



PENNDOT FOG SEAL SPECIFICATION IMPROVEMENT

Collaborative effort between PennDOT and PAAMA

PAAMA Liquid Bituminous Technical Committee:
Corinne Chalovich, Arkema & Mike Worden, Associated Asphalt

WORKING TOGETHER

- **August 8th, 2023:** PennDOT reached out to PAAMA for information for use of trackless tack in fog seal applications
- Board Of Directors met within the following week to discuss next steps
- Liquid Bituminous Technical Committee prepared a cohesive message, recommendations, and specification revisions
- **September 12th, 2023:** LB Technical Committee presented to PennDOT
- Over the course of the following two months a collaborative correspondence with PennDOT ensued resulting in a revised proposal
- **At present** we will propose an add on specification: “Fast Break Fog Seal”





PAAMA RECOMMENDATIONS FOR USE OF NTT/CNTT IN FOG SEAL APPLICATIONS

1. Please reference attached proposed specification changes. SLIDE 8 & 9
2. Please reference AASHTO Designation: R 105-22 Table 1 for recommended application rates for Fog Seal Design. SLIDE 7
3. Add option to the specification for 0% dilution.
4. Field dilution should NOT be permitted.
5. Minimum asphalt residue of 38% if dilution is applied.
6. Application temperature range between 160° Minimum – 180° Maximum. Lower end of the temperature range could affect cure time.



PAAMA RECOMMENDATIONS FOR USE OF NTT/CNTT IN FOG SEAL APPLICATIONS

7. Cleanliness of the road surface prior to application is critical to the fog seal application success.
8. Allow a minimum 2 days following chip seal/surface treatment applications before fog seal application. Best practice incorporates a waiting period of 14 days following a chip seal/surface treatment before fog seal application.
9. Dust or choke application of fine aggregate following a fog seal with NTT/CNTT is NOT recommended or needed. Dust or choke application should ONLY be used as a last resort option for slick roads needing a faster return to traffic.

RECOMMENDED SPECIFICATION REVISIONS

- Addition of the Table B for “Fast Break Fog Seal”
- Included key points in new Table B (38% minimum residue, and added a note that a minimum break/cure time for the NTT/CNTT “Fast Break Fog” must be achieved in 30 minutes or less)
- Relocate the original two “general” notes regarding keeping Cationic Fog with Cationic Chip Seals, and Anionic Fog with Anionic Chip Seals, under both tables



RECOMMENDED SPECIFICATION REVISIONS

- PAAMA recommended that the application rate of the NTT/CNTT Fog Material (now being called “Fast Break Fog Seal”) vs. Standard (SS-1H/CSS-1H/SS-1HPM/CSS-1HPM Standard Fog use “AASHTO Designation: R 105-22 Table 1 for recommended application rates for Fog Seal Design”

RECOMMENDED SPECIFICATION REVISIONS

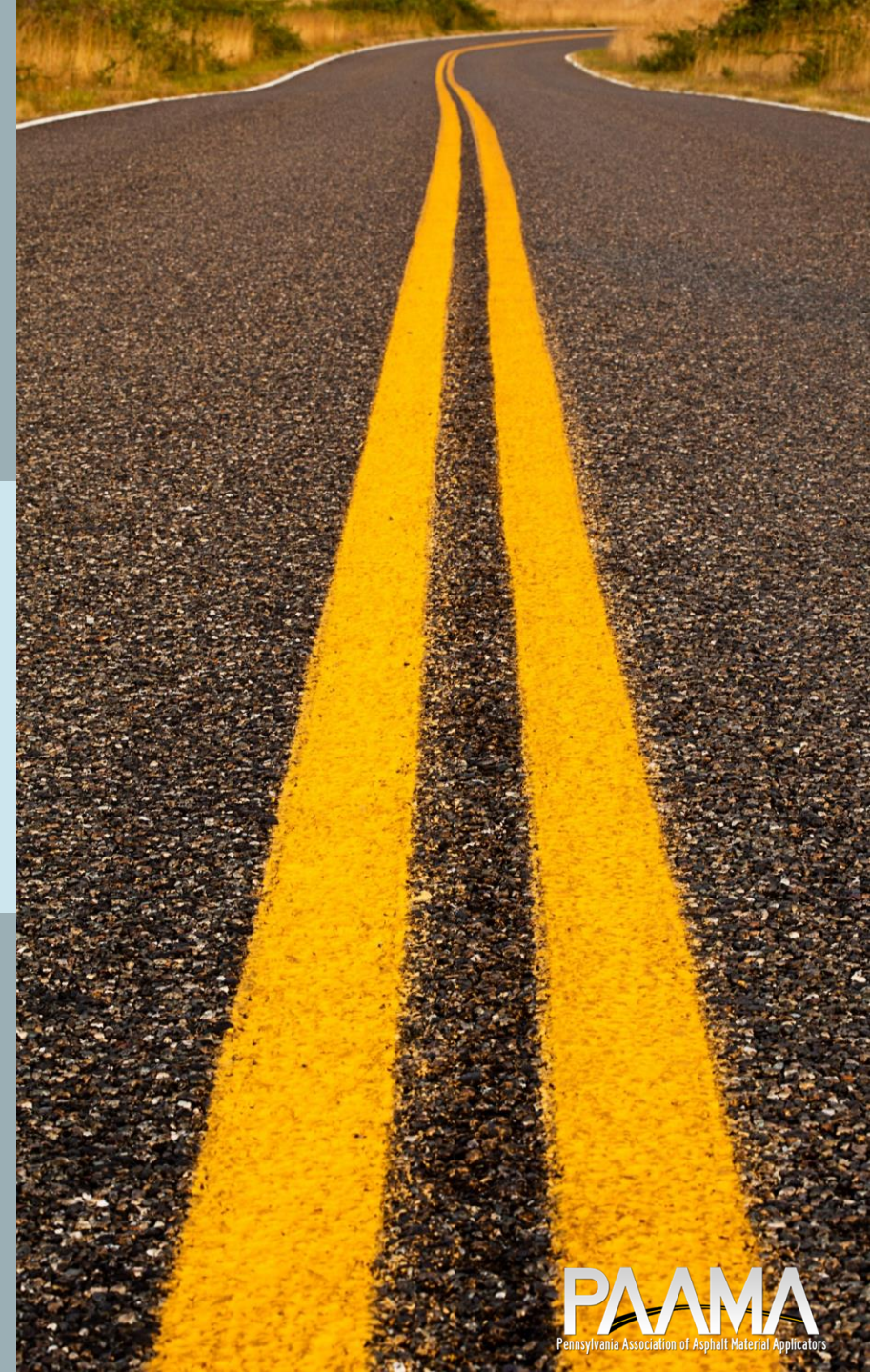
Table 1—Initial Target Fog Seal Application Rate

