

Revision of Section 515 Concrete Sealer (HMWM Resin)

Revise Section 515 of the Standard Specifications for this project to include the following:

Description

This work consists of furnishing and placing a high molecular weight methacrylate (HMWM) resin system with sand and absorbent material to concrete bridge decks or rigid overlays. The surface of the concrete shall be prepared and the HMWM resin system shall be applied in accordance with these specifications in conformity with the plans or as approved by the Engineer.

Submittals

At least 10 working days in advance of placing the initial test section, the Contractor shall submit manufactures literature and recommendations, material safety data sheet for the resin system and diatomaceous earth shipment, samples of the resin, and a HMWM resin system placement plan.

The HMWM resin system placement plan shall include:

- (1) Schedule of work and testing for each bridge
- (2) Requirements for surface preparation
- (3) Description of equipment and process for applying HMWM resin
- (4) Description of process to verify application rate.
- (5) Description of process to change application rate.
- (6) Range of gel time and final cure time for HMWM resin
- (7) Absorbent material to be used.
- (8) Description of equipment for applying and removing excess sand and absorbent material
- (9) Procedure for removing HMWM resin, including equipment.
- (10) Storage and handling of HMWM resin components and absorbent material
- (11) Disposal of excess HMWM resin and containers

Work shall not begin until written approval of the HMWM resin system placement plan has been approved.

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Materials

The concrete sealer shall consist of a HMWM resin, promoter, and initiator. HMWM resin shall be low odor and shall conform to Table 515-1.

**Table 515-1
HMWM Resin Properties**

Property	Requirement	Test Method
Volatile Content*	30 percent, maximum	ASTM D 2369
Viscosity*	0.36 x 10 ⁻⁵ psi-sec, maximum, (Brookfield RVT with UL adaptor, 50 RPM at 77 °F)	ASTM D 2196
Specific Gravity*	0.90 minimum, at 77 °F	ASTM D 1475
Flash Point*	180 °F, minimum	ASTM D 3278
Vapor Pressure*	0.4 inch Hg, maximum, at 77 °F	ASTM D 323
Tack-free time	400 minutes, maximum, at 77 °F	Specimens prepared per California Test 551
PCC Saturated Surface-Dry Bond Strength	700 psi, minimum at 24 hours and 70 ± 1 °F	California Test 551, Part 5

*Test must be performed before adding initiator.

The promoter and the initiator shall be in accordance with manufacturer recommendations.

Sand for abrasive sand finish shall:

- (1) Be commercial quality dry blast sand.
- (2) Have at least 95 percent pass the No.8 sieve and at least 95 percent retained on the No. 20 sieve.

Absorbent material shall be diatomaceous earth, abrasive blast dust, or substitute recommended by the HMWM resin supplier and approved by the Engineer.

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(a) *Testing.* The Contractor shall select an area of 500 square feet of pavement, as approved by the Engineer, for testing the HMWM system.

The test area shall be:

- (1) Located within the project limits outside the traveled way at an approved location.
- (2) Be constructed using the same equipment as the production work.
- (3) Replicate field conditions for the production work.
- (4) Demonstrate that proposed means and methods meet the acceptance criteria.
- (5) Demonstrate that production work will be completed within the time allowed.

The test will be considered successful if:

- (1) The treated surface is tack free and non-oily.
- (2) The sand cover adheres and resists brushing by hand.
- (3) Excess sand and absorbent material have been removed.
- (4) The coefficient of friction is at least 0.35 when tested under California Test 342 or ASTM E 274.

Construction Requirements

The final prepared surface shall adhere to the following requirements:

- (1) The areas to be overlaid shall be cleaned by shotblasting or abrasive sandblasted in the event that the shot blaster cannot access areas to be prepared. Steel shot shall comply with SSPC-AB3. Recycled steel shot shall comply with SSPC-AB2. Cleaning shall not commence until all work involving the repair of the concrete deck surface or rigid overlay has been completed and the surface is dry. All contaminants shall be picked up and stored in the vacuum unit and no dust shall be created during the blasting operation that will obstruct the view of motorists in adjacent roadways. Cleaned surfaces shall not be exposed to vehicular traffic unless approved by the Engineer. If the deck becomes contaminated before placing the overlay, the Contractor shall shotblast or abrasive sandblast the contaminated areas to the satisfaction of the Engineer at no additional cost to the project.
- (2) Any loose particles shall be removed prior to the overlay placement by magnets and compressed air and vacuuming such that no trapped particles remain. Power washing will not be allowed.
- (3) The areas to be overlaid shall be blown off with compressed air just prior to placement and shall be completely dry.

