MATERIAL SPECIFICATION FOR
PERFORMANCE GRADED ASPHALT CEMENT

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1101-A Commentary

1101.01 SCOPE
This specification covers the requirements for the properties, use, and payment of performance graded asphalt cements.

1101.01.01 Specification Significance and Use
This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.
Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner’s use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

REFERENCES

When the Contract Documents indicate that provincial-oriented specifications are to be used and there is a provincial-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.PROV, unless use of a municipal-oriented specification is specified in the Contract Documents. When there is not a corresponding provincial-oriented specification, the references below shall be considered to be to the OPSS listed, unless use of a municipal-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 313 Hot Mix Asphalt - End Result

Ontario Ministry of Transportation Publications

MTO Laboratory Testing Manual:
LS-227 Determination of Ash Content
LS-299 Determining Asphalt Cement’s Resistance to Ductile Failure Using Double-Edge-Notched Tension Test (DENT)
LS-308 Determination of Performance Grade of Physically Aged Asphalt Cement Using Extended Bending Beam Rheometer (BBR) Method

American Association of State Highway and Transportation Officials (AASHTO)

M 320-10 Standard Specification for Performance Graded Asphalt Binder
R 29-08 Grading or Verifying the Performance Grade of an Asphalt Binder
T 40-02 (2012) Sampling Bituminous Materials
TP 70-12 Multiple Stress Creep and Recovery (MSCR) of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)
1101.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

**Asphalt Binder** means modified or unmodified asphalt cement.

**Hot Mix Asphalt (HMA)** means as defined in OPSS 313.

**Independent Laboratory** means as defined in OPSS 313.

**Lot** means as defined in OPSS 313.

**Low Temperature Limiting Grade (LTLG)** means the warmest of the Limiting Grades, \( T_L \), obtained for 1 hour, 24 hours, 72 hours and the two conditioning temperatures according to LS-308, and Form B of LS-308.

**Low Temperature Performance Grade (-YY)** means the low temperature performance grade specified elsewhere in the Contract Documents and also referred to as the -YY specified for the performance graded asphalt cement where the PGAC Grade specified is PG XX-YY, and the minimum design pavement temperature.

**Performance Graded Asphalt Cement (PGAC)** means as defined in OPSS 313.

**Recompaction Temperature** means the temperature to which plant produced mix shall be reheated for testing purposes and shall be the same as the laboratory mix design compaction temperature.

1101.04 DESIGN AND SUBMISSION REQUIREMENTS

1101.04.01 Submission Requirements

1101.04.01.01 PGAC Test Documentation

For each grade of PGAC specified in the Contract Documents, the Contractor shall supply the following items to the Contract Administrator at least 14 Days prior to the first use of each product:

a) The PGAC supplier and the facility type and location that the product shall be supplied from.

b) Applicable mixing and compaction temperatures for the product.

c) The minimum temperature of the HMA immediately after spreading, recommended by the PGAC supplier. This information is required when paving on bridge decks only.

d) Documentation of construction, storage, and handling requirements, including the material safety data sheet, recompaction temperature, mix discharge temperature, and recommended extraction procedure.

e) When the PGAC contains any polyphosphoric acid (PPA) and a liquid anti-stripping additive is incorporated into the PGAC at the PGAC supplier’s depot:

   i. Information on how much anti-stripping additive was added to the PGAC.

   ii. Documentation from the PGAC supplier stating that the PPA modified PGAC with the liquid anti-stripping additive added at the PGAC supplier’s depot shall meet all asphalt cement material requirements specified in the Contract Documents, including AASHTO M 320 for the PGAC grade specified.
1101.05 MATERIALS

PGAC shall be according to AASHTO M 320 for the performance grades specified in the Contract Documents when tested using the methods designated in AASHTO R 29, section Test Procedure for Verifying the Nominal Grade of an Asphalt Binder.

When silicone oil is added to the PGAC, it shall be less than 5 parts per million of the PGAC.

PGAC shall be homogeneous, free of water and any contamination and shall not foam when heated to the temperatures specified by the manufacturer for the safe handling and use of the product. It shall be shipped, used, and handled at all times in accordance with the manufacturer's specifications.

PGAC 70-28, 70-34, and 64-34 shall not contain more than 0.5% PPA and shall only be used as a catalyst for the purpose of modification with polymers. Other grades of PGAC shall contain no more than 1.0% PPA. All grades of PGAC shall not contain any orthophosphoric acid.

