

## **AMENDMENT TO OPSS 308, APRIL 2012**

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Special Provision No. 103S08

August 2022

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OPSS 308, April 2012, Construction Specification for Tack Coating and Joint Painting, is deleted in its entirety and replaced with the following:

### **308.01 SCOPE**

This specification covers the requirements for the placement and acceptance of tack coating, and joint painting.

### **308.02 REFERENCES**

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

#### **Ontario Provincial Standard Specifications, Construction**

OPSS 313 Hot Mix Asphalt - End Result  
OPSS 914 Waterproofing Bridge Decks with Hot Applied Asphalt Membrane

#### **Ontario Provincial Standard Specifications, Material**

OPSS 1103 Emulsified Asphalt

#### **Ontario Ministry of Transportation Publications**

MTO Laboratory Testing Manual:

LS-100 Rounding-Off of Test Data and Other Numbers  
LS-325 Field Verification of Tack Coat Application Rate

#### **ASTM International**

D5/D5M-20 Standard Test Method for Penetration of Bituminous Materials  
D2995-14 Standard Practice for Estimating Application Rate and Residual Application Rate of Bituminous Distributors  
D6997-12(2020) Standard Test Method for Distillation of Emulsified Asphalt

#### **American Association of State Highway and Transportation Officials (AASHTO)**

R 66-16 (2020) Standard Practice for Sampling Asphalt Materials  
TP 114-18 (2019) Provisional Standard Method of Test for Determining the Interlayer Shear Strength (ISS) of Asphalt Pavement Layers

## Others

### PH-CC Forms

PH-CC-139	Bituminous Mix and Core Sample Identification
PH-CC-325	Method B: Field Verification of Tack Coat Application Rate
PH-CC-326	Method C: Field Verification of Tack Coat Application Rate by Tack Coat Distributor's Display

### 308.03 DEFINITIONS

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

**Binder Course** means as defined in OPSS 313.

**Emulsified Asphalt** means as defined in OPSS 1103.

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

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

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

**Protection Board** means as defined in OPSS 914.

**Quality Assurance (QA)** means as defined in OPSS 313.

**Surface Course** means as defined in OPSS 313.

**Tack Coat Break** means when the water separates enough from the emulsified asphalt for the colour to change from brown to black.

**Tack Coat Set** means when all the water from the emulsified asphalt has evaporated, leaving only the residual asphalt cement.

### 308.04 DESIGN AND SUBMISSION REQUIREMENTS

#### 308.04.01 Submission Requirements

At least five Business Days prior to the first use of tack coat or joint painting material, the following documentation shall be submitted to the Contract Administrator:

- a) Type and grade of emulsified asphalt to be used as tack coat and joint painting material;
- b) Supplier and applicator of the material;
- c) Safety Data Sheet and any other information for the safe handling, transportation, and storage of the material;
- d) Typical test results; and
- e) Minimum residue; minimum application rates and residual application rates.

Proposals for the use of alternative tack coat and joint painting material, shall be submitted in writing to the Contract Administrator at least 10 Business Days prior to the intended use of the alternate material.

The proposal shall include the following:

- a) The reason for the use of the alternate material;
- b) Type and grade of emulsified asphalt to be used as alternate tack coat and joint painting material;
- c) Safety Data Sheet and any other information for the safe handling, transportation, and storage of the material;
- d) Testing protocols to be used in confirming the properties of the material;
- e) Typical test results; and
- f) Minimum residue; minimum application rates and residual application rates.

Upon receipt of the proposal submission, the Contract Administrator shall review the proposal and shall respond in writing within five Business Days of receiving it. The alternate material shall not be used until the Contract Administrator has granted permission in writing.

### **308.05 MATERIALS**

#### **308.05.01 Tack Coat and Joint Painting Material**

Tack coat and joint painting material shall consist of SS-1 or SS-1H or SS-1HH emulsified asphalt diluted up to a maximum of 50% with water (maximum dilution 1:1). Diluted tack coat materials shall meet the requirements as specified in Table 1.

Tack coat and joint painting material shall be homogenous after mixing and maintain their physical and engineering properties for at least 24 Days from the day of delivery of the tack coat to the paving site. The undiluted material shall be according to OPSS 1103.

