

# ALABAMA DEPARTMENT OF TRANSPORTATION

DATE: April 8, 2013

Special Provision No. 12-0599

EFFECTIVE DATE: June 1, 2013

SUBJECT: Asphalt Materials

Alabama Standard Specifications, 2012 Edition, shall be revised by replacing SECTION 405, SECTION 407, and SECTION 804 with the following:

## SECTION 405 TACK COAT

### 405.01 Description.

The work under this Section shall cover the furnishing and placing of a bituminous tack coat on an existing surface which is to be covered by a bituminous plant mix material in accordance with these specifications and in reasonably close conformity with the lines shown on the plans or directed by the Engineer.

The work shall include the cleaning of the existing surface prior to application of the tack coat.

The area of treatment and the rate of application of a tack coat shall be based on the plans and specifications after evaluating the actual surface condition on which the plant mix overlay is to be placed.

### 405.02 Materials.

Bituminous material for tack coat shall be Emulsified Asphalt or one of the Performance Graded Asphalt Binders shown in Article 804.07. The cationic grades **CRS-1h**, CRS-2, CRS-2h, **CMS-1hp**, CSS-1, CSS-1h, CQS-1h, CQS-1hp, CRS-2p, CRS-2I, CNTT-1hs or the anionic grade NTSS-1HM shall be used. If Emulsified Asphalt is used, the emulsion shall not be diluted prior to application.

Unless shown otherwise on the plans, the contractor shall have the option of using any of the allowable bituminous materials, subject to other limitations of these specifications. In making the selection of materials, the Contractor shall take into consideration seasonal, weather, temperature, and other placement conditions, while keeping in mind that SS stands for slow setting, RS stands for rapid setting, and QS stands for quick setting (QS is the faster setting or breaking emulsion). Low temperatures and humid or damp conditions will retard the breaking or setting of all emulsions. The mixing of a cationic and an anionic emulsion will result in failure of emulsion materials.

All materials shall meet the requirements of Section 804.

### 405.03 Construction Requirements.

#### (a) EQUIPMENT.

In general it shall be the Contractor's responsibility to select the proper size and amount of equipment to provide the desired results. Equipment furnished shall meet the requirements of Subarticle 401.03(a).

#### (b) SEASONAL, NIGHTTIME, WEATHER, AND TEMPERATURE LIMITATIONS.

##### 1. SEASONAL LIMITATIONS FOR THE PLACEMENT OF TACK.

Grades CSS-1, CSS-1h Emulsified Asphalts shall not be placed between the dates of October 1 and May 1 in North Alabama and between the dates of November 1 and April 1 in South Alabama regardless of weather conditions. For the purpose of identification, South Alabama shall be referred to for projects lying partly or wholly in the area of the State lying south of latitude 33 °N and with North Alabama encompassing the remaining or northern portion of the State. These seasonal limitations shall not apply to the placement of other bituminous materials for tack allowed by Article

405.02. The tack may be placed if allowed by the Engineer when the pavement temperature is 40°F and rising.

2. NIGHTTIME LIMITATIONS FOR THE PLACEMENT OF TACK.

Grade CSS-1 and CSS-1h Emulsified Asphalts shall not be used for tack during nighttime paving operations.

3. WEATHER LIMITATIONS FOR THE PLACEMENT OF TACK.

Tack material shall not be applied on a wet surface or when in the Engineer's opinion weather conditions are not suitable. NTSS-1HM may become slippery when wet.

4. TEMPERATURE LIMITATIONS FOR THE PLACEMENT OF TACK.

Temperature limitations for the placement of tack coat material shall be the same as specified in Subarticle 410.03(b) for plant mixed pavements. NTSS-1HM material shall not be used for cold applied asphalt pavement.

(c) PREPARATION OF EXISTING SURFACE.

Loose material, dust, dirt, and all foreign matter shall be removed from the surface to be treated. Approval of the surface before application of the tack material is required.

(d) APPLICATION.

Tack coat materials shall be applied in an amount from 0.05 gallons per square yard {0.25 L/m<sup>2</sup>} up to a maximum of 0.10 gallons per square yard {0.5 L/m<sup>2</sup>} for emulsified asphalt and from 0.03 gallons per square yard {0.13 L/m<sup>2</sup>} up to a maximum of 0.07 gallons per square yard {0.3 L/m<sup>2</sup>} for asphalt binder. When tacking new, freshly laid pavement, the Engineer may approve reducing the above minimum requirements.