Surface Type	Residual Rate Gal/yd ²	Undiluted Gal/yd ²	Diluted 1:1 ^a Gal/yd ²
Dense-Graded Asphalt Mixture	0.015–0.021	0.025–0.035	0.05–0.07
Open-Graded Asphalt mixture	0.021–0.027	0.035–0.045	0.07–0.09
Chip Seal (<1/2 in. top agg size)	0.027–0.033	0.045–0.055	0.09–0.11
Chip Seal (≥1/2 in. top agg size)	0.033–0.039	0.055–0.065	0.11–0.13

^a Assume emulsified asphalt is 40 percent water and 60 percent asphalt.

NOTE: Initial target application rates. Application rates can then be adjusted to hit the final target application rate

PennDOT inclined to use the same allowable range for both of **“between 0.02 to 0.05 gallons per square yard, residual”**



SECTION 472—ASPHALT FOG SEAL FOR ASPHALT SEAL COATS

472.1 DESCRIPTION—This work is the treatment of an asphalt seal coat with an application of asphalt material ~~and an application of fine aggregate.~~

472.2 MATERIALS—

(a) **Emulsified Asphalt Material.** One of the following, as specified in Section 702:

TABLE A
Fog Seal Materials

Class of Material	Type of Material	Application Temperature (F)	
		Minimum	Maximum
CSS-1h ^(a)	Cationic Emulsified Asphalt	70	150
SS-1h ^(a)	Emulsified Asphalt	70	150
SS-1hPM	Polymer-Modified Emulsified Asphalt	70	150
CSS-1hPM	Cationic Polymer-Modified Emulsified Asphalt	70	150

Dilute Material using 1 part emulsion to 1 part water. All dilution must be done by the emulsified asphalt supplier at the emulsified asphalt supplier plant location. Provide a Bill of Lading from the emulsified asphalt supplier certifying the base emulsified asphalt properties before dilution (if warranted), the quantity of emulsified asphalt, and the water added for dilution, or certify the diluted product. Diluted emulsified asphalt must be applied within 48 hours after dilution. Dilution of asphalt emulsion in the field is not allowed.

Do not dilute NTT/CNTT. If required or directed, dilute other emulsified materials using 1 part emulsion to 1 part water or a compatible surfactant solution. Do not exceed dilution of less than 38% asphalt residue. All dilution must be done by the emulsified asphalt supplier at the emulsified asphalt supplier plant location. Provide a Bill of Lading from the emulsified asphalt supplier certifying the base emulsified asphalt properties before dilution, the quantity of emulsified asphalt, and the water added for dilution, or certify the diluted product. Diluted emulsified asphalt must be applied within 48 hours after dilution. Dilution of asphalt emulsion in the field is not allowed.

Notes:

Material selection for the Fog Seal application:

1. Use a Cationic Emulsified Asphalt material CSS-1h when a Cationic Emulsified Asphalt was used for the Asphalt Seal Coat.
2. Use an Anionic Emulsified Asphalt material SS-1h when an Anionic Emulsified Asphalt was used for the Asphalt Seal Coat.

