

ITEM SPECIAL - EPOXY PAVEMENT MARKINGS

A. DESCRIPTION

This work shall consist of furnishing and applying epoxy pavement markings in accordance with the requirements described herein. Except where otherwise indicated in these specifications, the requirements of Sections 641 and 740 of the Construction and Material Specifications shall apply to the installation and use of this material.

In general, the markings shall consist of four components:

1. Part A (White or Yellow),
2. Part B,
3. Size I Glass Beads, and
4. Size II Glass Beads, as described below.

B. EPOXY MATERIAL

Material supplied shall be a two part epoxy system capable of being applied at ambient temperatures down to 50 degrees F. The material shall be capable of retaining reflective glass beads of the drop-on or spray-on type.

The epoxy shall comply with the following requirements:

1. Formulation

The epoxy shall be formulated as a long life pavement marking system free of any peroxides, and/or TBPFA (Tri-Methylol Propane Tri-Acrylate) and other such multi-functional monomers. The epoxy should be designed to provide simple volumetric mixing ratio of its components (such as 2:1).

2. Viscosity

The viscosity of the various parts shall be as follows:

Part A White	18,000 - 20,000 cP
Part A Yellow	25,000 - 28,000 cP
Part B	1,850 - 2,050 cP

At the point of application the viscosities shall be within 10 percent of each other.

3. Weights

The weight of each part shall be as follows:

Part A White	11.8 lb./gal. +/- 0.2 lb./gal.
Part A Yellow	12.8 lb./gal. +/- 0.2 lb./gal.
Part B	9.6 lb./gal. +/- 0.2 lb./gal.

4. Epoxide Numbers

The epoxide number of the epoxy resin shall be 0.5 +/- 0.05 as determined by ASTM D-1882 for both White and Yellow Part A on a pigment free basis.

5. Amine Numbers

The amine number of the curing agent (Part B) shall be +/- 50 as per ASTM D-2074.

6. Toxicity

Upon heating to application temperature, the material shall not exude fumes which are toxic or injurious to persons or property. Upon curing the materials should be completely inert with all components fully reacted and environmentally safe.

7. Laboratory Drying Times

The pavement marking material, when mixed in the proper ratio and applied at the properly prescribed wet film thickness at 75 degrees F +/- 2 degrees F and with the proper saturation of glass spheres, shall exhibit a no tracking time of 48-60 minutes when tested according to ASTM D-711.

8. Field Drying Times

The pavement marking material shall have a setting time to a no-tracking condition of not more than 35 minutes at 75 degrees F +/- 2 degrees F. The line must be protected from tracking during the setting period by one or more of the following methods:

- a. Curing off the wet line from traffic,
- b. Use of a convoy of moving vehicles to prevent traffic crossing the wet line, and
- c. Saturation of the line with glass beads to prevent tracking.

9. Curing

The epoxy material shall be capable of fully curing under a constant surface temperature of 45 degrees F or above.

10. Adhesion to Pavement (Concrete and Asphalt)

The cured pavement marking materials, when tested according to ACT Method 805, shall have such a high degree of adhesion to the specified concrete (compressive strength 4,000 psi minimum) or asphalt surface that there shall be a 100 percent substrate failure in the performance of this test.

The prepared specimens shall be conditioned at room temperature (75 degrees F +/- 2 degrees F) for a minimum of 24 hours and a maximum of 72 hours prior to the performance of the tests indicated.

11. Hardness

The pavement marking materials, when tested according to ASTM D-2240-75, shall have a Shore D Hardness of between 70 and 90.

Samples shall be allowed to cure at room temperature (75 degrees F +/- 2 degrees F) for a minimum of 24 hours and a maximum of 72 hours prior to performing the indicated test.

12. Tensile Strengths

When tested according to ASTM D-638, the epoxy pavement marking materials shall have a tensile strength of not less than 3,000 pounds per square inch.

The Type IV specimens shall be cast in a suitable mold and pulled at a rate of 1/4" per minute by a suitable dynamic testing machine.

The samples shall be allowed to cure at room temperature (75 degrees F +/- 2 degrees F) for a minimum of 72 hours before performing the indicated tests.

13. Compressive Strengths

When tested according to ASTM D-695, the catalyzed epoxy pavement marking materials shall have a compressive strength of not less than 12,000 pounds per square inch.

The cast sample shall be conditioned at room temperature (75 degrees F +/- 2 degrees F) for a minimum of 72 hours before performing the indicated tests.

The rate of compression of these samples shall be no more than 1/4" per minute.

14. Abrasion Resistances

The abrasion resistance shall be evaluated on a Taber Abrader with a 1,000 gram load and CS-17 wheels. The duration of the test shall be 1,000 cycles. The wear index shall be calculated based on ASTM Test method C-501 and the wear index for the catalyzed material shall not be more than 100 mg.

The tests shall be run on cured samples of material which have been applied at a film thickness of 20 +/- 0.5 mil to code S-16 stainless steel plates.

The samples shall be allowed to cure at 75 degrees F +/- 2 degrees F for a minimum of 24 hours and a maximum of 72 hours prior to performing the indicated tests.

15. Impact Strengths

Properly mixed material shall be applied on a minimum of 28 day old clean concrete and shall be allowed to cure for 72 hours at 75 degrees F +/- 2 degrees F. Film thickness of the material shall be at the appropriately prescribed thickness.

At a temperature of 75 degrees F +/- 2 degrees F, a two pound (2 lb.) round steel ball shall be dropped from a height of 4 feet onto the cured sample. No cracking or chipping of the material shall take place.

16. Colors

The mixed epoxy compound, both White and Yellow, must be applied to 2 sets of 3' x 6' aluminum panels at 20 +/- 1 mil in thickness, one set with no glass spheres and one set with glass spheres as specified in this Specification (ensure the 50/50 distribution of Size I and Size II spheres, for this will impact the results of this test). Expose the prepared samples in a Q.U.V. Environmental Testing Chamber, as described in ASTM D-53, and they shall conform to the following requirements.

The test shall be conducted for 75 hours at 122 degrees F, 4 hours humidity and 4 hours U.V., in alternating cycles. The prepared panels shall be cured at 77 degrees F for 72 hours prior to exposure.

The color of the White epoxy material shall not be darker than Federal Standard No. 595A-17855.

The color of the Yellow epoxy material shall be reasonably close to Federal Standard No. 595A-13415.

17. Accelerated Life-Cycle Aging Tests

The material must not show any evidence of blistering, bubbling, or delaminating when submitted to test Method ATR-931.

6. GLASS BEADS

In addition to the requirements of 740.10, the following shall apply:

1. The glass spheres shall be colorless, clean, transparent, free from milkiness or excessive air bubbles and essentially clean from surface scarring or scratching.
2. The glass spheres shall have the following gradation when tested in accordance with ASTM D-1214:

Size II	U.S. Standard Sieve No.	Percent Retained
	10	0
	12	0-5
	14	5-20
	16	40-80
	18	10-40
	20	0-5
	Pen	0-2
Size III	U.S. Standard Sieve No.	Percent Retained
	20	0-5
	30	5-20
	50	30-75
	80	9-32
	Pen	0-10

3. Size I and Size II glass beads shall be spherical in shape and at least 70 percent shall be true spheres. Size I spheres shall be tested for roundness according to the procedural directives of the Materials Bureau. Size II spheres shall be tested in accordance with ASTM D-1186.

4. The refractive index of the spheres shall be a minimum of 1.50 as determined by the liquid immersion method at 77 degrees F. The silica content of the glass spheres shall not be less than 60 percent.