Unless approved otherwise by the Engineer, the application temperature shall be 120 °F - 170 °F {50 °C - 75 °C} for Cationic Emulsified Asphalts, 150 °F - 180 °F {66 °C - 82 °C} for Anionic Emulsified Asphalts; and 275 °F - 350 °F {135 °C - 175 °C } for Performance Graded Asphalt Binders. The NTSS-1HM asphalt emulsion shall be covered as soon as practical.

An asphalt distributor shall be provided for use on all accessible areas; inaccessible areas such as around manholes, etc. may be coated by other approved methods.

When applying tack coat, it shall be applied to all contact surfaces of curbs, gutters and manholes. Tack shall also be applied to all adjacent pavement edges except the pavement edges where joint sealant is required. Adjacent surfaces, such as gutters and the like, that are not to be in contact with the mix shall be adequately protected from the spray by means of heavy paper securely fastened in place or other satisfactory means. Any such surface soiled by tack coat material shall be cleaned and restored to its previous condition without additional compensation.

Tack coat material shall be spread only far enough in advance to permit the construction to progress consistently, uniformly, and continuously after the curing period and shall not be applied so far in advance that the viscous quality will be reduced by traffic prior to construction thereon. Tack coat that loses its viscous quality before being covered shall be renewed and any which has been damaged shall be replaced without extra compensation.

**405.04 Method of Measurement.**

The amount of bituminous material used as directed for tack coat will be measured in gallons {liters}, as specified in Article 109.02.

**405.05 Basis of Payment.**

(a) UNIT PRICE COVERAGE.

The amount of bituminous material used as directed for tack coat, measured as noted above, will be paid for at the contract unit price bid per gallon {liter} which shall be full compensation for furnishing the bituminous material, hauling, heating, application, curing, and maintaining and for all equipment, tools, labor, and incidentals necessary to complete the work.

(b) PAYMENT WILL BE MADE UNDER ITEM NO.:

405-A Tack Coat - per gallon {liter}

## SECTION 407 JOINT SEALANT FOR HMA PAVEMENT

**407.01 Description.**

This Section shall cover the sealing of longitudinal joints in hot mix asphalt pavements by the spraying or rolling of joint sealant on the vertical face of the joint in front of the asphalt spreader. Joint sealant application shall be a separate construction operation from the tack coat application

Joint sealant shall not be applied to the joints between HMA pavement and paved shoulders unless shown otherwise on the plans. Joint sealant shall not be applied to the joints between HMA pavement and curbs unless shown otherwise on the plans.

**407.02 Materials.**

A sample of the sealant will be taken by the Engineer and tested in accordance with the requirements established by the Department for sampling and testing Bituminous Surface Treatments given in Section 401.

The Contractor shall have the option of using the following materials for the joint sealant:

- PG 64-22 performance graded asphalt binder;
- PG 67-22 performance graded asphalt binder
- CRS-1H emulsified asphalt
- CMS-1HP emulsified asphalt
- CQS-1HP emulsified asphalt;
- NTSS-1HM emulsified asphalt;
- Pavon™;
- Crafcro™ Pavement Joint Adhesive Part No. 34524.

PG 64-22 shall meet the material requirements given in Table 2 of Section 804.

PG 67-22 shall meet the material requirements given in Table 3 of Section 804.

NTSS-1HM, CQS-1HP, CMS-1HP, and CRS-1H shall meet the requirements given in Table 5 of Section 804.

CQS-1HP shall be a cationic emulsion blended with a minimum of 1.2 % polymer meeting the requirements given in Article 811.03 and the requirements given in the following tables. Pavon™ is a proprietary product that shall also meet the requirements given in the following tables.

