

**AMENDMENT TO OPSS 1101, NOVEMBER 2020**

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Special Provision No. 111S14

July 2022

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**Requirements for Recovered Asphalt Cement (RAC) from Hot In-place Recycled (HIR) Mix and Performance Graded Asphalt Cement (PGAC) added to Beneficiating Hot Mix Asphalt**

**1101.01 SCOPE**

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

This specification also covers the material requirements for recovered asphalt cement (RAC) from hot in-place recycled (HIR) mix and performance graded asphalt cement (PGAC) added to the beneficiating hot mix asphalt.

**1101.02 REFERENCES**

Section 1101.02 of OPSS 1101 is amended by the addition of the following:

**Ontario Provincial Standard Specifications, Construction**

OPSS 332 Hot In-place Recycling

**Ontario Ministry of Transportation Publications**

LS-284 Recovery of Asphalt from Solution by Rotary Evaporator

**1101.03 DEFINITIONS**

The definitions of the following terms in Section 1101.03 of OPSS 1101 are deleted in their entirety and replaced with the following:

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

**High Temperature Performance Grade (XX)** means the high temperature performance grade specified in the Contract Documents also referred to as the XX specified for the PGAC or RAC where the PGAC or RAC grade specified is PG XX-YY, and the maximum design pavement temperature.

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

**Beneficiating HMA** means as defined in OPSS 332.

**Hot In-place Recycled (HIR) Mix** means as defined in OPSS 332.

**Recovered Asphalt Cement (RAC)** means as defined in OPSS 332.

## **1101.05 MATERIALS**

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

All RAC for performance grades specified in the Contract Documents shall be according to AASHTO M 320, except for the original binder requirements.

Except for the rolling thin film oven (RTFO) conditioning, the RAC shall be tested using the methods according to AASHTO R 29, section Test Procedure for Grading an Unknown Asphalt Binder. 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 performance grading requirements shown in Table A. Additional testing shall be carried out on the RAC according to Table B 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:

#### **1101.08.01.03 Recovered Asphalt Cement**

All RAC test samples shall be obtained by extraction and recovery according to LS-284 using re-agent grade trichloroethylene or other solvent acceptable to the Owner, from the HIR loose mix samples taken according to OPSS 332.

#### **1101.08.02 Lot Size**

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

##### **1101.08.02.02 Lot Size for Recovered Asphalt Cement**

The Contract Administrator shall determine the size and location of lots for RAC, after discussion with the Contractor and before HIR mix production for the HIR tender item starts. Lots for RAC performance grade are according to Air Voids and Compaction clause of OPSS 332. One subplot is required for each RAC lot.

A lot may be terminated at the Contract Administrator's option when HIR mix production for the work ceases for a period of 20 Days or more.

##### **1101.08.02.03 Lot Size for PGAC Added to the Beneficiating HMA**

The Contract Administrator shall determine the size and location of the lots for each grade of PGAC added to the beneficiating HMA, after discussion with the Contractor and before HIR mix production starts.

The quantity of PGAC added to the beneficiating HMA and incorporated into a maximum of 80,000 m<sup>2</sup> of HIR mix is considered one lot or as determined by the Contract Administrator.

All PGAC added to the beneficiating HMA lot sizes shall be based on the HIR tender quantity for each grade of PGAC.

A lot may be terminated at the Contract Administrator's option when HIR mix production for the work ceases for a period of 20 Days or more.

### **1101.08.03                    Acceptance Testing**

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

Material acceptance of RAC for performance grading as specified in Table A 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 the addition of the following:

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

Lots of PGAC in beneficiating HMA are categorized for acceptance according to Tables 1 and 2.

When a PGAC in beneficiating HMA lot is categorized with more than one category in Tables 1 and 2, acceptance of the HIR mix shall be dealt with using the category selected by the Owner.

### **1101.08.05                    Referee Testing**

Subsection 1101.08.05 of OPSS 1101 is amended by the addition of the following:

#### **1101.08.05.01                Recovered Asphalt Cement**

Referee testing may be invoked for any lot of RAC within 5 Business Days of receiving all the QA test results for the lot.

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 required in Table A. 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 the disposition of the HIR mix. The referee tests results are binding on both the Owner and the Contractor.

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

Section 1101.08 of OPSS 1101 is amended by the addition of the following:

#### **1101.08.07                    Disposition of Hot In-place Recycled Mix Produced with Borderline and Rejectable Lots**

The Owner shall review the test results and determine the disposition of the HIR mix produced using any RAC or PGAC that is not as specified in the Contract Documents. HIR mix for which RAC or PGAC test results indicate that the product is not as specified in the Contract Documents shall be dealt with as follows and a non-conformance report shall be issued:

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

Major Borderline: HIR mix 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 HIR mix contract price x quantity of HIR mix in the beneficiating HMA PGAC lot.

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

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 production of more than one HIR mix type, the payment reduction shall be calculated using the actual quantities of the HIR mix types produced with the PGAC for the HIR mix type, within the lot.

Rejectable: HIR mix for which RAC or PGAC test results are rejectable shall be subject to repair or payment adjustment. The Contract Administrator shall determine if rejectable HIR mix 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, HIR mix produced with this separate PGAC lot is administered as follows:

- a) The HIR mix payment shall not be assessed for a PGAC payment reduction for major borderline disposition due to performance grading.
- b) All HIR mix with PGAC that is rejectable shall be removed or its payment shall be adjusted at the discretion of the Contract Administrator.

**TABLES:**

OPSS 1101 is amended by the addition of the following Tables:

**TABLE A**  
**Performance Grading Requirements and Categories for RAC**

<b>Category</b>	<b>RAC Performance Grading Test Result Requirements (Notes 1 &amp; 2)</b>
Acceptable	$< 3.0$ below XX and $< 3$ above -YY
Minor Borderline	$\leq 4.0$ °C below XX and $\leq 4.0$ °C above -YY
Major Borderline	$\leq 5.0$ °C below XX and $\leq 5.0$ °C above -YY
Rejectable	$> 5.0$ °C below XX or $> 5.0$ °C above -YY

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.

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

<b>RAC Grade</b>	<b>Property and Attributes (Unit)</b>	<b>Test Method</b>	<b>Results Reported Rounded to Nearest</b>	<b>Category</b>
All Grades	Ash Content, % by mass of residue (%)	ASTM D8078	0.01	Testing carried out for information purposes only.
All 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 Grades	CTOD, $\delta_t$ (mm)	LS-299 (Note 4)	0.1	Testing carried out for information purposes only.
	Low temperature limiting grade (LTLG) ( $^{\circ}C$ )	LS-308 (Note 4)	0.1	Testing carried out for information purposes only.
	Grade Loss ( $^{\circ}C$ )	LS-308 (Note 4)	0.1	Testing carried out for information purposes only.
	Cross-Over Temperature ( $T_{\delta 45}$ ) ( $^{\circ}C$ )	LS-319 (Note 4)	0.1	Testing carried out for information purposes only.
	Low Temperature Critical Spread ( $\Delta T_c$ ) ( $^{\circ}C$ )	LS-320 (Note 4)	0.1	Testing carried out for information purposes only.

Notes:

1. PGAC grades for RAC are as specified in the Contract Documents.
2. The rounding-off procedure, for all values, shall be according to LS-100.
3. Conducted at 52  $^{\circ}C$  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  $^{\circ}C$  for locations South of PGAC Zone 1 in Ontario, including Manitoulin Island (also referred to as PGAC Zones 2 and 3).
4. Conducted on PAV residue LS-228 Method A.

**WARRANT:** Always with OPSS 332, Construction Specification for Hot In-place Recycling.