The deck or rigid overlay shall be dry before applying HMWM resin. The concrete surface shall be at least 50° F and shall be no greater than 100° F. Relative humidity shall be no more than 85 percent during the work shift.

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The Contractor shall thoroughly mix all the components of the HMWM resin and apply it to the surface within 5 minutes of mixing.

HMWM resin system applied by machine shall be combined in volumetric streams of promoted resin to initiate resin by static in-line mixers. It shall be applied without atomization.

HMWM resin system may be applied manually, but the quantity of resin mixed for manual application shall be limited to 5 gallons at a time.

The application rate shall be 90 square feet per gallon, unless otherwise directed by the Engineer.

The resin gel time shall be between 40 and 90 minutes. HMWM resin that thickens during application shall be removed and replaced at the Contractor's expense.

HMWM resin shall be spread uniformly across the deck. All cracks shall be filled with the resin. Excess resin shall be redistributed using squeegees or brooms within 10 minutes of application. For textured or grooved deck surface, excess resin shall be removed from the texture indentations.

The abrasive sand finish shall be applied at 2 pounds per square foot or until saturation has been achieved as determined by the Engineer no sooner than 20 minutes after applying resin, and before the material gels. Absorbent material shall be applied, and excess sand and absorbent material shall be removed by vacuuming or power sweeping before opening to traffic.

Traffic or equipment will only be allowed on the treated deck surface after the Engineer has determined:

1. The treated deck surface is tack free and non-oily
2. The sand cover adheres and resists brushing by hand
3. Excess sand and absorbent material have been removed
4. No material will be tracked beyond limits of treatment by traffic

The Contractor shall remove the HMWM resin from the deck surface by shot blasting if the Engineer determines (1) the above listed conditions have not been met and (2) the allowable lane closure time will be exceeded.

The Engineer will perform California Test 342 or ASTM E 274 on treated deck surfaces to evaluate the coefficient of friction. The Engineer will provide at least a 15-day notice for the Contractor to provide traffic control for each bridge location. The coefficient of friction of the treated deck surface shall be at least 0.35.

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Method of Measurement

Furnish Concrete Sealer (HMWM Resin) will be measured by the quantity of mixed HMWM resin actually placed and accepted but shall not exceed an application rate of 90 square feet per gallon unless otherwise directed by the Engineer.

Place Concrete Sealer (HMWM Resin) will not be measured but shall be the plan quantity shown on the Plans.

Basis of Payment

The accepted quantities of Furnish and Place Concrete Sealer (HMWM Resin) will be paid for at the contract unit.

Payment will be made under:

Pay Item	Pay Unit
Furnish Concrete Sealer (HMWM Resin)	Gallon
Place Concrete Sealer (HMWM Resin)	Square Feet

Payment for Furnish Concrete Sealer (HMWM Resin) will include all labor, materials, tools, equipment, and incidentals required to furnish the resin material including freight to the project site and disposal of any unused material. No payment will be made for materials wasted, not accepted, or not incorporated into the work.

Payment for Place Concrete Sealer (HMWM Resin) will include all labor, materials, tools, equipment, and all incidentals necessary to prepare the concrete surface and complete the item. The work shall include the shot blasting, mixing and applying the resin to the pavement surface, and includes the absorbent material and sand and applying these materials to the surface, and removing any excess resin, absorbent material, and sand.

Testing will not be measured and paid for separately but shall be included in the work.

Instructions to Designers (delete instructions and symbols from final draft):

Use this project special provision only with approval from Staff Bridge as a short term solution to extend service life by sealing older bare concrete decks and rigid overlays with HMWM instead of more expensive longer term alternatives.

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Base quantity calculation on 1 gallon/90 SF of sealing area. The typical gallons per square foot required varies from 80 to 90 square foot per gallon based on condition of concrete overlay surface, and how much cracking there is.

Add footnote for application rate used for calculation in Summary of Quantity sheet.

Permanent Changes to Project Dated Special Provisions

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<u>Date</u>	<u>Author</u>	<u>Description of Change</u>
1/14/19	BPM Cons.	Initial Website Issue
04.11.2023	M. Kayen	Revisions to make spec online accessibility-compliant. 5.22.23 Additional accessibility work.