### **308.06 EQUIPMENT**

#### **308.06.01 Tack Coat Distributors**

For main lane paving, tack coat shall be applied using self-propelled or tow-along pressure distributors capable of applying the material at the specified application rate and in a continuous and uniform manner both longitudinally and transversely for the full lane width. The distributors shall be equipped with a volume-metering system of sufficient sensitivity to measure the quantity of tack coat dispensed. The distributors shall be equipped, maintained, and operated to provide uniform heating and application rates as specified.

The distributor's metering system shall be accompanied by documentation confirming that it is calibrated within the past 12 months by the manufacturer, or its authorized representative, and such documentation shall be submitted to the Contract Administrator.

The use of a hand-held pressure applicator is acceptable for tack coating protection board and small irregularly shaped areas such as tapers.

#### **308.06.02 Joint Painting Distributors**

A hand-held pressure applicator shall be used for joint painting.

## **308.07 CONSTRUCTION**

### **308.07.01 Tack Coating and Joint Painting**

#### **308.07.01.01 Operational Constraints**

Surfaces to be tack coated and joint painted shall be free of all water and contamination, such as dirt, mud, loose aggregate, or debris. Protection board shall be dry and clean when the tack coat is applied.

Tack coating and joint painting shall be placed sufficiently ahead of the paving operation to allow for the tack coat set to occur prior to paving. Paving and construction equipment shall not be permitted onto the tack coated surfaces until after tack coat break and set has occurred. Tack coating and joint painting shall be applied ahead of the paver to accommodate not more than the scheduled day or night HMA production for paving that section. HMA shall not be placed on tack coated areas until tack coat set has occurred.

Construction traffic should be limited from travelling upon the tack coated areas and construction trucks shall not be lined up on the tack coated areas. Traffic shall be prevented from travelling upon the tack coated areas.

#### **308.07.01.02 Tack Coat Application**

Tack coat shall be applied to the following:

- a) Protection board
- b) New and existing pavement surfaces including, but not limited to, HMA and Portland cement concrete
- c) Milled pavement surfaces
- d) Expanded asphalt surfaces
- e) Cold in-place recycled surfaces
- f) Hot in-place recycled surfaces
- g) The surfaces of all new and existing binder courses
- h) The surfaces of padding and levelling courses

and other areas as specified in the Contract Documents.

#### **308.07.01.03 Tack Coat Application Rates**

The tack coat shall be applied at the application rate specified in Table 2. When a proposal to use an alternative tack coat material has been accepted, the application rates shall be as specified in the accepted proposal.

#### **308.07.01.04 Joint Painting**

Joint faces shall be painted with a thin, uniform, and continuous coating of joint painting material to the satisfaction of the Contract Administrator. The joint between pavement lanes paved in echelon is not required to be painted. The joint between pavement lanes paved with an infrared joint heater shall not be painted.

## **308.07.02                      Sampling**

Sampling frequency and minimum quantities shall be as shown in Table 3.

### **308.07.02.01                      Lot and Sublot Sizes**

There shall be separate lot(s) for each specified application rate for tack coat material used on the contract. The lots shall be divided into sublots, typically comprising ten sublots. Sublot size shall be the quantity used to cover an area of 40,000 m<sup>2</sup>, however, sublot sizes may be adjusted to ensure a minimum of three sublots per lot. The Contract Administrator in consultation with the Contractor shall determine the number of lots and sublot sizes. A sublot shall be terminated at the Contractor Administrator's request when the placement of HMA ceases for a period of 20 Days or more.

### **308.07.02.02                      Samples for Material Testing**

Tack coat samples for testing shall be representative of the material being used on site and shall be obtained at the paving site in accordance with AASHTO R 66 in the presence of the Contract Administrator. A set of two samples shall be taken from each sublot. One of these samples shall be for QA testing and the other shall be for referee testing. All required samples for acceptance and referee purposes shall be acquired at the same time and location as selected by the Contract Administrator.

The minimum quantity of each of the QA and referee samples shall be one litre. Only new containers shall be used for sampling purposes. Sample containers shall be triple tight one litre cans or suitable plastic containers of similar capacity that can be closed to prevent any leakage.

Samples shall be taken from a sampling spigot on the transfer line or, if one is not available, from the end of the transfer line. Each sample shall be taken after sufficient material has been drawn from the distributor truck tank to purge the transfer line. Sample containers shall be supplied and filled, leaving sufficient space to allow for expansion.

