

**DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA
SPECIAL PROVISION**

Section 820—Asphalt Cement

Delete Section 820 and substitute the following:

820.1 General Description

This section includes the requirements for asphalt cements prepared from crude petroleum.

820.1.01 Related References

A. Standard Specifications

General Provisions 101 through 150.

B. Referenced Documents

Standard Operating Procedure (SOP 4)

AASHTO R 28

AASHTO T 48

AASHTO T 179

AASHTO T 240

AASHTO T 313

AASHTO T 314

AASHTO T 315

AASHTO T 316

AASHTO T 350

C. Definitions

Performance Grade (PG): Method of classifying an asphalt cement binder relative to its rated performance at different testing temperatures.

Polymer Modified Asphalt (PMA): Engineered asphalt cement which incorporates Styrene-Butadiene-Styrene (SBS) or Styrene-Butadiene (SB) polymers.

Highly Modified Polymer Asphalt (PG 76-22E): Engineered asphalt cement which incorporates significantly higher levels of Styrene-Butadiene-Styrene (SBS) or Styrene-Butadiene (SB) polymers than PMA.

Asphalt Rubber Binders (ARB): Engineered asphalt cement which incorporates Styrene Butadiene Rubber (SBR) or Ground Tire Rubber (GTR). The GTR may be incorporated into the asphaltic concrete mixture via a dry method when approved by the Office of Materials and Testing.

Hot Applied Non-tracking Bituminous Tack: A non-tracking engineered asphalt cement based bituminous tack coat material that is applied using a conventional heated distributor.

820.2 Materials

820.2.01 Asphalt Cement

A. Requirements

1. Type

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Use a homogenous, free from water and deleterious- material that will not foam when heated to 347 °F (175 °C).

Ensure blend used to produce a specified performance grade meets the following requirements:

- Is uniform and homogeneous without separation
- Uses PG 64-22 or PG 67-22 described below for the base asphalt
- Consists of production materials not being “air-blown”.
- Contains < 0.5% acid (Polyphosphoric Acid (PPA) modification, for PG 76-22 PMA, 76-22E and PG76-22 ARB only, when approved by the Office of Materials.
- Only additives or modifiers approved by the Office of Materials and Testing are used.

2. Grade

Use the various grades of asphalt cement meeting the requirements shown in the test requirements for Petroleum Asphalt Cements.

- a. Add SBS or SB to neat asphalt to produce a binder meeting requirements for PG 76-22 PMA and PG 76-22E when roadway ADT is equal to or greater than 100,000 vpd for Stone Matrix Asphalt (SMA) and Porous European Mix (PEM) or Open Graded Friction Course (OGFC) Mixtures.
- b. SBR or GTR modified PG 76-22 ARB is an acceptable alternative to SBS or SB modified asphalt cement at the contractor’s discretion, when roadway ADT is less than 100,000 vpd, provided the SBR or GTR modified asphalt cement meets the tests’ requirements specified in Table 7.

For SBR modified PG 64-22 or PG 67-22 to meet PG 76-22 ARB, use only SBR currently approved on QPL-65 “Georgia’s List of Approved Latex Suppliers”. For GTR modified PG 64-22 or PG 67-22 to meet PG 76-22 ARB, use 30 mesh size ambient or cryogenic ground tire rubber at minimum 10% of weight of neat asphalt cement content of the asphaltic concrete mixture. Ensure Trans-Polyoctenamer is added at 4.5% of the weight of the crumb rubber to achieve better particle distribution. Other approved workability additives may be used, at the discretion of the Office of Materials, provided the end product meets all specified requirements of PG76-22 ARB. Ensure the end product is homogenous and shows no separation or coagulation. Percentage of ambient or cryogenic ground tire rubber is neat asphalt source dependent and may require > 10 % to meet specification requirements for PG 76-22 ABR.

Superpave PG Binder Table 1 – Hot Applied Non-tracking Bituminous Tack			
Test and Method	Test Temperature	Specification	Notes
Rotational Viscosity AASHTO T 316	275 °F (135 °C)	Maximum 3.0 Pa·s	a
Dynamic Shear, G*/sin δ AASHTO T 315 10 rad/sec	147 °F (64 °C)	Minimum 1.00 kPa	
Test on Residue from Distillation Test: Penetration, 77 °F (25 °C), 100 g, 5 sec., (dmm) AASHTO T49	77 °F (25 °C)	Maximum 25	
Softening Point (°F) AASHTO T53		Minimum 70	