PGAC grades shall meet the additional requirements shown in Table 1.

1101.07 PRODUCTION

1101.07.01 Sampling and Testing

Sampling shall be as specified in the Quality Assurance section.

1101.08 QUALITY ASSURANCE

1101.08.01 Basis of Acceptance

Material acceptance of asphalt cement for performance grading and the properties and attributes shown in Table 1 shall be based on QA test results conducted by the Owner’s designated laboratory, unless superseded by referee test results, subject to the conditions specified in the Contract Documents.

The Contractor shall be provided with test results from the tests completed to determine if the material complies with the requirements of the Contract Documents.

1101.08.02 Anti-Stripping Additive

The Contractor may request that an allowance be made for the impact of the anti-stripping additive on a PGAC grade for QA or referee purposes provided that when production begins the Contractor submits to the Contract Administrator complete AASHTO M 320 test results for the following:

a) Asphalt cement with anti-stripping additive at the percentage identified in the mix design.

b) Asphalt cement without the anti-stripping additive.

1101.08.03 Sampling

All test samples shall be obtained during the production of the asphalt mix at the asphalt mix plant from the storage tank which is directly feeding the production of the asphalt mix in accordance with AASHTO T 40 and the asphalt plant’s Health and Safety Plan. The asphalt plant’s Health and Safety Plan and procedure for sampling shall be discussed at the Pre-Pave Meeting. The QA, referee, and other required samples for possible Owner testing shall be taken at the same time.
The Contract Administrator shall inform the Contractor when the PGAC is required to be sampled.

Sampling frequency and minimum quantities shall be as shown in Table 2. Additional labelling and delivery requirements are provided in Table 2. Samples shall be delivered in a condition suitable for testing.

**1101.08.04 Lot Sizes**

The Contract Administrator shall determine lot sizes for PGAC in consultation with the Contractor.

PGAC lot sizes shall be based on the HMA tender quantity for each grade of PGAC, with the quantity of PGAC incorporated into 10,000 tonnes of HMA being considered as one lot. When the tender quantity of HMA is insufficient to complete a lot, the following shall apply:

a) When the total HMA tender quantity is less than 10,000 tonnes, the quantity of PGAC incorporated into the HMA shall be considered as one lot.

b) When a lot is terminated and the remaining HMA tender quantity is:
   i. Less than 5,000 tonnes, the quantity of PGAC shall be considered as part of the previous lot.
   ii. From 5,000 tonnes to less than 10,000 tonnes, the quantity of PGAC represented shall be considered as a separate lot.

A lot shall be terminated when the source of PGAC is changed. A lot may be terminated at the Contract Administrator’s option when HMA production for the Contract ceases for a period of 20 Days.

**1101.08.04.01 Switching Performance Grades**

When switching from the use of one performance grade to a different performance grade, the Contractor may request that the quantity of PGAC in the first tanker load be considered as a separate lot.

This request shall be submitted in writing to the Contract Administrator. The Contract Administrator shall consider only one request for the duration of the Contract.

**1101.08.05 Quality Assurance Testing**

Test results for lots that do not comply with the performance grading requirements shall be categorized as minor borderline, major borderline, or rejectable. PGAC shall be categorized based on its test result’s deviation from the individual design maximum or minimum pavement temperature and the sum of the deviations from the design maximum or minimum pavement temperatures defined as follows. The actual performance grading that is either higher than the maximum design pavement temperature or lower than the minimum design pavement temperature is not considered a deviation.

Minor Borderline: Individual deviations are less than or equal to 3 °C and the sum of deviations is less than or equal to 3 °C.

Major Borderline: Individual deviations are less than or equal to 3 °C and the sum of deviations is more than 3 °C, but less than or equal to 6 °C.

Rejectable: Not complying with either of the above.

Test results for lots that do not comply with asphalt cement acceptance requirements shown in Table 1 shall be categorized according to Table 1. When a Lot does not comply with more than one property, attribute, and PG grading, acceptance of the HMA shall be dealt with using the property, attribute, or PG grading selected by the Owner.
1101.08.06 Referee Testing

Referee testing by an independent laboratory may be invoked by the Contractor for any lot of PGAC within 5 Days of receiving all the QA test results for the lot, provided the Contractor has taken and delivered all referee samples in a condition suitable for testing.

