

Specification For Seal Coat - 4220

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1 GENERAL

1.1 Description

- 1.1.1 The Work shall consist of the material supply and construction of a Seal Coat comprised of asphalt binder and aggregate on a prepared surface.

1.2 Definitions

- 1.2.1 The following definitions shall apply for this Specification:
- 1.2.1.1 Binder is asphalt emulsion material as described in Section 4220.2.2.
 - 1.2.1.2 Seal Coat is a surface treatment that consists of layers of Binder, aggregate and perhaps other additive materials as an integrated treatment.
 - 1.2.1.3 Double Seal Coat is a Seal Coat constructed using two applications of Binder and two layers of aggregate. The first application of Binder is applied followed by a layer of Type 117, Type 118 or Type 119 aggregate followed by the second application of Binder and then a second layer of Type 117, Type 118 or Type 119 aggregate.
 - 1.2.1.4 Sweeping is the removal of all loose aggregate and debris from the roadway.

- 1.2.1.5 Business Day is any weekday excluding statutory Holidays and the provincial government's Floating Holiday.

2 MATERIALS

2.1 Binder

- 2.1.1 The type of asphalt will be HF-150s unless otherwise specified in the Special Provisions or the Schedule of Quantities.
- 2.1.1.1 The high float emulsified asphalt shall meet the requirements specified in the Specification for Manufactured Materials (SMM) SMM 103-3.1 where applicable.
- 2.1.1.2 An adhesion agent will be incorporated into the liquid asphalt.
- 2.1.2 Pay reductions for asphalt materials not meeting the specified requirements will be applied to the Contractor's final payment.

2.2 Aggregate

- 2.2.1 Seal Coat aggregate shall meet the requirements of Specification 4210 For Seal Coat Aggregate.

3 EQUIPMENT

3.1 General

- 3.1.1 All equipment shall be maintained in good working condition at all times.

3.2 Binder Distributor

- 3.2.1 The Contractor shall supply a self-powered pressure asphalt distributor which shall:
- 3.2.1.1 be capable of maintaining a uniform speed and be equipped with a device that measures the truck speed in metres per minute and distance travelled in metres.
- 3.2.1.2 have a minimum Binder capacity of 4 500 litres.
- 3.2.1.3 have a heating system capable of applying even heat to the Binder.

- 3.2.1.4 have a device capable of measuring the Binder temperature in the tank.
- 3.2.1.5 have a positive displacement asphalt pump with separate power unit or hydrostatic drive.
- 3.2.1.6 be equipped with a gauge that measures spray bar pressure.
- 3.2.1.7 have a spray bar that is capable of being maintained at a constant height throughout the entire operation.
- 3.2.1.8 have an adjustable length spray bar on which the nozzles on any portion may be closed off.
- 3.2.1.9 have a spray bar that has been provided with a positive shutoff to prevent leaking.
- 3.2.1.10 have spray bar nozzles that are of the same manufacture, type and size and are in good working condition.
- 3.2.1.11 have a device capable of measuring spray nozzle angle.
- 3.2.1.12 have nozzles that have been set in the spray bar so that the nozzle slots make the same angle (15 to 30 degrees) with the longitudinal axis of the spray bar.

3.3 Aggregate Spreader

- 3.3.1 The Contractor shall supply a self-propelled aggregate spreader capable of spreading the aggregate at a uniform rate in one application over the full width of the applied Binder.
- 3.3.2 The spreaders shall be equipped with controls for adjusting width and rate of spread, and a hook or clamp mechanism which enables the towing of the trucks.
- 3.3.3 The use of truck mounted hydrodrum aggregate spreaders will not be allowed.

3.4 Calibration of Equipment

- 3.4.1 The Contractor shall provide the Engineer with a certificate of calibration conforming to ASTM methodologies D2995 and D5624 and verified by a Professional Engineer for the Binder distributor and aggregate spreader,

which was performed in the year construction is to be carried out, prior to starting the Work.

