

## **POLYMER MODIFIED REJUVENATING EMULSION (PMRE) SCRUB SEAL**

### **2.01 Scope and Purpose**

PMRE Scrub Seal shall consist of applying asphaltic Polymer Modified Rejuvenating Emulsion and screenings on the pavement where shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

### **2.02 Materials**

The materials for scrub seal immediately prior to placement shall conform to the following requirements:

#### **2.02A Polymer Modified Asphaltic Rejuvenating Emulsion**

The emulsion used in the scrub seal shall be Polymer Modified Rejuvenating Emulsion or approved equivalent shall conform to the requirements in Table I.

**TABLE I**

<b><u>Test on Emulsion</u></b>	<b><u>Method of Test</u></b>	<b><u>Requirement</u></b>
Viscosity, SSF, @ 77 °F (25 °C), sec.	ASTM D244	50 – 350
Sieve Test, %	ASTM D244	0.1 max.
Residue by Distillation, %	ASTM D244	67 min.
Oil Distilled by Volume of Emulsion, %, pH	ASTM D244	0.5 max.
	ASTM E70	2.0 – 5.0
<b><u>Test on Residue from Distillation Test<sup>1</sup></u></b>		
Absolute Viscosity @ 60 °C Poises	ASTM D2171	3000 max.
Penetration, 4 °C., 200g @ 60 sec.	ASTM D5	40 min.
Toughness, N – m	ASTM D5801	4.0 min.
Tenacity, N – m	ASTM D5801	4.0 min.
Asphaltines, %	ASTM D2006	16 min.
Saturated Hydrocarbons, %	ASTM D2006	16 max.
Elastic Recovery, %	AASHTO T59	45 min.
<b><u>Test on Residue from Evaporation Test<sup>2</sup></u></b>		
Modified Torsional Recovery, %	Calif. Test 332 <sup>3</sup>	45 min.

- Notes: 1. AASHTO T59  
2. California Test 331  
3. Torsional recovery shall include the first 30 seconds.

**2.02B Screenings**

Screenings shall consist of sound, durable, crushed stone or crushed gravel. The material shall be free from vegetable matter and other deleterious substances. Screenings shall be 90% crushed particles as determined by California Test 205. The percentage composition by weight of the screenings shall conform to one of the following grading types dictated in the bid item:

The **Aggregate Screenings** shall conform to the following requirements prior to placing on the roadway.

<b><u>Screening Aggregates – shown by Grading Type and % passing*</u></b>					
<b>Grading</b>		<b>-</b>	<b>A</b>	<b>B</b>	<b>C</b>
			1/4 X #10	5/16 X #8	3/8 X #6
1/2	(12.5 mm)		100	100	100
3/8	(9.5 mm)		100	100	90 - 100
#4	(4.75mm)		60 - 80	35 - 55	5 - 20
#8	(2.36mm)		0 - 15	0 - 10	0 - 7
#16	(1.18mm)		0 - 5	0 - 5	0 - 5
#30	(600 um)		0 - 4	0 - 4	0 - 4
#200	(75 um)		0 - 3	0 - 3	0 - 3

\* Grading Type shall be that specified in the Bid Schedule

**Screenings shall also conform to the following quality requirements:**

<b>Test</b>	<b>California Test</b>	<b>Requirements</b>
Los Angles Rattler Loss at 500 rev. (max.)	211	35%
Cleanness Value (min.)	227	80
Percentage of Crushed Particles	205	100%

**2.02C Polymer Latex**

Polymer latex shall be added to the water/soap phase by injection prior to the mill manufacture of the asphaltic emulsion by the emulsion producer. The amount of latex solids shall be between 3 and 4 percent of the asphalt residual content and shall be certified by the emulsion producer on each load of emulsion delivered to the job site. **No post or field addition of Polymer Latex will be allowed.**

### **2.03 Preparation for Scrub Seal**

48 hours prior to the scrub seal operations, the contractor shall notify all residents, businesses and agencies with an approved written notice detailing the streets and limits of work to be done along, with the hours of work. The contractor shall also post all streets with temporary "No Parking - Tow Away" signs. These signs shall also state the day of the week and hours of no parking.

Prior to the scrub seal operation on city streets the Contractor shall spray all vegetation within the limits of the scrub seal with an approved herbicide. On rural county or state highways the use of herbicides will be done at the discretion of the Engineer.

