

## SECTION 331

### PERFORMANCE GRADED ASPHALT BINDER

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#### **331.01 SCOPE**

This specification applies to Performance Based Asphalt Binder (PGAB) that are graded by performance using the Multiple Stress Creep Recovery (MSCR) test. It shall include the supply and transportation of PGAB to the Contractor's plant that will be used in the manufacturing of asphalt concrete.

Final acceptance of the product shall be determined by QA testing by the Department to confirm that the specified asphalt binder grade was supplied. Testing will be performed on random samples taken from the Contractor's binder storage tank(s) located at the asphalt plant.

#### **331.02 REFERENCES**

Reference standards shall be the latest revision at the date of Tender closing. This specification refers to the following standards, specifications or publications:

- AASHTO M332 "Standard Specification for Performance-Graded Asphalt Binder Using Multiple Stress Creep Recovery (MSCR) Test"

- AASHTO R29 “Standard Practice for Grading or Verifying the Performance Grade (PG) of an Asphalt Binder”
- AASHTO T350 “Standard Method of Test for Multiple Stress Creep Recovery (MSCR) Test of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)”
- AASHTO T111 “Standard Method of Test for Mineral Matter or Ash in Asphalt Materials”
- ASTM D140 “Standard Practice for Sampling Asphalt Materials”
- ASTM D3665 “Standard Practice for Random Sampling of Construction Materials”

### **331.03 DEFINITIONS**

**Performance Graded Asphalt Binder (PGAB):** means an asphalt binder that is an asphalt-based cement produced from petroleum residue, either with or without the addition of non-particulate modifiers.

### **331.04 SUBMISSIONS REQUIREMENTS**

Initial acceptance of the PGAB will be based on the QC test results submitted by the Contractor showing conformance to the requirements here within. Samples of PGAB for QC and QA testing are to be taken after the addition of any anti-stripping or WMA additive has been added.

The Laboratory conducting the QC testing shall have participated in the most recent AASHTO/CCIL proficiency sample correlation program for PGAB. Documentation of the Laboratory’s participation and proficiency shall be provided to the Department prior to any testing being undertaken.

Prior to the start of and throughout pavement production current copies of PGAB property certification shall be provided to the Department. Safety Data Sheets for the PGAB and any chemical additives must also be submitted.

The Contractor shall supply a temperature viscosity chart from the manufacturer/supplier for each source or type of PGAB provided. The Contractor shall also request of the manufacturer/supplier any information or recommendations regarding the production and handling of the mix relating to the PGAB. All such requested information shall be available in advance of the pre-paving meeting for discussion and review during the meeting.

### **331.05 MATERIALS**

PGAB material shall conform to the latest edition of AASHTO M332 and tested in accordance with AASHTO R29 for the specified performance grade, except for clause 7.5 where the RTFO residue will be tested via MSCR per AASHTO T350 at the test

temperature indicated by the high temperature grading. The PGAB shall be PG 58S-28 unless otherwise specified in the contract documents.

When higher traffic grade designations are required Polyphosphoric Acid (PPA) modified asphalt binders or asphalt binders containing waste engine oils are not permitted.

The PGAB shall be homogenous and free from water and any contamination.

Irrespective of the binder specified, the ash content must be less than 0.50% when tested in accordance with AASHTO T111.

### **331.06 EQUIPMENT**

Tankers and storage tank(s) used to transport and store PGAB shall be free from hydrocarbon fuels and solvents. They shall have a sampling spigot per ASTM D140 and be equipped with thermometers, accurate and capable of reading to the nearest 2°C.

Storage tank(s) shall be equipped with a suitably sized circulating system to thoroughly mix and provide continuous circulation of the PGAB between the storage tank and proportioning units for the entire operation period.

Any PGAB other than that specified must be removed from the Contractor's tanks to prevent contamination.

### **331.07 SAMPLING**

The Contractor shall collect samples of PGAB as required by the Owner's Representative. At least one sample shall be collected per project as well as for every 5000t of asphalt produced. The Owner's Representative may opt to request one random sample per day. Samples shall be taken from the Contractor's storage tank(s) in accordance with ASTM D140. The sample size shall be at least two litres placed in one litre containers, one to be kept in the event an appeal of the test results is requested by the Contractor.

Collection of the PGAB sample shall be witnessed by the Owner's Representative. The sample shall be appropriately identified including the time and date of sampling, grade and type of binder, supplier, refinery and the name including proportions of any additives added. The sample shall be immediately forwarded to the witnessing Owner's Representative.

The Department will submit PGAB samples for quality assurance testing for price adjustment purposes.

### 331.08 QUALITY ASSURANCE

QA testing will be carried out by the Department for the purpose of ensuring materials used in the work conform to the requirements of AASHTO M332 and this specification. All PGAB material will be subject to testing for acceptance prior to and during use. Samples that are non-compliant with the specification will require further classification testing. Tests will determine the actual low temperature, rounded to the nearest 0.5 degrees Celsius and the  $J_{nr3.2}$ ,  $J_{nr diff}$ , and  $R_{3.2}$  (where applicable) at the test temperatures indicated by the high temperature and traffic grading designations of the PGAB, rounded to the nearest  $0.01\text{kPa}^{-1}$  and 0.1%, as applicable.

