

Amendment to OPSS 1101, November 2020 - Additional Testing and Acceptance Requirements for Performance Graded Asphalt Cement (PGAC) and Recovered Asphalt Cement (RAC)

Special Provision No. [BITU0027111S15](#)
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1101.01 SCOPE

Section 1101.01 of OPSS 1101 is amended by the addition of the following sentence:

This specification also covers material requirements for recovered asphalt cement.

1101.02 REFERENCES

Section 1101.02 of OPSS 1101 is amended by the addition of the following under **Ontario Ministry of Transportation Publications**:

LS-284 Recovery of Asphalt from Solution by Rotary Evaporator

1101.03 DEFINITIONS

Section 1101.03 of OPSS 1101 is amended by the addition of the following definitions:

Recovered Asphalt Cement (RAC) means the asphalt cement extracted from asphalt mix and recovered only using the Rotary Evaporator Method according to LS-284.

1101.05 MATERIALS

Section 1101.05 of OPSS 1101 is amended by the addition of the following:

The RAC for performance grades as specified in the Contract Documents shall be according to AASHTO M 320, except for the original binder requirements. The RAC shall be tested using the methods designated in AASHTO R 29, section Test Procedure for Grading an Unknown Asphalt, except for the rolling thin film oven (RTFO) (AASHTO T 240) conditioning. The continuous grading temperatures for the RAC shall be determined according to ASTM D7643 and reported continuous grading temperatures rounded to the nearest 0.1 °C.

The RAC shall meet the requirements shown in Table 1. Additional testing shall be carried out on the RAC according to Table 2A and results reported for information purposes only.

1101.08 QUALITY ASSURANCE

1101.08.01 Sampling

Subsection 1101.08.01 of OPSS 1101 is amended by the addition of the following clause:

1101.08.01.03 Recovered Asphalt Cement

All RAC test samples shall be obtained by extraction and recovery according to LS-284 from asphalt mix samples taken as specified in the Contract Documents.

RAC sampling frequency and minimum quantities shall be as specified in the Contracts Documents.

1101.08.02 Lot Sizes

Subsection 1101.08.02 of OPSS 1101 is amended by the addition of the following paragraph:

The size and location of RAC lots shall be determined by the Contract Administrator before the paving operations start. Generally, The lots for RAC will shall be the same as those for PGAC lots.

1101.08.03 Acceptance Testing

Subsection 1101.08.03 of OPSS 1101 is amended by the addition of the following paragraph:

Material acceptance of RAC for performance grading as specified 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 as specified in the Contract Documents.

1101.08.04 Basis of Acceptance

Subsection 1101.08.04 of OPSS 1101 is amended by deleting the second paragraph in its entirety and replacing it with the following paragraphs:

Lots of RAC are categorized for acceptance according to Table 1.

When a PGAC or RAC lot is categorized with more than one category, acceptance of the HMA in that lot shall be dealt with using the category selected by the Owner.

1101.08.05 Referee Testing

Subsection 1101.08.05 of OPSS 1101 is deleted in its entirety and replaced with the following:

1101.08.05.01 General

Referee testing may be invoked for any lot of PGAC or RAC within five Days of receiving all the QA test results for the lot. Referee testing shall be done by an independent laboratory.

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

1101.08.05.02 Performance Graded Asphalt Cement

Referee testing may only be invoked for a PGAC lot that is categorized as major borderline or rejectable.

The referee testing shall include all testing specified in Tables 1 and 2. Test results generated by the referee laboratory shall be used to re-evaluate the lot to determine whether the PGAC conforms to the Contract Documents and to determine the disposition of the HMA. The referee test results are binding on both the Owner and the Contractor.

1101.08.05.03 Recovered Asphalt Cement

Referee testing may only be invoked for a RAC lot that is categorized as major borderline or rejectable.

The referee testing shall include all testing specified in Tables 1 and 2A. Test results generated by the referee laboratory shall be used to re-evaluate the lot to determine whether the RAC conforms to the Contract Documents and to determine the disposition of the HMA. The referee test results are binding on both the Owner and the Contractor.

1101.08.06

Disposition of HMA Produced with Borderline and Rejectable Lots

Subsection 1101.08.06 of OPSS 1101 is deleted in its entirety and replaced with the following:

The Owner shall review the test results and determine the disposition of the HMA produced using any PGAC or RAC that does not conform to all requirements of the Contract Documents. HMA for which PGAC or RAC test results indicate that the product did not conform to the Contract Documents shall be dealt with as follows and a non-conformance report shall be issued:

Minor Borderline: HMA shall be accepted into the Work at full payment.