The herbicide shall be applied at least ten (10) days prior to the scrub seal operation, or as directed by the manufacturer of the approved herbicide. Reward and Round Up are pre-approved herbicides. All other herbicides shall be submitted by the Contractor for approval by the City, and shall be certified for use in the State of California for the specific use intended. The application of the herbicide shall be performed in accordance with all applicable regulations. Any and all fines or clean-up costs for unlawful misuse or discarding of herbicides shall be the sole responsibility of the Contractor. Mixtures and spread rates for the herbicides shall be determined by the manufacturer's specifications. Wash down of equipment or discarding of herbicides shall not enter the catch basins or positive drainage facilities.

The Contractor shall remove all existing thermoplastic striping, legends, and raised pavement markers within the scrub seal limits.

Before placing the scrub seal, the pavement surface shall be cleaned by sweeping, flushing or other means necessary to remove all loose particles of paving, all dirt and all other extraneous material.

### **2.04 Placing**

The emulsion for scrub seal shall be applied in conformance with these special provisions and with the provisions for applying asphaltic emulsion in Section 37-1.05, "Applying Asphaltic Emulsion," of the Standard Specifications and these special provisions.

The emulsion shall be applied with a distributor truck to the pavement surface at a rate of 0.20 to 0.40 gallons per square yard. The emulsion application rate shall be adjusted up or down, at the Engineers discretion, depending on ability to fill cracks in the roadway. The emulsion shall be heated at a temperature above one hundred ten (110) degrees F, but not to exceed one hundred eighty (180) degrees F at application. For smaller areas the emulsion may be applied with a wand. A drag broom shall be pulled by the distributor truck.

All incidental work such as surfacing of driveway aprons and returns shall be done concurrently with the surfacing of the street proper. The scrub seal shall be applied zero (0) inches to eight (8) inches from the lip of the gutter. Where a curb exists without gutter, the scrub seal shall be

placed from edge of pavement to edge of pavement. Where no curb or gutter exists, the scrub seal shall be applied from edge of pavement to edge of pavement. The edges of the limits of the scrub seal application on both sides of the street shall be maintained in a neat and uniform line. Scrub seal shall not be applied on concrete gutters unless directed by the Engineer.

Immediately following the application of the emulsion to the road surface, the material shall be scrubbed with a scrub broom for the purpose of forcing the emulsion into the existing surface and distributing the emulsion evenly over variable road surface contours.

The scrub broom frame shall be constructed of metal. The scrub broom shall be attached to and pulled by the distributor truck. The scrub broom must be equipped with the means to mechanically raise and lower the scrub broom off and onto the road surface at designated points of completion and start up. It shall be tow able in the elevated position to the next area of construction. The weight of the broom assembly shall be such that it does not squeegee the emulsion off the roadway surface.

The main body of the scrub broom shall be a frame minimum six (6) feet nine (9) inches wide, ten (10) feet deep. The maximum transverse rigid frame width at any point shall not exceed six (6) feet nine (9) inches. The nearest and furthest members, paralleling the back of the spreader truck, and diagonal members shall be equipped with street brooms. The leading member and the trailing member shall have broom heads angled at 10 to 15 degrees off the centerline of the supporting member. The diagonal members shall have broom heads attached in line with the centerline of the supporting member. Each individual street broom attached to the scrub broom assembly shall be three and one half (3 ½) inches wide by six and one half (6 ½) inches high by sixteen (16) inches long and have stiff nylon bristles. Bristle height is to be maintained at a minimum of five (5) inches. The scrub broom shall be equipped with hinged wing assemblies attached to the main body not to exceed four (4) feet six (6) inches per side, with diagonals and equipped with street brooms. The purpose of the maximum rigid frame width and the hinged wing extensions is not only for maximum width of sixteen (16) feet but to maintain the scrubbing process evenly as contours and cross-sections change across the existing road surface.

**NOTE:** The Contractor shall supply a scrub broom as described for the purpose of scrubbing the polymer modified asphaltic rejuvenating emulsion. If the Contractor fails to supply the scrub broom specified, the project shall be shut down until the Contractor supplies the required equipment in full operation. Shut downs resulting from the failure to provide this specified scrub broom shall not excuse the Contractor from the provisions of contract working days.

Immediately following the emulsion, an application of screenings shall be spread evenly by a mechanical spreader.

**Aggregate Application Rate:**

For Grading A 18-24 lbs/sq. yd.

For Grading B 20-27 lbs/sq. yd.

For Grading C 22-31 lbs/sq. yd.

