

**SECTION 12.10**  
**EPOXY RESIN PAVEMENT MARKINGS, SYMBOLS AND LEGENDS**

**12.10.01 – Description:** This item shall consist of furnishing and installing reflectorized white and yellow epoxy resin pavement markings of the width and color specified and epoxy resin pavement markings, symbols and legends at the locations indicated on the plans and in conformity with the plans, these specifications and as directed by the Engineer.

Epoxy resin pavement markings includes epoxy resin installed with a truck-mounted machine such as center lines, lane lines, and shoulder lines.

Epoxy resin pavement markings, symbols and legends include stop bars, crosswalks, parking stalls, lane arrows, legends, and markings within areas such as paved islands, gore areas and paved medians.

On two-way highways, the exact location for passing zones will be determined by the Engineer prior to the application of the pavement markings. The Contractor shall notify the Engineer of the anticipated date of installation at least two weeks prior to that date, to allow time for the determination of the passing zone locations.

**12.10.02 – Materials:** Materials for this work shall conform to the requirements of Article M.07.22.

**12.10.03 – Construction Methods:**

**1 - Equipment:** Equipment furnished shall include an applicator truck of adequate size and power, together with (a) remote application equipment designed to apply an epoxy resin material in a continuous pattern and (b) portable glass bead applicators, one for each size bead, designed to provide uniform and complete coverage of the epoxy binder by a controlled free fall method. Pressurized glass bead application shall not be used. Before epoxy color is changed, equipment shall be cleaned out sufficiently to ensure that the color of material applied will be correct.

When working on a roadway with more than one lane in either direction, the applicator truck (striper) shall have a permanently mounted direction variable illuminated arrow board, fully operational and visible to approaching traffic. There will be no additional payment for the arrow board. Its cost shall be included in the bid price for this item.

For markings applied on pavements over one year old, equipment furnished shall also include a power washing machine capable of cleaning the pavement with a pressure of 16 550 to 19 300 kPa, with water heated to 82° – 90° C. No chemicals shall be added to the water used in the process. The power washer shall be equipped with a turbo blast tip with an oscillating head and shall be capable of supplying a minimum of 19 liters/minute/gun.

All guns on the spray carriages shall be in full view of the operator(s) during operation.

Each vehicle furnished shall include at least one experienced operator, who shall be fully knowledgeable about all equipment operations and application techniques.

The Contractor shall also furnish one technical expert, who shall be fully knowledgeable about all equipment operations and application techniques, to oversee the project operation.

**2 - Procedures:** Pavement markings shall be applied in accordance with the details shown on the plans and the control points established by the Contractor and approved by the Engineer.

The road surface shall be cleaned at the direction of the Engineer just prior to application. Pavement cleaning shall consist of power washing using clean water heated to 82° – 90° C at a pressure of 16 550 – 19 300 kPa. The areas to be power washed shall include all areas where epoxy marking symbols and legends (including stop bars and crosswalks) are to be applied and at least 25 mm beyond the area to be marked. The surface shall be cleaned to the satisfaction of the Engineer. For other pavement areas, cleaning shall consist of brushing with rotary broom (non-metallic), and any additional work as recommended by the material manufacturer and acceptable to the Engineer. New portland cement concrete surfaces shall be cleaned by abrasive blasting to remove any surface treatments and/or laitance. New bituminous concrete surfaces are not to be power washed.

All surfaces which are power washed shall be allowed to dry sufficiently prior to the application of the epoxy markings. The areas to be marked shall be broom cleaned immediately prior to the application of the epoxy markings.

Glass beads shall be applied immediately after application of the epoxy resin marking to provide an immediate no-track system.

The Contractor will place necessary “spotting” at appropriate points to provide horizontal control for striping and to determine necessary starting and cutoff points. Broken line intervals will not be marked. Longitudinal joints, pavement edges and existing markings shall serve as horizontal control when so directed.

A tolerance of 6 mm under or 6 mm over the specified width shall be allowed for striping provided the variation is gradual and does not detract from the general appearance. Alignment deviations from the control guide shall not exceed 50 mm provided the variation is gradual and does not detract from the general appearance. Material shall not be applied over a longitudinal joint. Establishment of application tolerances shall not relieve the Contractor of the responsibility to comply as closely as practicable with the planned dimensions.

Operations shall be conducted only when the road surface temperatures is 10° C or as allowed by the Engineer. They shall be discontinued during periods of rain, and shall not continue until the Engineer determines that the roadway surface is dry enough to achieve adhesion.