REQUIRED PROPERTIES FROM THE TESTING OF Pavon™			
Parameter	Test Method	Value	
Residue % By Distillation	ALDOT 415	60 % Min.	-
Viscosity, SF @ 77 °F, sec.	AASHTO T 59	20 SF Min.	100 SF Max.
Sieve Test, %	AASHTO T 59	-	0.1 % Max.
Particle Charge	AASHTO T 59	Positive	

REQUIRED PROPERTIES FROM THE TESTING OF DISTILLATION RESIDUE FROM Pavon™			
Parameter	Test Method	Value	
Penetration, 100 g, 5 secs. @ 77 °F	AASHTO T 49	60 mm Min.	130 mm Max.
Ductility, cms., @ 39.2 °F	AASHTO T-51	40 cms Min.	-
Elastic Recovery @ 50 °F, %	AASHTO T-301	50 % Min.	-

Crafco™ Pavement Joint Adhesive Part No. 34524 is a proprietary product that shall meet the requirements given in the following table.

REQUIRED PROPERTIES FROM THE TESTING OF Crafco™ PAVEMENT JOINT ADHESIVE PART NO. 34524		
Parameter	Test Method	Value
Cone Penetration, 77 °F	ASTM D5329	60-100
Flow, 140 °F	ASTM D5329	5 mm-Maximum
Resilience, 77 °F	ASTM D5329	30 %-Minimum
Ductility, 77 °F	AASHTO T51	30 cm-Minimum
Ductility, 39.2 °F	AASHTO T51	30 cm-Minimum
Softening Point	AASHTO T53	170 °F Minimum

#### 407.03 Construction Requirements.

Unless shown otherwise on the plans, joint sealant shall only be applied to the joints in the wearing layers of Section 424 (Superpave) and Section 423 (Stone Matrix Asphalt) mixes and to the joints in the surface layers between existing HMA pavement and new HMA pavement. Joint sealant shall not be applied to the joints between HMA pavement and paved shoulders unless shown otherwise on the plans. Joint sealant shall not be applied to the joints between HMA pavement and curbs unless shown otherwise on the plans.

As a separate application from the tack coat, the sealant shall be applied by being sprayed or rolled on the face of the vertical joint of the previously placed asphalt in front of the asphalt spreader to seal the joint between the previously placed layer and the newly placed layer.

Joint sealant shall be placed at the rates and temperatures given in the following table.

JOINT SEALANT APPLICATION RATES AND TEMPERATURE		
Joint Sealant	Application Rate	Application Temperature
PG 64-22	24 gallons per mile per inch of lift with a +/-10 % tolerance	212 °F to 230 °F
PG 67-22	24 gallons per mile per inch of lift with a +/-10 % tolerance	275 °F to 350 °F
CRS-1h CMS-1HP	40 gallons per mile per inch of lift with a +/-10 % tolerance	120 °F to 170 °F
NTSS-1HM	40 gallons per mile per inch of lift with a +/-10 % tolerance	165 °F to 170 °F
CQS-1hp Pavon™	40 gallons per mile per inch of lift with a +/-10 % tolerance	Ambient Temperature
Crafco™ Pavement Joint Adhesive Part No. 34524	70 gallons per mile per inch of lift with a +/- 10 % tolerance	380 °F ± 20 °

The Engineer will limit the length of placement ahead of the spreader (usually no more than 1000 feet) to reduce the possibility of damage to the sealant. The Engineer will also require the placement of CQS-1HP emulsified asphalt, NTSS1HM emulsified asphalt, and Pavon™ far enough ahead of the asphalt spreader to allow the curing of the sealant.

#### 407.04 Method of Measurement.

The application of joint sealant will be measured by the mile for each joint.

#### 407.05 Basis of Payment.

##### (a) UNIT PRICE COVERAGE.

Joint sealant will be paid for at the contract unit price per mile for each joint which shall be full compensation for furnishing the joint sealant material, applying the sealant and for all equipment, tools, labor, and incidentals necessary to complete the work.

##### (b) PAYMENT WILL BE MADE UNDER ITEM NO.:

407-B Joint Sealant for Hot Mix Asphalt Pavement - per mile

## SECTION 804 ASPHALT MATERIALS

### 804.01 General.

The asphalt materials furnished shall be of approved quality and shall meet the requirements shown under its respective type in the following tables and referenced specifications for the kind of material furnished. For any contract, the material furnished shall show uniform test results. Where more than one grade of material is permitted for any item of work, the Engineer shall specify the grade. In all cases, the Engineer will specify the consistency limits for the grade of material shown on the plans and/or proposal. The Contractor may, without extra compensation, supply asphalt material containing approved additives for producing non-stripping characteristics. For such materials, an adjustment in the total asphalt requirements of this subdivision will be made as deemed necessary. Other additives shall not be added to the asphalt material unless expressly authorized in writing by the Materials and Tests Engineer. The use of any unauthorized additive will be cause for rejection of the asphalt material.