The rate shall be adjusted up or down so that no bleed through occurs during rolling. Screenings for the scrub seal shall be spread in conformance with the provisions specified for spreading screenings on asphaltic emulsion in these special provisions and in Section 37-1.06, "Spreading Screenings," of the Standard Specifications and these special provisions.

Pneumatic tire rolling shall follow immediately after the screenings is applied. The following equipment to be used for the scrub seal shall be as follows:

- A. An asphalt distributor for application of the emulsion shall have a full circulation spray bar that is adjustable to at least sixteen (16) feet wide and capable of heating and circulating the emulsion simultaneously. It must have computerized rate control for adjusting and controlling the application from the cab by .01 gallons per square yard increments. The distributor shall also be equipped with a volume measuring device and a thermometer for measuring the emulsion temperature in the tank.
- B. An emulsion broom pulled behind the distributor truck shall be used to scrub the emulsion after application.
- C. A self-propelled screenings spreader with front discharge that can evenly distribute screenings throughout the entire range of application rates specified for the project gradation. The spreader shall be equipped with computerized rate control.
- D. Two (2) pneumatic-tired rollers weighing at least five (5) tons each.
- E. Two (2) mechanically powered kick-brooms or mechanically powered pick up brooms equipped with vacuum type suction, for sweeping on city streets.
- F. A back pack blower for removing excess screenings during the sweeping operation.

The scrub seal shall not be placed if either the pavement or the air temperature is below forty (40) degrees F and falling, but may be applied when both the air and pavement temperature is forty (40) degrees F or above and rising. The weather forecast should be for highs near sixty (60) degrees F and no rain forecast for the next twenty-four (24) hours after the scrub seal has been applied. The mixture shall not be applied if high relative humidity prolongs the curing beyond a reasonable time. Scrub seal to be placed shall consist of an application of Polymer Modified Rejuvenating Emulsion and a single screening; and shall be applied and finished in conformance with these Special

Provisions. The lane to be scrub sealed shall be closed from the time the asphaltic emulsion is applied until the time the scrub seal has set sufficiently to be opened to traffic.

The Contractor shall take precautions such that no asphaltic emulsion or screenings are allowed to enter streams and waterways near the project during the course of the work.

Immediately before commencing the scrub seal operations, all surface metal utility covers (including survey monuments) shall be protected by thoroughly covering the surface with an appropriate adhesive and paper or plastic. No adhesive material shall be permitted to cover, seal or fill the joint between the frame and cover of the structure. Covers are to be uncovered and cleaned of scrub seal material by the end of the same work day.

For the purpose of this project, the construction zone is defined to include all stockpile staging areas and travel routes to/from streets where the scrub seal is to be applied.

The Contractor shall abide, at all times, to the State of California, Department of Transportation's "Manual of Traffic Controls for Construction and Maintenance Work Zones" as applicable to this project.

### **2.05 Finishing**

Scrub seal shall be finished in conformance with the provisions for finishing screenings spread on asphaltic emulsion in these special provisions and in Section 37-1.07, "Finishing," of the Standard Specifications and these special provisions.

Rolling and sweeping shall be in accordance with provisions of Section 37-1.07 "Finishing," of the Standard Specifications.

Rollers shall be pneumatic-tired and a minimum of 2 rollers shall be used. Initial rolling shall begin immediately behind the chip spreader. The pneumatic tired-rollers shall carry a minimum loading of three thousand (3000) pounds. On each wheel an air pressure of one hundred (100) pounds per square inch is required.

All streets shall be power swept after placing the scrub seal before the end of day. The sweepers shall be self-propelled vacuum or mechanical broom pickup, with water spray bars to reduce dust. If necessary, more than one type of sweeper may be used. Sidewinder sweepers or brooms that windrow material and do not remove it shall not be used. A minimum of two (2) sweepers shall be used at all times. All areas shall be swept a second time or more if necessary in the same manner as the first sweeping. Completion of sweeping shall be evidenced by the absence of loose screenings in gutters or driveways. Special attention shall be required in sweeping from the driveways clear of loose chips. The contractor shall also be responsible for removal of all screenings from the sidewalks and other affected areas such as adjacent streets and truck route.

The Contractor shall exercise care to prevent oil from being deposited on concrete surfaces. The Contractor shall remove oil from the surfaces not designated to be scrub sealed.

**2.06 Measurement and Payment**

Scrub seal will be measured and paid for by the square yard for the actual surface areas covered.

The contract price paid per square yard for scrub seal shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved in the furnishing and placing of the scrub seal complete in place, including cleaning the surface, all as shown on the plans, as specified in these specifications and as directed by the Engineer.