### **308.07.02.03                      Pavement Core Samples for Interlayer Shear Strength Testing**

The Contract Administrator shall submit in writing notification of random surface core sample location. One pavement surface core shall be obtained from each lot from random sample location in the presence of the Contract Administrator, no later than the next Business Day after the completion of the sublot for testing for information purposes only. Each core shall meet the following requirements:

- a) The pavement cores shall be approximately 150 mm in diameter (145 to 150 mm) with all surfaces of the perimeter perpendicular to the surface of the core within 6 mm;
- b) Pavement cores shall be taken full depth, where possible, so that no prying action is needed to extract the cores from the pavement. As a minimum pavement core shall consist of two asphalt layers (i.e., full top layer and one underlying layer);
- c) For composite pavements, core shall be extracted only from the asphalt layers and shall not go into the concrete base; and
- d) If a pavement core debonds at the interface during the coring operation, an additional pavement core shall be taken, and a note of the occurrence shall be added to the sampling form.

Prior to coring at the core location, the direction of travel shall be marked with a straight line with permanent marker across the diameter parallel to the traffic flow so that it can be identified once the core is removed. PH-CC-139 form shall be filled out in full and submitted with the core samples. Cores shall not be taken on bridge decks. Cores shall be taken a minimum of 1.0 m away from other cores.

Core samples shall also include design lift thickness on the label. The traffic direction, lot and subplot numbers shall be clearly marked with a permanent marker on all cores.

HMA and compaction requirements for filling the sample holes shall be the same as the adjacent undisturbed pavement. Sample holes shall be cleaned, dried, and filled and then compacted using mechanical self-powered gas-, electric-, or air-powered compactor immediately after sampling.

**308.07.03 Management of Excess Material**

Management of excess material shall be according to the Contract Documents.

**308.08 QUALITY ASSURANCE**

**308.08.01 Acceptance Criteria**

Acceptance of the tack coat shall be based on the following criteria:

- a) Tack Coat Material
  - i. Percent Residue
- b) Field Application
  - i. Field Tack Coat Application Rate
  - ii. Appearance/Coverage

**308.08.02 Acceptance Testing**

The Owner shall conduct tests, carry out calculations and provide values according to Table 6. Results from the completed tests will be provided to the Contractor.

**308.08.03 Basis of Acceptance**

**308.08.03.01 General**

The Contract Administrator shall determine the acceptability of tack coat and joint painting.

All material and work shall be visually inspected by the Contract Administrator. Visually defective material and work shall be rejected and shall not be incorporated into the finished work irrespective of any test results.

**308.08.03.02 Material Acceptance**

Tack coat material acceptance is based on the percent residue of the diluted material for each subplot, as well as the weighted lot mean percent residue. The percent oil portion of distillate and penetration shall be reported for each subplot for information purposes only.

The weighted lot mean for the percent residue ( $WM_{pro}$ ) shall be calculated using the following equation:

$$WM_{pro} = [(PR_1 \times A_1) + (PR_2 \times A_2) + \dots + (PR_n \times A_n)] / [A_1 + A_2 \dots + A_n]$$

Where:

$WM_{pro}$  shall be calculated to one decimal place according to LS-100.

$PR_s$  = Percent Residue for subplot n

$A_n$  = the area of subplot n  
n = the number of sublots with percent residue greater than or equal to 26.5%

Sublots with percent residue less than 26.5% shall be deemed rejectable and shall not be included in the weighted lot mean.

**308.08.03.03 Residue Penetration**

One penetration test shall be performed on the residue obtained by the distillation test on the diluted material for each subplot. The penetration test results shall be reported for information purposes only.

**308.08.03.04 Referee Testing**

Referee testing for percent residue, penetration, and oil portion of distillate for a given subplot can only be invoked by the Contractor within two Business Days of the Contractor receiving the subplot results and if the referee sample received by the laboratory is in a condition suitable for testing.

All referee test results shall replace the respective QA test results for acceptance of the applicable subplot and shall be binding on both the Owner and the Contractor.

If the referee percent residue subplot test result is less than 27.5%, then the Contractor shall bear the cost of the referee testing at the rates specified in the Contract Documents.

