Technical Specification

Transport and Main Roads Specifications
MRTS35 Recycled Material Blends for Pavements

July 2018

Queensland Government

Feedback: Please send your feedback regarding this document to: tmr.techdocs@tmr.qld.gov.au

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1 Introduction

1.1 Introduction to MRTS35

This Technical Specification applies to the use of recycled material blends for the construction, rehabilitation and maintenance of road pavements.

When used in accordance with the provisions of this Technical Specification, a recycled material blend may be used as a substitute for a quarry sourced material otherwise specified for the Works. Likewise a quarry sourced material may be used as a substitute for a recycled material blend.

The requirements of this Technical Specification are supplementary to the relevant parent Technical Specifications, as identified in Table 1.1. Where there are any contradictory requirements between this Technical Specification and the respective parent Technical Specification, the requirements of this Technical Specification shall apply where recycled material blends are used.

Table 1.1 – Parent Technical Specifications

Application	Parent Technical Specification
Unbound pavement construction	MRTS05
Plant-mixed lightly bound pavement construction	MRTS10
Plant-mixed heavily bound (cemented) pavement construction	MRTS08
Plant-mixed foamed bitumen pavement construction	MRTS09
Insitu stabilisation of pavements using cement or cementitious blends	MRTS07B
Insitu stabilisation of pavements using foamed bitumen	MRTS07C

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.

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

1.2 Permissible use

This Technical Specification may be used for Contracts where the pavements are designed in accordance with the Transport and Main Roads *Pavement Design Supplement* and the following requirements are met:

a) the requirements for recycled material blends used in unbound pavement construction are as follows:

   i. There are no restrictions to the use of recycled materials in sub-base or lower unbound pavement layers

   ii. For 'District Roads' as defined in the Transport and Main Roads *State Road Network of Queensland* map and where the recycled material is immediately below an asphalt layer:

   - where the average daily ESA in the design lane in the year of opening is less than 100, the surfacing shall be dense graded and/or stone mastic asphalt at least 25 mm thick, or

- where the average daily ESA in the design lane in the year of opening is greater than or equals to 100, a minimum combined thickness of 100 mm of dense graded and/or stone mastic asphalt is required,

iii. For 'National Network Roads', 'State Strategic Roads' or 'Regional Roads' as defined in the Transport and Main Roads *State Road Network of Queensland* map and where the recycled material is immediately below an asphalt layer, a minimum combined thickness of 100 mm of dense graded and/or stone mastic asphalt is required.

iv. A recycled material blend shall not be used in:

- any pavement layer directly in contact with traffic, such as an unsealed shoulder or unsealed road
- any base layer immediately below a sprayed sealed surfacing that is to be trafficked for longer than three months, including construction traffic and / or public traffic
- any pavement base layer below a sprayed sealed surfacing that is to be trafficked where the speed limit exceeds 60 km/h.

b) The requirements for recycled material blends used in stabilised pavements are specified in the relevant Parent Technical Specification.

2 Definition of terms

The terms used in this Technical Specification shall be as defined in Clause 2 of MRTS01 *Introduction to Technical Specifications* and the relevant parent Technical Specifications as given in Table 1.1. Further definitions are as defined in Table 2.

Table 2 – Definition of terms

Term	Definition
Base Course (Base)	A course principally intended to directly support the traffic loads, constructed from a mixture of unbound granular pavement materials, cementitious stabilising agent and water.
Brick	A block of clay hardened by burning in a kiln and suitable for use under the Building Code of Australia as a building material in domestic housing or industrial building construction
Ceramic	An inorganic, non metallic solid prepared by the action of heat and subsequent cooling which have an inorganic crystalline or partly crystalline structure
Coarse component	The fraction of the material which does not pass the AS 0.425 mm sieve
Constituents	The recycled materials and, if applicable, quarry materials that constitute the recycled material blend.
Contaminant	A material that is not a specified material to be recycled as part of the recycled material blend; contaminants include debris and foreign material as specified in this Technical Specification, and materials that contravene environmental legislation and regulations
Course	A layer or multiple layers of a particular pavement material as reflected in the pavement design. For example, surfacing course, base course, sub-base course or improved layer.
Crushed brick	Crushed material that principally consists of crushed brick and may also include some crushed concrete and concrete mortar