Sampling of tank cars, tank trucks, distributor trucks, or recirculating storage tanks shall be by the use of a sampling valve, as prescribed in Figure 3 of AASHTO T 40, installed in the tanks.

All products furnished for use shall be from an approved producer who is participating in and meeting the requirements of ALDOT-243, ACCEPTANCE PROGRAM FOR ASPHALT MATERIALS, and listed on List I-4, PRODUCERS OF ASPHALT PRODUCTS, of the Department's "Materials, Sources, and Devices With Special Acceptance Requirements" Manual. Refer to Subarticle 106.01(f) and ALDOT-355 concerning this list.

### 804.02 Performance Graded Asphalt Binders (PGAB).

The material supplied under this Article shall be asphalt prepared by the refining of asphaltic petroleum. No air-blown or oxidized asphalt will be allowed. The refined asphalt binder shall be homogeneous, free of water and shall not foam when heated at 347 °F {175 °C}.

The PG 58-22, PG 64-22, and PG 76-22 binders shall conform to the requirements given in AASHTO M-320 as shown in Tables 1, 2 and 4 in Article 804.07. The PG 67-22 binder (not shown in AASHTO M-320) shall conform to the requirements given in AASHTO M-320 and the requirements given in Table 3 of Article 804.07.

Shipping temperature of the asphalt from the refinery shall not exceed 356 °F {180 °C} for unmodified binders. For polymer modified binders, shipping temperatures in excess of 356 °F {180 °C} may be allowed with the approval of the Materials and Tests Engineer. At the time of use, the asphalt temperature shall comply with the requirements of Item 401.03(d)2. or Subarticle 410.02(b) whichever is applicable.

### 804.03 Cutback Asphalt.

The materials supplied under this Article shall be made from liquid asphalt binder and naphtha solvent, so proportioned and mixed that the finished product shall be homogeneous and conform to the requirements of AASHTO M 81 for rapid curing cutback and AASHTO M 82 for medium curing cutback.

### 804.04 Emulsified Asphalt.

The materials supplied under this Article shall be homogeneous emulsification of asphalt and shall show no separation of asphalt or objectionable change in viscosity within three months after delivery. Separation at any time caused by freezing or contamination shall be cause for rejection. Emulsified asphalt shall conform to the requirements as shown in Asphalt Materials Table No. 5 in Article 804.07.

### 804.05 Emulsified Petroleum Resin.

The material supplied under this Article shall be a homogeneous emulsification of petroleum resin. The emulsified petroleum resin shall be supplied from the producer in the form in which it shall be placed. No dilution of the product will be allowed after the product has left the supplier's facility. Emulsified petroleum resin shall conform to the requirements as shown in Asphalt Materials Table No. 6. in Article 804.07.

804.06 Blank.

804.07 Tables of Asphalt Materials.

(a) ASPHALT MATERIALS TABLE NUMBER 1, GRADE PG 58-22.

ASPHALT MATERIALS TABLE NO. 1 SPECIFICATIONS FOR PERFORMANCE GRADED ASPHALT BINDER		
Property	Grade PG 58-22	
	Specification	Test Method
<i>Original Binder</i>		
Flash Point Temperature	Minimum 230 °C	AASHTO T 48
Rotational Viscosity	Maximum 3 Pa•s @ 135 °C	AASHTO T 316
Dynamic Shear, $G^*/\sin \delta$	Minimum 1.00 kPa @ 58 °C	AASHTO T 315
<i>Rolling Thin Film Oven Residue (AASHTO T 240)</i>		
Mass Loss (RTFO)	Maximum 1.00 %	AASHTO T 240
Dynamic Shear, $G^*/\sin \delta$	Minimum 2.20 kPa @ 58 °C	AASHTO T 315
<i>Pressure Aging Vessel Residue (AASHTO R 28)</i>		
Dynamic Shear, $G^*\sin \delta$	Maximum 5000 kPa @ 22 °C	AASHTO T 315
Creep Stiffness, S	Maximum 300 MPa @ -12 °C	AASHTO T 313
m-value	Minimum 0.300 @ -12 °C	AASHTO T 313

(b) ASPHALT MATERIALS TABLE NUMBER 2, GRADE PG 64-22.