- 3.4.2 At the start of each Project section, the Contractor shall verify the emulsion and aggregate application rates in accordance with the requirements for Seal Coat Aggregate From The Roadway (STP 105-1) and Distributor Application Rate (STP 203-20).
- 3.4.3 The Contractor shall recalibrate the equipment if deemed necessary by the Engineer.

3.5 Rollers

- 3.5.1 The Contractor shall supply sufficient pneumatic-tired rollers to meet the production rate. The rollers shall meet the following requirements:
 - 3.5.1.1 They shall be fully ballasted.
 - 3.5.1.2 They shall be constructed so that wheels on either the front or back end oscillate either independently or in pairs.
 - 3.5.1.3 The tires shall be smooth-treaded and uniformly inflated to a minimum of 450 kPa when the tires are cold.
- 3.5.2 Vibratory rollers having rubber-coated drums will be permitted providing they are operated in static mode only and in conjunction with pneumatic-tired rollers.
- 3.5.3 Pull type rollers shall not be used except for the first Seal Coat placed on subgrades.
- 3.5.4 Wobble type rollers shall not be used.

3.6 Power Brooms

- 3.6.1 The Contractor shall supply sufficient mechanically operated, rotary-type power brooms to meet the specified Sweeping requirements. The brooms shall be equipped with the following:
 - 3.6.1.1 A broom wider than the width of the power unit when the broom is mounted in front of the power unit.

3.6.1.2 A flashing or rotating amber light with not less than 55 W halogen bulbs and mounted not less than 2.5 metres above the ground surface.

3.6.1.3 Devices that enable the operator to control the action of the broom from the towing unit for a pull type power broom.

4 CONSTRUCTION

4.1 Seal Coat Limitations

4.1.1 The Contractor shall adhere to the following time and length limitations:

TABLE 4220.3.T1

TIME AND LENGTH LIMITATIONS

Description	Seal on Subgrade	Seal on Primed Base Course	Seal on Other Surfaces
1 st Seal, Earliest Start Date	Not Specified	Not Specified	May 16
1 st Seal, Completed By	October 10	October 10	August 31
2 nd Seal, Earliest Start Date	June 15	June 15	n/a
2 nd Seal, Completed By	August 31	August 31	n/a
Minimum Cure Time of Cutback Asphalt Prime	Greater of: 4 days or actual cure time	Greater of: 4 days or actual cure time	n/a
Minimum Cure Time of Emulsified Asphalt Prime	Greater of: 1 day or actual cure time	Greater of: 1 day or actual cure time	n/a
Maximum Time a Primed Surface Shall Remain Unsealed	3 weeks	3 weeks	n/a

Minimum Time Between the 1 st & 2 nd Seal	10 days *	10 days *	n/a
Maximum Length of Unsealed Primed Surface Before October 1	5 km	7 km	n/a
Maximum Length of Unsealed Primed Surface After October 1	5 km	3 km	n/a
* The second Seal Coat shall be applied no sooner than 10 days after the completion of the first sweep as described in Section 4220.4.8.1.1 provided the minimum atmospheric temperature remains above 4°C. For each day the minimum atmospheric temperature is below 5°C or rain occurs, an additional day shall be required prior to application of the second Seal Coat.			

4.1.2 The Contractor shall adhere to the following weather limitations for the first application of Binder for a Double Seal Coat:

4.1.2.1 Binder shall not be applied to a prepared surface when:

- 4.1.2.1.1 the atmospheric temperature is less than 5°C or,
- 4.1.2.1.2 the surface temperature is less than 10°C or,
- 4.1.2.1.3 the atmospheric high temperature for the day is forecast to be less than 10°C or,
- 4.1.2.1.4 the atmospheric low temperature for the day is forecast to be less than 0°C or,
- 4.1.2.1.5 the surface temperature is 50°C or greater or,
- 4.1.2.1.6 the road surface is wet or,
- 4.1.2.1.7 the weather is misty, rainy, or if rain is impending or,
- 4.1.2.1.8 the relative humidity is greater than 85%.

4.1.2.2 If the Seal Coat is applied when the surface temperature is greater than 40°C the first cleaning shall be a minimum of 24 hours after the Seal Coat was applied.

