

## Changes to Section 711

The case 13-14 was voted on and passed by the full MAG technical committee in August 2013. Since there are a few minor corrections that need to be addressed before this case can be implemented.

1. In table 711-1 we need to move the section that reads: PAV Aging temps.... This block should be below the heading "Test using Pressure Aging Vessel Residue"
2. In table 711-2 under "Elastic recovery" the test temperature of 25C should be removed. This is too warm to run any meaningful test and does not screen for modifiers well enough. The test temp of 10 C should remain and be the only temp.
3. The line reading: "PAV Aging Temperature" needs to be moved below the heading "Test using Pressure Aging Vessel Residue" line.
4. Table 711-2 under the block containing "solubility in Trichloroethylene" should be changed to: Solubility in Trichloroethylene/or n-propyl bromide that is allowed under the ASTM test.

**SECTION 711  
PAVING ASPHALT**

**711.1 GENERAL:**

The asphalt shall be produced from crude asphalt petroleum or a mixture of refined liquid asphalt and refined solid asphalt. It shall be free from admixture with any residues obtained by the artificial distillation of coal, coal tar, or paraffin oil and shall be homogeneous and free from water.

Polymer modified asphalt cement shall be produced from crude asphalt petroleum and a polymer or blend of polymers mixed to produce a homogeneous material free from water.

Asphalt shall not be heated during the process of its manufacture, storage, or during construction so as to cause injury as evidenced by the formation of carbonized particles.

**711.2 TESTING REQUIREMENTS:**

Paving asphalt shall be classified by the Performance Grading System and shall conform to the requirements set forth in Table 711-1 and AASHTO M-320 with the PAV temperature changes noted in the table. On all Grades Flash Point Temperature AASHTO T48: Minimum 230 °C and Mass Loss, Maximum 1.00 percent.

TABLE 711-1				
PERFORMANCE GRADING SYSTEM				
	PG 58-22	PG 64-16	PG 70-10	PG 76-16
<b>Original Asphalt</b>				
Viscosity, AASHTO T316 (Note 1) Max. 3 Pa-s, Test Temp, °C	135	135	135	135
Dynamic Shear AASHTO T315 (Note 2) G*/Sin δ, Min., 1.0 kPa Test Temp. @ 10 rad/s, °C	58	64	70	76
<b>Tests Using Rolling Thin Film Oven Residue (AASHTO T240)</b>				
Mass Loss, Maximum %	1.0	1.0	1.0	1.0
Dynamic Shear AASHTO T315 G*/Sin δ, Min., 2.20 kPa Test Temp. @ 10 rad/s, °C	58	64	70	76
<u>PAV Aging Temperature, °C (AASHTO R28)</u>	<u>100</u>	<u>100</u>	<u>110</u>	<u>110</u>
<b>Tests Using Pressure Aging Vessel Residue (AASHTO R28)</b>				
<u>PAV Aging Temperature, °C (AASHTO R28)</u>	<u>100</u>	<u>100</u>	<u>110</u>	<u>110</u>
Dynamic Shear AASHTO T315 G*·Sin δ, Max., 5000 kPa Test Temp. @ 10 rad/s, °C	22	28	34	34
Creep Stiffness, AASHTO T313 (Note 3) S, Maximum, 300.0 Mpa m-value, Minimum, 0.300 Test Temp. @ 60s, °C	-12	-6	0	-6
Direct Tension, AASHTO T314 (Note 3) Failure Strain, Minimum 1.0% Test Temp. @ 1.0 mm/min. °C	-12	-6	0	-6

NOTES:

(1) This requirement may be waived at the discretion of the specifying agency if the supplier warrants that the asphalt binder can be adequately pumped and mixed at temperatures that meet all applicable safety standards.

