

07030 Cold Plastic Pavement Markings

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07030-1 General

This Specification covers cold plastic material suitable for use as reflecting pavement markings on bituminous pavement and method of application. The materials shall be so manufactured to be applied by extrusion onto the pavement in liquid form with glass spheres mixed in and also dropped onto the material immediately after it is applied.

07030-2 Materials**2.1 General Conditions**

The compound shall not deteriorate by contact with sodium chloride, calcium chloride or other chemicals used against formation of ice on roadways or streets, or because of oil dropping from traffic. In the plastic state, the materials shall not give off fumes which are toxic or otherwise injurious to persons or property.

During manufacture, reflecting glass spheres shall be mixed into the material to the extent of not less than 20 percent nor more than 50 percent by weight of the material.

2.2 Colour

The colour of the markings shall be brilliant white or yellow. The brightness value will be obtained with the Gardner Multi-purpose Reflectometer when measuring 0 - 45 daylight luminous directional reflectance with the green filter: shall not be less than 70 percent for white or 55 percent for yellow.

The material shall not be subject to discoloration or bond failure due to ultra violet rays from the sun.

2.3 Properties**2.3.1 Curing Time**

The curing time shall be controllable by the workers. Normal curing time shall be from 10 - 35 minutes with 100% curing complete in under one hour at all times. Curing is complete and the material does not rely on glass beads to keep it from tracking during a prolonged curing time.

2.3.2 Water Absorption

The material shall have no more than 0.5 percent by weight of retained water when tested by ASTM designation D-570, "Water Absorption of Plastic" procedure (A) (24 hour immersion).

2.3.3 Softening Point

The material shall not have a softening point.

2.3.4 Specific Gravity

The specific gravity of the plastic compound at 25 C, shall be from 1.90 - 2.20.

2.3.5 Impact Resistance

Shall not be less than 1.13 Newton-metres at 25 C after the material has been cast into bars of 25 mm² cross-sectional area, 75 mm long and placed with 25 mm extending above the vice in a cantilevers beam (Izod type) tester using the 2.82 Newton-metre scale. This instrument is described in ASTM designation D-256.

2.3.6 Abrasion Resistance

The material shall have a maximum weight loss of 0.5 grams when subjected to 200 revolutions on a Taber Abraider at 25 C using H-22 Calibrade wheels weighted to 500 grams. The test sample shall be prepared by forming representative lots of material of a thickness of 3.0 mm \pm 0.1 mm on a 100 mm square plate. The test surface shall be kept wet during the test.

2.3.7 Indentation Resistance

The indentation resistance of the material shall be measured by a Shore Durometer Type A2 as described in ASTM designation, D-1706. The reading of the Shore Durometer after 15 seconds and using a 0.907 kilogram weight shall not be less than the amounts specified below when the material is tested after heating four hours at 204 C and cooled to the following temperatures:

Table 1: Indentation Resistance

Temperature	Reading
46 C	65 ± 2
25 C	95 ± 2

2.3.8 Chemical Resistance

Material test sections, 5 cm x 5 cm should show no signs of degradation after exposure to:

1. 5% NaCl (24 hr. Immersion)
2. 5% CaCl₂ (24 hr. Immersion)

2.4 Glass Beads

The surface of the spheres shall be smooth and free from film, scratches and pits. At least 90 percent shall be of true spherical shape and free from milkiness, dark or air inclusions and other defects.

The liquid immersion method of 25 C may be used to determine the refractive index of the glass spheres. A refractive index of 1.50 to 1.60 is required.

The glass spheres shall meet the following gradation requirements when tested in accordance with ASTM designation D-1214.

Table 2: Spheres included in the manufacture of the material

Standard Sieve	% Passing
Passing #270 um	80 - 100
Passing #100 um	0 - 10

Table 3: Spheres for application on molten material

Standard Sieve	% Passing
Passing #900 um	90 - 100
Passing #300 um	20 - 50
Passing #200 um	0-10

07030-3 Installation**3.1 General**

The material shall be suitable for application in film thickness from 0.5 mm up to 15 mm. Normal surface applications will be from 1.5 to 2.0 mm thick.

The material when cured shall be flexible when cast into film thickness of 2 mm to 5 mm. The material shall contain no solvents.

The material shall be suitable for application on concrete, new asphalt, and old asphalt. Bond strength on any of these surfaces shall be sufficient for the material to remain in place for a number of years, under most normal conditions.

3.2 Existing Pavement markings

Where the location of the new cold plastic markings conflict with existing pavement markings, such as paint, the new marking shall be installed in the same line as the existing marking.

