DELIVERING FOR QUEENSLAND

Technical Specification

Transport and Main Roads Specifications
MRTS45 Road Surface Delineation

November 2025

(ATS 4110 Longitudinal Pavement Marking, Ed 1.0 May 2021)

Queensland Government

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Feedback

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About this document

The document adopts and modifies Austroads Technical Specification ATS 4110 *Longitudinal Pavement Marking* as part of national harmonisation. It sets out the requirements for the supply and installation of both longitudinal and transverse pavement markings, audio tactile line marking (ATLM), and raised pavement markers (RRPMs).

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 4110 *Longitudinal Pavement Marking* applies in Queensland
- has precedence over the Austroads Technical Specification ATS 4110 *Longitudinal Pavement Marking* when applied in Queensland
- has the same clause numbering and headings as the Austroads Technical Specification ATS 4110 *Longitudinal Pavement Marking*.

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.

Reference to...	Means
Administrator	The Administrator will be responsible for the overall administration of this Contract.

Contents

1 Scope

1.1 This Technical Specification sets out the performance-based requirements for the application of:

a) pavement markings including longitudinal lines, transverse lines and pavement messages (using waterborne road marking paint, thermoplastic or cold applied plastic material)

b) audio-tactile pavement marking, and

c) temporary pavement markers.

1.2 This Technical Specification also sets out the requirements for the application of raised pavement markers.

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.

Coloured surface treatments must be applied in accordance with best practice to ensure these treatments are durable and have adequate skid resistance. Refer to MRTS110 *Coloured Surface Treatments*. High Friction Surface Treatments must be applied in accordance with MRTS111 *High Friction Surface Treatments*. For enquiries related to MRTS110 *Coloured Surface Treatments* and MRTS111 *High Friction Surface Treatments* please email TMRRoadSurfacings@tmr.qld.gov.au.

2 Definitions

2.1 In addition to the definitions in AP-C87-15 and Clause 2 of MRTS01 *Introduction to Technical Specifications*, Table 2.1 definitions apply to this Technical Specification.

Table 2.1 – Definition of terms

Term	Definition
CSIRO	Commonwealth Scientific and Industrial Research Organisation.
ILAC MRA	Laboratory Accreditation Cooperation Mutual Recognition Arrangement.
Longitudinal lines	Dividing, barrier, lane, edge and continuity lines and outlines markings.

Term	Definition
Pavement markings	Longitudinal lines, transverse lines and pavement messages.
Period Contract	A long term contract where the Contractor is required to measure the properties of the pavement marking and renew the marking if the pavement marking properties are below the intervention level.
Retroreflectivity	The value of reflected light measured in millicandelas per lux per m^2, using a retroreflectometer calibrated to a nationally recognised standard, using a 30 m geometry instrument.
Transverse lines	Stop and give way lines, turn lines, markings at stop and give way signs, pedestrian guidelines, diagonal and chevron markings, arrows, shapes, symbols, numerals, parking areas and kerb markings.

3 Referenced documents

3.1 The requirements of the referenced documents listed in Table 3.1 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 3.1 – Reference documents

Reference	Title
Australian / New Zealand Standards	
AS 1742	*Manual of uniform traffic control devices*
AS 1906.3	*Retroreflective materials and devices for road traffic control purposes, Part 3: Raised pavement markers (retroreflective and non-retroreflective)*
AS 2009	*Glass beads and particles for pavement marking materials*
AS 2700	*Colour standard for general purpose*
AS 4049.2	*Paints and related materials – Pavement marking materials Part 2 – Thermoplastic pavement marking materials – For use with surface applied beads*
AS 4049.3	*Paints and related materials – Pavement marking materials Part 3 – Waterborne paint – For use with surface applied Beads*
AS 4049.4	*Paints and related materials – Pavement marking materials Part 4: High performance pavement marking systems*
Austroads	
AP-C87-15	*Austroads Glossary of Terms*