Major Borderline: HMA shall be accepted into the Work, provided that a payment reduction is accepted, equal to the highest of the payment reductions calculated as follows:

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

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

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 and the corresponding RAC for the HMA type, within the lot.

Rejectable: HMA for which PGAC or RAC 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 there are 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 shall be administered as follows:~~

~~a) The HMA payment shall not be assessed a PGAC or RAC payment reduction for a major borderline disposition due to performance grading.~~

~~b) All HMA with PGAC or RAC that is rejectable shall be removed or its payment shall be adjusted at the discretion of the Contract Administrator.~~

TABLES:

Table 1 is deleted in its entirety and replaced with the following:

TABLE 1
Performance Grading Requirements and Categories for PGAC and RAC

Category	PGAC Test Result Requirements	RAC Test Result Requirements	<u>Ash Content, % by mass of residue (%)</u>
Acceptable	Equal to or above XX and equal to or below -YY	<u>Equal to or above XX and equal to or below -YY</u> ≤ 3.0 °C below XX and ≤ 3.0 °C above -YY	<u>≤ 1.0</u>
Minor Borderline	≤ 0.5 °C below XX and ≤ 0.5 °C above -YY	≤ 4.0 <u>4.02.0</u> °C below XX and ≤ 4.0 <u>4.02.0</u> °C above -YY	=
Major Borderline	≤ 1.0 °C below XX and ≤ 1.0 °C above -YY	≤ 5.0 <u>5.04.0</u> °C below XX and ≤ 5.0 <u>5.04.0</u> °C above -YY	=
Rejectable	> 1.0 °C below XX or > 1.0 °C above -YY	> 5.0 <u>5.04.0</u> °C below XX or > 5.0 <u>5.04.0</u> °C above -YY	<u>> 1.0</u>
Notes: 1. XX is the specified high temperature performance grade and design maximum pavement temperature. -YY is the specified low temperature performance grade and design minimum pavement temperature. 2. Performance grading test results shall be reported rounded to the nearest 0.1 °C. 3. <u>Ash content is determined as per ASTM D8078 test method. Round-off the ash content values to 0.01 according to LS-100</u>			

OPSS 1101 is amended by the addition of the following ~~table~~[Table 2A for RAC](#):

TABLE 2A
Additional Testing Requirements for RAC (Notes 1 and 2)

RAC Grade	Property and Attributes (Unit)	Test Method	Results Reported Rounded to Nearest	Category
All PGAC RAC Grades	Ash Content, % by mass of residue (%)	LS-227AST M-D8078	0.01	Testing carried out for information purposes only.
All PGAC RAC Grades Except PG58-28 and PG52-34	Non-recoverable creep compliance at 3.2 kPa ($J_{nr-3.2}$) (kPa ⁻¹)	AASHTO T 350 (Note 3)	0.01	Testing carried out for information purposes only.
	Average percent recovery at 3.2 kPa ($R_{3.2}$) (%)		0.1	Testing carried out for information purposes only.
	Percent difference in non-recoverable creep compliance between 0.1 kPa and 3.2 kPa, $J_{nr diff}$ (%)		0.1	Testing carried out for information purposes only.
ALL PGAC RAC Grades	CTOD, δ_t (mm)	LS-299 (Note 4)	0.1	Testing carried out for information purposes only.
	Low temperature limiting grade (LTLG) (°C)	LS-308 (Note 4)	0.1	Testing carried out for information purposes only.
	Grade Loss (°C)	LS-308 (Note 4)	0.1	Testing carried out for information purposes only.
	Cross-Over Temperature (T_{545}) (°C)	LS-319 (Note 4)	0.1	Testing carried out for information purposes only.
	Low Temperature Critical Spread (ΔT_c) (°C)	LS-320 (Note 4)	0.1	Testing carried out for information purposes only.

Notes:

- PGAC grades [pertinent to RAC grades](#) are as specified in the Contract Documents.
- The rounding-off procedure, for all values, shall be according to LS-100.
- [Multiple Stress Creep Recovery \(MSCR\) testing is C](#)conducted at 52 °C for Contracts located north of the boundary formed by the French River, Lake Nipissing, and the Mattawa River, excluding Manitoulin Island (also referred to as PGAC Zone 1). Conducted at 58 °C for locations South of PGAC Zone 1 in Ontario, including Manitoulin Island (also referred to as PGAC Zones 2 and 3).
- Conducted on PAV residue LS-228 Method A.

WARRANT: ~~When recommended by the Regional Geotechnical sections and EMO Bituminous Section, for trial contracts where RAC will be tested in addition to PGAC, this NSSP shall be included~~[Always with OPSS 1101, Material Specification for Performance Graded Asphalt Cement.](#)

CUSTODIAN: Engineering Materials Office (EMO), Bituminous Section.