ASPHALT MATERIALS TABLE NO. 2 SPECIFICATIONS FOR PERFORMANCE GRADED ASPHALT BINDER		
Property	Grade PG 64-22	
	Specification	Test Method
<i>Original Binder</i>		
Flash Point Temperature	Minimum 230 °C	AASHTO T 48
Rotational Viscosity	Maximum 3 Pa•s @ 135 °C	AASHTO T 316
Dynamic Shear, $G^*/\sin \delta$	Minimum 1.00 kPa @ 64°C	AASHTO T 315
<i>Rolling Thin Film Oven Residue (AASHTO T 240)</i>		
Mass Loss (RTFO)	Maximum 1.00 %	AASHTO T 240
Dynamic Shear, $G^*/\sin \delta$	Minimum 2.20 kPa @ 64 °C	AASHTO T 315
<i>Pressure Aging Vessel Residue (AASHTO R 28)</i>		
Dynamic Shear, $G^*\sin \delta$	Maximum 5000 kPa @ 25 °C	AASHTO T 315
Creep Stiffness, S	Maximum 300 MPa @ -12 °C	AASHTO T 313
m-value	Minimum 0.300 @ -12 °C	AASHTO T 313



The binder shown in Table No. 2 shall be made by adding polymer to a refined grade of PG 58-22 or shall be blended from PG 76-22 using an ALDOT approved blending procedure at the refinery. Air blown and oxidized asphalt shall not be used.

All PG 64-22 shall contain a minimum of 1.5 %, by weight, polymer solids.

A sample and infrared scan (Fourier Transform Infrared, FTIR) using the ALDOT 408 test method to determine the styrene and butadiene peaks and polymer percentage at the appropriate polymer loading shall be submitted to the Materials and Tests Engineer for laboratory evaluation prior to use.

All polymers shall conform to Section 811 for polymer additives.

All Polymer Modified Asphalt Binder manufacturers shall submit the information required in Article 811.01 annually or upon request by the Department.

(c) ASPHALT MATERIALS TABLE NUMBER 3, GRADE PG 67-22.

ASPHALT MATERIALS TABLE NO. 3 SPECIFICATIONS FOR PERFORMANCE GRADED ASPHALT BINDERS (NOT SHOWN IN AASHTO M-320)		
Property	Grade PG 67-22	
	Specification	Test Method
<i>Original Binder</i>		
Flash Point Temperature	Minimum 230 °C	AASHTO T 48
Rotational Viscosity	Maximum 3 Pa•s @ 135 °C	AASHTO T 316
Dynamic Shear, G*/sin δ	Minimum 1.00 kPa @ 67 °C	AASHTO T 315
<i>Rolling Thin Film Oven Residue (AASHTO T 240)</i>		
Mass Loss (RTFO)	Maximum 1.00 %	AASHTO T 240
Dynamic Shear, G*/sin δ	Minimum 2.20 kPa @ 67 °C	AASHTO T 315
<i>Pressure Aging Vessel Residue (AASHTO R 28)</i>		
Dynamic Shear, G*•sin δ	Maximum 5000 kPa @ 26.5 °C	AASHTO T 315
Creep Stiffness, S	Maximum 300 MPa @ -12 °C	AASHTO T 313
m-value	Minimum 0.300 @ -12 °C	AASHTO T 313

(d) ASPHALT MATERIALS TABLE NUMBER 4, GRADE PG 76-22.

