from the submitted grading (as defined by AS 2758.1) by more than the limits of deviation for manufactured fine aggregate in AS 2758.1, as summarised in Table 8.4.

Table 8.4 - RCG Limits of Derivation

Sieve Aperture (mm)	Limits of Deviation (%)
4.75	± 5
2.36	± 10
1.18	± 15
0.60	± 15
0.30	± 10
0.15	± 5
0.075	± 5

8.5 Apparent particle density, dry particle density, saturated surface dry density and water absorption must be determined in accordance with AS 1141.5.

8.6 Aggregates must be assessed for any unstable silica minerals by petrographic examination in accordance with ASTM C295.

Alkali-Silica reactivity

- 8.7 Unless the Administrator has approved the concrete mix and waived the requirement for Alkali-Silica Reactivity (ASR) testing, RCG as fine aggregate replacement must be tested in accordance with AS 1141.60.1.
- 8.8 If the RCG is identified as having a potential for ASR when tested in accordance with AS 1141.60.1 then treatment to control the effect must be in accordance with SA HB 79 and the applicable Technical Specification for the concrete (MRTS39 *Lean-mix Concrete Subbase*, MRTS40 *Concrete Pavement Base* or MRTS70 *Concrete*).

9 Testing and conformance

- 9.1 Sampling must be carried out in accordance with AS 1141.3.1.

Table 9.1 – Standard Test Methods

Property to be Tested	Method No.
Sampling of aggregates	AS 1141.3.1
Particle size distribution	AS 1141.11.1
Material finer than 75 µm	AS 1141.12
Chemicals – sample preparation	USEPA SW 846 Method 3051A Microwave assisted acid digestion of sediments, sludges, soils, and oils
Chemicals – analysis	USEPA SW 846 Method 6010C Inductively coupled plasma - atomic emission spectrometry, or an equivalent analytical method with a detection limit < 10% of the stated absolute maximum concentration in Table 6.3.
Mercury concentration	USEPA SW 846 Method 7471B Mercury in solid or semisolid waste (manual cold vapour technique), or an equivalent analytical method with a detection limit < 20% of the stated absolute maximum concentration in Table 6.3.
Total organic carbon content	Method 105 (Organic Carbon) and using a 2 gram sample in Schedule B (3): <i>Guideline on Laboratory Analysis of Potentially Contaminated Soils</i> , National Environment Protection (other published or validated classical chemistry technique or instrumentation technique) ⁽¹⁾

Property to be Tested	Method No.
Electrical conductivity	Method 104 (Electrical Conductivity) in Schedule B (3): <i>Guideline on Laboratory Analysis of Potentially Contaminated Soils</i> , National Environment Protection (Assessment of Site Contamination) Measure 1999 or APHA 2510 B. (other published or validated classical chemistry technique or instrumentation technique)

Note:

(1) Where an equivalent analytical method is used, the detection limit must be equal to or less than that nominated for the methods in Table 9.1. Instrumentation techniques may include Ion Chromatography / Inductively Coupled Plasma / Discrete Analyser and so on. Nata endorsed test results are evidence of a validated technique.

- 9.2 The maximum Lot size is 500 tonnes, unless otherwise relaxed under Clause 9.3. Nonconforming Lots must not be incorporated into the Works.
- 9.3 The Contractor may submit a proposal to the Administrator to increase the size of a Lot where the process control has achieved a consistent product, as demonstrated by 5 consecutive Lots conforming to the requirements of this Technical Specification. The maximum Lot size may be increased as specified in Table 9.3. The Administrator is under no obligation to accept any such proposal.

Table 9.3 – Revision to Maximum Lot Size

Number of Consecutive Complying Lots	Maximum Lot Size
< 5	500 tonnes
≥ 5	1000 tonnes

- 9.4 The Contractor must submit test certificates to demonstrate compliance with the requirements of this Technical Specification prior to Incorporation of the RCG into the Works. The test certificates must include details about the source of the RCG, test results and any other relevant information. **Hold Point 2 Record**

HOLD POINT 2	
Process Held	Incorporation of RCG into the Works.
Submission Details	The test results must be submitted to the Administrator prior to the incorporation of the RCG into the Works.

Appendix A: Summary of Hold Points, Witness Points, Milestones and Records

General requirements for Hold Points, Witness Points, Milestones and Records are specified in Clause 5.2 of MRTS01 *Introduction to Technical Specifications*.

The Hold Points, Witness Points, Milestones and Records that the Contractor must submit to the Administrator to demonstrate compliance with this Technical Specification are summarised in Table A. There are no Witness Points or Milestones defined.

Table A – Hold Points, Witness Points, Milestones and Records

Clause	Hold Point	Witness Point	Milestone	Record
4.5	1. Quality system conformance			Quality Plan
9.4	2. Incorporation of RCG into the Works			Test Certificates