Term	Definition
Crushed concrete	Crushed material that principally consists of rock fragments coated with cement, crushed concrete mortar, and cementitious fines derived from cement mortar. The source material is typically reclaimed concrete from buildings and other large structures.
ERA	Environmentally Relevant Activity (ERA) as defined under Schedule 2 of the Environmental Protection Regulation 2008
ESA	Equivalent Standard Axle
Fine component	The fraction of the material passing the AS 0.425 mm sieve
Improved Layer	Refer to *Pavement Design Supplement*
Glass cullet	A product of mixed recycled glass sourced from manufacturing and post consumer waste, is 100% crushed glass and is generally angular, flat and elongated in shape, this fragmented material comes in colour or colourless forms and its size varies depending on the chemical composition and method of production
Quarry	A site from which construction materials are won by blasting, ripping or other excavation means for use in their natural state or after processing such as by crushing, screening or combining with other materials. The term quarry also includes pits.
Quarry material	Coarse and/or fine aggregates (sourced from a registered quarry) which conform to the requirements of the equivalent unbound material specified in MRTS05 *Unbound Pavements*
RAP	Reclaimed Asphalt Pavement (RAP) is purely asphalt material that has been milled or excavated from existing asphalt pavement layers, or unused asphalt returned from job sites
Recycled material	Recycled Material that is suitable for use in pavement construction which conforms to the requirements of this technical specification (MRTS35). Recycled material may include crushed concrete, crushed brick, tile, RAP, and glass cullet.
Recycled material blend	Recycled unbound pavement material that complies with the requirements of this specification as either RM001, RM002, RM003, RM004, RM005, or RM006. May consist of a combination of recycled material and quarry material constituents.
Subbase Course (Sub-base)	A structural pavement course immediately below the base course. A sub-base course may be divided into upper and lower courses
Tile	A manufactured piece of ceramic or stone

3 Referenced documents

Table 3 – Referenced documents

Reference	Title
–	*Environmental Protection (Waste Management) Regulation 2008*
–	*Transport and Main Roads State Road Network of Queensland*
MRTS01	*Introduction to Technical Specifications*
MRTS05	*Unbound Pavements*
MRTS07B	*Insitu Stabilised Pavements using Cement or Cementitious Blends*

Reference	Title
MRTS07C	*Insitu Stabilised Pavements using Foamed Bitumen*
MRTS08	*Plant-Mixed Heavily Bound (Cemented) Pavements*
MRTS09	*Plant-Mixed Pavements Layers Stabilised Using Foamed Bitumen*
MRTS10	*Plant-Mixed Lightly Bound Pavements*
MRTS50	*Specific Quality System Requirements*
MRTS51	*Environmental Management*
Pavement Design Supplement	*Transport and Main Roads Pavement Design Supplement*

4 Standard test methods

The following test methods apply to this Technical Specification:

a) test methods listed in Table 4, and

b) test methods listed in the relevant parent Technical Specifications.

Further details of test numbers and test descriptions are specified in Clause 4 of MRTS01 *Introduction to Technical Specifications*.

For all test methods, except Particle Size Distribution (PSD) testing, asphalt shall be removed from the sample prior to sample preparation, and discarded. For testing the PSD of materials that contain asphalt, the asphalt shall be removed from the sample prior to sample preparation and sieved separately using the sieve sizes for the test method. The asphalt masses retained on each sieve shall be recorded and added to the cumulative masses for the equivalent sieve in testing the balance of the material. The combined result shall be reported.