#### 331.08.01 Price Adjustments

Price adjustments, where applicable, will be cumulative and will be expressed as a percentage of the Contractor's unit bid price for the PGAB. Projects with only one PGAB sample collected and not meeting the specified grade will have price adjustments applied to all the unit prices of the entire quantity of asphalt concrete. Projects with multiple samples of PGAB will have the price adjustment applied proportionally to the affected asphalt.

PGAB's with lower than the minimum design temperature will not be subject to a price adjustment however bonuses will not be applied to any asphalt produced/placed using this material.

#### Low Temperature Deficiency ( $^{\circ}\text{C}$ ) Price Adjustment

Low Temperature Deviation (All Grades)	Price Adjustment (% of PGAB)
0.5 $^{\circ}\text{C}$ to 1.0 $^{\circ}\text{C}$	-10%
1.5 $^{\circ}\text{C}$ to 2.0 $^{\circ}\text{C}$	-20%
2.5 $^{\circ}\text{C}$ to 3.0 $^{\circ}\text{C}$	-50%
Greater than 3.5 $^{\circ}\text{C}$ of Specified Grade	Rejection

#### $J_{nr3.2}$ ( $\text{kPa}^{-1}$ ) Price Adjustments

Traffic Level	Price Adjustment (% of PGAB Price)					
	+10.0 %	0%	-10.0%	-25.0%	-50.0%	Reject
S	NA	2.00 $\text{kPa}^{-1}$ to 4.50 $\text{kPa}^{-1}$	4.51 $\text{kPa}^{-1}$ to 4.73 $\text{kPa}^{-1}$	4.74 $\text{kPa}^{-1}$ to 4.95 $\text{kPa}^{-1}$	4.96 $\text{kPa}^{-1}$ to 6.75 $\text{kPa}^{-1}$	>6.75 $\text{kPa}^{-1}$

H	<1.00 kPa <sup>-1</sup>	1.00 kPa <sup>-1</sup> to 2.00 kPa <sup>-1</sup>	2.01 kPa <sup>-1</sup> to 2.10 kPa <sup>-1</sup>	2.11 kPa <sup>-1</sup> to 2.20 kPa <sup>-1</sup>	2.21 kPa <sup>-1</sup> to 3.00 kPa <sup>-1</sup>	>3.00 kPa <sup>-1</sup>
V	<0.50 kPa <sup>-1</sup>	0.50 kPa <sup>-1</sup> to 1.00 kPa <sup>-1</sup>	1.01 kPa <sup>-1</sup> to 1.05 kPa <sup>-1</sup>	1.06 kPa <sup>-1</sup> to 1.10 kPa <sup>-1</sup>	1.11 kPa <sup>-1</sup> to 1.50 kPa <sup>-1</sup>	>1.50 kPa <sup>-1</sup>
E	NA	0.10 kPa <sup>-1</sup> to 0.50 kPa <sup>-1</sup>	0.51 kPa <sup>-1</sup> to 0.53 kPa <sup>-1</sup>	0.53 kPa <sup>-1</sup> to 0.55 kPa <sup>-1</sup>	0.56 kPa <sup>-1</sup> to 0.75 kPa <sup>-1</sup>	>0.75 kPa <sup>-1</sup>

### R<sub>3.2</sub> (%) Price Adjustment

Traffic Level	Price Adjustment (% of PGAB Price)				
	0%	-5%	-10.0%	-25.0%	-50.0%
All (minimum values indicated in Note)	≥ 100% of min value	95.0% to 99.9% of the min value	90.0% to 94.9% of the min value	75.0% to 89.9% of the min value	<75.0% of the min value

Note: The following minimum percent recovery values shall be provided for asphalt binders:

- Heavy Traffic "H":  $R_{3.2} \geq 30.0\%$
- Very Heavy Traffic "V":  $R_{3.2} \geq 35.0\%$
- Extremely Heavy Traffic "E":
  - o For  $0.25 \text{ kPa}^{-1} < J_{nr3.2} \leq 0.50 \text{ kPa}^{-1}$ ,  $R_{3.2} \geq 45.0\%$
  - o For  $J_{nr3.2} \leq 0.25 \text{ kPa}^{-1}$ ,  $R_{3.2} \geq 55.0\%$

### 331.08.02 Appeal Testing

In the event of an appeal, the Contractor shall serve notice of appeal to the Owner's Representative, in writing, within 48 hours of receipt of the QA test results. Appeal testing may be carried out only if the cost of the impact of non-compliance, as determined by the Owner's Representative, exceeds of cost of re-testing. The outcome of the testing is binding on the Department and the Contractor.

If the appeal test results indicate that a price adjustment no longer applies, the testing costs incurred by the Department during the appeal process shall be borne by the Department. The Contractor shall be responsible for any other costs that may incur.

If the new test results after the appeal process verify that a unit price adjustment or rejection remains valid for that Lot, the shipping and testing costs incurred by the Department during the appeal procedure shall be charged to the Contractor.

### **331.09 MEASUREMENT OF PAYMENT**

The asphalt binder will be measured in tonnes, rounded to two decimal places.

Price adjustments, where applicable, will be cumulative and will be expressed as a percentage of the Contractor's unit bid price for the PGAB. Additional price adjustments as per Section 332 or Section 333 will also apply.

### **331.10 BASIS OF PAYMENT**

Payment at the contract price for Asphalt Binder shall be compensation in full for all labor, materials, and equipment to supply the PGAB shall include purchase, loading, transportation, unloading and storage at the asphalt plant