

ALABAMA DEPARTMENT OF TRANSPORTATION

DATE: September 28, 2020

Special Provision No. 18-0452(2)

EFFECTIVE DATE: February 1, 2021

SUBJECT: Scrub Seal.

Alabama Standard Specifications, 2018 Edition, are hereby amended by the addition of a new SECTION 433.

SECTION 433 SCRUB SEAL

433.01 Description.

This Section covers the placement of a polymer modified asphalt rejuvenating scrub seal.

433.02 Materials.

All materials shall comply with the requirements of Division 800, Materials, except as noted herein. Special reference is made to the following:

(a) Emulsion.

Sources for scrub seal shall meet the requirements given in Article 804.01.

The emulsion shall be a CMS-1PC for rejuvenating scrub seal meeting the requirements in Table 1.

Table 1		
Property	Method	Specification
		CMS-1PC
Test on Emulsion		
Viscosity @ 77°F (SFS)	AASHTO T 59	50-350
Residue, w%, minimum	AASHTO T 59	60
pH	ASTM E70	2.0-5.0
Sieve, w%, max.	AASHTO T 59	0.1
Oil distillate, w%, max.	AASHTO T 59	0.5
Test on Residue⁽¹⁾		
Penetration @ 39.2°F, 200 g, 60 sec., minimum	AASHTO T 49	30
MSCR, 52°C, Jnr, 3.2/kPa, max.	AASHTO T 350	4.0
MSCR, 52°C, % Recovery, 0.1/kPa, minimum	AASHTO T 350	30
Test on Polymer:		
Tensile strength, die C dumbbell, psi, minimum	ASTM D412 ⁽²⁾	800
Swelling in rejuvenating agent, % maximum; 48 hours exposure @ 104°F	ASTM D471 ⁽³⁾ Modified	40%
Test on Rejuvenating Agent:		
Flash point, COC, °F	AASHTO T 48	380 Min
Viscosity, 140°F, CST	AASHTO T 201	15-175
Saturate, % by wt.	ASTM D2007	30 Max
Asphaltenes	ASTM D2007	1.0 Max.
Test on Residue from RTFO		
Weight Change, %	AASHTO T 240	6.5 Max.
Viscosity Ratio	AASHTO T 201	3 Max

⁽¹⁾ Exception to AASHTO T59: Bring the temperature on the lower thermometer slowly to 350° F plus or minus 10° F. Maintain at this temperature for 20 minutes. Complete total distillation in 60 plus or minus 5 minutes from first application of heat.

⁽²⁾ Tensile Strength Determination: Samples for testing for tensile strength in accordance with ASTM D412 shall be tested with the following test procedure modifications:

Prepare the polymer film, dilute the waterborne polymer to 40% Total Solids Content and pour 57 g into a Teflon or silicone release mold of dimensions 7'' X 7'' X ¼''. Allow to dry at 23°C (73 °F) and 50% RH (controlled conditions) for 7 - 10 days total time, during which time the film should be flipped around once, preferably after 3 or 4 days. The film should be transparent in the end. To drive out any residual water, place the film in an oven at 50°C for 30 min. Dried film thickness should be 25 mil +/- 5 mils. Discard films <20 mil. Cut out dumbbell-shaped test specimens of dimension 75 mm total length, 25 mm mid-section (L) and 4 mm width of mid-section. Grip in Instron machine with gap size 1 inch, use 8 inch/min cross-head speed.

(3) Polymer testing shall be prepared from polymer as follows:

Resistance to Swelling: Using a syringe, place 0.8 gm of latex into an 18 mm diameter DSR mold. Allow the sample to dry at ambient lab conditions (air conditioned) on the bench for 72 hours. Sample should be easily removable from the mold. Take the "button" out of the mold and place the sample into a forced air oven at 40°C (104°F) for 48 hours (on release paper). If at the end of the ambient dry, the sample sticks to the mold, place it into the oven and check it after 1-2 hours. After 48 hours cool and weigh the sample to the nearest 0.0001 gram and record the weight. Put ½ inch of Rejuvenating Agent into a 3 oz penetration tin. Place the "button" on the Rejuvenating Agent, and add another ½ inch of Rejuvenating Agent, so that the "button" is covered. Put the cap on the penetration tin and place it into the 40°C oven for 48 hours. . Remove the "button from the Rejuvenating Agent, blot surface of the "button" to remove excess Rejuvenating Agent, cool the "button" to room temperature and weigh it. Calculate weight gain of the "button", express as a percent.