Table 4 – Standard test methods

Property to be Tested	Method No.
California Bearing Ratio (CBR)	Q113A
Conductivity (water)	APHA 2510-B
Flakiness Index	Q201
Linear Shrinkage, Weighted Linear Shrinkage	Q106
Liquid Limit	Q104A
Particle Size Distribution (PSD)	Q103A
Ten Percent Fines Value (wet) (wet strength)	AS 1141.22 or Q205B
Wet / Dry Strength Variation	AS 1141.22 or Q205C
Unconfined Compressive Strength (UCS)	Q115
Foreign Material Content (Recycled Material Blend)	Q477
Free Lime or Cement Content	RMS T134
Foreign Material Content (Glass Cullet)	RMS T276
Flat or Elongated Particles (Glass Cullet)	ASTM D 4791
pH (water)	APHA 4500-H B
Degradation Factor (coarse aggregate)	Q208B

Property to be Tested	Method No.
Sampling of soils, crushed rock and aggregates	Q060
Selection of sampling or test locations	Q050
Spot Sampling of soils, crushed rock and aggregates	Q061
Sulphate content	AS 1289.4.2.1

5 Quality system requirements

5.1 Hold Points, Witness Points and Milestones

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

The Hold Points, Witness Points and Milestones applicable in this Technical Specification are summarised in Table 5.1. There are no Witness Points defined.

Table 5.1 – Hold Points and Milestones

Clause	Hold Point	Witness Point	Milestone
5.2.1	1. Acceptance of Construction Procedure for pavement works incorporating recycled material blends		Submission of Construction Procedure for Recycled Material Blends (14 days)
6			Nomination of details of recycled material blends (14 days)

5.2 Construction procedures

5.2.1 General

The Contractor shall prepare documented procedures for all construction processes as defined in Clause 6 of MRTS50 *Specific Quality System Requirements*.

No pavement works incorporating recycled material blends shall commence until all relevant construction procedures have been accepted by the Administrator. **Hold Point 1**

5.2.2 Recycled material blend construction procedure

In addition to the requirements of the relevant parent Technical Specifications, the Contractor shall prepare a Construction Procedure that provides as a minimum the following details:

a) Procedures used to control the source material including:

   i. records of source materials contained in each truck coming to the plant / site

   ii. the source by general region of each type of recycled material

   iii. inspection of materials at the entry gate of the plant / site

   iv. inspection of materials at the point of tipping, and

   v. detection and management of contaminants and excess foreign materials

b) Procedures for manufacture of the recycled material including:

   i. selection of source materials used

   ii. sorting and stockpiling of raw materials

   iii. method for dust control

   iv. handling, crushing and processing procedures

   v. plant details including plant type, proposed location, output capacity, and

   vi. identification and removal of foreign materials/contaminates including the method of metal extraction, and

c) Procedures for production control including:

   i. statistical control processes to assure quality and satisfy the Contract

   ii. calibration methods and frequencies, including a minimum of daily calculations to ensure compliance with the mix requirements

   iii. method for addition of water and controlling moisture content of the mix

   iv. methods for handling of materials including loading of mixture, control of segregation from production to placement and transferring recycled material blend to trucks and the Works, and

   v. stockpiling and storage of crushed materials

d) If a quarry product is used in the blend, detail:

   i. the source of the quarry product, including its current Transport and Main Roads Quarry Registration Certificate, and

   ii. the subtype of the quarry product in accordance with MRTS05.

The Recycled Material Construction Procedure shall be submitted to the Administrator at least 14 days prior to the commencement of pavement works incorporating recycled material blends. **Milestone**

6 Nomination of recycled material blend

The Contractor shall nominate the recycled material blend to be used in the works, including:

a) the company producing the recycled material blend

b) the recycled material blend type, and

c) the proportion of each constituent material

Where a recycled material blend is being nominated as an alternative to a subtype specified using MRTS05 *Unbound Pavements*, the recycled material type must comply with the requirements of Table 7.1.3(a).

