



CONSTRUCTION SPECIFICATION FOR GRANULAR SEALING

TABLE OF CONTENTS

305.01	SCOPE
305.02	REFERENCES
305.03	DEFINITIONS
305.04	DESIGN AND SUBMISSION REQUIREMENTS - Not Used
305.05	MATERIALS
305.06	EQUIPMENT
305.07	CONSTRUCTION
305.08	QUALITY ASSURANCE
305.09	MEASUREMENT FOR PAYMENT
305.10	BASIS OF PAYMENT

APPENDICES

305-A	Commentary
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305.01	SCOPE
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This specification covers the materials and requirements for the work of surface preparation and the supply and application of sealer to granular shoulders, shoulder rounding, and all other designated areas.

305.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

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

305.01.02 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.

305.02 REFERENCES

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

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

Ontario Provincial Standard Specifications, Construction

OPSS 304 Single and Double Surface Treatment
OPSS 501 Compacting

Ontario Provincial Standard Specifications, Materials

OPSS 1010 Aggregates – Base, Subbase, Select Subgrade, and Backfill Material
OPSS 1102 Liquid Asphalt
OPSS 1103 Emulsified Asphalt
OPSS 2510 Tall Oil Pitch Emulsion

Ontario Ministry of Transportation, Publications

MTO Laboratory Testing Manual:

LS-100 Rounding-Off of Test Data and Other Numbers
LS-200 Penetration of Bituminous Materials
LS-202 Method of Test for Kinematic Viscosity of Asphalts
LS-204 Solubility of Bituminous Materials in Trichloroethylene
LS-205 Ductility of Bituminous Materials
LS-216 Determination of Residue by Distillation of Emulsified Asphalts
LS-217 Determination of Oil Portion of Distillate in Emulsified Asphalt Primers
LS-218 Particle Charge of Emulsified Asphalt and Emulsified Asphalt Primers
LS-219 Viscosity of Emulsified Asphalts

LS-221 Settlement and Storage Stability of Emulsified Asphalt
LS-223 Sieve Test for Emulsified Asphalts

ASTM International

D1310-14 Standard Test Method for Flash Point and Fire Point of Liquids by Tag Open-Cup Apparatus
D402/D402M-14 Standard Test Method for Distillation of Cutback Asphalt

305.03 DEFINITIONS

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

Lot means a specific quantity of material or a specific amount of construction obtained from a single source and produced by the same process.

Quality Assurance means a system or series of activities carried out by the Owner to ensure that Materials received from the Contractor meet the requirements specified in the Contract Documents.

305.05 MATERIALS

Sealers may consist of one or more of the following materials:

- a) Type I-a: RC-30 and MTO primer according to OPSS 1102; or
Type I-b: Emulsified asphalt primer according to OPSS 1103.
- b) Type II: Solvent-free emulsified asphalt according to OPSS 1103.
- c) Type III: Tall oil pitch (TOP) emulsion according to OPSS 2510.

305.06 EQUIPMENT

The pressure distribution system used for sealer application shall be according to OPSS 304 and, when applicable, shall include an attachment for hand spraying.

Rollers shall be steel-drum or pneumatic-tired according to OPSS 304.

305.07 CONSTRUCTION

305.07.01 Operational Constraints

A sealer shall only be applied when:

- a) The ambient temperature is a minimum of 5 °C and rising.
- b) The designated area to be sealed is not frozen.
- c) Precipitation is not occurring or imminent and, for Type III emulsion applications, precipitation has not occurred within the 24 hours prior to application.
- d) The surface is free of standing water.

- e) The wind is not strong enough to cause drifting of sealer spray.
- f) The shoulder is smooth and conforms to the crossfall and grade specified in the Contract Documents.

305.07.02 Surface Preparation

As soon as is practical prior to applying sealer, the granular shoulder shall be rolled with a minimum of two passes. The shoulder rounding surface shall not be rolled.

Granular materials to be sealed with Type I or Type II sealers shall be uniformly dampened immediately prior to applying.

The moisture content of granular materials to be sealed with a Type III sealer shall be according to the manufacturer's recommendations.

305.07.03 Application

The sealer types and the locations where they shall be used are specified elsewhere in the Contract Documents.

Type I-a or Type I-b sealers may be used in any areas where Type I sealers have been specified.

Sealers shall be uniformly applied in all areas using a pressure distribution system.

Sealer application rates and temperatures shall be as specified in Table 1.

Sealers shall be overlapped a minimum of 100 mm onto adjacent paved surfaces.

All other application requirements shall be in accordance with the Manufacturer's recommendations and the application performed to the satisfaction of the Contract Administrator.

305.07.04 Management of Excess Material

Management of excess material shall be as specified in the Contract Documents.

305.08 QUALITY ASSURANCE

305.08.01 General

The Owner reserves the right to make inspections, take samples, and perform QA tests, at such times and locations as the Owner may consider necessary, in order to ensure that the materials supplied and placed are in accordance with this specification.

305.08.02 Sampling of Sealer for Acceptance

Sealers shall be randomly sampled in lots as specified in Table 2.

