Roads

Master Specification

RD-LM-C2 Supply and Application of Audio Tactile Line Marking

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DEPARTMENT FOR INFRASTRUCTURE AND TRANSPORT

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1	Initial issue (formerly R47 – Supply and Application of Audio Tactile Line Marking)	28/6/19
2	Addition of more detail on equipment and testing requirements	August 2020

Document Management

Contents

RD-LM-C2 Supply and Application of Audio Tactile Line Marking

1 General

1.1 This Part specifies the requirements for the supply and application of Audio Tactile Line Marking (**ATLM**).

1.2 Documents referenced in this Part are listed below:

a) AS 4049.2 Paints & Related Materials – Pavement Marking Materials, Part 2: Thermoplastic Pavement Marking Materials – For use with surface applied glass beads

b) AS 4049.4 Paints & Related Materials – Pavement Marking Materials, Part 4: High Performance Pavement Marking Systems
Appendix K – Determination of Retroreflectivity

c) AS 2009 Glass Beads for Pavement Marking Materials

d) APAS 0042 Glass Beads for Use in Pavement Marking Paints

e) Department OI 2.13 Audio Tactile Line Marking.

1.3 In the event of an inconsistency between the Documents referenced above and this Part, this Part shall apply.

1.4 "**PCCP**" means Painting Contractors Certification Program (refer www.apas.gov.au/pccp).

2 Quality Requirements

2.1 The Contractor must prepare and implement a Quality Plan that includes detailed procedures for:

a) ensuring that the plant, processes and personnel used to apply ATLM comply with the specified certification requirements and are capable of delivering the quality of marking required;

b) controlling the quality of materials used;

c) verifying that materials have been applied at the specified application rates; and

d) verifying that the field performance meets specified requirements.

2.2 If not submitted beforehand, the procedures must be submitted at least 28 days prior to the commencement of site work.

2.3 Provision of the documentation listed in this Clause shall constitute a **Hold Point.**

3 Contractor Accreditation

3.1 The work must be undertaken by a company that has PCCP accreditation for the following:

a) Class 22-2, Audio-tactile markings.

b) Class 27-1, Pavement marking; Removal.

3.2 Provision of the evidence for accreditation listed in this Clause shall constitute a **Hold Point**.

4 Materials

Thermoplastic Pavement Marking Material

4.1 Thermoplastic pavement marking material must comply with the laboratory testing requirements of AS 4049.2 except as modified below:

a) Softening Point - When determined in accordance with AS 2341.18, the softening point must not be less than 95ºC.

b) Cold Flow - When determined in accordance with AS 4049.2 Appendix 1, the cold flow must be no more than 5% at 40ºC.

4.2 The colour of the thermoplastic pavement marking material must be white as described in AS 4049.2.

Beads

4.3 Glass beads must comply with AS 2009, Type B beads (drop-on beads) and APAS 0042.

Product Certification

4.4 The Contractor must provide, prior to delivery, a certificate of compliance verifying that the thermoplastic pavement marking material and glass beads comply with Clause 4.1 and 4.3, respectively, together with the results of the relevant tests. The tests must be carried out by a laboratory accredited by NATA to carry out such tests. Where a NATA accredited laboratory does not exist for particular tests, the testing shall be undertaken by a laboratory as agreed by the Principal. The laboratory shall be based in Australia with a proven track record for that test. The testing shall not be undertaken by the manufacturer supplying the raw material.

4.5 For thermoplastics, certificates relate only to the formulation on which the tests were made and must be valid for not more than three years. New certification must be provided whenever changes in product formulation are made.

4.6 For glass beads, certificates must be valid for not more than three years.

4.7 Provision of the certificates shall constitute a **Hold Point**.

5 Application of ATLM

5.1 The contractor shall comply with OI 2.13 Audio Tactile Line Marking.

Site Preparation

5.2 The Contractor must prepare the site, including removal of existing unsound pavement markings. Where the ATLM is to be applied to a surface where it may be incompatible with the existing marking or surface, the surface must be suitably treated.