Reference	Title
AGPT-T800	*Assessment of retroreflectivity of pavement markings*
AGTTM-SET	*Guide to Temporary Traffic Management*
Australian Paint Approval Scheme (APAS)	
APAS 0041/2	*Pavement marking paint, solvent-borne*
APAS 0041/3	*Pavement marking material, cold applied plastic*
APAS 0041/4	*Pavement marking paint, thermoplastic*
APAS 0041/5	*Pavement marking paint, water-borne*
APAS 0042	*Glass beads for use in pavement marking paints*
National Transport Commission	
ADG Code	*Australian Code for the Transport of Dangerous Goods by Road and Rail*
Transport and Main Roads Technical Documents	
MRTS01	*Introduction to Technical Specifications*
MRTS50	*Specific Quality System Requirements*
MRTS110	*Coloured Surface Treatments*
MRTS111	*High Friction Surface Treatments*
QGTTM	*Queensland Guide to Temporary Traffic Management*
Queensland MUTCD	Queensland *Manual of Uniform Traffic Control Devices*
QGRS	*Queensland Guide to Road Safety*
RPDM	*Road Planning and Design Manual 2nd Edition Volume 3, Part 3 Geometric Design*

4 Quality system requirements

4.1 The Contractor must hold current accreditation to the Painting Contractors Certification Program (PCCP), under the appropriate classes from Category B 'Pavement markings', as follows:

Class	Description
20	Long-run longitudinal pavement markings on major roads
21	Short- to medium-run longitudinal pavement markings on minor roads
22	Audio-tactile markings (where this work is included in the contract)
27	Pavement marking removal

4.2 The Contractor must prepare and implement a Quality Plan in accordance with MRTS50 *Specific Quality System Requirements* that also includes:

a) details of the proposed materials, including all relevant datasheets and limitations on their use, (such as seasonal constraints and incompatibility with other materials)

b) evidence of current PCCP accreditation

c) the proposed program of work, and

d) procedures for:

i. ensuring that the plant, processes and personnel used to apply pavement marking comply with the specified certification requirements and are capable of delivering the quality of marking required

ii. controlling the quality of materials used

iii. protecting the work from premature trafficking

iv. verifying that materials have been applied at the specified application rates (where required)

v. verifying that the field performance meets specified requirements, including details of the testing laboratory, and

vi. verifying that materials have been mixed strictly in accordance with the manufacturer's recommendations.

4.3 The Contractor's Work Health and Safety Plan must address any potential hazard from the use of pavement marking materials. **Hold Point 1** **Record**

HOLD POINT 1	
Process Held	Application of line marking.
Submission Details	The Quality Plan must be provided by the time specified in the General Conditions of Contract, or if no time is specified, at least 21 days prior to the commencement of work on site.

5 Materials

General

5.1 The Contractor is responsible for the selection and supply of the pavement marking materials to achieve the performance requirements specified in Clause 14. In addition, the materials must comply with the requirements specified in this Clause 5 and be approved by APAS.

5.2 The Contractor must comply with all requirements of the ADG Code relevant for the classes of materials, quantities and pack sizes being transported. **Record**

5.3 Testing must be undertaken by a laboratory that is accredited to meet the requirements of AS ISO/IEC 17025 by the Association of Testing Authorities (NATA) or another signatory to the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement (ILAC MRA) for testing laboratories. Test certificates and reports must display the name of the accreditation body.

5.4 If a laboratory conforming to the requirements in Clause 5.3 is not available, the Contractor may submit a proposal to the Administrator for the Principal's approval for testing to be undertaken by a laboratory not accredited to AS ISO/IEC 17025.

Pavement marking paint

5.5 Waterborne pavement marking paint must hold current APAS approval status to 0041/5.

5.6 Solvent based paint must not be used for longitudinal pavement unless approved otherwise by the Administrator, in which case it must hold current APAS approval status to 0041/2.

5.7 A current Certificate of Product Conformity issued by APAS for the product proposed to be used must be submitted to the Administrator. **Record**

5.8 The Contractor must submit batch and certificate numbers of the paint to the Administrator. Electronic quality control batch testing records must be maintained and made available to the Administrator upon request.