TABLE B
Fast Break* Fog Seal Materials

Class of Material	Type of Material	Application Temperature (F)	
		Minimum	Maximum
NTT*	Non-Tracking Tack	140	180
CNTT*	Cationic Non-Tracking Tack	140	180

If required or directed, dilute Non-Tracking emulsified materials using emulsion and water or a compatible surfactant solution. Do not exceed dilution of less than 38% asphalt residue. All dilution must be done by the emulsified asphalt supplier at the emulsified asphalt supplier plant location. Provide a Bill of Lading from the emulsified asphalt supplier certifying the base emulsified asphalt properties before dilution, the quantity of emulsified asphalt, and the water added for dilution, or certify the diluted product. Diluted emulsified asphalt must be applied within 48 hours after dilution. Dilution of asphalt emulsion in the field is not allowed.

*A minimum break/cure time must be achieved in 30 minutes or less.

Notes:

Material selection for the Fog Seal application:

1. Use a Cationic Emulsified Asphalt material for the Fog Seal when a Cationic Emulsified Asphalt was used for the Asphalt Seal Coat.
2. Use an Anionic Emulsified Asphalt material for the Fog Seal when an Anionic Emulsified Asphalt was used for the Asphalt Seal Coat.

- (b) Fine Aggregate (Cover Sand). Type A, Type B1, or B3, Section 703.1

472.3 CONSTRUCTION—Place the fog seal on an asphalt seal coat constructed as specified in Section 470, or as directed by the Representative. Allow the seal coat to cure a minimum of 1 day before fog sealing. Place the fog seal application within ~~42~~ to 30 days after the last day of the seal coat placement, unless otherwise directed in writing by the District Executive.

(a) **Weather Limitations.** Apply fog seal when the air, surface, and aggregate temperatures are above 60F. Do not apply emulsified asphalt if, in the Representative's opinion, rain is imminent or if freezing temperatures are expected within 8 hours after application. The fog seal will normally cure within 2 hours under dry conditions and temperatures above 60F.

(b) **Surface Preparations.** The road surface must be clean and dry prior to placing the fog seal. ~~If needed, lightly sweep the pavement with a motorized broom to remove excess seal coat aggregate, debris and dust.~~ If the seal coat surface aggregate is damaged by the sweeping operation, stop sweeping and adjust the operation until a satisfactory clean surface is achieved. Cover manholes, valve covers, sensors, etc. to prevent adherence of the emulsified asphalt. Remove protective coverings prior to opening the road to traffic.

(c) **Emulsified Asphalt Application.** Apply the emulsified asphalt with a distributor meeting the requirements of Section 460.3(b). Place emulsified asphalt on ~~all~~ completed seal coated areas.

Construct a 100-foot test strip. Review the application of ~~diluted (1:1)~~ emulsified asphalt and adjust the application rate as needed. Apply. Target the application rate between ~~0.402~~ to 0.052 gallons per square yard, diluted residual. Determine the distributor's application rate in the field according to PTM No. 747. Apply the emulsified asphalt to minimize the amount of overspray.

(d) **Fine Aggregate (Cover Sand) Application.** If indicated or directed, Apply fine aggregate uniformly over the surface treatment within 5 minutes of applying the emulsified asphalt. The fine aggregate application rate is 2 to 5 pounds per square yard. Lightly cover remaining spots of excess emulsified asphalt with fine aggregate, before opening to traffic. Sweep the pavement with a motorized broom prior to opening to traffic.

(e) **Pavement Markings.** Interim pavement markings can be placed after the fog seal cures. Do not place permanent pavement markings on the fog seal until 3 days after the last day of fog seal placement.

(f) **Opening to Traffic.** Check shaded areas to ensure the fog seal has cured fully before opening fog sealed roadways to traffic. Do not allow traffic on the emulsified asphalt until it has cured.

472.4 MEASUREMENT AND PAYMENT—

472 – 2
Initial Edition

472.3(eb)

472.40

- (a) Area Basis. Square Yard

- (b) Material Used Basis.

1. Fine Aggregate. Ton
2. Emulsified Asphalt Material. Gallon

472 – 3
Initial Edition

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Notes:

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SUMMARY

Table A: Standard Fog Seal.

- Will list out all emulsions included as they currently have it (CSS-1h, SS-1h, CSS-1hpm, SS-1hpm) CNTT/NTT will not be listed in this section, rather a “Table B” introduced.

Table B: Fast Break Fog Seal.

- 38% minimum residue. If dilution is needed, dilutions must be performed at a PennDOT approved emulsion manufacturing plant. A minimum break/cure time must be achieved in 30 minutes or less.



TEAMWORK

WE NEED YOUR FEEDBACK

Thank you to the 6 members who responded

YOU ARE OUR VOICE!



TEAMWORK

Survey:

1. Are there any PG graded asphalt binder or emulsions (materials or applications) specifications that you feel may need updating or are out-of-date?
2. Does your business need clarification on any of the current liquid bituminous specifications?
3. Are there any topics where you feel more education may be needed to bridge the gaps between PennDOT and industry?
4. What are your top 1-3 concerns that you feel PAAMA's Liquid Bituminous Committee should attempt to address with PennDOT?