Details of the recycled material blend to be used in the works shall be submitted to the Administrator at least 14 days prior to the commencement of pavement works incorporating the recycled material blend. **Milestone**

Throughout the works, prior to the Contractor making any change in the recycled material blend type or the proportion of each constituent material (outside of the allowable tolerances), the Contractor shall re-submit the details of the revised recycled material blend at least 14 days prior to the commencement of pavement works incorporating the revised recycled material blend.

7 Materials

7.1 Recycled material blend requirements

7.1.1 General

The recycled material blend shall be mixed thoroughly to ensure that there is an even and homogenous distribution of constituents.

Where the recycled material blend is to be in direct contact with galvanized or aluminium pipes/fittings, the pH value of the recycled material blend shall not exceed 11. Alternatively, the pipes and fittings shall be covered with a suitable fabric liner to the satisfaction of the Administrator.

Coarse aggregates shall consist of crushed fragments that are clean, sound, hard, durable, and angular. The crushed fragment shall be free from laminated particles, clay and other aggregations of fine material, soil, organic matter and any other deleterious material.

7.1.2 Particle size distribution (PSD)

The recycled material blend, including all constituents and any contamination or foreign materials, shall comply with the particle size distribution limits specified in Table 7.1.2.

Table 7.1.2 – Particle size distributions for recycled material blends

Test Sieve Size (mm)	Percent Passing by Mass		
	RM001 and RM002	RM003 and RM004	RM005 and RM006
	Limits	Limits	Limits
26.5	100	100	100
19.0	95 – 100	95 – 100	84 – 100
13.2	78 – 92	75 – 95	69 – 95
9.50	63 – 83	60 – 90	56 – 90
4.75	44 – 64	42 – 76	37 – 77
2.36	30 – 48	28 – 60	23 – 63
0.425	13 – 21	10 – 28	8 – 30
0.075	5 – 11	3 – 11	2 – 14

7.1.3 Constituent portions of recycled material blends

The constituents used in each recycled material blend shall comply with the requirements of Table 7.1.3(a) and 7.1.3(b).

The recycled material blend may contain a blend of quarry material (coarse and fine aggregate sourced from a registered quarry) conforming to the requirements of the equivalent unbound material specified in MRTS05 *Unbound Pavements*, and recycled materials.

Table 7.1.3(a) – Limits of constituents in recycled material blends

Recycled Material Type	Equivalent MRTS05 Subtype	Maximum Limit of each Constituent[1] (percent by mass of final mix)				
		Quarry Material	Crushed Concrete	RAP	Crushed Brick	Glass Cullet
RM001	2.1	100	100	0	0	0
RM002	2.2	100	100	15	0	0
RM003	2.3	100	100	15	15	0
RM004	2.4	100	100	15	15	0
RM005	2.5	100	100	15	45	5
RM006	3.5	100	100	15	45	5

Notes:

1. The maximum limit of each constituent includes all materials whether included as primary mix design material, additives or foreign material.

Table 7.1.3(b) details the tolerances that apply to the constituent material proportions of the recycled material blend nominated in Clause 6.

Table 7.1.3(b) – Constituent tolerances

Constituent	Tolerance from Nominated Constituent Proportions (% by Mass)
Recycled products	
Crushed concrete	± 5
Crushed brick and nonceramic tile	± 2
RAP	± 2
Glass cullet	± 1
Non-recycled products	
Quarry material	± 5

7.1.4 Property limits

The combined recycled material constituents (excluding quarry materials) shall comply with the requirements of Table 7.1.4(a).

Quarry materials used in any recycled material blend must comply with the requirements of MRTS05 *Unbound Pavements* for the equivalent subtype given in Table 7.1.3(a).

The recycled material blend (combined coarse and fine component from all constituents) shall comply with the requirements specified in Table 7.1.4(b).

