

Date: August 3, 2011

To: MAG Specification and Detail Committee members

From: Jeff Benedict

RE: case 11-09 section 334, 718 "Preservative Seal"

Purpose: To bring section into current available products and practices used in the MAG area of use. Current products have been added and now conform to MAG standard

Revisions: added "plastic seal", "TRMSS" and conventional emulsified asphalts.

The petroleum resins and Hydrocarbon emulsions remain in this section. These products are difficult to apply to pavements successfully and should be used with extreme caution. Bleeding and surface texture loss is typical results of these product applications. Revisions to the 718 table reflect the new products and current test methods.

This would be considered a major change.

## SECTION 334

### PRESERVATIVE SEAL FOR ASPHALT CONCRETE

#### 334.1 DESCRIPTION:

The asphalt concrete preservative seal shall be composed of an emulsified asphalt or asphalt rejuvenate, or an asphalt sealant to preserve the asphalt concrete pavement.

Preservative seals are applicable for asphalt pavements as directed on the plans, special provisions, or the Engineer.

#### 334.2 MATERIALS:

The preservative seal shall be one of the following materials as specified by the Engineer:

<u>Type</u>	<u>Description</u>	<u>Material Conformance</u>
A	Rejuvenating emulsion	Section 718
B	Petroleum hydrocarbon emulsion	Section 718
C	"Filled" asphalt sealer such as TRMSS or equal	Section 718
D	Acrylic polymer emulsion	Section 718
Other	Diluted asphalt emulsion, CSS-1 or SS-1h	Section 713

#### 34.3 CONSTRUCTION METHOD:

The material shall be approved by the Engineer in accordance to this specification. The application rates, dilution and curing shall be directed by the Engineer in accordance with this specification.

The contractor shall be responsible to clean the pavement to be treated free of trash, debris, earth or other deleterious substances present in sufficient quality to not interfere with the work to be preformed.

The application rate will be based upon a typical surface condition test site with application rate trials to determine the needed rate. All application rates specified in Section 712 shall be a diluted 50-50 emulsified asphalt and water, except as recommended by the manufacturer for Type B and C. Any over applied seal will be sanded as directed by the Engineer. Application equipment shall be in accordance with Section 330.

Before opening a treated area to traffic, the surface shall be checked for slipperiness and/or tackiness. If the treated portion of the roadway must be opened to traffic prior to the disappearance of slipperiness and/or tackiness, the surface shall be sanded with a minimum of 1 ½ pounds per square yard or as directed by the Engineer. Sand Blotter shall comply with Section 333.

#### 334.4 MEASUREMENT:

Preservative seal for asphalt concrete will be measured by the gallon or ton applied.

#### 334.5 PAYMENT:

Payment will be made on the basis of the unit price bid in the proposal. Payment shall be full compensation for preservative seal complete and in place.

**SECTION 718**  
**PRESERVATIVE SEAL FOR ASPHALT CONCRETE PAVEMENT**

**718.1 GENERAL**

Asphalt Concrete preservative seal shall be one of the following types or equal, with typical application rates.

**TYPE A** - Asphalt rejuvenating agent shall be an emulsion composed of a petroleum resin oil base uniformly emulsified with water. Each supplier must submit a certified statement from the asphalt rejuvenator manufacturer showing that the asphalt rejuvenating emulsion conforms to the required physical and chemical requirements. They also must provide documentation of tests that determine the acceptable range of application of the product. Typical application rates are .07 to .18 gallons per square yard.

**TYPE B** - Petroleum Hydrocarbon emulsion. Applied at .05 to .20 gallons per square yard, diluted.

**TYPE C** - Tire modified surface sealer (TRMSS) or equal not diluted, and applied at a rate of .10 to .20 gallons per square yard.

**TYPE D** - Acrylic polymer, modified emulsion. Diluted to the manufacture's recommendation and applied at a rate of .08 to .20 gallons per square yard.

**718.2 TEST METHODS AND REQUIREMENTS**

Preservative seal for asphalt concrete material, shall meet type A, B, or C on Table 718-1 by certification from the manufacturer.

All tests shall be performed by AMRL accredited laboratory, accredited in the specified test being performed.