4.1.2.3 The first Sweeping will not be allowed when the surface temperature is greater than 40°C.

4.2 Preparation and Maintenance of Existing Surface

4.2.1 When the Contractor is responsible for the surface on which the Seal Coat is to be applied, the Contractor shall ensure the following are completed prior to sealing:

4.2.1.1 Raveled base courses, potholes and other failures are repaired and primed.

4.2.1.2 The surface is swept clean of dust, loose aggregate, mud and excess moisture.

4.2.2 When the Contractor is not responsible for the surface on which the Seal Coat is to be applied, the Contractor shall ensure the following is completed prior to sealing:

4.2.2.1 The surface is swept clean of dust, loose aggregate, mud and excess moisture.

4.2.3 When a second Seal Coat is specified, the Contractor shall be responsible for maintenance of the first Seal Coat.

4.3 Longitudinal Seams

4.3.1 Longitudinal seams from successive Seal Coats shall have a minimum separation of 0.3 m.

4.3.2 Longitudinal seams on the final Seal Coat will only be permitted on the edge of any lane.

4.3.3 The longitudinal edge of a previously constructed Seal Coat shall be swept prior to construction of the adjacent Seal Coat. All loose aggregate shall be removed to at least 150 mm from the proposed longitudinal seam with a minimum dislodgement of embedded aggregate.

- 4.3.4 Binder for the adjacent Seal Coat shall be applied such that a minimum of half the spray fan from the end nozzle overlaps the longitudinal seam. No excessive overlap will be allowed.

4.4 Application of Binder

- 4.4.1 The Binder shall be applied only after a written authorization has been received from the Engineer. The authorization is valid for only 24 hours.
- 4.4.2 The application rate of the Binder shall be determined by the Contractor and shall be in the range of 1.5 to 2.0 L/m², deviation from this range will not be permitted unless authorized by the Engineer.
- 4.4.3 The Binder shall meet the temperature requirements listed in the following table and shall also be maintained within $\pm 10^{\circ}\text{C}$ of the temperature of the Binder at the time the distributor was calibrated:

TABLE 4220.3.T2

TEMPERATURE RANGE OF BINDER

Type of Binder	Temperature (Degrees Celsius)	
	Minimum	Maximum
HF100P	50	80
HF150P	50	80
HF100S	50	80
HF150S	50	80
HF250S	50	80
HF350S	50	80

- 4.4.4 The Binder application shall be started on a strip of building paper each time the distributor starts spraying unless the Contractor can demonstrate to the Engineer that an acceptable joint can be obtained without building paper. The paper shall be removed and disposed of following the Binder application.
- 4.4.5 The spray pattern shall provide a minimum double lap coverage.
- 4.4.6 The Contractor shall remove any splattered Binder from structures, wheel guards, curbs, guardrail, and other roadway appurtenances.

- 4.4.7 Binder shall not be spilled, sprayed, or tracked on completed sections of seal coat.

4.5 Delivering Aggregate to the Road

- 4.5.1 Hauling Seal Coat aggregate shall be carried out in accordance with Specification 2405 For Haul On The Basis Of The Kilometre.
- 4.5.2 Vehicles used to haul aggregate shall be equipped with clean metal boxes.
- 4.5.3 Trucks shall not travel on the Seal Coat until rolling is completed.
- 4.5.4 Trucks shall refrain from sharp turning movements and sudden stops and starts on the fresh Seal Coat.

4.6 Application of Aggregate

- 4.6.1 The amount of surface moisture on the aggregate shall be subject to the approval of the Engineer before application.
- 4.6.2 Immediately after the Binder is applied, aggregate shall be spread uniformly over the entire sprayed surface.
 - 4.6.2.1 The aggregate application rate shall be determined by the Contractor and shall be in the range of 16 to 22 kg/m²; deviation from this range will not be permitted unless authorized by the Engineer.
 - 4.6.2.2 The Binder shall be covered with aggregate within 10 minutes of the application of the Binder when there is a disruption in the operation.
- 4.6.3 No aggregate shall be spilled from the back end of the spreader. If this occurs, the sealing operation shall cease until the problem is rectified.
- 4.6.4 Communications shall be available between the Contractor's distributor operator and the Contractor's field supervisor on site, so that adjustments can be made without stopping the sealing operation.