5.3 Where the existing material is flaking or chipping, is of a type or is in such a condition that adhesion of the new material to the road surface cannot be guaranteed for the required life of the marking, the Contractor must obtain the agreement of the Principal to the proposed method of surface preparation and its extent.

5.4 The area to be marked must be dry and free of dirt, gravel, flaking pavement marking material and other loose or foreign material. The area around the marking must also be free of dirt, gravel and other loose or foreign material so that tracking of such material on to the new marking is avoided.

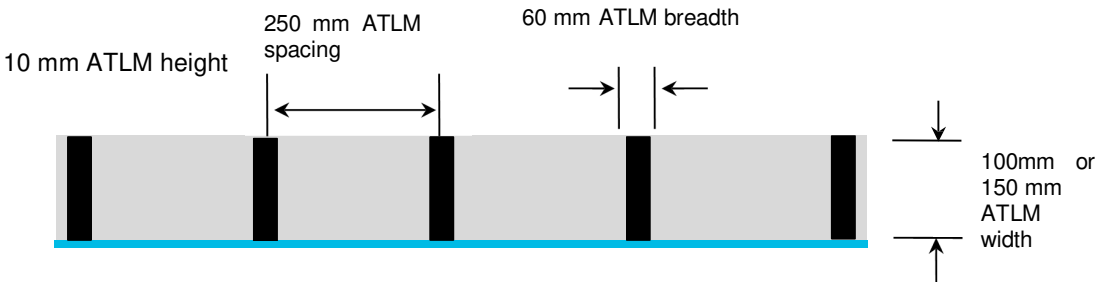
5.5 Where removal of unsuitable pavement marking is required, the removal must be undertaken so as to not adversely affect the skid resistance, texture depth, susceptibility to ponding and appearance of the road surface. The Contractor must obtain approval of the proposed removal method prior to undertaking the removal. Any materials produced by removal activity must be immediately collected and removed from site and disposed of in an environmentally acceptable manner.

Spotting Alignment

5.6 The Contractor must complete any spotting that may be required for the installation of the ATLM. If the edge line is missing the spotting must be completed to match the correct lane widths for that section of road.

Pattern and Dimensions

5.7 Unless specified otherwise, the pattern must conform to the following dimensions:



Application of Beads

5.8 Glass beads must be sprinkled or sprayed on to the thermoplastic pavement marking material while it is in a fluid state immediately after it has been applied to the pavement. The surface beads must be distributed to give a uniform coverage over the whole surface of the plastic material.

5.9 A minimum of 275 g/m2 is to be applied on the marking surface.

5.10 The Contractor must ensure that glass beads adhere to the surface of the ATLM to achieve the retroreflectivity requirements.

Retroreflectivity

5.11 Retroreflectivity requirements apply to ATLM installed over pavement line marking.

5.12 Acceptance of the retroreflectivty of the ATLM is based on the achievement of a minimum level of reflectivity of 350mcd/m2/lux, measured in accordance with Clause 6.

Test Run

5.13 The Contractor must apply an initial run of ATLM over 10% of the length of the project or 1km, whichever is the lesser distance. At the completion of this initial run a Hold Point shall apply.

5.14 The Contractor shall provide the Principal with at least 48 hours' notice of when the Test Run will be installed.

Tolerances

5.15 Unless otherwise specified, the ATLM must be installed within the tolerances specified in Table RD-LM-C2 5-1.

Table RD-LM-C2 5-1 Tolerances

Tolerances	
ATLM width	+ 20 mm, - 5 mm
ATLM height	+ 2 mm, - 0 mm
ATLM breadth	+ 10 mm, - 0 mm
ATLM spacing (in longitudinal direction)	± 50 mm
ATLM shape	≤ 5 mm deviation from straight edge placed along each side of the ATLM.
Distance between the centreline of the ATLM and the centreline of the existing marking or spotting	< 20 mm

5.16 The apparent line of the markings must be smooth and continuous when viewed in the direction of the line.

Protection of Work

5.17 The Contractor is responsible for protecting the work by an appropriate means until the work can be trafficked without being picked up and / or spread by tyres of passing traffic. If pick-up does occur, the Contractor must remove the spread thermoplastic material.