Recycled material blend to be stabilised (for example, to replace material unsuitable for insitu stabilisation or for use in plant-mixed stabilisation) shall have a water soluble sulfate content not exceeding 1.9 grams of sulfate (expressed as SO_4) per litre, when tested in accordance with Test Method AS 1289.4.2.1.

Table 7.1.4(a) – Property limits for combined recycled material constituents (excluding quarry material)

Property[1]	Limit	Recycled Material Blend					
		RM001	RM002	RM003	RM004	RM005	RM006
Course Component							
Wet Ten Percent Fines Value (wet strength) (kN)	Minimum	85	85	70	70	–	–
Wet/dry Strength Variation (%)	Maximum	35	40	45	45	45	45
Degradation Factor	Minimum	–	–	–	–	–	–
Flakiness Index (%)	Maximum	35	35	40	40	40	40
Fine Component							
Liquid Limit (%)	Maximum	35	35	35	35	40	40
Linear Shrinkage	Maximum	3.5	3.5	4.5	6.5	7.5	7.5
Weighted Linear Shrinkage	Maximum	85	85	110	195	–	–

Notes:

1. Any quarry material used in the recycled material blend shall comply with the requirements of MRTS05 *Unbound Pavements* for the equivalent subtype listed in Table 7.1.3(a).

Table 7.1.4(b) – Property limits for recycled material blend (combined course and fine components)

Property	Limit	Recycled Material Blend					
		RM001	RM002	RM003	RM004	RM005	RM006
California Bearing Ratio (soaked) (%)	Minimum	80	60	45	35	15	–
California Bearing Ratio (unsoaked) (%)	Minimum	–	–	–	–	–	15
UCS (MPa) at 7 days	Maximum	0.7[1]					

Notes:

1. This limit applied to an unbound recycled material blend. Where the material is to be stabilised, this requirement applies prior to mixing of the stabilising agent, however a higher UCS limit is permitted after stabilisation.

7.1.5 Contamination limits

Foreign materials types (as prescribed in Test Method Q477) in that fraction of the recycled material blend retained on a 4.75 mm sieve shall not exceed the percent by mass specified in Table 7.1.5.

Free lime shall not exceed the limit specified in Table 7.1.5 when a representative sample of the entire blend is tested using Test Method RMS T134.

Asbestos shall not be incorporated into any recycled material blend.

Table 7.1.5 – Limits of foreign materials in recycled material blends

Constituents of Foreign Material Type	Test Method	Recycled Material Blend	Maximum Percent in Mix (% by Mass)
Brick	Q477	RM001, RM002	1
Asphalt		RM001	1
Metal, ceramics and slag (other than blast furnace slag)		All	3
Plaster, clay lumps and other friable material		All	1
Rubber, plastic, bitumen not part of asphalt, paper, cloth, paint, wood and other vegetable matter		All	0.2
Free lime	RMS T134	All	0.6

7.2 Constituent material requirements

7.2.1 General

All constituents shall be free of contaminants such as clay, organic matter and any other deleterious material.

7.2.2 Quarry material

Quarry material (course and fine) used in the production of a recycled material blend shall comply with the requirements of MRTS05 *Unbound Pavements*, for the equivalent subtype given in Table 7.1.3(a).

7.2.3 Crushed concrete

Crushed concrete that contains appreciable unhydrated cement or free lime shall not be used. This requirement shall be satisfied by the UCS and free lime testing included in this Technical Specification.

Limiting unhydrated cement or free lime will help stop or limit tufa precipitate formation in pavement drainage structures.

7.2.4 Reclaimed asphalt pavement (RAP) material

RAP material included in a recycled material blend shall be purely asphalt and processed to a well graded, free flowing and consistent state. Minimum processing shall involve crushing and screening operations to ensure a maximum size not greater than the maximum aggregate size of the recycled material blend is being produced.