Thermoplastic

5.9 Thermoplastic pavement marking material must:

a) include aggregate, pigment, binder, glass beads and extenders, capable of being softened by heating and hardened by cooling

b) comply with the requirements of AS 4049.2, and

c) be approved under the Australian Paint Approval Scheme – Specification 0041/4.

5.10 Thermoplastic used for audio-tactile line markings must comply with all requirements of AS 4049.2 excluding Section 8.

Cold Applied Plastic (CAP)

5.11 Cold applied plastic (2 part methyl methacrylate) resin based pavement marking material must:

a) comply with AS 4049.4

b) be approved under the Australian Paint Approval Scheme – Specification 0041/3

c) be suitable for application to both unpainted and previously painted road surfaces consisting of sprayed seals or asphalt, and

d) be used in conjunction with glass beads complying with Clause 5.12.

Glass beads

5.12 Glass beads must comply with AS 2009 and must be Type B-HR, C-HR and/or D-HR which are approved under APAS 0042. The type to be used must be as stated in Annexure MRTS45.1

5.13 The glass beads can be blended to meet specific performance requirements.

5.14 The Contractor must provide the following to the Administrator: **Record**

a) a valid APAS product approval certificate indicating the product being used complies to APAS 0042 specification, and

b) batch numbers.

5.15 For each batch number of glass beads supplied from a continuous production run, the Contractor must maintain batch testing records and provide the records to the Administrator on request.

Anti-skid media

5.16 Anti-skid media must:

a) consist of angular particles which are resistant to polishing, and

b) when applied in accordance with the manufacturer's instructions, be capable of providing a skid resistance of at least 45 BPN or equivalent.

Roadmaking tapes

5.17 The use of permanent pavement marking tape is not permitted unless approved otherwise by the Administrator.

6 Equipment for the application of pavement marking

6.1 Longitudinal line marking machinery must:

a) be capable of applying the pavement marking paint or long life material to achieve the required dry film thickness and application of the surface applied anti-skid media and/or glass beads in accordance with the requirements of this Specification

b) be fitted with automatic pattern control

c) be capable of applying lines up to and adjacent to traffic islands and kerbing

d) be capable of marking a set of two lines forming a double one-way or double two-way barrier line concurrently

e) be capable of accurately applying a continuous line with gaps at specified intervals if required

f) be capable of accurately superimposing succeeding coats of paint or long life material upon the first coat and/or on existing pavement markings, and

g) consist of a rubber tyred vehicle which is manoeuvrable to the extent that straight lines can be followed and normal curves can be painted in true arcs.

6.2 Where the configuration or location of a longitudinal line cannot be painted with the longitudinal line application machine the pavement marking paint, surface applied glass beads and/or anti-skid media can be applied by hand-sprayed means.

6.3 All paint marking vehicles must have an application system to provide coverage of both paint and glass beads that produces similar retroreflectivity in both directions (to within 15%), such as dual angled spray guns and static bead drop systems.

6.4 All pavement marking vehicles must have been tested and calibrated to achieve the required rates of application of pavement marking materials.

6.5 Stencils, boards and hand-spray equipment must be used to paint transverse markings. Stencils must conform to the dimensions shown on the design documents or be marked in accordance with Queensland MUTCD.

7 Protection of people, property and the environment

7.1 The Contractor must implement temporary traffic management required for the safety of workers and road users in accordance with the requirements of QGTTM, Queensland MUTCD Part 3, relevant Technical Specifications and Technical Notes, and applicable legislation.

7.2 The Contractor must undertake all activities in connection with the application and removal of pavement markings in accordance with the applicable environmental legislation and any other environmental requirements specified in the Contract documents. Waste material, including unused materials, containers and temporary markers, must be removed from the site as soon as practicable and disposed of at an authorised disposal site.

7.3 The Contractor must implement measures to prevent damage to the property of:

a) the Administrator (such as such as that resulting from spillage, overspray onto roadside furniture or spreading by traffic onto adjacent pavement), and

b) third parties (including protecting vehicles from overspray and wet paint).

7.4 The Contractor must protect all markings until the material has dried and hardened sufficiently to resist marking damage and bead loss through premature traffic wear.