ASPHALT MATERIALS TABLE NO. 4 SPECIFICATIONS FOR PERFORMANCE GRADED ASPHALT BINDER		
Property	Grade PG 76-22	
	Specification	Test Method
<i>Original Binder</i>		
Flash Point Temperature	Minimum 230 °C	AASHTO T 48
Rotational Viscosity	Maximum 3 Pa•s @ 135 °C	AASHTO T 316
Dynamic Shear, G*/sin δ	Minimum 1.00 kPa @ 76°C	AASHTO T 315
<i>Rolling Thin Film Oven Residue (AASHTO T 240)</i>		
Mass Loss (RTFO)	Maximum 1.00 %	AASHTO T 240
Dynamic Shear, G*/sin δ	Minimum 2.20 kPa @ 76 °C	AASHTO T 315
Elastic Recovery	Minimum 50 % @ 10°C	AASHTO T 301 <sup>1</sup>
<i>Pressure Aging Vessel Residue (AASHTO R 28)</i>		
Dynamic Shear, G*•sin δ	Maximum 5000 kPa @ 26.5 °C	AASHTO T 315
Creep Stiffness, S	Maximum 300 MPa @ -12 °C	AASHTO T 313
m-value	Minimum 0.300 @ -12 °C	AASHTO T 313
<sup>1</sup> The following exceptions shall be made to the requirements given in AASHTO T 301: The statement given in Section 4.5 that reads "Attach the clips to the pins or hooks of the force adapter and the testing machine..." shall be disregarded. The mold shall be in accordance with the requirements given in ASTM D 6084 with dimensions noted in this method. All Elastic Recovery failures will be subject to FTIR scans for acceptability.		

All binders used in Table 4 shall be made by the addition of polymer to refined grades of PG 67-22 without using air blown or oxidized asphalt.

All PG 76-22 shall contain a minimum of 2.5 %, by weight, polymer solids.

A sample and infrared scan (Fourier Transform Infrared, FTIR) using the ALDOT 408 test method to determine the styrene and butadiene peaks along with the percentage of polymer added at the appropriate polymer loading shall be submitted to the Materials and Tests Engineer for laboratory evaluation prior to use. All polymers shall conform to Section 811 for polymer additives.

All Polymer Modified Asphalt Binder manufacturers shall submit the information required in Article 811.01 annually or upon request by the Department.

Obsolete



(f) ASPHALT MATERIALS TABLE NUMBER 5, EMULSIFIED ASPHALTS.

ASPHALT MATERIALS TABLE NO. 5 SPECIFICATIONS FOR EMULSIFIED ASPHALTS									
	VISCOSITY GRADE								
	NTSS-1HM Min-Max	CMS-2, CMS-2h, CSS-1, CSS-1h, CRS-2 CRS-2p* CRS-2I*	AE-P Min-Max	CMS-1hp Min-Max	CRS-1h Min-Max	CRS-2h CRS-2hp*	CQS-1h CQS-1hp*	CNTT-1hs Min-Max	AASHTO TESTS
AASHTO M 208		Meet							T 59
Elastic Recovery Minimum 50 % @ 50°F {10°C}	--	50 % for CRS-2p and CRS-2I	--	50%		50% for CRS-2hp	50% for CQS-1hp	--	T 301 **
Viscosity, Saybolt Furol: @ 77 °F {25 °C}, Sec @ 122 °F {50 °C}, Sec	25 500 --	-- --	10 50 -- --	30 400 -- --	15-100	200 500	20 150 -- --	0 100	T 59 T 59 *See Note #4
Settlement, 5 days, %	-- 5	--	-- 5	-- --	-- --	-- --	-- --	-- --	T 59
Storage Stability Test 24 hr., %	-- 1.0	--	-- --	-- 1.0	-- 1.0	-- 1.0	-- 1.0	1.0	T 59
Demulsibility, 35 m/0.8% Sod. Dioctyl Sulfosuccinate, %	--	--	-- --	--	-- --	60 --	-- --	-- --	T 59
Classification Test	--	--	-- --	-- --	-- --	Passes	-- --	-- --	T 59
Particle Charge	Negative	--	-- --	Positive	Positive	Positive	Positive	Positive	T 59
Sieve Test, %	--	--	-- 0.1	-- 0.10	-- 0.10	-- 0.10	-- 0.10	0.10	T 59
Distillation: Oil Distillate or Naphtha, by Volume of Emulsion, % Residue by Distillation, %	-- 1.0 35 --	-- --	-- 12 45 --	-- 3.0 50 --	-- 3.0 55 --	-- 3.0 65 --	-- -- 60 --	3.0 50 --	T 59 T 59
Stone Coating Test, % Coated	--	--	-- --	-- --	-- --	-- --	-- --	-- --	See Note #1
Modified Sand Coating	--	--	-- --	-- --	-- --	-- --	-- --	-- --	See Note #2
Tests on Residue from Distillation: Float Test @ 140 °F {60 °C}, Sec. Solubility in CLCH:CCL2, % Ductility @ 77 °F {25 °C}, cm Ash, % by Mass Specific Gravity, 77 °F/ 77 °F {25 °C/25 °C} Softening Point Penetration 77 °F {25 °C}, 100 g. 5s	-- -- -- -- -- 65°C -- -- 20	-- -- -- -- -- -- --	20 -- 97.5 -- -- -- -- -- --	-- -- -- 40°C -- 45-90	-- -- -- 49°C -- 40 90	-- 97.5 -- 60 -- -- -- -- 70 100	-- 97.5 -- 40 -- -- -- -- 60 110	-- -- -- -- -- 49°C -- 40 90	See Note #3 T 44 T 51 T 111 T 228 T 53 T 49

