SECTION 9 - LINEMARKING

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9.1 GENERAL

This section covers the requirements for the supply and application of pavement marking paint and glass beads, thermoplastic or cold-applied plastic material and glass beads, and pliant polymer tape for new installations of longitudinal lines, intersection markings and other markings on the road surface.

9.2 STANDARDS

The position and dimensions of the linemarking and roadmarking shall conform to the following standards:

*** (a) AS 1742;

*** (b) VicRoads' Traffic Engineering Manual, Volume 2;

*** (c) the linemarking drawings.

9.3 DEFINITIONS

(a) Linemarking is the term used to define all longitudinal lines such as separation, lane, edge, turn and continuity lines.

(b) Roadmarking is the term used to define all transverse lines and markings such as Stop/Give Way lines, pedestrian lines, and includes arrows, word, symbol and island markings.

(c) Pavement marking is the term used to define all linemarking and roadmarking.

9.4 MATERIALS

The linemarking and roadmarking materials shall conform to the following standards.

(a) Paint

The paint shall be white water-borne or solvent-borne chlorinated rubber as approved by the Superintendent. Solvent-borne chlorinated rubber paint may only be substituted for water-borne for initial applications on new surfaces and initial and final applications during winter months with the approval of the Superintendent. All paints shall be approved under the Australian Paint Approval Scheme (APAS).

In addition:

(i) Initial Markings

For initial marking on reseals and other new surfaces, paint shall comply with the requirements of AS 4049.1 : 1992 “Paints and related materials - Roadmarking materials, Part 1: Solvent-borne paint - For use with drop-on beads” or AS/NZS 4049.3 : 1996 for water-borne paint. Within the period four to eight weeks after the initial treatment, all markings shall be repainted using a waterborne paint.

(ii) Repaints

Within the period of four to eight weeks after the initial marking all markings shall be repainted using water-borne paint.

(b) Glass Beads

Glass beads shall be used on the markings and shall conform with the requirements for drop-on beads as described in Australian Standard AS 2009 "Glass Beads for Traffic Marking", except that 800 micron nominal size drop-on glass beads shall be adopted for use with 0.3 mm minimum dry film thickness second linemarking application of water-borne paint, or larger glass beads as approved by VicRoads and shall comply with size distribution requirements of Table 9.4.1.

Table 9.4.1 Size Distribution for Glass Beads

Sieve size um	% Passing			% Retained
	Drop-On Glass Beads	**E20 Glass Beads**	**Type 3 Glass Beads**	**Intermix Glass Beads**
2.36				
2.0				
1.7			100	
1.4		100	95 - 100	
1.18		95 - 100	80 - 95	0 - 3
1.0		80 - 95	10 - 40	
0.85	100	10 - 40	0 - 5	5 - 20
0.71		0 - 5	0 - 2	
0.60	90 - 100	0 - 2		
0.42	35 - 75			65 - 95
0.30	15 - 45			
0.15	0 - 5			
0.75	0 - 1			
Pan				0 - 10

(c) Thermoplastic Pavement Marking Material

Thermoplastic pavement marking material used under this Contract shall comply with the requirements of Australian Standard AS 4049.2, Thermoplastic Roadmarking Materials, and which is approved by VicRoads.

(d) Cold-applied Plastic Pavement Marking Material

Cold-applied plastic pavement marking material used under this Contract shall be a Poly Methyl Methacrylate resin based pavement marking material conforming with the colour, luminance and bead content requirements of AS 4049.2, Thermoplastic Roadmarking Materials, and which is approved by VicRoads.

(e) Pliant Polymer Pavement Marking Tape

Pliant polymer pavement marking tape intended for use under this Contract shall be commercially available tape approved by VicRoads.

9.5 SITE PREPARATION

The area to be marked shall be dry and free of dirt, gravel and other loose or deleterious material to enable proper adhesion to the road surface and unless otherwise specified site preparation shall be the sole responsibility of the Contractor and at the Contractor's cost.

Longlife material shall not be laid on a road surface if the temperature of the road surface is 5°C or less unless otherwise recommended by the manufacturer.

Where the application of a tack coat or primer is not considered appropriate the Contractor shall obtain the approval of the Superintendent to omit such application.