RAP, including the binder in it, shall not contain tar.

7.2.5 Glass cullet

The following requirements shall apply to any recycled material blend utilising recycled glass cullet:

a) Recycled glass source:

Glass shall be sourced only from food and beverage containers or building and window glass. Other glass shall not be used. Such other glass includes recycled glass classified as hazardous waste, light bulbs, laboratory equipment, televisions, computers, cathode ray tubes, porcelain products, cook tops, automobile and vehicle glass including windscreens, and fluorescent tubes.

b) Contaminants:

Cullet shall contain no more than 5.0% by mass of contaminants such as paper, foil, cardboard, metal, organics, plastic wrappers and bottle tops, as determined using RMS Test Method T267.

c) Cleanliness:

The cullet shall be cleaned to ensure that undesirable odours are eliminated.

d) Crushing:

Cullet crushing operations shall include crushing by a shaping crushing plant and shall produce a well graded product.

e) Particle Size Distribution (PSD):

The cullet particle size distribution shall comply with Table 7.2.5.

f) Flat or elongated particles:

The component of the cullet retained on the 4.75 mm test sieve shall not contain more than 1% of flat or elongated particles with a maximum dimension to minimum dimension ratio greater than 5:1, as determined using test method ASTM D 4791.

Table 7.2.5 – Particle size distribution of glass cullet

Test Sieve Size	Percent Passing by Mass
9.5 mm	100
4.75 mm	70 – 100
2.36 mm	35 – 88
1.18 mm	15 – 45
0.30 mm	4 – 12
0.075 mm	0 – 5

7.2.6 Water quality

Water used in recycled material blend production shall be free from oil, acids, organic matter and other matter which could be deleterious to the mixture. Unless otherwise accepted by the Administrator, the water shall satisfy the following requirements:

a) have a pH within the range of 6 to 10, when tested using Test Method APHA 4500-H B or equivalent, and

b) have an electrical conductivity not more than 3500 µS/cm when tested using Test Method APHA 2510-B or equivalent.

Unless otherwise accepted by the Administrator, water sources shall be tested at a maximum of twelve monthly intervals during the course of supply or when the nature of the water source has changed.

Water sources classified by the relevant water authority as 'potable water' shall be exempt from testing.

Electrical conductivity is an indirect measurement of the concentration of salts dissolved in the water.

pH measures the acidity or basicity of the water to assess its corrosiveness. The specification limits require the water to be essentially basic or mildly alkaline.

Where the Contractor can demonstrate a proven history or conformance from a specific water source, such as might be required for ongoing environmental monitoring purposes, the Administrator may waive the requirement for water quality testing of non-potable water sources.

8 Material manufacture

8.1 General

Recycled material blends shall be manufactured at a controlled and dedicated mixing plant. The constituents and proportions of each nominated blend shall not be adjusted from the nominated proportions and shall be consistent across all samples within the allowable tolerances specified in Clause 7.1.3.

The constituent material proportions, their distribution within the mixture and the overall workability of the recycled material blend shall be such that it can be handled and transported without segregation and can be placed, worked and compacted so that the resulting pavement layer is homogeneous and meets all requirements of this Technical Specification and the respective parent Technical Specification.

8.2 Manufacture of recycled material blend

8.2.1 Blending

The constituent materials shall be added, combined and blended using procedures that:

a) are controlled to ensure uniformity of the blended material

b) ensure that the blended material is processed to a well graded, free flowing and consistent state, and

c) comply with the blending / mixing / production requirements specified in the relevant parent Technical Specifications.

8.2.2 Moisture content

During manufacture of the recycled material blend, water shall be incorporated using a controlled, measured process so that it is uniformly distributed throughout the material by using a pug mill or equivalent mechanical process.

8.2.3 Blending with quarry material

When a recycled material is blended with a quarry material to meet the PSD requirements in Table 7.1.2, the recycled material constituents shall be pre wetted so that they can be blended consistently with the quarry material.