**Table 718-1**

<b>Properties</b> * (note 2)		Type-A	Type-B	Type -C	Type-D
Saybolt Viscosity @77°F (sfs)	ASTM-D7496-09	45-55 (KU)* (note 1)	15-40	15-40	15-40
Residue by evaporation 138°C	ASTM D6934-08	30-40	.10 Max	53 min.	60-65
Sieve test %	ASTM D6933-08	N/A		.10 max.	0.1
5 day settlement test	ASTM D6930-10		2.0% max	N/A	N/A
<b>Test on residue from evaporation ASTM D6934-08</b>					
Flash point °F	ASTM D92	450°F	450°F	450°F	385°F
Softening point	ASTM D36M-09	130°F min	N/A	130°F min.	N/A
Accelerated weathering test	ASTM-D4799-03	Report * (note 3)	N/A	Report (note 3)	Plant certification within 6 months
Ductility (@77°F) 100g 5 sec.	ASTM D113-07	N/A	N/A	20 min.	N/A
Storage stability, test 1 day%	ASTM 6930-10	N/A	N/A	N/A	N/A

Viscosity @ 140°F, cSt	D-445	N/A	1,000-9,500	N/A	210-390
Asphaltenes, % w (max)	D-2006-70	N/A	10.0 Max.	N/A	1.00
Maltene Dist. Ratio	D-2006-70	N/A	0.2-1.4	N/A	0.3-0.6
PC/S Ratio <sup>45</sup> (Min) (Note 4)	D-2006-70	N/A	0.5 Min.	N/A	0.5
Saturated Hydrocarbons,S <sup>5</sup> (note 4)	D-2006-70	N/A	28 Max.	N/A	21-28

Notes:

1. Krieb units (ASTM D562)
2. A full set of tests shall be performed by as specified by the special provisions in the undiluted condition. These tests and any other specified will be performed at the contractor's expense.
3. The Ultraviolet resistance testing results will be provided at no cost to the engineer.
4. Only residue by evaporation shall be run on diluted samples. Specification limits should be diluted rate times minimum residual value of concentrate.
5. PC/S ratio:  $\frac{PC + A_1}{S + A_2}$ <sup>5</sup>

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#### 334.2 MATERIALS:

The preservative seal shall be one of the following materials as specified by the Engineer:

Type	Description	Material Conformance
A	<del>Rejuvenating emulsion</del>	<del>Section 718 Acrylic</del>
	<del>polymer emulsion</del>	<del>Section 718</del>
B	<del>Petroleum hydrocarbon emulsion</del>	<del>Section 718 Rejuvenating</del>
	<del>emulsion</del>	<del>Section 718</del>
C	“filled” asphalt sealer such as <del>Sealmaster’s</del> TRMSS or equal	Section 718
D	<del>Acrylic polymer emulsion</del>	<del>Section 718</del>
Other	Diluted asphalt emulsion, CSS-1 or SS-1h	Section 713

#### 34.3 CONSTRUCTION METHOD:

The material shall be approved by the Engineer in accordance to this specification. The application rates, dilution and curing shall be directed by the Engineer in accordance with this specification.

The contractor shall be responsible to clean the pavement to be treated free of trash, debris, earth or other deleterious substances present in sufficient quality to not interfere with the work to be preformed.

The application rate will be based upon a typical surface condition test site with application rate trials to determine the needed rate. All application rates specified in Section 712 shall be a diluted 50-50 emulsified asphalt and water, except as recommended by the manufacturer for Type B and C. Any over applied seal will be sanded as directed by the Engineer. Application equipment shall be in accordance with Section 330.

Before opening a treated area to traffic, the surface shall be checked for slipperiness and/or tackiness. If the treated portion of the roadway must be opened to traffic prior to the disappearance of slipperiness and/or tackiness, the surface shall be sanded with a minimum of 1 ½ pounds per square yard or as directed by the Engineer. Sand Blotter shall comply with Section 333.

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Preservative seal for asphalt concrete will be measured by the gallon or ton applied.

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#### 718.1 GENERAL

Asphalt Concrete preservative seal shall be one of the following types or equal, with typical application rates.

**TYPE A-** Asphalt rejuvenating agent shall be an emulsion composed of a petroleum resin oil base uniformly emulsified with water. Each supplier must submit a certified statement from the asphalt rejuvenator manufacturer showing that the asphalt rejuvenating emulsion conforms to the required physical and chemical requirements. They also must provide documentation of tests that determine the acceptable range of application of the product. Typical application rates are .07 to .18 gallons per square yard.