Glass beads conforming to the requirements of Grading “B” (larger beads) shall be applied at a rate of 1.44 kg/l of epoxy pavement marking material, immediately followed by a second drop of glass beads conforming to the requirements of Grading “A” (smaller beads) applied at a rate of 1.55 kg/l of epoxy pavement marking material. Traffic cones or some other acceptable method shall be used to protect the pavement markings until cured.

Time to No-Track: The material shall be in “no-tracking” condition within 15 minutes, or as allowed by the Engineer. The no-tracking time shall be determined by passing over the line with a passenger car or pickup truck in the simulated passing maneuver. A marking showing no visual deposition of the material to the pavement surface when viewed from a distance of 15 meters shall be considered as showing “no-tracking” and conforming to this requirement for time to no-track.

When stencils are used during the application of epoxy markings, care must be used when removing the stencils so that the epoxy resin does not drip on the road, sidewalk, grass, etc., and so that the applied markings have edges which are clean, straight and neat.

Epoxy resin pavement markings may be applied over existing painted markings provided they are sufficiently worn to allow adequate adhesion. If required by the Engineer, existing plastic, thermoplastic, epoxy or freshly painted markings shall be removed prior to the application of epoxy markings. Payment for removal will be made under the item “Removal of Pavement Markings.”

**3 - Performance and Warranty:** In order to be accepted, the applied markings must meet the following minimum retroreflectivity reading as measured using an LTL 2000 Retrometer with 30 meter geometry one to two weeks after installation:

White Epoxy	250 millicandelas per lux per square meter
Yellow Epoxy	175 millicandelas per lux per square meter

**WARRANTY:**

The Contractor shall warrant for the period and percentage level indicated below that the installation shall remain intact and serviceable. The installed material shall show no fading, lifting, shrinking, tearing, rollback, distortion or chipping due to vehicular traffic or normal maintenance activities including snow plowing. Although some wear is expected, the markings shall not wear out for the period and percentage level indicated below.

	<u>First Year</u>
Epoxy Resin Pavement Markings	95% (meters)
Epoxy Resin Pavement Markings, Symbols and Legends	95% (square meters)

In addition, the epoxy resin pavement markings shall be warranted to retain a minimum reflective value of 150 millicandelas per lux per square meter one year after installation. The measurements shall be made utilizing an LTL 2000 Retrometer with 30 meter geometry.

Determination of percentages of serviceability and minimum reflective values will be made jointly at the end of one year by the Contractor's representative and by the Engineer. The decision of the Engineer shall be final. The term "percentage of serviceability" shall be defined as follows: The percentage of serviceability of the markings shall apply to the total meters for Epoxy Resin Pavement Markings and total square meters for the Epoxy Resin Pavement Markings, Symbols and Legends measured on the project for payment.

The Contractor shall replace, entirely at the Contractor's expense, such amount of markings, if any, required to meet the above stated percentage. The Engineer will indicate the areas and lines to be replaced to meet the above stated percentages. The Contractor shall also replace those markings that fail the minimum value for reflectance. Replacement under either situation shall include all materials, equipment, labor and work incidental thereto.

The Contractor shall provide to the State, at no extra cost, any manufacturer's warranties or guarantees that exceed the minimum requirements stated previously, that are normally provided by the manufacturer.

These written warranties shall be provided when the documentation for the product is provided. The warranties will be retained by the Department.

**4 - Crosswalks:** Only glass beads conforming to the requirements of Grading "A" (smaller beads) shall be applied at a rate of 3.0 kg/l of epoxy pavement marking material.

**12.10.04 – Method of Measurement:** Epoxy resin pavement markings shall be measured for payment by the actual number of meters of epoxy resin pavement markings installed on the pavement and accepted by the Engineer. Epoxy resin pavement markings, symbols and legends will be measured for payment by the actual number of square meters of epoxy resin pavement markings, symbols and legends installed on the pavement and accepted by the Engineer.

**12.10.05 – Basis of Payment:** This work shall be paid for at the contract unit price per meter for "Epoxy Resin Pavement Markings" of the width and color specified, and/or the contract unit price per square meter for "Epoxy Resin Pavement Markings, Symbols and Legends" installed on the pavement and accepted. This price shall be for all the work required by this section and all materials, equipment, tools and labor incidental thereto. Payment will not be made for pavement markings affected by Contractor error and ordered removed.

Pay Item	Pay Unit
(Width) (Color) Epoxy Resin Pavement Markings	m
Epoxy Resin Pavement Markings, Symbols And Legends	m <sup>2</sup>