9 Stockpile requirements

In addition to the stockpile requirements of the relevant parent Technical Specifications:

a) the Contractor's Environmental Management Plan (Construction) to be prepared in accordance with MRTS51 *Environmental Management* shall include provisions that the location of and clearances to a stockpile shall suitably protect ground water and water bodies from any deleterious leachates

b) the Contractor's Stockpile Management Plan shall include the control of PSD and Foreign Material Content for each product, as specified in Clause 5

c) where recycled material blend has been stockpiled for some time and is no longer in a free flowing condition, it shall be reprocessed to ensure it is in a free flowing condition at the time of use

d) the stockpile site shall be clear, clean, even firm, adequately paved, and well drained

e) if a stockpile is constructed in more than one layer, each layer shall be fully contained within the area occupied by the upper surface of the preceding layer

f) there shall be a separate stockpile for each material of a different standard

g) all stockpiles shall be separated from other stockpiles by at least two metres, unless otherwise approved by the Administrator

h) glass cullet shall be in a separate discrete stockpile prior to blending

i) the surface of the stockpile shall be kept damp to prevent a net loss of moisture and to minimise the generation of airborne dust

For the purpose of testing, each individual stockpile lot shall be clearly delineated by one of the alternative methods below:

a) a separate stockpile shall be formed for each stockpile lot, or

b) material meeting the same requirements shall be added to a single stockpile incrementally such that a portion representing a stockpile lot is added, tested and found to be conforming before the next portion, representing the next stockpile lot, is added. Nonconforming stockpile lots shall be removed from the stockpile prior to the addition of further portions.

10 Construction

10.1 General

The construction of pavements using recycled material blends shall comply with all the requirements of the relevant parent Technical Specifications and all relevant legislation and regulations.

10.2 Supply of material to the Works

10.2.1 General

Any stockpiled materials must comply with the requirements of this Technical Specification when it is incorporated into the works.

10.2.2 Delivery dockets

Deliveries of recycled material blends to the Site shall be accompanied by a delivery docket that states the following minimum information:

a) mix type of the recycled material blend

b) mix identifier (if applicable)

c) name and address of the Manufacturer of the recycled material blend

d) information that is sufficient to track the date of manufacture of the recycled material blend, and

e) production lot number and stockpile number

Delivery dockets shall be made available for inspection onsite, and copies submitted to the Administrator with each construction lot.

11 Compliance testing

11.1 General

Compliance testing of pavement works incorporating recycled material blends shall be undertaken on a lot basis in accordance with MRTS01 *Introduction to Technical Specifications*. The total quantity of material in the lot shall be subject to acceptance or rejection in accordance with the requirements of both this Technical Specification and the relevant parent Technical Specifications.

For each lot, the Contractor is responsible for performing sufficient tests to ensure that the pavement complies in all regards with the requirements of this Technical Specification and the applicable parent Technical Specification. As a minimum the Contractor's testing program shall not be less than that specified in this clause.

Maximum lot sizes, minimum test frequencies and the minimum number of tests required are specified in Appendix A.

Where testing frequencies are specified as a number of tests per a quantity, the tests should be representative of the quantity of materials nominated, or part thereof.

For example, if a frequency of 1 test per 1000 m² is nominated, and a lot includes 2500 m² of that material.

- 1 test shall be taken between 0 – 1000 m² of material produced/placed
- 1 test shall be taken between 1000 – 2000 m² of material produced/placed, and
- 1 test shall be taken between 2000 – 2500 m² of material produced/placed.

11.2 Test locations

Samples for material compliance testing shall be taken from stockpiles unless otherwise varied by the relevant parent Technical Specification.

Locations for compliance testing shall be selected by random stratified sampling as specified in Test Method Q050. Representative sampling shall be undertaken as detailed in Test Method Q060. Spot sampling shall be undertaken as detailed in Test Method Q061.

