

## DEPARTMENT OF TRANSPORTATION

### STATE OF GEORGIA

#### SUPPLEMENTAL SPECIFICATION

### Special Provision 454—Bituminous Fog Seal

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#### 454.1 General Description

This work includes furnishing and applying a bituminous fog seal on a prepared road surface including cleaning the road surface. The application locations will be shown in the plans, specifications, or as directed by the Engineer.

##### 454.1.01 Definitions

General Provisions 101 through 150.

##### 454.1.02 Related References

###### A. Standard Specifications

[Section 109—Measurement and Payment](#)

[Section 424—Bituminous Surface Treatment](#)

[Section 824—Cationic Asphalt Emulsion](#)

###### B. Referenced Documents

General Provisions 101 through 150.

##### 454.1.03 Submittals

###### A. Invoices

Furnish formal written invoices from a supplier for all bituminous materials used for fog seal when requested by the Department. Show the following on the Bill of Lading:

- Date Manufactured for emulsified asphalt materials.
- Date shipped
- Quantity in gallons
- Included with or without additives

#### 454.2 Materials

Ensure materials used are approved on QPL 7 “Georgia’s List of Approved Bituminous Materials Suppliers” and meet the following Specifications:

Cationic emulsified asphalt CSS-1, CSS-1h, CMS-1P and other approved cationic emulsified asphalt fog seal products listed on QPL 7

**Table 1 – Bituminous Materials**

Material Use	Fog Seal (Note 1)		Rejuvenating Fog Seal (Note 1)	
Test Properties	Material Type		Material Type	
	CSS-1h		CMS-1P (Note 3)	
	Min	Max	Min	Max
Viscosity @ 77°F, Saybolt Furol (seconds)	20	100	20	100
Viscosity @ 122°F, Saybolt Furol (seconds)				
Storage Stability, 24 hours, (%)		1		1
Demulsibility (%)				
Settlement, 5 days, (%)		5		5
Paertical Charge (positive)	Positive		Positive	
Sieve (%)		0.1		0.1
Oil Distilation, (%) Note 2				0.5
Residue by Distilation, (%) Note 2	57		57	
Residue by Evaporation (%)	57		57	
Test on Residue	Min	Max	Min	Max
Penetration @ 39.2 °F, (dmm)			30	90
Penetration @ 77 °F, 100 g, 5 sec. (dmm)	40	90		
Ductility @ 39.2 °F, 5 cm/min (cm)				
Ductility @ 77 °F, 5 cm/min (cm)	40			
Softening Point (°F) AASHTO T 53 or other method approved by Office of Materials and Testing			125	
Solubility in Trichloroethylene	97.5			

**Notes:**

- (1) May be acceptable for use in limited test sections in conjunction with OMAT
- (2) AASHTO T-59 modified to include a maximum temperature of 350 °F ± 10°F to be held for 20 minutes.

- (3) Use CMS-1P(R) as a Rejuvenating Seal diluted 1:1. Sample undiluted for testing at the manufacture site. Sample diluted for testing from the distributor (Minimum Residue of 29 % required).

Use any of the materials shown in Table 1 as bituminous fog seal for work performed under Section 454 as directed by the Engineer. Ensure the undiluted cationic emulsified asphalt fog seal material has a minimum 57 % residual rate. Ensure the diluted cationic emulsified asphalt fog seal material has a minimum 29 % residual rate. Ensure dilution occurs during manufacture or as detailed in Note 3 – Table 1.

The Department may change the grade or type of bituminous materials without a change in the Contract Unit Price if the Engineer determines the grade or type selected is not performing satisfactorily.

#### **454.2.01 Delivery, Storage, and Handling**

General Provisions 101 through 150.

##### **Emulsified Asphalt**

Maintain all equipment used for the delivery, storage, and handling of cationic emulsified asphalt to prevent contamination of the emulsion. Transfer cationic emulsified asphalt directly to the pressure distributor from the transport tanker.

Provide and maintain temperature measuring devices to continuously monitor the temperature of cationic emulsified asphalt in storage and in the pressure distributor. Do not allow cationic emulsified asphalt to freeze. Do not dilute the emulsified asphalt in the field.

**Note:** Asphalt emulsion that has been stored longer than 30 days from the time of initial manufacture shall be tested and approved for compliance with specified requirements prior to being used as fog seal for work performed under Section 454.

#### **454.3 Construction Requirements**

##### **454.3.01 Personnel**

General Provisions 101 through 150.

##### **454.3.02 Equipment**

Provide equipment in good repair, including the following units that meet the requirements of Subsection 424.3.02, Equipment.”