7.5 In the event of any damage occurring to the property of third parties, the Contractor must promptly rectify the damage in an environmentally safe manner or pay any compensation that it is required to be paid under law.

7.6 The Contractor must remove and/or rectify any damage or excess paint caused by spillage, overspray or spreading by the action of road users prior to hardening.

8 Application

General

8.1 The pavement marking must be set out in accordance with the drawings and any other requirements specified in the Contract documents.

8.2 The work includes:

a) spotting or setting out the alignment of the pavement markings to ensure they are applied at the correct locations, and

b) prior to resealing or placement of an asphalt overlay, taking measurements, preparing drawings and establishing offsets to ensure that the position of the line marking will be the same as the previous line marking. **Witness Point 1**

WITNESS POINT 1	
Process	Application of pavement marking.
Notification	At least one working day (not less than 24 hours) prior to the application of pavement marking.

8.3 All materials must be handled and applied in accordance with the manufacturer's instructions.

8.4 Pavement marking materials must not be applied during wet weather, or when the road pavement is wet or when adverse weather conditions may prevail during the work.

8.5 Prior to application of pavement marking material, the road surface must be prepared to produce a clean, dry surface which is free of dirt, dust and loose / foreign material.

8.6 Any foreign material such as parts of tyres, rubbish and animal carcasses that resist removal by air blasting must also be removed from the road surface prior to application of pavement markings.

8.7 If an error occurs in the placement of any pavement marking, the error must be corrected as soon as practicable. Painting over misplaced pavement markings is not permitted.

8.8 If the pavement marking material:

a) is potentially incompatible with an existing pavement marking or surface, or

b) will be applied to existing pavement marking which is flaking or chipping, or is in a condition that may impair the adhesion of the new marking, the marking or surface must be suitably prepared before applying the pavement marking material to ensure that the life of the pavement marking will not be adversely affected.

8.9 If the pavement marking is to be applied to new rigid concrete pavement surface, any curing compound must be removed beforehand by a physical abrasive means such as grinding or sandblasting.

8.10 Where the pavement surface is 'light' in colour (e.g. concrete pavements or where light coloured aggregates are used) the luminance factor must be measured in accordance with AS 4049.4 Appendix H, method 2. If a contrast of 80% is not achieved, then black painted contrasting lines (minimum width of 50 mm) must be used to augment the pavement marking to achieve the required luminance factor.

8.11 The application of pavement marking to an unmarked surface must comply with the tolerances listed in Clause 9.

8.12 Where the pavement marking is to be applied to previously painted surface, the pavement marking must be applied directly over the existing markings and within the tolerances listed in Clause 9.

Application of general waterborne pavement marking paint

8.13 Completed pavement markings must be uniform in appearance, texture, width and thickness and the surface applied glass beads must be even, and free from traffic damage and other defects.

8.14 All edges of the painted line must be clean sharp cut, free of dusting or splattering. Dusting is when the paint vaporises before it reaches the road and forms a cloud of paint and splattering is when the paint bounces off the road surface as droplets.

8.15 Where required, drying additive may be applied in accordance with the paint manufacturer's guidelines.

Thermoplastic

8.16 The marking produced must be uniform in texture, width and thickness and the surface substantially free from blisters, streaks, lumps and other defects. Any occurrence of overspray and gun dribble must be removed by the Contractor before leaving the site.

Cold Applied Plastic (CAP)

8.17 Cold Applied Plastic (CAP) must be applied in accordance with AS 4049.4.

8.18 Where CAP is applied using a structured pattern, it must have a coverage of 60-80% and a maximum height of 4 mm.

8.19 Completed markings must be uniform in appearance, texture, width and thickness and the surface must be free from blisters, air bubbles, tears, lumps, streaks, overlaps, unbeaded areas, tyre marks or other defects. Edges and cut-offs must be neat and sharp, and there must be no visible run-off, overspray, dribbles, splash or spillage on to the surrounding area.

Audio-tactile line marking

8.20 Where audio-tactile line markings (ATLM) are specified, the markings must comprise of CAP or thermoplastic. The material must be capable of retaining a film build of the raised rib height required in Table 9.2.