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Superpave PG Binder Table 2 – PG 58-22			
Test and Method	Test Temperature	Specification	Notes
Original Binder			
Flash Point, AASHTO T 48		Minimum 446 °F (230 °C)	
Rotational Viscosity AASHTO T 316	275 °F (135 °C)	Maximum 3.0 Pa·s	a
Mass Loss (%) AASHTO T 240	325± 1.8 °F (163± 1°C)	Maximum 0.50	b, c
Dynamic Shear, $G^*/\sin \delta$ AASHTO T 315 10 rad/sec	136 °F (58 °C)	Minimum 1.00 kPa	
Rolling Thin Film Oven Test Residue (RTFO) AASHTO T 240			
Dynamic Shear, $G^*/\sin \delta$ AASHTO T 315 10 rad/sec	136 °F (58 °C)	Minimum 2.20 kPa	
Pressure Aging Vessel (PAV) AASHTO R 28			
Dynamic Shear, $G^* \sin \delta$ AASHTO T 315 10 rad/sec	72 °F (22 °C)	Maximum 5000 kPa	
Creep Stiffness AASHTO T 13 @ 60 sec	10 °F (-12 °C)	S (Stiffness), Maximum 300 MPa	
		m-value, Minimum 0.300	

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Superpave PG Binder Table 3 – PG 64-22			
Test and Method	Test Temperature	Specification	Notes
Original Binder			
Flash Point, AASHTO T 48		Minimum 446 °F (230 °C)	
Rotational Viscosity AASHTO T 316	275 °F (135 °C)	Maximum 3.0 Pa·s	a
Mass Loss (%) AASHTO T 240	325± 1.8 °F (163± 1°C)	Maximum 0.50	b
Dynamic Shear, G*/sin δ AASHTO T 315 10 rad/sec	147 °F (64 °C)	Minimum 1.00 kPa	
Rolling Thin Film Oven Test Residue (RTFO) AASHTO T 240			
Dynamic Shear, G*/sin δ AASHTO T 315 10 rad/sec	147 °F (64 °C)	Minimum 2.20 kPa	
Pressure Aging Vessel (PAV) AASHTO R 28			
Dynamic Shear, G* sin δ AASHTO T 315 10 rad/sec	77 °F (25°C)	Maximum 5000 kPa	
Creep Stiffness AASHTO T 13 @ 60 sec	10 °F (-12 °C)	S (Stiffness), Maximum 300 MPa	
		m-value, Minimum 0.300	

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Superpave PG Binder Table 4 – PG 67-22			
Test and Method	Test Temperature	Specification	Notes
Original Binder			
Flash Point, AASHTO T 48		Minimum 446 °F (230 °C)	
Rotational Viscosity AASHTO T 316	275 °F (135 °C)	Maximum 3.0 Pa·s	a
Mass Loss (%) AASHTO T 240	325± 1.8 °F (163± 1°C)	Maximum 0.50	b
Dynamic Shear, $G^*/\sin \delta$ AASHTO T 315 10 rad/sec	153 °F (67 °C)	Minimum 1.00 kPa	
Rolling Thin Film Oven Test Residue (RTFO) AASHTO T 240			
Dynamic Shear, $G^*/\sin \delta$ AASHTO T 315 10 rad/sec	153 °F (67 °C)	Minimum 2.20 kPa	
Pressure Aging Vessel (PAV) AASHTO R 28			
Dynamic Shear, $G^* \sin \delta$ AASHTO T 315 10 rad/sec	80 °F (26.5 °C)	Maximum 5000 kPa	
Creep Stiffness AASHTO T 13 @ 60 sec	10 °F (-12 °C)	S (Stiffness), Maximum 300 MPa	
		m-value, Minimum 0.300	

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Superpave PG Binder Table 5 – PG 76-22 PMA			
Test and Method	Test Temperature	Specification	Notes
Original Binder			
Flash Point, AASHTO T 48		Minimum 446 °F (230 °C)	
Rotational Viscosity AASHTO T 316	275 °F (135 °C)	Maximum 3.0 Pa·s	a
Mass Loss (%) AASHTO T 240	325± 1.8 °F (163± 1 °C)	Maximum 0.50	b
Dynamic Shear, $G^*/\sin \delta$ AASHTO T 315 10 rad/sec	169 °F (76 °C)	Minimum 1.00 kPa	
Dynamic Shear, Phase Angle δ AASHTO T 315	169 °F (76 °C)	Maximum 75°	
Rolling Thin Film Oven Test Residue (RTFO) AASHTO T 240			
Dynamic Shear, $G^*/\sin \delta$ AASHTO T 315 10 rad/sec	169 °F (76 °C)	Minimum 2.20 kPa	
Multiple Stress Creep Recovery, $J_{nr, 3.2}$ AASHTO T 350	169 °F (76 °C)	Maximum 1.0 kPa ⁻¹ Maximum $J_{nr, diff} = 75 \%$	
Multiple Stress Creep Recovery, % Recovery AASHTO M 332	169 °F (76 °C)	$\% \text{Recovery}_{3.2} > 29.37 (J_{nr, 3.2})^{-0.2633}$	
Pressure Aging Vessel (PAV) AASHTO R 28			
Dynamic Shear, $G^* \sin \delta$ AASHTO T 315 10 rad/sec	88 °F (31 °C)	Maximum 6000 kPa	
Creep Stiffness AASHTO T 13 @ 60 sec	10 °F (-12 °C)	S (Stiffness), Maximum 300 MPa	
		m-value, Minimum 0.300	

