

ALABAMA DEPARTMENT OF TRANSPORTATION

DATE: August 14, 2017

Special Provision No. 12-0291(2)

EFFECTIVE DATE: September 1, 2017.

SUBJECT: Asphalt Materials

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

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, **installed in the tanks**, as prescribed in Figure 3 of AASHTO T 40.

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 δ	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 δ	Minimum 2.20 kPa @ 58 °C	AASHTO T 315
<i>Pressure Aging Vessel Residue (AASHTO R 28)</i>		
Dynamic Shear, G*•sin δ	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 δ	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 δ	Minimum 2.20 kPa @ 64 °C	AASHTO T 315
<i>Pressure Aging Vessel Residue (AASHTO R 28)</i>		
Dynamic Shear, G*•sin δ	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 ¹
<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
¹ 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.

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

ASPHALT MATERIALS TABLE NO. 5 SPECIFICATIONS FOR EMULSIFIED ASPHALTS											
VISCOSITY GRADE											
	NTSS-1HM Min-Max	MTQS-1HL Min-Max	CMS-2h, CMS-2h, CSS-1, CSS-1h, CRS-2 CRS-2p* CRS-2l*	AE-P Min-Max	CMS-1hp Min-Max	CRS-1h Min-Max	CBC-1HT Min-Max	CRS-2h CRS-2hp* Min-Max	CQS-1h CQS-1hp* Min-Max	CHTT-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-2l	--	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 --	100	--	10 50 --	30 400 --	15-100 --	10 - 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	-- 1.0	1.0	T 59
Demulsibility, 35 m/0.8%	--	--	--	--	--	--	--	60	--	--	T 59
Sod. Dioctyl Sulfosuccinate, %	--	--	Positive	--	Positive	Positive	Positive	Positive	Positive	Positive	T 59
Particle Charge	Negative	Non-ionic	--	--	Positive	Positive	Positive	Positive	Positive	Positive	T 59
Sieve Test, %	--	-- 0.10	--	-- 0.10	-- 0.10	-- 0.10	-- 0.30	-- 0.10	-- 0.10	0.10	T 59
Distillation:											
Oil Distillate or Naphtha, by Volume of Emulsion, %	-- 1.0	--	--	-- 12	-- 3.0	-- 3.0	--	-- 3.0	--	3.0	T 59
Residue by Distillation, %	50	60	--	45	50	55	50	65	60	50	T 59
Stone Coating Test, % Coated Modified Sand Coating	--	--	--	--	--	--	--	--	--	--	See Note #1 See Note #2
Tests on Residue from Distillation:											
Float Test @ 140 °F [60 °C], Sec.	--	--	--	20	--	--	--	--	--	--	See Note #3
Solubility in CLCH:CCL2, %	--	--	--	97.5	--	--	--	97.5	97.5	--	T 44
Ductility @ 77 °F [25 °C], cm	--	--	--	--	--	--	--	60	40	--	T 51
Ash, % by Mass	--	--	--	--	--	--	--	--	--	--	T 111
Specific Gravity, 77 °F / 77 °F [25 °C/25 °C]	65°C	60°C	--	--	40 °C	49 °C	--	--	--	--	T 228
Softening Point	--	--	--	--	--	--	--	--	--	49 °C	T 53
Dynamic Shear@67°C (G'/sinδ, 10rad/s), kPa	--	1.0	--	--	--	--	--	--	--	--	T 315
MSCR@67°C, J _r @3.2kPa	--	--	--	--	--	--	--	--	--	--	T 350
Penetration 77 °F [25 °C], 100 g, 5s	-- 20	-- 20	--	--	45-90	40 90	2.0	70 100	60 110	40 90	T 49

* All CRS-2p, CRS-2hp, CRS-2l, 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 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.

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.

(f) 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.				