8.21 Unless specified otherwise in the Contract documents, audio-tactile line markings must be positioned on the lines.

8.22 Type C-HR glass beads must be mixed into the thermoplastic material at not less than 20% by mass prior to application.

8.23 Two part cold applied plastic used for audio tactile line markings must be white, matt grey or matt black as specified. Matt grey and matt black profile markings must not be retroreflective and must not include intermix or surface applied glass beads. Only white cold applied plastic base line and profile ribs are to include intermix glass beads and surface applied glass beads.

Surface applied glass beads

8.24 Surface applied glass beads including intermix and larger sizes must be applied to the surface of all pavement marking. Pavement marking material that has cured to the extent that adhesion of the drop-on glass beads to the plastic is impaired must be reapplied.

8.25 A proprietary adhesive coating must be applied to surface applied DHR beads.

8.26 The surface applied glass beads must be applied immediately after the application of the pavement marking to ensure that the beads are uniformly distributed, populated, placed and embedded across the surface.

Anti-skid media

8.27 If specified in the Contract documents, surface applied anti-skid media must be applied to pavement markings if the skid resistance is below 45 BPN (or equivalent).

8.28 When required, surface applied anti-skid media must be applied with the glass beads immediately after the application of the pavement marking using suitable equipment to ensure that the surface applied anti-skid media and glass beads are adequately distributed, populated, placed and embedded across the painted surface.

Installation of raised pavement markers and pavement bars

8.29 Raised pavements markers and pavement bars, must be installed as shown on the design documents or be marked in accordance with the Queensland MUTCD.

8.30 Prior to installation of the markers or bars, any material detrimental to the adhesion between the item and the pavement, must be removed.

8.31 Adhesive must be prepared, applied and cured strictly in accordance with the manufacturer’s recommendations.

9 Position tolerances

9.1 Longitudinal Pavement Markings, when not applied over an existing line, must be applied within the tolerances specified in Table 9.1.

Table 9.1 – Tolerance for installation of longitudinal pavement markings

Application	Tolerance
Maximum deviation from straightness	5 mm in 2000 mm
Maximum deviation from correct alignment or position	± 15 mm
Width of road marking	- 0 mm + 10 mm
Longitudinal start painting position	± 100 mm
Length of marking segment	± 100 mm
Spacing between marking segments	± 100 mm
Double one-way and double two-way line gap	0 mm + 10 mm

9.2 ATLM must be applied within the tolerances specified in Table 9.2 where not otherwise specified in the Contract or design drawings.

Table 9.2 – Location and pattern tolerances for audio-tactile line marking

Application	Tolerance
Height of raised ribs, proud of pavement surface (with surface applied beads)	± 2 mm
Thickness of strip in between raised rib sections (if applied)	T ≤ 2 mm
Spacing of raised ribs (in longitudinal direction)	± 50 mm
Width of the raised rib	± 10 mm
Length of raised ribs (in longitudinal direction)	± 10 mm
Slope angle of raised rib lead and trail faces	45° (approx.)

9.3 Transverse Pavement Markings must be applied within the tolerances specified in Table 9.3.

Table 9.3 – Tolerance of installation of transversevpavement markingsApplication	**Tolerance**
Dimension of transverse markings and shapes	± 20 mm
Placement from spotting	± 10 mm
Placement from existing markings	± 10 mm

9.4 Geometric tolerances must be checked at intervals specified in Annexure MRTS45.1, if stated.

10 Temporary pavement markers (FLAPS)

10.1 To assist the management of traffic, temporary pavement markers must be installed on all areas of cold planed, asphalt or spray seal surfaced prior to the areas being temporarily opened to traffic.

10.2 Temporary raised pavement markers must be removed and replaced with permanent markers as soon as the final road surface is completed and ready to receive the permanent markers. Where temporary markers are used to delineate traffic lanes and directions pending installation of permanent markings, they must be offset from the final alignment sufficiently to allow permanent markings to be installed without hindrance prior to the removal of the temporary markers.