The emulsion manufacturer shall submit certification that the emulsion meets the specification. The polymer manufacturer, through the emulsion supplier and the contractor, shall submit to the Department test results from an approved laboratory and certification that the polymer is cationic and meets the required specifications. The manufacturer of the recycling agent, through the emulsion supplier and the contractor, shall submit the test results on the recycling agent and certification that the recycling agent meets the required specifications. Polymer films required for testing shall be prepared by the same laboratory testing the polymer performance requirements as outlined in the specification. The manufacturer of the recycling agent shall submit to the laboratory testing the polymer a one-quart sample of the recycling agent for use in the swell test.

For the polymer, certification shall be from a laboratory with an ISO 17025 certification and accredited by IAS. Laboratories must be accredited in the test procedures specified above for the polymer and the rejuvenating agent. Certifications and test results on the emulsion, the polymer and the recycling agent shall be submitted to the Materials and Tests Engineer and approved prior to starting the work.

(b) Aggregate.

The aggregate shall be an ALDOT Size No. 89 or No. 89 Modified in accordance with the material requirements for bituminous surface treatments given in Section 801 and the modified No. 89 gradation below:

<u>Sieve % Passing</u>	
½"	100
⅜"	90-100
#4	20-55
#8	0-15
#16	0-10
#50	0-5

433.03 Construction Requirements.

(a) Placement Rates and Temperature.

The placement rate for the emulsion shall be from 0.25 to 0.35 gallons per square yard. The Engineer will require that the placement rate be adjusted up or down as necessary to fill the cracks in the roadway.

The placement rate for the aggregate shall be from 18 to 25 pounds per square yard. The Engineer will require that the placement rate be adjusted so that no bleed through occurs during rolling.

(b) Weather.

The scrub seal shall only be applied when the air temperature is above 45 °F with the forecast high temperature being less than 100 °F.

The application of the scrub seal shall be stopped a minimum 24 hours prior to expected rain.

(c) Surface Preparation.

The area to be covered shall be cleaned of dirt, vegetation, and dust and other deleterious materials prior to the application of the surfacing.

On pavements where the scrub seal is to be the final layer, the Contractor should remove all existing thermoplastic striping, markings, and legends within the scrub seal limits prior to the scrub seal operation. If a subsequent surface treatment or pavement layer will be placed over the scrub seal, removal of the existing thermoplastic may not be required.

Prior to the scrub seal operation, the Contractor shall remove all raised pavement markers including any excessive adhesive left on the pavement caused from the removal of raised pavement markers.

Prior to the scrub seal operation, all drain inlet covers, monument covers, and all other utility covers shall be protected from the Contractor's scrub seal operations by applying a sheet of plastic over the exposed facilities, or other methods approved by the Engineer.

(d) Test Section.

The Contractor shall demonstrate the capability of meeting the placement requirements. The materials used in the test section shall be those that are proposed for production use. The Engineer will identify the location and length of the test section. The test section shall be one lane, 12 feet in width and up 1000 feet long. The Contractor shall verify in the presence of the Engineer the asphalt distributor's and aggregate spreader's calibrated application rates. If the application to the test section is unsuccessful, the Contractor shall make the necessary corrections and apply a new test section without additional compensation.

The placement rate and adhesion of the emulsion and aggregate will be evaluated.

(e) Equipment.

1. Asphalt Distributor.

An asphalt distributor shall be furnished for the application of the asphalt emulsion. The distributor shall have a full circulating spray bar that is adjustable to at least 16 feet wide in two feet increments and is capable of heating and circulating the emulsion simultaneously. It shall have computerized rate control for adjusting and controlling the application from the cab. The rate shall be adjustable 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.