9.6 LAYOUT OF MARKINGS

The set out for pavement markings shall be carried out by the Contractor in accordance with the above Standards.

9.7 APPLICATION OF PAINTED MARKINGS

HP **Painting shall not commence until the Superintendent has inspected the set out and given consent to proceed, unless an exemption has been granted in writing by the Superintendent.**

Linemarking shall be applied by a self propelled machine, and stencils shall be used with all roadmarking.

Completed markings shall be uniform in appearance from all angles of observation, texture, width and thickness and the surface shall be free from streaks, overlaps, unbeaded areas, tyre marks or other defects. Edges and cut-offs should be neat and sharp, and there shall be no visible run-off, overspray, dribbles, splash or spillage on to the surrounding area, or on to parked or passing vehicles. The Contractor shall be responsible for the cost of removal of paint from such vehicles.

Glass beads shall be applied to the paint while it is still wet to produce a uniform properly bonded coverage over the whole painted surface. Glass beads shall be applied to all markings.

All markings are to be in accordance with the dimensions and spacings as set out in the Standards above.

The Contractor shall be responsible for any spillage on to the surrounding area, and cost of any remedial action required.

9.8 APPLICATION RATES OF PAINTED MARKINGS

The initial and repaint application rates for paint and glass beads shall be as follows:

(a) Paint Water-borne or Solvent-borne

(i) Linemarking - 0.3 mm minimum dry film thickness

(ii) Roadmarking - 0.3 mm minimum dry film thickness

The minimum dry paint film thickness specified above shall be the end product thickness measured on a 200 mm x 100 mm sheet metal test plate without beads.

(b) Glass Beads

(i) Linemarking

Initial marking drop-on glass beads shall be 400 micron nominal size
Repaint drop-on glass beads shall be 800 micron nominal size drop-on

(ii) Roadmarking

Initial marking drop-on glass beads shall be 400 micron nominal size drop-on
Repaint drop-on glass beads shall be 800 micron nominal size drop-on

A minimum of 250 g/m^2 shall be retained in the painted marking for each application.

9.9 APPLICATION OF PLASTIC MARKINGS

HP **Application of material shall not commence until the Superintendent has inspected the set out and given consent to proceed, unless an exemption has been granted in writing by the Superintendent.**

(a) Thermoplastic and Cold Applied Plastic Pavement Marking Material

Thermoplastic material shall be melted for use in accordance with the manufacturer's specification in a heater fitted with a mechanical stirrer.

A thermometer accurate to within ±5°C at the working temperature of the heater shall be used during melting and laying.

Once fluid, thermoplastic shall be used within 6 hours, which may include more than one cycle of heating and cooling to no more than three quarters of the application temperature. The material shall not exceed the manufacturer's application temperature during that time, and shall be discarded after that time if unused.

Cold-applied plastic material shall be prepared for use in accordance with the manufacturer's specification. Material which has cured to the extent that adhesion to the road or of the drop-on glass beads to the plastic will be affected shall not be used.

(b) Pliant Polymer Pavement Marking Tape

Pliant polymer pavement marking tape shall be laid in accordance with the manufacturer's instructions and within the atmospheric and road surface temperature limits recommended by the manufacturer. Where a primer has been used it shall be touch dry before the tape is laid. The precise position of the marking shall be marked in chalk or by other means before the backing paper is removed from the tape.

All backing paper and tape offcuts shall be removed from the site and legally disposed of by the Contractor.

(c) Application of Plastic Material, Pliant Polymer Tape and Glass Beads

Where a primer is required by the manufacturer of plastic material it shall be touch dry before the marking is laid.

All plastic material shall be applied to the road surface by machine using extrusion, screeding, spraying or other techniques or by hand trowelling while the material, road surface and atmospheric temperatures are within the limits recommended by the manufacturer. All linemarking shall be applied using a self-propelled ride-on machine except Statcon centre-lines or unless otherwise specified or approved by the Superintendent.