10.3 Temporary markers must be placed at 12 m centres and in accordance with Table 10.3.

Table 10.3 – Temporary markers

Type	Colour
Single sided (uni-directional)	White on broken lane lines
Single sided (uni-directional)	Red on left edge line
Single sided (uni-directional)	Yellow on right edge, barrier / centre line and outline pavement markings
Single sided (uni-directional) and double sided (bi-directional)	Yellow on double one-way barrier line
Double sided (bi-directional)	Yellow on unbroken separation lines and double two-way barrier lines

10.4 Temporary pavement markers must be aligned such that the retroreflective surfaces of the marker are angled between 85 to 95 degrees to the direction of on-coming traffic.

10.5 Subject to Clause 10.2, the lateral divergence of temporary pavement markers must be within ± 10 mm. The longitudinal spacing of temporary pavement markers must be within ± 150 mm.

11 Redundant pavement markings

General

11.1 Pavement markings which are redundant (or the Contract documents specify their removal) must be removed or masked to leave a clean and undamaged pavement with surface texture, reflectivity characteristics and colour comparable to the adjacent pavement surface.

11.2 After removal of the markings, the condition of the resulting pavement surface must be suitable for bonding of new markings.

11.3 At the completion of the removal process, the redundant markings must not be discernible.

11.4 When removing or masking pavement markings such as arrows, numerals, letters, or other pavement markings, the removal or masking must take the form of a rectangular area or block around such markings. When removing or masking longitudinal and transverse lines such as edge lines, centre lines, lane lines, holding lines, or other lines, the removal or masking must cover a minimum of 200% of the total area of existing lines; i.e. minimum 50% extra coverage on both sides of the existing lines.

11.5 Where existing pavement markings are to be removed and replaced by other pavement markings, the pavement markings must not be removed until adequate provision has been made to complete the installation of the replacement markings. The pavement markings must be removed in a sequence that will not mislead or misdirect road users.

11.6 Blacking out with paint or similar may only be used:

a) with the prior approval of the Administrator, and

b) as an emergency temporary response (for example, to cover paint spillage or incorrectly applied markings).

11.7 If blacking out with paint is permitted, the paint must have skid resistant properties. The paint must be replaced with a permanent solution as soon as possible (in no case longer than 48 hours after the application of the paint).

Sprayed seal surfaces

11.8 For sprayed seal surfaces, existing pavement markings no longer required must be concealed by a double application of a cutback bitumen and 5 mm crushed aggregate overspray. The application of bitumen and 5 mm aggregate requires a second application of the same treatment, after a light brooming. Unless specified otherwise in Annexure MRTS45.1, this method must not to be used for asphalt surfaces.

11.9 For longitudinal line markings, the overspray must be sufficiently wide to cover the entire marking. For other pavement markings the overspray area must be the minimum rectangular area required to cover the existing marking. The overspray must be aligned parallel to the road centreline.

11.10 The timing of this treatment must be coordinated with the commissioning of the new works and application of new pavement markings to minimise the impact on road users.

11.11 The binder must be a cutback bitumen blend comprising 90% Class 170 bitumen and 10% medium curing cutting oil sprayed at an application rate of 1.0 litre/m^2.

11.12 The cover material must be 5 mm crushed aggregate applied at a rate of 120 m^2/m^3, and as far as possible, must match the colour of the surrounding pavement surface.

Asphalt pavement

11.13 The Contract documents may specify a method to be used for pavement marking removal. If a method is not specified in Annexure MRTS45.1, the Contractor may select the method in accordance with the requirements of this Clause 11.

11.14 Methods that may be used on an asphalt pavement include:

a) grinding

b) plane and reseal

c) sandblasting, and

d) high-pressure water spraying.

Hazard management

11.15 Where the pavement marking removal method may create a hazard to others (such as high-pressure water spraying or sandblasting) the Contractor must in accordance with the QGTTM and Queensland MUTCD Part 3:

a) in trafficked areas, erect signs warning approaching traffic of the hazard and the need to close windows during work activities, and

b) in pedestrian trafficked areas, erect signs warning pedestrians of the hazard during work activities.