- Power broom and blower
- Pressure distributor

Provide a dedicated pressure distributor for cationic emulsified asphalt fog seal material to avoid contamination with incompatible materials.

##### **454.3.03 Preparation**

General Provisions 101 through 150.

##### **454.3.04 Fabrication**

General Provisions 101 through 150.

##### **454.3.05 Construction**

###### **A. Seasonal and Weather Limitation**

Perform fog seal operations only during daylight hours and not during foggy weather. Do not apply fog seal if the existing surface is wet or frozen. Do not place emulsified asphalt fog seal if the air temperature is less than 60 °F (16 °C) and rising. Do not apply fog seal when rain or other precipitation is forecast within 24 hours after the fog sealing application.

## B. Application

Prior to the fog seal application, the contractor shall clean and seal the joints and cracks as directed by the Engineer. The joint and crack cleaning and sealing shall be done using methods approved by and completed to the satisfaction of the Engineer. Coat the entire areas with the approved fog seal material unless directed otherwise by the Engineer. Apply fog seal with distributor spray bars instead of hand hoses, except in small areas inaccessible to spray bars prior to placement of permanent pavement markings. Apply the fog seal to minimize the amount of overspray.

The Engineer may direct additional or corrective fog seal application for areas where the proper application was not applied or original application was damaged due to weather events.

**Table 2 - Application Rates for Cationic Emulsified Asphalt Fog Seal Material,  
gal/yd<sup>2</sup> (L/m<sup>2</sup>)**

Bituminous Materials	Dense-graded Mixtures gal/yd <sup>2</sup> (L/m <sup>2</sup> )		Open-graded Mixtures gal/yd <sup>2</sup> (L/m <sup>2</sup> )	
	Minimum	Maximum	Minimum	Maximum
CSS-1h and CMS-1P(R)	0.04 (0.18)	0.10 (0.45)	0.08 (0.36)	0.19 (0.86)

## C. Temperature of Material

Apply bituminous materials within the temperature ranges specified below.

**Table 3 – Bituminous Materials and Application Temperatures**

Bituminous Materials	Temperature of Application °F (°C)
Cationic Emulsified Asphalt CSS-1h, CMS-1P (R) and other approved cationic emulsified asphalt fog seal products listed on QPL 7	140 - 180 (60 - 80)

## D. Cleaning

Immediately before applying the fog seal, clean the entire area free of loose dirt, clay, and other foreign materials.

## E. Application Rate

The Engineer will determine the application rate of the bituminous fog seal at the recommendation of the Bituminous Material Fog Seal Supplier .

## F. Limitations and Areas Coated

Apply only enough fog seal material to the prepared road surface where proper traffic markings can be applied prior to re-opening the roadway up to traffic.

## G. Maintenance and Protection

After applying the fog seal material, allow it to break and cure prior to placing traffic on the fog sealed pavement as directed by the Engineer. Do not allow distributor and other related construction equipment on the fog sealed pavement prior to curing.

If directed by the Engineer, the Contractor shall furnish and distribute clean, fine sand uniformly over the fog seal surface to blot the excess cationic emulsified asphalt.

## 454.3.06 Quality Acceptance

### A. Acceptance Plans for Bituminous Materials Distributor Samples

Bituminous materials distributor samples, used for fog seal, shall be randomly sampled and tested for acceptance.

**1. Bituminous Materials Distributor Sample**

The Department shall obtain a minimum of one bituminous materials distributor sample per week, per distributor. The Department will monitor the handling and quality control of the bituminous materials used by the Contractor for fog seal. Failure to comply with specified Quality Assurance Testing requirements may subject the bituminous fog seal supplier to removal from QPL 7.

**454.3.07 Contractor Warranty and Maintenance**

General Provisions 101 through 150.

**454.4 Measurement**

Bituminous materials for fog seal applied and accepted are measured as outlined in Subsection 109.02, "Measurement of Bituminous Materials."

Diluting emulsified fog seal in the distributor is not allowed other than as detailed in this specification . The composition of diluted emulsified fog seal defined in Subsection 454, is measured by the gallon (liter) of diluted material.

**454.4.01 Limits**

General Provisions 101 through 150.

**454.5 Payment**

The accepted volume of bituminous material will be paid for at the Contract Unit Price per gallon (liter) for bituminous fog seal of the type and grade and approved by the Engineer, complete in place. Payment is full compensation for preparing, cleaning, furnishing, hauling, applying material, and providing incidentals to complete the work.

Cleaning and sealing joints and cracks shall be paid for separately under the appropriate Pay Item.

Payment will be made under:

Item No. 454	Diluted emulsified asphalt fog seal	Per gallon (liter)
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