If the remaining quantity after completing a lot is less than one-half the quantity for a complete lot, then that quantity shall be added to the previous lot. Otherwise the remaining quantity shall form its own lot.

The Contract Administrator shall randomly-choose one sample of sealer from the designated truck tanker representing each lot.

Duplicate 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 truck tank to purge the transfer line. Sample containers shall be supplied and filled, leaving sufficient space to allow for expansion.

Sampling requirements shall be as specified below and elsewhere in the Contract Documents.

Sample containers for each portion of each duplicate sample shall be triple tight one-litre cans for Type I-a or Type III sealers or triple tight four-litre pails, or suitable plastic containers of similar capacity that can be closed to prevent any leakage for Type I-b or Type II sealers.

Identification tags, provided by the Contract Administrator, shall be completed and attached to each sample container. All sample containers shall be supplied with appropriate WHMIS labels.

Samples shall be delivered within the required time and to the appropriate laboratory specified by the Owner.

305.08.03 Sealer Quality

305.08.03.01 Acceptance

One portion of each duplicate sample shall be tested for material properties by the QA laboratory according to OPSS 1102 for Type I-a sealers, OPSS 1103 for Type I-b and Type II sealers, and OPSS 2510 for Type III granular sealers, respectively.

Individual test results shall be forwarded to the Contractor as they become available.

A lot of sealer shall be deemed to be acceptable, if all of the test results and other requirements specified in OPSS 1102 for Type I-a sealers, OPSS 1103 for Type I-b and Type II sealers, and OPSS 2510 for Type III granular sealers are respectively met.

A lot of sealer not meeting all of the sealer quality requirements shall be given a payment adjustment, as specified in the clause under Payment Adjustments for Sealers.

The Owner shall be responsible for all costs associated with QA testing for acceptance.

305.08.03.02 Referee Testing

The Contractor may invoke referee testing for one or more tested attributes by submitting a written request to the Contract Administrator, within 2 Business Days following notification that the sealer does not meet the requirements of this specification.

Referee testing shall be carried out as specified below and elsewhere in the Contract Documents.

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

If a lot is not accepted at full payment based on the referee test results, then the Contractor shall be responsible for the cost of the referee testing of that lot at the rates specified elsewhere in the Contract Documents. In all other cases, the Owner shall bear the cost of the referee testing of that lot.

305.08.04 Visual Deficiencies

All surfaces deemed visually unacceptable by the Contract Administrator due to uneven application of sealer, surface damage, flushing, bleeding or contamination, shall be repaired to the satisfaction of the Contract Administrator.

305.08.04.01 Repairs

All surfaces deemed unacceptable due to uneven application of sealer shall be repaired.

Deficiencies other than uneven application of sealer shall be repaired by removing all deficient areas of sealed granular material, then replacing it with clean, compacted Granular A meeting the requirements specified in OPSS 1010 and OPSS 501.

All repaired areas shall be resprayed with the same sealer type or a sealer with a lower sealer type number, as originally specified in the Contract Documents.

305.09 MEASUREMENT FOR PAYMENT

305.09.01 Granular Sealing

305.09.01.01 Actual Measurement

Measurement shall be by the area sealed in square metres or by mass in kilograms of sealer used, as specified in the Contract Documents.

305.09.01.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurements shall be based on the units shown in the clause under Actual Measurement.

305.10 BASIS OF PAYMENT

305.10.01 Granular Sealing

305.10.01.01 Granular Sealing - 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.

Sprayed areas damaged by the Contractor's operations or identified by the Contract Administrator as being inadequately treated shall be repaired and resprayed, at no additional cost to the Owner.

Sprayed areas damaged by others shall be repaired and resprayed and shall be administered as a Change in the Work.

305.10.01.02 Payment Adjustments for Sealers

305.10.01.02.01 General

Payment for any lot of sealer that does not meet all Contract requirements shall be subject to a price adjustment. A calculated price adjustment shall be determined through a system of adjustment points based on the test results for any lot sample, provided the sample remains in a condition suitable for testing.

Adjustment points related to the test results for each test shall be individually rounded to one decimal place according to LS-100.

The total number of adjustment points for the tested sample representing a lot shall be divided by 25 to obtain the payment adjustment, expressed as a percentage for the lot.

A fixed adjustment of 50% of the Contract price shall be made for lots to which at least one of the following conditions apply:

- a) A lot sample has not been received by the QA laboratory within sufficient time for the sample to be tested;
- b) The lot sample contains insufficient material for testing; or
- c) The lot sample does not remain in a condition suitable for testing for 14 Days after sampling (e.g., broken emulsion or foam over during distillation).

305.10.01.02.02 Adjustment Points for Type I-a Sealers

For each lot, the total number of adjustment points shall be equal to the summation of the number of units that each test deviates from the specification limits times the multiplier specified for each particular test in Table 3.