3.3 Application**3.3.1 Longitudinal Joints**

The cold plastic markings shall not be installed over a longitudinal joint or seam except transverse markings such as stop lines and crosswalk lines.

3.3.2 Road Surface

All work must be done on a clean dry road surface.

3.3.3 Application Temperature

To insure the best possible adhesion, the compound as specified shall be installed in a liquid state in a temperature range of +5 C to +35 C.

3.4 Traffic Control and Work Area

3.4.1 Requirements

The Contractor shall at all times keep traffic congestion to a minimum. The work shall be undertaken from one lane only and all men, materials and equipment shall be contained as much as possible in that lane. The work shall be carried out as quickly as possible to prevent excessive delay and inconvenience to traffic.

All equipment or combination of equipment used in the application, including the sweeper, material applicator and cone truck shall operate within 100 metres at any one time.

3.4.2 Work Restrictions

Work on any roadway may be restricted by the Engineer during the following time periods:

1. 0700 - 0900 hours
2. 1600 - 1800 hours
3. In or near residential or built-up areas, where sleeping occupants may be disturbed, between 2200 and 0700 hours.

3.5 Adhesion to Pavement

The Contractor shall make all tests and take all samples necessary to assure adequate adhesion between the cold plastic material and the pavement. Acceptance of this Contract shall be evidence that the Contractor is satisfied that no adhesion problems will be encountered.

3.6 Workmanship

3.6.1 Rejected Work

Further to Section 00700-15 of the General Conditions, faulty markings, such as unstraight lines, too much overflow, non-uniform lengths, must be redone within five working days.

3.6.2 Warranty and Maintenance Period

The Contractor shall remedy all defects in the work due to faulty material or workmanship or failure of the work itself for a period of two (2) years from the date of the Completion Certificate.

The Engineer shall give the Contractor written notice of all defects observed within the maintenance period.

The maintenance shall be a continuous operation and shall be carried on until expiration of the maintenance period of which time the Contractor's liability shall cease, unless there is an outstanding order from the Engineer requiring the Contractor to correct some of the maintenance that has not been completed.

The Contractor shall supply the Owner with a written two (2) year maintenance guarantee for retention of at least ninety (90) percent of the longitudinal markings and eighty (80) percent of the transverse markings.

In the event that the above minimum retention is not met due to either a material or installation failure, the contractor will, at the option of the Engineer, either:

1. Replace the missing sections to the satisfaction of the Engineer at no expense to the Owner or;
2. Reimburse the Owner at the same rate the Contract was awarded, for the quantity of line missing.

07030-4 Types of Markings

4.1 General

The pavement markings shown on the plans were designed, where possible, in compliance with the Uniform Traffic Control Manual for Canada. If conflict arises as to the interpretation between the plans and the Uniform Traffic Control Device Manual, precedence shall be given to the plans.

4.2 Description of Markings

4.2.1 Directional Dividing Lines

Directional Dividing Lines shall be 100 mm wide, yellow in colour, solid or broken and may be a single line or two parallel lines separated by a distance of 100 mm. When broken, the directional dividing line shall consist of a line 5 metres long with an 8 metre skip distance between lines in a consecutive pattern.

4.2.2 Lane Lines

Lane Lines shall be single line, 100 mm wide, white in colour and may be broken or solid. When broken, the lane line shall consist of a line 5 metres long with an 8 metre skip distance between lines in a consecutive pattern.

4.2.3 Pavement Edge Lines

Pavement Edge Lines shall be single, solid line 100 mm wide and may be yellow or white in colour.

4.2.4 Continuity Lines

Continuity Lines shall be a single line, 200 mm wide, white or yellow in colour and may be broken or solid. When broken, the continuity line shall consist of a line 5 metres long with a 5 metre skip distance between lines in a consecutive pattern.

4.2.5 Stop Lines

Stop Lines shall be a single solid line, 600 mm wide and white in colour.

4.2.6 Crosswalk Lines

Crosswalk Lines shall be two parallel, solid lines, 100 mm wide and white in colour.

4.2.7 Arrows

Arrows shall be white and designed according to the Uniform Traffic Control Device Manual for Canada.

4.2.8 Chevrons

Chevrons shall be white or yellow 600 mm wide and designed according to the Uniform Traffic Control Device Manual for Canada.

07030-5 Payment

Payment is to be made on the basis of the number of lineal metres of material installed except arrows. Payment for arrows is to be made on the basis of unit price per arrow.

The unit prices are to include the complete cost of supplying and installing the material. The amount paid will be based on field measurements by the Engineer.

The plans and schedules provided are to be used for estimating purposes only.

End of Specification 07030