**308.08.03.05 Field Application**

The Owner's acceptance of field application shall consist of the field application rate and appearance meeting the requirements of the Contract Documents.

**308.08.03.05.01 Verification of Field Tack Coat Application Rate**

Verification of field tack coat application rate for each subplot shall be conducted by the Contract Administrator by using one of the following options and testing frequency as determined by the Contract Administrator:

- Option 1: Using LS-325 Method A or B:  
An initial verification of field application rate on a 100 m trial section at the start of application of tack coating the first subplot and then on every subplot thereafter by using LS-325 Method A or B.
- Option 2: Using LS-325 Method A or B and Method C (Tack Coat Distributor's Display Method):  
An initial verification of field application rate on a 100 m trial section at the start of application of tack coating the first subplot by using LS-325 Method A or B then on every subplot thereafter by using LS-325 Method C.
- Option 3: Using only LS-325 Method C (Tack Coat Distributor's Display Method):  
An initial verification of field application rate on a 100 m trial section at the start of application of tack coating the first subplot and then on every subplot thereafter using the LS-325 Method C.

Sublots with field tack coat application rates less than the minimum application rates for tack coat specified in Table 2 shall be deemed rejectable.

**308.08.03.05.02            Appearance Acceptance**

The tack coat and joint painting application shall be visually uniform and shall fully cover the area specified in the Contract Documents. Areas of insufficient or non-uniform coverage shall be re-sprayed by the Contractor at no additional cost to the Owner. Where tack coating is performed using hand-held devices, the visual appearance of such areas shall be consistent with the adjacent areas of machine applied material. Tack coat and joint painting deemed by visual appearance to be non-uniform or to have uncoated surfaces or to have patches of bare material due to tracking by vehicles or dirty or does not fully cover the areas specified in the Contract Documents, shall be deemed rejectable.

**308.08.03.05.03            Joint Painting Application Rate Acceptance**

Joint painting shall provide a thin, uniform, and continuous coating to the satisfaction of the Contract Administrator.

**308.08.03.06                Disposition of HMA Produced with Rejectable Tack Coat**

The Owner shall review the laboratory testing and field application rate test results and determine the disposition of the HMA placed on any tack coat that is deemed rejectable.

HMA placed on tack coat for which both laboratory testing and field application results are rejectable shall be subject to repair or payment adjustment. The Owner shall determine if HMA placed on a rejectable tack coat subplot may remain in the work without repairs, with a payment adjustment accepted by the Owner. When test results indicate non-conformance with the Contract Documents, all costs to the Owner to establish the degree and extent of the non-conformance shall be the responsibility of the Contractor.

**308.09                        MEASUREMENT FOR PAYMENT**

**308.09.01                    Plan Quantity Payment**

**308.09.01.01                Tack Coat**

Measurement shall be by Plan Quantity Payment by area in square metres.

**308.10                        BASIS OF PAYMENT**

**308.10.01                    Tack Coat - Item**

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment, and Material to do the work, except that:

- a) Payment for joint painting shall be made under the appropriate hot mix tender item.
- b) Payment for tack coating of concrete surfaces completed in association with bridge deck waterproofing shall be included in the bridge deck waterproofing item and payment for tack coating of the protection board shall be paid under the Tack Coat item.

**308.10.01.01                Payment Adjustment for Tack Coat**

The payment adjustment for each lot of tack coat shall be calculated using the following equation:



Payment Adjustment = Total lot area tack coated x Price x TODRF [1.00 – (Percent Residue Payment Factor)]

Where:

Total lot area tack coated = Total area of sublots included in the weighted lot mean percent residue

TODRF = Tender opening date reduction factor according to Table 5.

Price = The price shall be the tender item price for the tack coat material or the negotiated price of the alternate material if the Owner accepted the use of that material.