\* All CRS-2p, CRS-2hp, CRS-2I, and CQS-1hp shall contain a minimum of 3.0 % polymer by volume. CRS-2p shall meet the requirements given in AASHTO M 316 with the exception of polymer content. All polymers shall conform to the requirements given in Section 811. All Elastic Recovery failures will be subject to FTIR scans for acceptability.

\*\* The following exceptions shall be made to the requirements given in AASHTO 301: The statement given in Section 4.5 that reads "Attach the clips to the pins or hooks of the force adapter and the testing machine..." shall be disregarded. The mold shall be in accordance with the requirements given in ASTM D 6084 with dimensions noted in this method.

NOTES TO ASPHALT MATERIALS TABLE NO. 5.

NOTE #1. Stone Coating Test.

Use AASHTO T 59, Coating Test, except the mixture of stone and asphalt emulsion shall be mixed vigorously for five minutes and then immediately drenched with approximately twice its own volume of tap water at room temperature after which the aggregate shall be at least 90 percent coated with an asphalt film.

NOTE #2. Modified Sand Coating Test.

Use AASHTO T 59, Coating Test, except a mixture of air-dry test aggregate and asphalt emulsion shall be mixed thoroughly for five minutes then allowed to stand for five hours, after which the mixture shall be capable of being mixed for an additional five minutes. The mixture shall then be drenched with approximately twice its own volume of tap water at room temperature without showing more than 10 percent loss of bituminous film. The test aggregate for use in this test shall be a combination of 90 percent concrete sand and 10 percent Portland cement. The amount of asphalt emulsion used shall be 10 percent by weight {mass} of the aggregate.

NOTE #3. Float Test.

Use AASHTO T 50, with the exception that the residue shall be allowed to cool to room temperature and re-melted at lowest possible temperature that will bring it to a sufficiently fluid condition for easy pouring. Then pour into the collar for completion of the float test.

NOTE #4. Viscosity Test.

If the Viscosity Test begins to drip at 122 °F {50 °C} test temperature, the test shall be repeated at 160 °F {70 °C}. The Viscosity at 160 °F {70 °C} shall not exceed 200 seconds.

(g) ASPHALT MATERIALS TABLE NUMBER 6, EMULSIFIED PETROLEUM RESIN.

ASPHALT MATERIALS TABLE NO. 6 SPECIFICATIONS FOR EMULSIFIED PETROLEUM RESIN				
TESTS	RESULTS		TEST METHODS	
	Minimum	Maximum	ASTM	AASHTO
Particle Charge Test	Positive		D 244	T 59
Residue, % (Residue contains 5% Asphalt)	60	--	D 244	T 59
Sieve Test, %	--	0.1	D 244	T 59
Viscosity, @ 77 °F {25 °C}, SFS	14	60	D 244	T 59
Tests on Residue:				
Flash Point, COC (°F)	210	---	D 92	T 48
Viscosity at 140 °F {60 °C} (cST)	190	450	D 2170	T 201
* ASTM D 244 Evaporation Test for percent of residue is modified by heating 50 gram sample to 149 °C until foaming ceases, then cooling immediately and calculating results.				
** Test procedure identical with ASTM except that distilled water shall be used in place of 2% sodium oleate solution.				