Glass beads shall be applied to all plastic markings. Glass beads shall be sprinkled or sprayed on to the plastic material while it is in a fluid state immediately after it has been applied to the pavement. The method of application shall ensure retention of the beads on the surface of the plastic material and also within the body of the plastic material in the case of sprayed cold applied plastic processes. The surface beads shall be distributed to give a uniform coverage over the whole surface of the plastic material.

Completed markings shall be uniform in appearance, texture, width and thickness and the surface shall be free from blisters, air bubbles, tears, lumps, streaks, overlaps, unbeaded areas, tyre marks or other defects. Edges and cut-offs shall be neat and sharp, and there shall be no visible run-off, overspray, dribbles, splash or spillage on to the surrounding area, or on to parked or passing vehicles. The Contractor shall be responsible for the cost of removal of pavement marking material from such vehicles.

All pavement markings are to be in accordance with the dimensions and spacings as set out in Clause 9.2.

9.10 THICKNESSES AND APPLICATION RATES OF PLASTIC MARKINGS

The applied minimum thickness of plastic materials shall be as follows unless otherwise specified:

(a) Thermoplastic

(i) sprayed markings - 2.0 mm minimum thickness with a minimum of 250 gm/m^2 of drop-on glass beads retained on the marking surface.

(ii) extruded line markings - 2.0 mm minimum thickness on longitudinal lines with a minimum of 250 gm/m^2 of drop-on glass beads retained on the marking surface. Intermix beads shall be E20 glass beads.

(iii) extruded road markings - 3.0 mm minimum thickness on intersections with a minimum of 250 gm/m^2 of drop-on glass beads retained on the marking surface. Intermix beads shall be E20 glass beads.

(iv) preformed markings - 2.3 mm with a minimum skidding resistance value of 45 BPN (British Pendulum Number).

(b) Cold-applied Plastic

(i) sprayed line markings - 1.0 mm minimum thickness for longitudinal line markings only, sprayed with no intermixed beads and a minimum of 250 gm/m^2 of E20 glass beads retained in and on the marking surface.

(ii) sprayed road markings - 2.0 mm minimum thickness for all roadmarkings, sprayed in two layers with no intermixed beads and a minimum of 250 gm/m^2 per layer of E20 glass beads retained in and on the marking surface.

(iii) trowelled, screeded, or extruded markings - 2.0 mm minimum thickness with E20 intermixed beads and a minimum of 250 gm/m^2 E20 glass beads retained on the marking surface.

The minimum thickness specified in Clause 724.08(a)(iii) and 724.08(b)(iii) shall be the height above the upper road surface level including glass beads. The Contractor shall allow for any extra material required when placing on coarse chip seals. All other thicknesses shall be as measured on a metal test plate including glass beads, except 724.08(b)(i) and 724.08(b)(ii) where the height of the cold-applied plastic material between the E20 glass beads on the metal plate is to be measured.

(c) The applied thickness of pliant polymer pavement marking tape is as supplied.

9.11 PROTECTION OF WORK

The Contractor shall be responsible for protecting the work using traffic cones or other appropriate means, and ensuring that wet material is not picked up and spread by tyres of passing traffic. If pick-up does occur, the Superintendent may direct that the spread material shall be removed at the Contractor's cost. **In such cases the method of removal shall be reviewed by the Superintendent.**

The Contractor shall be responsible for the cost of removal of plastic roadmarking material from vehicles which have picked it up from the fluid plastic applied by the Contractor.

9.12 TOLERANCES

The Contractor shall paint pavement markings lay longlife pavement markings so that:

(a) the distance between the centreline of the marking and the centreline of the set out mark is less than 30 mm; and

(b) the apparent line of the markings is a smooth, continuous alignment when viewed in the direction of the line; and

(c) the width of completed markings is within ±10 mm of the specified dimensions; and

(d) the length of completed stripes and blocks is within ±10% of the specified length; and

(e) the gap between double lines is within ±10 mm of the required 80 mm gap; and

(f) the paint application rate is within +50%, -0% of the specified rate; and

(g) the bead retention rate is within +50%, -0% of the specified rate.

The acceptance of markings outside the above tolerance will be at the discretion of the Superintendent who will determine the extent of reduced payment for out-of-tolerance markings.

9.13 WET WEATHER

No payment shall be made for delays caused by wet weather.