

## EPOXY OVERLAY SPECIAL, ITEM SPV.0175.XX.

### A Description

This special provision describes furnishing and applying two layers of a two-component polymer overlay system to the bridge decks shown on the plans. The total thickness of the overlay system shall be 3/8".

### B Materials

#### B.1 General

Furnish materials specifically designed for use over concrete bridge decks. Pre-qualified polymer liquid binders are as follows:

<u>Product Trade Name</u>	<u>Manufacturer or Supplier</u>	<u>Telephone</u>
Mark-163 Flexogrid	PolyCarb, Inc.	(866) 765-9227
Mark-174 Polymer Road System	Poly Carb, Inc.	(866) 765-9227
Sikadur 22 Lo-mod	Sika Corporation	(248) 569-5665
E-Bond 526 Lo-Mod	E-Bond Epoxies, Inc.	(954) 566-6555
Propoxy DOT Type III	Unitex	(816) 231-7700
SR 444 Low Mod Epoxy	Axson Technologies	(517) 663-8191

#### B.2 Polymer Resin

The polymer resin base and hardener shall be composed of two-component, 100% solids, 100% reactive, thermosetting compound with the following properties:

Property	Requirements	Test Method
Gel Time <sup>A</sup>	15 - 45 minutes @ 75° F	ASTM C881
Viscosity <sup>A</sup>	7 - 25 poises	ASTM D2393, Brookfield RVT, Spindle No. 3, 20 rpm
Shore D Hardness <sup>B</sup>	65±5	ASTM D2240
Absorption <sup>B</sup>	1% maximum at 24 hr	ASTM D570
Tensile Elongation <sup>B</sup>	30% - 70% @ 7 days	ASTM D638
Tensile Strength <sup>B</sup>	>2000 psi @ 7 days	ASTM D638
Flexural Strength <sup>B</sup>	>4500 psi @ 7 days	ASTM D790

<sup>A</sup> Uncured, mixed epoxy binder

<sup>B</sup> Cured, mixed epoxy binder

#### B.3 Aggregates

Furnish natural or synthetic aggregates that have a proven record of performance in applications of this type. Furnish aggregates that are non-polishing, clean, free of surface moisture, fractured or angular in shape; free from silt, clay, asphalt, or other organic

materials; and meet the following properties and gradation requirements:

**Aggregate Properties:**

Property	Requirement	Test Method
Moisture Content	≤0.2%	ASTM C566
Hardness	≥6.5	Mohs Scale

**Gradation:**

Sieve Size	% Passing by Weight
No. 4	100
No. 8	30 – 75
No. 16	0 – 5
No. 30	0 – 1

**B.4 Required Properties of Overlay System**

The required properties of the overlay system are listed in the table below:

Property	Requirement <sup>A</sup>	Test Method
Minimum Compressive Strength at 8 Hrs. (psi)	1,000 psi @ 8 hrs 5,000 psi @ 24 hrs	ASTM C 579 Method B, Modified <sup>B</sup>
Thermal Compatibility	No Delaminations	ASTM C 884
Minimum Pull-off Strength	250 psi @ 24 hrs	ACI 503R, Appendix A

<sup>A</sup> Based on samples cured or aged and tested at 75°F

<sup>B</sup> Plastic inserts that will provide 2-inch by 2-inch cubes shall be placed in the oversized brass molds.

**B.5 Approval of Bridge Deck Polymer Overlay System**

For systems or materials that are not listed on the prequalification list, provide a product history that includes a minimum of 5 bridge/roadway projects where the proposed overlay system has been applied in Wisconsin or in locations with a similar climate - include contact names for the facility owner, current phone number or e-mail address, and a brief description of the project.

A minimum of 20 working days prior to application, submit product data sheets and specifications from the manufacturer, product history/reference projects, and a certified

test report to the engineer for approval of the overlay system. The engineer may request samples of the polymer and/or aggregate, prior to application, for the purpose of acceptance testing by the department.

A certified test report consists of a certification by an independent testing laboratory showing compliance with the requirements of this specification. Include the test results with the certification.

Product data sheets and specifications from the manufacture consists of literature from the manufacturer showing general instructions, application recommendations/methods, product properties, general instructions, or any other applicable information.

## **C Construction**

### **C.1 General**

Conduct a pre-installation conference with the manufacturer's representative prior to construction to establish procedures for maintaining optimum working conditions and coordination of work. Furnish the engineer a copy of the recommended procedures and apply the overlay system according to the manufacturer's instructions. The manufacturer's representative familiar with the overlay system installation procedures, shall be present at all times during surface preparation and overlay placement to provide quality assurance that the work is being performed properly.

Store resin materials in their original containers in a dry area. Store and handle materials according to the manufacturers recommendations. Store all aggregates in a dry environment and protect aggregates from contaminants on the job site.

### **C.2 Deck Preparation**

#### **C.2.1. Deck Repair**

Remove all asphaltic patches and unsound or disintegrated areas of the concrete decks as the plans show, or as the engineer directs. Work performed to repair the concrete deck will be paid for under the item for deck patching. Insure that products used for deck patching are compatible with the epoxy overlay system.

NOTE: Some epoxy systems require concrete patch material to be in place a minimum of 28-days before overlaying - contact epoxy manufacture before completing Deck Patching.