Temporary masking of pavement marking

11.16 Black non-reflective masking tape may be used if indicated in Annexure MRTS45.1 for the temporary masking of pavement marking, provided that it is specifically designed for this purpose and has skid resistant properties. Once it is no longer required, the tape must be removed soon as practicable, and in no case more than 48 hours after it is no longer required.

11.17 Temporary pavement marking tape and long life material whether of a preformed, extruded, spray or screeded type, must be removed in accordance with the Manufacturer instructions.

11.18 Unless specified otherwise in Annexure MRTS45.1, any pavement marking tape that is applied over existing markings as a temporary masking measure must be removed within 6 months of application.

12 Period Contracts

12.1 This Clause 12 only applies if the pavement marking is being performed under the Line marking Maintenance Contract.

12.2 The Contractor must monitor the pavement marking and test it at the times specified in Annexure B. If the retroreflectivity is below that specified in Annexure B, the Contractor must reapply the pavement marking in accordance with this Technical Specification.

12.3 Audio tactile pavement markings must be replaced where:

a) edge lines are distorted in shape or lose shape due to wear, such that the height of individual ribs are less than 5 mm above the adjacent road surface, over more than 36 m continuous or 25% of any 300 m lane length, or

b) ribs have shattered or no longer adhere to the road surface over more than 10 m continuous or 15% of any 300 m lane length.

13 Acceptance of work

13.1 The Contractor must apply pavement marking which conforms with this Technical Specification, including the performance criteria specified in Clause 14.

13.2 If the work is Non-conforming at any time during the period during which the Contractor is responsible for the repair of defective work, the Contractor must reapply the pavement marking, at a time approved by the Administrator, so that it complies with the requirements of this Technical Specification.

13.3 In order to provide a uniform visual guide to the road user, all longitudinal lines within a 300 m segment must be replaced where the length of Non-conforming pavement marking exceeds:

a) 36 m continuous or 25% of total on any 300 m lane length on curves and barrier lines, or

b) 72 m continuous or 50% of total on any 300 m lane length on straights.

13.4 The Administrator may carry out its own field testing of the pavement marking for any requirement included in this Technical Specification.

14 Performance criteria

Dry retroreflectivity

14.1 The Contractor must undertake testing of dry retroreflectivity in accordance with AGPT-T800 and provide certificates for all testing undertaken to the Administrator within 28 days of testing. **Record**

14.2 The Contractor must test the pavement marking at the time periods and frequency specified in Annexure MRTS45.1. If nothing is specified, the time periods and frequency in Annexure B apply.

14.3 The minimum values of dry retroreflectivity must comply with the values specified in Annexure MRTS45.1. If nothing is specified, the values in Annexure B apply.

14.4 Dry retroreflectivity of white audio tactile lines must be assessed as follows:

a) where the audio tactile ribs are placed on top of the longitudinal line, the rib will be measured for retroreflectivity

b) where audio tactile ribs are installed adjacent to the longitudinal line, the retroreflectivity of the line and ribs will be measured separately and the line must be assessed in accordance with the requirements in Annexure MRTS45.1. If nothing is specified, the time periods and frequency in Annexure B

c) where the audio-tactile ribs are installed without longitudinal line marking, the ribs must be measured for dry retroreflectivity.

14.5 The minimum dry retroreflectivity of the audio-tactile ribs must not be less than 150 mcd/lux/m² for the life of the rib.

Wet retroreflectivity

14.6 The wet retroreflectivity of any white pavement marking, when measured in accordance with AGPT-T800 must be a minimum of 80 mcd/lx/m² at any time after application.

Colour

14.7 If requested by the Administrator, the Contractor (at its own cost) must prepare a sample pavement marking material panel in accordance with AS 4049.4 Appendix F.

14.8 White markings must be whiter in appearance than the colour ‘Y35 Off White’ as specified in AS 2700.

14.9 Yellow markings must be equivalent to ‘Y12 Wattle’ or ‘Y15 Golden Yellow’ as specified in AS 2700, or any colour which falls between these colours.

14.10 When non-white colour pavement markings in the wheel path are assessed for colour change against a reference sample in accordance with AS 4049.4 Appendix G, the grey scale rating must be 3 or greater.