**TYPE B-** Petroleum Hydrocarbon emulsion. Applied at .05 to .20 gallons per square yard, diluted.

**TYPE C-** Tire modified surface sealer ( TRMSS) or equal not diluted, and applied at a rate of .10 to .20 gallons per square yard.

**Type ~~DC~~**- Acrylic polymer, modified emulsion. Diluted to the manufacture's recommendation and applied at a rate of .08 to .20 gallons per square yard.

#### 718.2 TEST METHODS AND REQUIREMENTS

Preservative seal for asphalt concrete material, shall meet type A, B, or C on table 718-1 by certification from the manufacturer.

All tests shall be performed by AMRL accredited laboratory, accredited in the specified test being performed.

**Table 718-1**

Properties *(note 2)		Type-A	Type-B	Type -C	Type-D
Saybolt Viscosity @77F (sfs)	<del>AASHTO T42</del> <del>ASTM-D7496-09</del>	45-55(KU)*(note 1)	<del>15-40</del> <del>15-40</del>	<del>15-40</del> <del>15-40</del>	<del>15-40</del>
Residue by evaporation 138C	ASTM D6934-08	30-40	.10 Max <del>53min.</del>	<del>53min.</del> <del>60-65</del>	<del>60-65</del>
Sieve test %	ASTM D6933-08	N/A	<del>.10 max.</del>	<del>.10 max.</del> <del>0-4</del>	<del>0.1</del>
<u>5 day settlement test</u>	ASTM D6930-10		<u>2.0% max</u>	<u>N/A</u>	<u>N/A</u>
<b>Test on residue from evaporation AASHTO <del>T59</del> D6934-08</b>					
Flash point F	ASTM D92	450F	<del>450F</del> <del>450F</del>	<del>450F</del> <del>385F</del>	<del>385F</del>
Softening point	ASTM D36M-09	130F min	<del>N/A</del> <del>130 F min.</del>	<del>130 F min.</del>	<del>N/A</del>
Accelerated weathering test	ASTM-D4799-03	Report *(note 3)	<del>N/A Report (note 3)</del>	<del>Report (note 3)</del> <del>N/a</del>	<u>Plant certification within 6 months</u>
Ductility(@77F)100g 5 sec.	ASTM D113-07	N/A	<del>N/A</del> <del>20 min.</del>	<del>20 min.</del> <del>N/A</del>	<del>N/A</del>
Storage stability, test 1 day%	ASTM 6930-10	N/A	<del>N/A</del> <del>N/A</del>	<del>N/A</del> <del>N/a</del>	<del>N/a</del>
Viscosity @ 140°F, cSt	D-445	N/A	<del>1,000-9,500</del> <del>N/A</del>	<del>N/A</del> <del>210-390</del>	<del>210-390</del>
Asphaltenes, %w (max)	D-2006-70	N/A	<del>10.0</del> <del>Max</del> <del>N/A</del>	<del>N/A</del> <del>4.00</del>	<del>1.00</del>
Maltene Dist. Ratio	D-2006-70	N/A	<del>0.2-1.4</del> <del>N/A</del>	<del>N/A</del> <del>0.3-0.6</del>	<del>0.3-0.6</del>
PC/S Ratio <sup>4,5</sup> (Min) (Note 4)	D-2006-70	N/A	<del>0.5</del> <del>Min</del> <del>N/A</del>	<del>N/A</del> <del>0.5</del>	<del>0.5</del>
Saturated Hydrocarbons,S <sup>5</sup> (note 4)	D-2006-70	N/A	<del>28 Mx</del> <del>N/a</del>	<del>N/A</del> <del>21-28</del>	<del>21-28</del>

Notes:

1, Krieb units (ASTM D562)

2. A full set of tests shall be performed by as specified by the special provisions in the undiluted condition. These tests and any other specified will be performed at the contractor's expense.

3.The Ultraviolet resistance testing results will be provided at no cost to the engineer.

4.Only residue by evaporation shall be run on diluted samples. Specification limits should be diluted rate times minimum residual value of concentrate.

54. PC/S ratio :

$$\frac{PC + A_1^5}{S + A_2}$$