Removal of Pavement Markings (PCCP Class 27-1)

5.18 Where required, removal of pavement marking must be undertaken so as to not adversely affect the skid resistance, texture depth, susceptibility to ponding and appearance of the road surface. The Contractor must obtain approval from the Principal of the proposed removal method prior to undertaking the removal. Any materials produced by removal activity must be immediately collected and removed from site and disposed of in an environmentally acceptable manner.

Installation Records

5.19 The Contractor shall provide a Daily Activity Sheet for each day that ATLMs are installed. The Daily Activity Sheets shall include the interval of ATLM installation for that day in terms of maintenance marker peg (MMP) locations from start to finish, and gaps. If there are gaps, the reasons shall be recorded.

5.20 Submission of these records are required within 7 days of the completion of each Lot.

6 Testing and Acceptance

Identification ATLM Pattern and Dimension

6.1 A Lot is defined as:

a) no greater than 5km in length; and

b) with all marking completed within 30 days of each other; and

c) with all markings of a uniform material, application procedure and level of exposure.

ATLM Pattern and Dimension

6.2 The completed ATLM must comply with the pattern and dimension specifications in Clause 5.7, and to the tolerances in Clause 5.15.

6.3 The completed ATLM must be uniform in appearance and texture, and must be free from blisters, air bubbles, tears, lumps, streaks, overlaps, un-beaded areas, tyre marks or other defects.

6.4 The Contractor must provide measurements of width, height, breadth, spacing, shape and distance to existing line marking or spotting using 10 consecutive ATLMs at 10 locations for each Lot, per edgeline and centreline installed.

6.5 Measurements are to be recorded on a Test Sheet, and include the following information:

a) Results of measurements as per Clause 6.2.

b) Date of Testing.

c) Name of operator(s) who undertook the testing and the installation.

d) Road name.

e) GPS coordinates and maintenance marker peg (MMP) locations of the start and end of each group of ATLMs tested (MMP location accuracy to the nearest 0.1m).

f) The location identifier for each ATLM unit within the group.

g) The location of the ATLMs in terms of the centreline, or the edgeline on the east, west, north or south side of the road, as applicable.

6.6 Photos are to be taken of the units tested to record the quality of the units and their location relative to roadside features. The photos must identify the unit and group tested in terms of location.

6.7 Measurement locations are to be selected by the Principal.

6.8 Where practicable, a spray-painted line to the side of the road is to be used to mark the start and end of each group of ATLMs tested.

6.9 At the completion of each Lot, the Contractor must provide the test results specified in Clause 10 “Verification Requirements and Records”.

Additional Requirements for ATLM Height Testing

6.10 The contractor must undertake testing of ATLM height using a ZAP 5030 or equivalent NATA traceable calibrated ATLM height measurement device as approved by the Principal.

6.11 The ZAP 5030 must be modified by the manufacturer to include widened feet, appropriate for contact with both spray sealed and asphalt surfaces.

6.12 The minimum height requirement (inclusive of glass beads) of the ATLM specified is based on the height above the upper road surface level.

6.13 Measurement method shall be the following:

a) The measuring bridge must be placed at an angle of 900 transverse to the trafficked direction, over the centreline of the ATLM.

b) The width of the measuring bridge must be adjusted to have the contact feet on the road directly adjacent the edge of the ATLM (tolerance +20mm).

c) The measuring wedge must be placed at an angle of 900 to the measuring bridge, on the ATLM, in the trafficked direction.

Retroreflectivity

6.14 The Contractor must undertake testing of retroreflectivity, in accordance with AS 4049.4, Appendix K “Determination of Retroreflectivity”, except as modified below:

a) Use apparatus conforming with K3.1(c) “Photometer or retroreflectometer”.

b) Apply procedure K4.1 “Method 1 – Dry testing”, with the exclusion of item (b) relating to the reading locations. Reading locations shall be the same as Clause 6 of this Part, under “ATLM Pattern and Dimensions”, with the same markers tested.

c) Exclude procedure K4.2 “Method 2 – Wet testing”.