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Superpave PG Binder Table 6 – PG 76-22E			
Test and Method	Test Temperature	Specification	Notes
Original Binder			
Flash Point, AASHTO T 48		Minimum 446 °F (230 °C)	
Rotational Viscosity AASHTO T 316	275 °F (135 °C)	Maximum 8.0 Pa·s	a
Mass Loss (%) AASHTO T 240	325± 1.8 °F (163± 1 °C)	Maximum 0.50	b
Dynamic Shear, $G^*/\sin \delta$ AASHTO T 315 10 rad/sec	169 °F (76 °C)	Minimum 3.00 kPa	
Dynamic Shear, Phase Angle δ AASHTO T 315	169 °F (76 °C)	Maximum 75°	
Rolling Thin Film Oven Test Residue (RTFO) AASHTO T 240			
Dynamic Shear, $G^*/\sin \delta$ AASHTO T 315 10 rad/sec	180 °F (82 °C)	Minimum 2.20 kPa	
Multiple Stress Creep Recovery, $J_{nr, 3.2}$ AASHTO T 350	180 °F (82 °C)	Maximum 0.50 kPa ⁻¹ Maximum $J_{nr, diff} = 75\%$	
Multiple Stress Creep Recovery, % Recovery AASHTO M 332	180 °F (82 °C)	%Recovery _{3.2} > 29.37 ($J_{nr, 3.2}$) ^{-0.2633}	
Pressure Aging Vessel (PAV) AASHTO R 28			
Dynamic Shear, $G^* \sin \delta$ AASHTO T 315 10 rad/sec	88 °F (31 °C)	Maximum 5000 kPa	
Creep Stiffness AASHTO T 13 @ 60 sec	10 °F (-12 °C)	S (Stiffness), Maximum 300 MPa	
		m-value, Minimum 0.300	

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Superpave PG Binder Table 7 – PG 76-22 ARB			
Test and Method	Test Temperature	Specification	Notes
Original Binder			
Flash Point, AASHTO T 48		Minimum 446 °F (230 °C)	
Rotational Viscosity AASHTO T 316	275 °F (135 °C)	Maximum 3.0 Pa·s	a, d
Mass Loss (%) AASHTO T 240	325± 1.8 °F (163± 1°C)	Maximum 0.50	b, d
Dynamic Shear, G*/sin δ AASHTO T 315 10 rad/sec	169 °F (76 °C)	Minimum 1.00 kPa	d, e
Rolling Thin Film Oven Test Residue (RTFO) AASHTO T 240			
Dynamic Shear, G*/sin δ AASHTO T 315 10 rad/sec	169 °F (76 °C)	Minimum 2.20 kPa	d, e
Pressure Aging Vessel (PAV) AASHTO R 28			
Dynamic Shear, G* sin δ AASHTO T 315 10 rad/sec	88 °F (31 °C)	Maximum 5000 kPa	d, e
Creep Stiffness AASHTO T 13 @ 60 sec	10 °F (-12 °C)	S (Stiffness), Maximum 300 MPa	
		m-value, Minimum 0.300	
Polymer Separation Test ASTM D7173 Softening Point	(325.4 ± 9°F) 163 ± 5 °C	Maximum 18 °F (10 °C) difference between top and bottom specimens	
AASHTO T 51, 5 cm per min, cm	77°F (25°C)	Ductility Minimum 19 cm	
ASTM D 5329, %	77°F (25°C)	Resilience Minimum 10 percent	

Notes:

- The Department may waive this requirement if the supplier warrants the asphalt binder can be adequately pumped, mixed and/or sprayed at temperatures meeting all applicable safety standards.
- Heat loss by AASHTO: T 179 may be accepted in lieu of mass loss by AASHTO: T 240.
- The maximum Mass Loss shall be ≤ 1%, when used in conjunction with Bituminous Surface Treatment (Section 424).
- PG 64-22 or PG 67-22 modified to meet PG 76-22 ARB using GTR, via the dry method, will be evaluated using complete analysis for compliance with PG 76-22 ARB requirements prior to mixture production using laboratory blended materials. PG 64-22 or PG 67-22 modified to meet PG 76-22 ARB using GTR via the dry method, will be evaluated for compliance with original DSR testing requirements for PG 76-22 ARB during mixture production using abson recovery in accordance with GDT 119 in compliance with AC sampling frequencies established in GSP 21 sub-section A.9.
- AASHTO T 315 will be performed at a 2 mm gap for PG 76-22 ARB.

Thoroughly blend the composite materials at the supply facility prior to being loaded into the transport vehicle if modification is required in accordance with 820.2.01. Ensure all blending procedures, formulation, and operations are approved by the Office of Materials.

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3. Certification:

Provide certified test results from an approved, certified laboratory of blends for proposed PG asphalt for each specification characteristic of the asphalt cement proposed for shipment. Provide the certified results to the State Materials Engineer as required in Standard Operating Procedure (SOP 4).

The State Materials Engineer may interrupt production until test results are known in the event there is reason to suspect a sample will be outside specification limits. Mixture placed incorporating modified binders determined to not meet specification requirements may be subject to removal at the recommendation of the State Materials Engineer.

B. Materials Warranty

General Provisions 101 through 150.