305.10.01.02.03 Adjustment Points for Type I-b and Type II Sealers

For each lot, the total number of adjustment points shall be equal to the summation of the number of units that each test deviates from the specification limits times the multiplier specified for each particular test in Table 4, plus:

- a) 1,000 adjustment points, if the test result for the LS-218, the Particle Charge Test, fails to meet the requirement specified in OPSS 1103; plus
- b) 1,000 adjustment points, if the test result for LS-221, the Storage Stability Test, 24 hour, fails to meet the requirement specified in OPSS 1103.

305.10.01.02.04 Adjustment Points for Type III Sealers

For each lot, the total number of adjustment points shall be equal to 62.5 for every 0.1% less than 8% solids for the sample tested according to the procedure given in OPSS 2510 plus an additional 1000 adjustment points, if the material is determined to be anionic according to the Particle Charge Test, LS-218.

TABLE 1
Application Rates and Temperatures

Type of Sealer	Application Rate (kg/m ²)		Application Temperature
	Hand-Sprayed Areas	Machine-Applied/Other Areas	
I-a	3.4	2.6	30 to 45 °C
I-b	3.4	2.6	At Manufacturer's Recommendations
II			
III	5.5	4.5 (Note 1)	Ambient Temperature (Note 2)

Notes:

- 1) Type III sealers shall be applied in 2 or 3 coats for emulsions with 12% and 8% solids, respectively, to deliver a total of 4.5 kg/m².
- 2) Type III sealers shall not be applied if there is any chance that the ambient temperature will reach 0 °C or below within 24 hours after application.

TABLE 2
Lot Sizes

Tender Quantity in m ² or kg		Lot Size (Maximum)
Sealed Area in m ²	Mass of Sealer Used in kg	
< 500	< 1500	Sampling and Testing at CA's Discretion
500 to 5,000	1,500 to 15,000	One lot
> 5,000 to 10,000	>15,000 to 30,000	5,000 m ² / 15,000 kg
> 10,000 to 50,000	>30,000 to 150,000	10,000 m ² / 30,000 kg
> 50,000	> 150,000	20,000 m ² / 60,000 kg

TABLE 3
Tests, Units, and Multipliers for Type I-a Sealers

Test Method	Test Description	Unit	Multiplier
ASTM D 402	Residue by Distillation to 360 °C	%	200
ASTM D 402	Distillate, as % of Total Distillate to 360 °C		
	to 190 °C	%	10
	to 225 °C	%	10
	to 260 °C	%	10
	to 316 °C	%	10
LS-202	Kinematic Viscosity at 60 °C	mm ² /s	20
Tests on Residue			
LS-200	Residue Penetration at 25 °C	0.1 mm	15
LS-204	Residue Solubility	%	10
LS-205	Residue Ductility at 25 °C	cm	10

TABLE 4
Tests, Units, and Multipliers for Type I-b and Type II Sealers

Test Method	Test Description	Unit	Type I-b Multiplier	Type II Multiplier
LS-216	Residue by Distillation	%	200	200
LS-217	Oil Portion of Distillate, By Volume	%	50	50
LS-219	Viscosity at 50 °C, Less Than Minimum	Saybolt Furol Seconds	30	-
	Viscosity at 50 °C, Greater Than Maximum	Saybolt Furol Seconds	5	-
LS-219	Viscosity at 25 °C, Less Than Minimum	Saybolt Furol Seconds	-	30
	Viscosity at 25 °C, Greater Than Maximum	Saybolt Furol Seconds	-	5
LS-223	Sieve Test	%	-	1000
ASTM D 1310	Flash Point, Open Tag	°C	10	-
Tests on Residue				
LS-200	Residue Penetration at 25 °C	0.1 mm	15	15
LS-204	Residue Solubility	%	10	10
LS-205	Residue Ductility at 25 °C	cm	10	10

WARRANT: Always with this tender item.

**Appendix 305-A, November 2016
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

The designer should specify the following in the Contract Documents:

Sampling requirements shall be as specified below and elsewhere in the Contract Documents.

Security measure shall be implemented for referee sample pick-up and delivery. Contractor should be responsible because of time to delivery and adjustment.

The designer should determine if a particular Sealer Type [I, II or III] should be specified in the Contract Documents (305.05).

The designer may choose the appropriate sealer on the basis of the expected number of years when the shoulder would typically need to be re-sealed as follows:

Sealer Type	Expected # of Years Before Re-Sealing*
I	4
II	3
III**	2

*Note: * The expected years shown below are based on the understanding that the shoulder will only be occasionally subjected to vehicular traffic. Note that all sealers shown below should perform behind guiderails for at least 3 years when they're being applied, in accordance with the manufacturer's requirements.

**Type III should only be selected where there is a minimal risk of the shoulders being subjected to vehicular traffic.

Granular Sealer Type III, should only be applied to aggregates meeting the requirements of Granular A, S, or M.

The designer should ensure that the General Conditions of the Contract and the 100 Series General Specifications are included in the Contract Documents.

- Areas designated for granular sealing. (305.07.03)
- Number of Business Days for the delivery of samples. (305.08.01)
- Name and location of the testing laboratory. (305.08.01)
- Unit of measurement for granular sealer. (305.09.01.01)

Related Ontario Provincial Standard Drawings

OPSD 210.070 Granular Sealing