#### **C.2.2 Surface Preparation**

Determine an acceptable shotblasting machine operation (size of shot, flow of shot, forward speed, and/or number of passes) under the supervision of the engineer. Select one test area of 4 SF per span, conduct a minimum of 3 tests per test area to average the results, prepare test area by shotblasting according to manufacture's recommendation, apply the overlay system and allow to cure, test the tensile adhesion strength according to ACI 503R, Appendix A of the *ACI Manual of Concrete Practice*. If the adhesion strength is less than 250 psi or the failure area at a depth of 0.25 inches or more is greater than 50% of the test area, adjust the shotblasting machine, select another test area, and perform the test again. Continue adjustment of the shotblasting machine and testing

adhesion until one passing test result is obtained from each span.

Prepare the entire deck using the final accepted adjustments to the shotblasting machine as determined above. Thoroughly blast clean with hand-held equipment any areas inaccessible by the shotblasting equipment. Do not perform surface preparation more than 24 hours prior to the application of the overlay system.

Just prior to overlay placement, clean all dust, debris, and concrete fines from the deck surface including vertical faces of curbs and barrier walls up to a height of 1 inch above the overlay with compressed air. When using compressed air, the air stream must be free of oil. Any grease, oil, or other foreign matter that rests on or has absorbed into the concrete shall be removed completely.

Cover the bridge deck drains and bridge expansion joints to prevent materials from adhering and entering.

The engineer may consider alternate surface preparation methods per the overlay system manufacture's recommendations. The engineer will approve the final surface profile and deck cleanliness prior to the contractor placing the epoxy overlay.

### **C.3 Application of the Overlay**

Perform the handling and mixing of the epoxy resin and hardening agent in a safe manner to achieve the desired results according to the manufacturer's instructions. Do not apply the overlay system if one or more of the following occurs:

- a. Ambient air temperature is below 50°F;
- b. Deck temperature is below 50°F;
- c. Moisture content in the deck exceeds 4.5% measured in accordance with ASTM D4263 or other approved method;
- d. Rain is forecasted within 8 hours after the estimated completion time;
- e. Materials component temperatures below 50°F.

Construction traffic will not be allowed on any portion of the deck that has been shotblasted or on the overlay without approval from the engineer. Begin overlay placement as soon as possible after surface preparation operations. In no case shall the time between surface preparation and application of the first lift exceed 24 hours.

The polymer overlay shall consist of a two-course application of epoxy and aggregate. Each of the two courses shall consist of a layer of epoxy covered with a layer of aggregate in sufficient quantity to completely cover the epoxy. Apply the epoxy and aggregate according to the manufacturer's requirements. Apply the overlay using equipment designed for this purpose. The application machine shall feature positive displacement volumetric metering and be capable of storing and mixing the polymer resins at the proper mix ratio. Disperse the aggregate using a standard chip spreader or equivalent machine that can provide a uniform, consistent coverage of aggregate. First course applications that do not receive enough aggregate before the epoxy gels shall be removed and replaced. A second course applied with insufficient aggregate may be left

in place, but will require additional applications before opening to traffic.

After completion of each course, cure the overlay according to the manufacturer's instructions. Remove the excess aggregate from the surface treatment by sweeping or vacuuming without tearing or damaging the surface; the material may be re-used if approved by the engineer and manufacturer. Do not allow traffic on the treated area until directed by the engineer.

After the first layer of coating has cured to the point where the aggregate cannot be pulled out, apply the second layer. Prior to applying the second layer, broom and blow off the first layer with compressed air to remove all loose excess aggregate.

Provide at least eight hours of curing or the minimum cure as prescribed by the manufacturer prior to opening that section to public or construction traffic.

Store resin materials in their original containers in a dry area. Store and handle materials according to the manufacturers recommendations. Store all aggregates in a dry environment and protect aggregates from contaminants on the job site.

Prior to opening to traffic, clean expansion joints and joint seals of all debris and polymer.

#### **C.4 Application Rates**

Apply the epoxy overlay in two separate courses in accordance with the manufacturer's instructions, but not less than the following rate of application.

<b>Course</b>	<b>Minimum Epoxy Rate<sup>A</sup> (GAL/100 SF)</b>	<b>Aggregate<sup>B</sup> (LBS/SY)</b>
1	2.5	10+
2	5.0	14+

<sup>A</sup> The minimum total applications rate is 7.5 GAL/100 SF.

<sup>B</sup> Application of aggregate shall be of sufficient quantity to completely cover the epoxy.

#### **C.5 Minimum Curing Periods**

As a minimum, cure the coating as follows:

	Average temperature of deck, epoxy and aggregate components in °F					
<b>Course</b>	<b>60-64</b>	<b>65-69</b>	<b>70-74</b>	<b>75-79</b>	<b>80-84</b>	<b>85+</b>
1	4 hrs.	3 hrs.	2.5 hrs	2 hrs	1.5 hrs.	1 hr.
2 *	6.5 hrs.	5 hrs.	4 hrs.	3 hrs.	3 hrs.	3 hrs.

\* Cure course 2 for 8 hours if the air temperature drops below 60° F during the curing period.

### C.6 Acceptance

Acceptance of the materials will be based on the certified test report received during the approval process, a certification of compliance from the manufacturer, and results of any acceptance tests ordered or performed by the engineer during construction.

### D Measurement

The department will measure Epoxy Overlay Special in area by square yards of completed and accepted work.

### E Payment

The department will pay for measured quantities at the contract unit price under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0165.XX	Epoxy Overlay Special	SY

Payment is full compensation for preparing the surface; for providing the overlay; for cleanup; and for sweeping/vacuuming and disposing of excess materials. Concrete Deck Repair will be paid for separately.