The referee testing shall determine the actual performance high and low temperatures, rounded to the nearest 0.5 °C of the PGAC and the properties and attributes shown in Table 1. Test results generated by the referee laboratory shall be used to re-evaluate the lot to determine whether the product conforms to the Contract Documents and the disposition of the HMA.

Referee testing costs as specified elsewhere in the Contract Documents shall be borne by the Contractor, unless the referee testing confirms total conformance of the PGAC sample to the Contract Documents when the QA testing did not, in which case the costs shall be borne by the Owner.

1101.08.07 Disposition of HMA Produced with Borderline and Rejectable Lots

The Owner shall review the test results and determine the disposition of the HMA produced using any PGAC that does not conform to all requirements of the Contract Documents. This shall also include all additional testing requirements for which acceptance requirements have been specified and the identification of any trends evident through the analysis of the additional testing. HMA produced using PGAC, for which test results indicate that the product did not conform to the Contract Documents shall be dealt with as follows:

Minor Borderline: HMA shall be accepted at full payment.

Major Borderline: HMA shall be accepted into the Work, provided that the Contractor accepts a payment reduction, calculated as follows:

Payment Reduction = 5% of HMA contract price x quantity of HMA in the lot.

If the Contractor does not accept the payment reduction for Major Borderline HMA, the HMA shall not be accepted into the Work.

The quantity of HMA shall be in tonnes or square metres as specified for the applicable HMA tender item.

This payment reduction is assessed independently of other payment adjustment provisions specified in the Contract Documents.

If the PGAC in a particular lot has been used for the production of more than one HMA type, the payment reduction shall be calculated using the actual quantities of the HMA types produced with the PGAC, within the lot.

HMA produced using PGAC for which test results are rejectable shall be subject to repair or payment adjustment. The Contract Administrator shall determine if a rejectable lot may remain in the work without repairs, with a payment adjustment accepted by the Owner. When test results indicate non-compliance with the Contract Documents, all costs to the Owner to establish the degree and extent of the non-compliance shall be the responsibility of the Contractor.

When the Contractor changes from one performance grade to a different performance grade and the request for the establishment of a separate lot has been accepted according to the Switching Performance Grades clause, HMA produced with this separate PGAC lot is administered as follows:

a) The HMA payment shall not be assessed a PGAC payment reduction for borderline deviations from the performance grading requirements.
b) HMA produced with PGAC that is rejectable shall be removed or its payment shall be adjusted at the discretion of the Contract Administrator.
### TABLE 1
Additional Testing Requirements and Acceptance Criteria for All PG Grades

<table>
<thead>
<tr>
<th>Property and Attributes</th>
<th>Test Method</th>
<th>Results Reported Rounded to the Nearest</th>
<th>Acceptance Criteria</th>
<th>Rejectable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ash Content, % by mass of residue (%)</td>
<td>LS-227</td>
<td>0.1</td>
<td>≤ 1.0</td>
<td>&gt;1.0</td>
</tr>
</tbody>
</table>

### TABLE 2
Sampling Requirements

<table>
<thead>
<tr>
<th>Samples</th>
<th>Frequency</th>
<th>Minimum Sample Quantity</th>
<th>Labelling</th>
<th>Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>QA</td>
<td>Each Lot</td>
<td>2 litres (Note 1)</td>
<td>Label shall include: - Grade - Supplier</td>
<td>- Samples shall be delivered as specified in the Contract Documents. - Samples shall be delivered at the same time.</td>
</tr>
<tr>
<td>Referee</td>
<td>Each Lot</td>
<td>2 litres (Note 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Samples for possible Owner testing</td>
<td>First Lot for each grade and source of asphalt cement used on the Contract and for any subsequent Lot requested by the Contract Administrator.</td>
<td>4 litres (Note 2)</td>
<td>Label shall include: - Grade - Supplier - AAT</td>
<td>- Samples shall be delivered at the same time. - Samples shall be delivered within 7 Days of sampling to: Attention: Bituminous Laboratory Room 15, Building C 1201 Wilson Ave. Toronto, ON M3M 1J8</td>
</tr>
</tbody>
</table>

**Notes:**

1. Two litres shall be provided in 2 suitable one litre containers or a container able to hold a minimum of 2 litres.
2. Four litres shall be provided in 4 suitable one litre containers or a container able to hold a minimum of 4 litres.
Appendix 1101-A, November 2014
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner’s design decisions and methodology.

Designer Action/Considerations

No information provided here.

Related Ontario Provincial Standard Drawings

No information provided here.