6.15 The Contractor must provide the information specified in Clause 10 “Verification Requirements and Records”.

Glass Beads

6.16 The Contractor must record the consumption of Glass Bead material.

6.17 The Contractor must provide the information specified in Clause 10 “Verification Requirements and Records”.

Timing of Acceptance Testing

6.18 The Contactor must undertake testing as per Clause 5 and 6 for the following Acceptance Points:

a) Within 20 days following completion of each Lot for all tests;

b) 12 months after installation for requirements of Clause 8 “Performance Requirements”, and

c) 24 months after installation for requirements of Clause 8 “Performance Requirements”.

6.19 The Contractor must provide the test results specified in Clause 10 “Verification Requirements and Records”.

7 Rectification of Defects

7.1 The Contractor must carry out remedial work to rectify defects as per the requirements defined below:

a) Pattern and Dimensions – ATLM within a Lot was not installed to the requirements of Clauses 5 and 6, with an exception for height as per Clause (b), below;

b) Height – The height of individual ATLMs above the top of the road surface level, over more than 10% of the tested ATLMs of the Lot, is less than specified in Table RD-LM-C2 5-1.

7.2 The location and length of replacement / rectification work will be determined by the Principal.

8 Performance Requirements

8.1 The Contractor must monitor the ATLM for a period of 24 months and must carry out remedial work to rectify defects at acceptance points of 12 months and 24 months, as defined below:

a) Height – The height of individual ATLMs above the top of the road surface level, over more than 10% of the tested ATLMs of the Lot, is less than specified in Table RD-LM-C2 8-1.

b) Retroreflectivity – The retroreflectivity of individual ATLMs, over more than 10% of the tested ATLMs of the Lot, is less than specified in Table RD-LM-C2 8-1.

c) Adherence and Integrity – ATLM has shattered, chipped, lost shape or no longer adheres to the road surface over more than 1% of the entire Lot, or over a continuous length exceeding 1m.

Table RD-LM-C2 8-1 Height and Retroreflectivity Performance Requirements

Timing	Minimum ATLM Height	Minimum ATLM Retroreflectivity(1)
12 months after installation	9mm	>250mcd/m2/lux
24 months after installation	8mm	>150mcd/m2/lux

Note: (1) Retroreflectivity requirements apply for ATLMs installed over line marking only.

8.2 The same markers are to be tested as those initially tested following installation

8.3 The location and length of replacement / rectification work will be determined by the Principal.

9 Hold Points

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

Table RD-LM-C2 9-1 Hold Points

Document Ref.	Hold Point	Response Time
2.3	Quality Documentation	7 Working Days
3.2	PCCP Accreditation	7 Working Days
4.7	Product Certification	1 Working Day
5.13	After completion of the initial Test Run of applied markings	Within 1 hour

10 Verification Requirements and Records

10.1 The Contractor must undertake the testing specified in this Clause and must supply written evidence of compliance on a Lot basis.

10.2 Submission of records is required within 7 days of completion of the Lot.

Table RD-LM-C2 10-1 Verification Requirements

Ref	Subject	Property	Procedure	Frequency	Acceptance Limits
5,6	Application of ATLM	Pattern and Dimensions	Contractor to provide a record of field measurements as per Clauses 5 and 6	Per Lot	Refer Table RD-LM-C2 5-1"Tolerances"
5,6	Application of ATLM	Retroreflectivity	Contractor to provide a record of field measurements as per Clause 6.14.	Per Lot	Clause 5.12
5.9	Application of ATLM	Application Rate of Glass Beads	Contractor to provide evidence through materials consumption and area	2 per day of 1 per visit of line marker whichever is greater; and after pressure of speed settings are changed	Minimum of 275g/m2 retained on the marking surface as per Clause 5.9
8	Performance Requirements	Height, Retroreflectivity, Adherence and Integrity	Contractor to provide a record of field measurements and per Clauses 5 and 6; Contractor to provide a record of Adherence and Integrity rate of ATLM	Per Lot, per Acceptance Point	Clause 8