



**CONSTRUCTION SPECIFICATION FOR
GRANULAR SEALING**

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305.01 SCOPE

This specification covers the requirements for material, surface preparation, supply and application of sealer to granular shoulders, shoulder rounding, and all other designated areas.

305.02 REFERENCES

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 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

ASTM International

D5/D5M-20	Standard Test Method for Penetration of Bituminous Materials
D113-17	Standard Test Method for Ductility of Asphalt Materials
D1310-14(2021)	Standard Test Method for Flash Point and Fire Point of Liquids by Tag Open-Cup Apparatus
D6930-19	Standard Test Method for Settlement and Storage Stability of Emulsified Asphalts
D6933-18	Standard Test Method for Oversized Particles in Emulsified Asphalts (Sieve Test)
D6997-12(2020)	Standard Test Method for Distillation of Emulsified Asphalt
D7402-09(2017)	Standard Practice for Identifying Cationic Emulsified Asphalts
D7496-18	Standard Test Method for Viscosity of Emulsified Asphalt by Saybolt Furol Viscometer
D8078-18e1	Standard Test Method for Ash Content of Asphalt and Emulsified Asphalt Residues

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.

305.05 MATERIALS

305.05.01 Sealers

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

- a) Type I: Emulsified asphalt primer shall be according to OPSS 1103.
- b) Type II: Solvent-free emulsified asphalt shall be according to OPSS 1103.
- c) Type III: Tall oil pitch (TOP) emulsion shall be according to OPSS 2510.

305.06 EQUIPMENT

305.06.01 Pressure Distributor

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

305.06.02 Rollers

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.
- d) A minimum period of 24 hours has passed after precipitation has stopped for Type III emulsion application.
- e) The surface is free of standing water.
- f) The wind is not strong enough to cause drifting of sealer spray.
- g) The shoulder is smooth and is according to the crossfall and grade specified in the Contract Documents.

305.07.02 Surface Preparation

Prior to applying sealer, the granular shoulder shall be rolled with a minimum of two passes, as soon as is practical. 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 application of sealer.

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 as specified in the Contract Documents.

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

Sealer application rates and temperatures shall be according to Table 1.

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

All other application requirements shall be according to the manufacturer's recommendations and the application performed to the satisfaction of the Contract Administrator.

305.07.04 Material Sampling and Testing

305.07.04.01 General

The general requirements of samples for quality assurance, referee and other testing by the Owner shall be as specified in the Contract Documents.

Arrangement shall be made with the Contract Administrator for delivery of samples to the laboratory as specified in the Contract Documents within 2 Business Days of sampling.

305.07.04.02 Sampling

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 filled, leaving sufficient space to allow for expansion.

Sample containers for each portion of each duplicate sample shall be triple tight one-litre cans for 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 or Type II sealers.

Identification tags, provided by the Contract Administrator, shall be attached to each sample container.

305.07.05 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 quality assurance (QA) tests, at such times and locations as the Owner may consider necessary.

305.08.02 Acceptance of Granular Sealer

305.08.02.01 Lot Size

Lot sizes shall be according to 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.

305.08.02.02 Sealer Quality

One of duplicate samples shall be tested for material properties by the QA laboratory according to OPSS 1103 for Type I and Type II sealers, and OPSS 2510 for Type III granular sealers, respectively.

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

A lot of sealer not meeting all the sealer quality requirements shall be subjected to a payment adjustment according to the Payment Adjustments for Sealers clause.

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

305.08.02.03 Referee Testing

Referee testing may be invoked for one or more tested attributes of a lot 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.

The referee laboratory shall be designated by the Owner. The other duplicate sample representing the lot shall be tested according to OPSS 1103 for Type I and Type II sealers, and OPSS 2510 for Type III granular sealers, respectively.

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 based on the referee test results:

- a) The lot shall be subject to a payment adjustment according to the Payment Adjustments for Sealers clause; and
- b) The Contractor shall be responsible for the cost of the referee testing of that lot, including the cost of transporting the samples to the referee laboratory, at the rates specified in the Contract Documents.

When the referee results indicate that the refereed lot is acceptable, the Owner shall bear the cost.

305.08.03 Repairs

The Contract Administrator shall visually inspect the work to determine if the completed work contains any of the following defects:

- a) Uneven application of sealer.
- b) Surface damage.
- c) Flushing.
- d) Bleeding.
- e) Contamination.

Any defects identified shall be repaired to the approval of the Contract Administrator.

Defects other than uneven application of sealer shall be repaired by removing all defective areas of sealed granular material, then replacing it with clean, compacted Granular A according to OPSS 1010 and OPSS 501.

All repaired areas and uneven application of sealer 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, subject to payment adjustment.

Granular sealing damaged by the Contractor's operations or identified by the Contract Administrator as being inadequately treated shall be repaired and resprayed.

Granular sealing 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 payment adjustment. A calculated payment 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) The lot sample contains insufficient material for testing; or
- b) 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 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 test in Table 3, plus:

- a) 1,000 adjustment points, if the test result for the ASTM D7402, the particle charge test, fails to meet the requirement according to OPSS 1103; and
- b) 1,000 adjustment points, if the test result for ASTM D6930, the storage stability test, 24 hour, fails to meet the requirement according to OPSS 1103.

305.10.01.02.03 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 1,000 adjustment points, if the material is determined to be anionic according to the Particle Charge Test, ASTM D7402.

TABLE 1
Application Rates and Temperatures

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

Notes:

- Type III sealers shall be applied in 2 coats with 12% solids or 3 coats with 8% solids for emulsions to deliver a total of 4.5 kg/m².
- 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 and Type II Sealers

Test Method	Test Description	Unit	Type I Multiplier	Type II Multiplier
ASTM D6997	Residue by Distillation	%	200	200
ASTM D6997	Oil Portion of Distillate, By Volume	%	50	50
ASTM D7496	Viscosity at 50 °C, Less Than Minimum	Saybolt Furol Seconds	30	-
	Viscosity at 50 °C, Greater Than Maximum	Saybolt Furol Seconds	5	-
	Viscosity at 25 °C, Less Than Minimum	Saybolt Furol Seconds	-	30
	Viscosity at 25 °C, Greater Than Maximum	Saybolt Furol Seconds	-	5
ASTM D6933	Sieve Test	%	-	1000
ASTM D1310	Flash Point, Open Tag	°C	10	-
Tests on Residue				
ASTM D5M	Residue Penetration at 25 °C	0.1 mm	15	15
ASTM D8078	Ash Content, By Mass	%	1000	1000
ASTM D113	Residue Ductility at 25 °C	cm	10	10