Percent Residue Payment Factor = From Table 4 using the weighted lot mean percent residue calculated for the lot

**TABLE 1**  
**Tack Coat Materials Requirements (Maximum Dilution 1:1)**

<b>Emulsified Asphalt Type/Grade</b>	<b>SS-1</b>	<b>SS-1H</b>	<b>SS-1HH</b>
Minimum Residue by Distillation, % by Mass	27.5	27.5	27.5
Maximum Percent Oil Distillation	1.5	1.5	1.5
Penetration on Residue (at 25 °C, 100 g, 5 s), 0.1 mm	100-200	40-100	20-55

**TABLE 2**  
**Application Rate Requirements for Tack Coat Materials**

<b>Surface Type</b>	<b>Minimum Residual Application Rate, kg/m<sup>2</sup></b>	<b>Minimum Application Rate for Undiluted Tack Coat, kg/m<sup>2</sup></b>	<b>Minimum Application Rate for Diluted Tack Coat, kg/m<sup>2</sup></b>	<b>Range of Application Rate for Diluted Tack Coat, kg/m<sup>2</sup> (Note2)</b>
Existing pavement surfaces, milled pavement surfaces, full-depth reclamation with expanded asphalt stabilization surfaces (see Note1) and any binder course surface that has been left open to traffic over at least one winter	0.10 kg/m <sup>2</sup>	0.18 kg/m <sup>2</sup> *	0.35 kg/m <sup>2</sup>	0.35 – 0.45 kg/m <sup>2</sup>
Cold in-place recycled surfaces, cold in-place recycled expanded asphalt mix surfaces, hot in-place recycled surfaces, and new surfaces that have been paved in the same calendar year	0.07 kg/m <sup>2</sup>	0.13 kg/m <sup>2</sup> *	0.25 kg/m <sup>2</sup>	0.25 – 0.35 kg/m <sup>2</sup>
Protection board	0.14 kg/m <sup>2</sup>	0.25 kg/m <sup>2</sup>	0.50 kg/m <sup>2</sup>	0.50 – 0.60 kg/m <sup>2</sup>
<p>Note: 1.SS-1HH and SS-1H tack coat not permitted on full depth reclamation with expanded asphalt stabilization surfaces.</p> <p>2. Range of application rate is provided for equipment variability.</p> <p>* May not be achievable by the equipment</p>				

**TABLE 3**  
**Sampling Frequency and Sample Size**

<b>Sample Type</b>	<b>Frequency</b>	<b>Minimum Sample Quantity</b>	<b>Labelling</b>
QA and Referee	Every Sublot	One Litre Each	-Tack Coat Material Type -Supplier
Pavement Core Sample for Interlayer Shear Strength (ISS) Test by QA Laboratory	Every Lot	One Core every Lot	-Attach filled PH-CC-139 Form -ISS Testing -Tack Coat Material Type -Field Application Rate -Surface Type on which tack coat was applied -Supplier -Mix Type

**TABLE 4**  
**Payment Factors for Weighted Lot Mean Percent Residue**

<b>% Residue - Weighted Lot Mean (WM<sub>pro</sub>)</b>	<b>Payment Factor</b>
≥ 27.5	1.00
26.5 - 27.4	0.75

**TABLE 5**  
**Tender Opening Date Reduction Factor for Tack Coat Payment Factor**

<b>Year of Tender Opening</b>	<b>Tender Opening Date Reduction Factor (TODRF)</b>
2022 and 2023	0.75
2024 and beyond	1.00

**TABLE 6  
Testing Requirements**

<b>Properties and Attributes</b>	<b>Testing Method</b>	<b>Calculations, Values, and Results Required</b>
<b>Test on Emulsified Asphalt</b>		
Residue by Distillation, % by Mass	ASTM D6997	% Residue to 0.1%, Weighted lot mean to 0.1%
Percent Oil Distillation	ASTM D6997	% Oil Distillate to 0.1% (For information purposes only)
<b>Test on Residue</b>		
Penetration (at 25 °C, 100 g, 5 s)	ASTM D5	Penetration Units to 1 dmm (For information purposes only)
<b>Assessment of Field Application</b>		
Verification of Field Application Rate	LS-325	Application Rate of Tack Coat in the Field Complete and submit PH-CC-325 and PH-CC-326 as applicable
Appearance	Visual Assessment	Visual assessment of uniformity and coverage
<b>Test on Pavement Cores - Interlayer Shear Strength (ISS) Test</b>		
Interlayer Shear Strength (ISS) test on Pavement Cores (Bond Strength Test)	AASHTO TP 114. This test to be conducted on field pavement cores. No normal load is required during testing.	ISS, Ultimate Applied Load (For information purposes only)

WARRANT: Always with OPSS 308, Construction Specification for Tack Coating and Joint Painting and OPSS 313, Construction Specification for Hot Mix Asphalt - End Result.