11.3 Maximum lot sizes

The maximum lot sizes for pavement works incorporating recycled material blends shall be as specified in Table A1 of Appendix A.

11.4 Compliance testing requirements

11.4.1 Recycled material blends

Minimum testing frequencies for recycled material blends, and their constituents where applicable, shall be as specified in Table A2 of Appendix A.

11.4.2 Segregation

The Administrator may direct testing of any areas which show visible signs of segregation during construction.

11.4.3 Other compliance testing

Other compliance testing shall be carried out as specified in the relevant parent Technical Specifications. This shall include:

a) product testing (for stabilised materials)

b) construction standard testing, and

c) geometric testing.

12 Supplementary requirements

The requirements of MRTS35 *Recycled Material Blends for Pavements* are varied by the supplementary requirements specified in Clause 1 of Annexure MRTS35.1.

Appendix A: Maximum lot sizes and minimum testing frequencies

Table A1 – Maximum lot size requirements

Construction Activity	Maximum Lot Size
Supply of recycled material blends	5000 tonnes
Construction of pavement incorporating recycled material blends	Refer to the relevant parent Technical Specification

Table A2 – Recycled material blends – product testing

Property[1,2,3]	Test Method	Normal Testing Level		Reduced Testing Level	
		Minimum Testing Frequency	Minimum No. of Tests	Minimum Testing Frequency	Minimum No. of Tests
Ten Percent Fines Value (Wet) (wet strength)[1]	AS 1141.22 or Q205B	1 per 2500t	2 per lot	1 per 5000t	1 per lot
Wet/dry Strength Variation[1]	AS 1141.22 or Q205C	1 per 2500t	2 per lot	1 per 5000t	1 per lot
Flakiness Index	Q201	1 per 2500t	2 per lot	–	1 per lot
California Bearing Ratio	Q113A	1 per 2500t	2 per lot	–	1 per lot
PSD (Recycled Material Blend)	Q103A	1 per 1000t	–	1 per 2500t	–
PSD (Glass Cullet)	Q103A	1 per 2500t	–	1 per 5000t	–
Liquid Limit	Q104A	1 per 1000t	–	1 per 2500t	–
Linear Shrinkage	Q106	1 per 1000t	–	1 per 2500t	–
Unconfined Compressive Strength (without stabilising agent added)[4]	Q115	-	1 per lot	-	1 per lot
Foreign Materials (Recycled Material Blend)[5]	Q477	1 per 1000t	–	1 per 2500t	–
Foreign Materials (Glass Cullet)[6]	RMS T267	1 per 2500t	–	1 per 5000t	–
Flat or Elongated Particles (Glass Cullet)[7]	ASTM D 4791	1 per 2500t	–	1 per 5000t	–
Free Lime	RMS T134	1 per 25000t	–	1 per 5000t	–
pH (water)	APHA 4500-H B	12 month intervals	–	12 month intervals	–
Conductivity (water)	APHA 2510-B				
Sulphate Content (material to be stabilised only)	AS 1289.4.2.1	Monthly	–	Monthly	–
pH (recycled material blend) (material in contact with pipes only)	AS 1289.4.3.1				

Notes:

1. For quarry materials used as a constituent in recycled material blends, the properties to be tested and the testing frequencies shall be as specified in MRTS05 *Unbound Pavements*.
2. Where quarry material are used in the production of a recycled material blend, conformance of the Quarry Material itself is specified in MRTS05 *Unbound Pavements*.
3. Additional product testing requirements apply for stabilised materials as per the respective parent technical specification.
4. One (1) test is the average of three (3) individual UCS specimens.
5. When determined using test method Q477, “recycled crushed concrete” shall be read as “recycled material blend”
6. When determined using test method RMS T267, “recycled crushed concrete” shall be read as “recycled material blend”
7. The test sample shall be taken as the material retained on the 4.75 mm sieve.