Luminance

14.11 When white pavement markings in the wheel path are tested for the luminance factor in accordance with AS 4049.4 Appendix H, Method 2, the test marking must be lighter than Natural Colour System (NCS) swatch S 2500-N (see SS 01 91 02).

14.12 If requested by the Administrator, the Contractor must test a sample prepared in accordance with Clause 14.7 in accordance with the equipment and procedure specified in AS 4049.3 Appendix H. The luminance factor must exceed the following when measured in accordance with AS 4049.3 Section 6.1.9:

a) 80% for white markings, and

b) in the range of 45–50% for yellow markings.

14.13 Concrete or light coloured aggregate spray seal pavements may reduce the perceived visibility of markings due to the lack of contrast between the luminance of the pavement and the markings. It may be necessary to utilize black or coloured markings in conjunction with or adjacent to white or yellow markings to enhance visibility.

Skid resistance

14.14 The average skid resistance value (SRV) of any pavement marking, excluding audio tactile lines, must be ≥ 45 BPN or equivalent when measured in accordance with AS 4049.4 Appendix J. Skid resistance testing must be undertaken in accordance with the test periods and frequency stated in Annexure MRTS45.1, if any.

14.15 The average skid resistance of the beaded base material of an audio tactile line, must be ≥ 45 BPN or equivalent when measured in accordance with AS 4049.2 Appendix L. Skid resistance testing must be undertaken in accordance with the test periods and frequency stated in Annexure MRTS45.1, if any.

Degree of wear

14.16 When pavement markings are tested for the degree of wear in accordance with AS 4049.4 Appendix L, the pavement marking tested must be ‘70% of area intact’ or better, in accordance with AS 4049.4 Appendix M.

Thickness

14.17 Except where specified for tactile purposes, the thickness of (non-profile) pavement marking material must not exceed 5 mm.

15 Records

15.1 The Contractor must record the location, weather conditions and type of line marking applied each day and provide these records to the Administrator within 10 days. The records must identify any regulatory pavement marking installed. **Record**

16 Supplementary requirements

16.1 The requirements of MRTS45 *Road Surface Delineation* are varied by the supplementary requirements given in Clause 8 of Annexure MRTS45.1.

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 supply to the Administrator to demonstrate compliance with this Technical Specification, are summarised in Table A. There are no Milestones defined.

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

Clause	Hold Point	Witness Point	Milestone	Record
4.3	1. Commencement of surface preparation and application of coating			Quality Plan
5.2				Dangerous goods approval (if required)
5.7				Certificate of compliance for paint
5.14				Certificate of compliance for glass beads
8.2		1. Application of Pavement Marking		
14.1				Test results for dry retroreflectivity
15.1				Daily records of work

Annexure B: Dry retroreflectivity

B1 Unless specified otherwise in Annexure MRTS45.1 documents:

a) the frequency of dry retroreflectivity testing must not be less than the frequency in Table B1(a), and

b) the average dry retroreflectivity per Lot (when measured in accordance with Austroads Test Method AGPT-T800) must not be less than the value in Table B1(b).

Table B1(a) – Minimum frequency of testing for dry retroreflectivity

Length of road (km)	Minimum number of test sites
≤ 5	2
6-20	4
21-30	6
31-50	10
51-100	20
> 100	Every 10 km

Table B1(b) – Dry retroreflectivity

Test	Timing of Test (Days of wear after opening to traffic)	Average Dry Retroreflectivity [1] (mcd/lx/m²)	
		White longitudinal pavement markings	Yellow pavement marking
Initial Test	Within the first 30 days	≥ 400	≥ 200
Second Test[2]	Between 365 and 395 days	≥ 250	≥ 150
Intervention Level[2]	At least once every 12 months	< 150	< 100

Notes:

[1] Each individual test for the lot must be more than 95% of the specified value.

[2] Only applies to Period Contracts, and as ordered by Administrator or if specified in Annexure MRTS45.1.

B2 If the pavement comprises of concrete or light coloured aggregate spray seal, the retroreflectivity of markings must exceed that of the pavement surface by a minimum of 150 mcd/m²/lx.