(2) For quality control of unmodified asphalt cement production, measurement of the viscosity of the original asphalt cement may be substituted for dynamic shear measurements of  $G^*/\sin(\delta)$  at test temperatures when the asphalt is a Newtonian fluid. Any suitable standard means of viscosity measurement may be used, including capillary or rotational viscometer (AASHTO T210 or AASHTO T202).

(3) If the Creep Stiffness is below 300 MPa, the direct tension test is not required. If the Creep Stiffness is between 300 and 600 MPa, the direct tension failure strain requirement can be used in lieu of the Creep Stiffness requirement. Direct tension test is recommended for polymer modified asphalt binders. The  $m$ -value requirement must be satisfied in all cases.

Polymer modified paving asphalt shall be classified by the Performance Grading System and shall conform to the requirements set forth in Table 711-2 and AASHTO M320 with the PAV temperature changes noted in the table. On all Grades Flash Point Temperature AASHTO T48: Minimum 230 °C and Mass Loss, Maximum 1.00 percent. [P is for Polymer and TR is for Tire Rubber.](#)

TABLE 711-2				
PERFORMANCE GRADING SYSTEM				
	PG 64-28P	PG-76-22P	PG76-22TR Type 1 (Note 4)	PG76-22TR Type 2 (Note 4)
Viscosity, AASHTO T316 (Note 1) Max. 3 Pa-s, Test Temp, °C	135	135	135	135
Dynamic Shear AASHTO T315 (Note 2) $G^*/\sin \delta$ , Min., 1.0 kPa Test Temp. @ 10 rad/s, °C	64	76	76	76
Elastic recovery <a href="#">D-ASTM D6084</a> <a href="#">pProcedure</a> <a href="#">"B" @ 25°C</a> <a href="#">"B" @ 10°C</a>	65	65	<a href="#">5565</a>	55
Phase Angle, Max	75	75	75	75
Separation test, Texas 540 % Max	4	4	4	4
Solubility in Trichloroethylene <a href="#">ASTM D2042</a> or n-propyl bromide <a href="#">ASTM D7553</a> % minimum <a href="#">ASTM D 2042</a>	-	-	97.5	-
<b>Tests Using Rolling Thin Film Oven Residue (AASHTO T-240)</b>				
Mass Loss, Maximum %	1.0	1.0	1.0	1.0
Dynamic Shear AASHTO T315 $G^*/\sin \delta$ , Min., 2.20 kPa Test Temp. @ 10 rad/s, °C	64	76	76	76
<del>PAV Aging Temperature, °C (AASHTO R28)</del>	<del>100</del>	<del>110</del>	<del>110</del>	<del>110</del>
<b>Tests Using Pressure Aging Vessel Residue (AASHTO R28)</b>				
<del>PAV Aging Temperature, °C (AASHTO R28)</del>	<del>100</del>	<del>110</del>	<del>110</del>	<del>110</del>
Dynamic Shear AASHTO T315 $G^*/\sin \delta$ , Max., 5000 kPa Test Temp. @ 10 rad/s, °C	22	31	31	31
Mass Loss, AASHTO T240 Weight % Max	1.0	1.0	1.0	1.0
<del><math>m</math>-value AASHTO T313 0.300 Min</del>	<del>-18</del>	<del>-12</del>	<del>-12</del>	<del>-12</del>

Creep Stiffness, AASHTO T313 S, Maximum, $\geq 300$ Mpa <i>m</i> -value, Minimum, 0.300 Test Temp. @ 60s, °C	-18	-12	-12	-12
Direct Tension, AASHTO T314 (Note 3) Failure Strain, Minimum 1.0% Test Temp. @ 1.0 mm/min. °C	-18	-12	-12	-12