2. Emulsion Broom.

The emulsion broom frame shall be constructed of metal. The emulsion broom shall be attached to and pulled by the distributor truck. The emulsion broom must be equipped with a means of raising and lowering the emulsion broom at desired points. It shall be towable in the elevated position. The broom assembly shall be such that it does not squeegee the emulsion off the roadway surface.

The main body of the emulsion broom shall have a minimum frame size of 6.5 feet wide and 10 feet long. The maximum transverse rigid frame width at any point shall not exceed 6.75 feet. 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 brooms 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 emulsion broom assembly shall be 3.5 inches wide x 6.5 inches high x 16 inches long and have stiff nylon bristles. Bristle height is to be maintained at a minimum of five inches (5"). The emulsion broom shall be equipped with hinged wing assemblies attached to the main body not to exceed 4.5 feet 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 16 feet but to maintain the scrubbing process evenly as contours and cross-sections change across the existing road surface.

3. Aggregate Spreader.

A self-propelled spreader with computerized rate control shall be used to spread the aggregate. The spreader shall have front discharge and shall be capable of evenly distributing the aggregate at the required placement rates.

4. Rollers.

Two pneumatic tire rollers shall be used to seat the aggregate into the emulsion. The rollers shall be self-propelled. The minimum total weight of each roller shall be 5 tons.

5. Aggregate Removal Equipment.

A mechanically powered pick-broom shall be furnished with a vacuum for the removal of excess aggregate.

(f) Material Application.

The emulsion broom shall be pulled behind the emulsion distributor immediately after the application of the emulsion. All cracks in the pavement shall be filled by emulsion by the movement of the weighted emulsion broom through the emulsion.

The aggregate shall be dry during spreading. The aggregate shall be evenly spread over the scrubbed emulsion.

The seal should be rolled immediately after the aggregate is applied. There shall be at least three passes made with a pneumatic roller.

The scrub seal system shall be stiff enough to allow sweeping up excess aggregate without damage to the pavement surface. The excess aggregate shall be removed with the vacuum broom within two hours of rolling or as directed by the Engineer.

The roadway shall not be opened to traffic until at least two hours after the completion of the placement of the emulsion and aggregate. The Engineer may require a second power sweeping to remove any loose aggregate. Excess aggregate shall be removed from the project unless otherwise approved by the Engineer.

For inner layer applications the scrub seal shall be sufficiently cured prior to placing a bituminous overlay, micro-surfacing, or other asphalt surface treatments. The Engineer will require a second power sweeping of the scrub seal surface at least two hours after completion of the placement of the emulsion and aggregate to determine the status of the scrub seal being cured. The ability to sweep all loose aggregate from the surface without removing any aggregate adhered to the bituminous emulsion shall determine that the scrub seal is cured.

Longitudinal joints shall not overlap. The longitudinal construction joint shall coincide with the painted lane line or at the outside edge of shoulder.

(g) Sampling.

A minimum of one daily sample of the aggregate will be taken from the application vehicle and tested for gradation. If the average test results vary from the gradation requirements, production shall stop. The Contractor shall identify the cause and document in detail what corrective action was taken. Documentation of the corrective action shall be furnished to the Engineer before placement will be allowed.

(h) Acceptance.

The Contractor shall be responsible for the maintenance of the surface treatment until the work is accepted by the Engineer. Damage or loss of aggregate in the surface exceeding 2 % of the surface area in any 500-foot-long section shall be repaired by use of additional emulsion and aggregate. All bleeding (excess asphalt) surfaces shall be covered with additional concrete sand in such a manner that the asphaltic material will not adhere to or be picked up by the wheels of vehicles.

If in the Engineer's judgment, defective areas warrant removal, the Contractor shall remove and replace those areas at the Contractor's expense with materials meeting specification requirements.

433.04 Method of Measurement.

Scrub seal will be measured in units of square yards.

433.05 Basis of Payment.

(a) Unit Price Coverage.

The unit price of the scrub seal shall be full compensation for all materials, equipment, tools, and labor required for furnishing and placing the scrub seal, **for removing and disposing of raised pavement markers**, and for post-sweeping. If removal of thermoplastic striping, markings, or legends is required, it will be paid for under Item 701D or Item 703C.

(b) Payment will be made under Item No.:

433-A Scrub Seal - per square yard