**NOTES:**

- (1) This requirement may be waived at the discretion of the specifying agency if the supplier warrants that the asphalt binder can be adequately pumped and mixed at temperatures that meet all applicable safety standards.
- (2) For quality control of unmodified asphalt cement production, measurement of the viscosity of the original asphalt cement may be substituted for dynamic shear measurements of  $G^*/\sin \delta$ , at test temperatures when the asphalt is a Newtonian fluid. Any suitable standard means of viscosity measurement may be used, including capillary or rotational viscometer (AASHTO T210 or AASHTO T202).
- (3) If the Creep Stiffness is below 300 MPa, the direct tension test is not required. If the Creep Stiffness is between 300 and 600 MPa, the direct tension failure strain requirement can be used in lieu of the Creep Stiffness requirement. Direct tension test is recommended for polymer modified asphalt binders. The *m*-value requirement must be satisfied in all cases.
- (4) "TR" binders shall have 9% to 11% reclaimed tire rubber and enough virgin polymer to meet all performance grade criteria specified. The blend percentages shall be listed on the Certificate of Compliance by the manufacturer. Type 1 shall meet solubility limits.

**711.3 TEST REPORT AND CERTIFICATION:**

At the time of delivery of each shipment of asphalt, the supplier supplying the material shall deliver to the purchaser 3 certified copies of the test report which shall indicate the name of the refinery and supplier, type and grade of asphalt delivered, date and point of delivery, quantity delivered, delivery ticket number, purchase order number, and results of the above specified tests. The test report shall be signed by an authorized representative of the supplier certifying that the product delivered conforms to the specifications for the type and grade indicated.

Until the certified test reports and samples of the material have been checked by the Engineer, that material will be only tentatively accepted by the Contracting Agency. Final acceptance will be dependent upon the determination of the Engineer that the material involved fulfills the requirements prescribed. The certified test reports and the testing required in connection with the reports shall be at no additional cost to the Contracting Agency.

**711.4 TEMPERATURES:**

Paving asphalt shall be heated in such a manner that steam or hot oils will not be introduced directly into the paving asphalt during heating.

**711.5 CONVERSION OF QUANTITIES:**

When pay quantities of paving asphalt are determined from volumetric measurements, the volumetric measurement at any temperature shall be reduced to the volume the material would occupy at 60 degrees F. in accordance with ASTM D-1250. In converting volume to weight, the computations shall be based on Table 711-3.

TABLE 711-3		
ASPHALT CEMENT QUANTITY CONVERSION		
Grade of Material	Gals. Per Ton of 60 °F.	Lbs. Per Gal at 60 °F.
PG 58-22	236	8.47
PG 64-16	235	8.51
PG 70-10	235	8.51
PG 64-28P	236	8.47
PG 76-22P,TR	236	8.47
PG 76-16	233	8.58

- End of Section -

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Mass Loss, Maximum %	1.0	1.0	1.0	1.0
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<b>Tests Using Pressure Aging Vessel Residue (AASHTO R28)</b>				
PAV Aging Temperature, °C (AASHTO R28)	100	100	110	110
Dynamic Shear AASHTO T315 G*·Sin δ, Max., 5000 kPa Test Temp. @ 10 rad/s, °C	22	28	34	34
Creep Stiffness, AASHTO T313 (Note 3) S, Maximum, 300.0 Mpa m-value, Minimum, 0.300 Test Temp. @ 60s, °C	-12	-6	0	-6
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NOTES:

(1) This requirement may be waived at the discretion of the specifying agency if the supplier warrants that the asphalt binder can be adequately pumped and mixed at temperatures that meet all applicable safety standards.

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(3) If the Creep Stiffness is below 300 MPa, the direct tension test is not required. If the Creep Stiffness is between 300 and 600 MPa, the direct tension failure strain requirement can be used in lieu of the Creep Stiffness requirement. Direct tension test is recommended for polymer modified asphalt binders. The  $m$ -value requirement must be satisfied in all cases.

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Mass Loss, AASHTO T240 Weight % Max	1.0	1.0	1.0	1.0
Creep Stiffness, AASHTO T313 S, Maximum, 300 Mpa $m$ -value, Minimum, 0.300 Test Temp. @ 60s, °C	-18	-12	-12	-12
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