4.7 Rolling

- 4.7.1 Immediately after the aggregate has been spread it shall be rolled. Rolling shall be continuous with the entire fresh Seal Coat being rolled until a

thoroughly compacted surface is obtained. A minimum of five (5) rolling passes are required.

- 4.7.2 The line of rolling shall not be suddenly changed or the direction of rolling suddenly reversed.
- 4.7.3 If the road surface is subject to a sudden rain during the Seal Coat operation, the Contractor shall perform extra rolling to preserve the seal.

4.8 Sweeping

- 4.8.1 The Seal Coat shall be swept as follows:
 - 4.8.1.1 The first Sweeping shall be a light Sweeping and shall not commence until the seal has set. The set time shall be a minimum of six (6) hours after the Seal Coat is applied subject to weather limitations. Initial sweeping shall not dislodge aggregate that was embedded into the Seal Coat.
 - 4.8.1.2 The second Sweeping shall commence within 24 hours after the first Sweeping is completed.
 - 4.8.1.3 If the Engineer deems necessary, the Contractor shall perform a third Sweeping which would commence within 36 to 72 hours after the second sweeping is completed.
- 4.8.2 The maximum length of Seal Coat that has not received its first Sweeping shall not at any time exceed 8 km.
- 4.8.3 The maximum length of Seal Coat on a Project on which both the first and second Sweepings have not been completed shall not exceed 15 km at any time.
- 4.8.4 The Contractor may be required to use water for dust abatement during the Sweeping process when directed by the Engineer. The Work shall be in accordance with Specification 2500 For Watering with the following exceptions:
 - 4.8.4.1 The Contractor shall furnish the source of water.
 - 4.8.4.2 The repair, maintenance and construction of haul roads for water sources shall be in accordance with General Provision 1300.7.1.4.

- 4.8.4.3 Water used for dust abatement during the Sweeping process will be paid for at the rate specified in the Special Provisions. Payment will be based on the square metres of Seal Coat to which the water is applied.

4.9 Traffic Control

- 4.9.1 The Contractor shall not allow equipment on uncovered surfaces of fresh Binder.
- 4.9.2 The Contractor shall not allow traffic on the Seal Coat until rolling is completed.
- 4.9.3 All equipment shall use approaches to turn around.
- 4.9.4 The Contractor shall supply and operate pilot vehicles in accordance with the following:
 - 4.9.4.1 Both directions of traffic shall be piloted until the first Sweeping is completed excepting the period between dusk and dawn.
 - 4.9.4.2 All piloting on unswept Seal Coat shall be conducted at speeds not exceeding 40 km/h.

5 COMPLETION AND ACCEPTANCE OF WORK

- 5.1 The Seal Coat will be considered acceptable after the final Sweeping if there is no streaking or ravelling, the finished surface has a uniform and even texture, there are no surface defects, the seams are straight, the ride is smooth, there are no bleeding areas and loose aggregate is not evident.
 - 5.1.1 Work that does not meet these requirements shall be repaired or reconstructed to the satisfaction of the Engineer at no direct expense to the Ministry.
- 5.2 The Contractor shall provide the Engineer 3 Business Days notice following completion of Work on any site, to arrange for a Final Acceptance inspection of that site.

6 WARRANTY REQUIREMENTS

6.1 Warranty Period

- 6.1.1 The warranty period shall be 24 months following Final Acceptance of all Work under the Contract by the Engineer. If warranty repairs are identified within 30 days of the end of the 24-month period, the warranty period shall be extended to include such warranty repairs. The warranty work shall be completed between May 16th and August 31st inclusive.

6.2 Warranty Exemption

- 6.2.1 Shaving of the Seal Coat surface during snow and ice removal operations is exempt from the warranty requirements.

6.3 Warranty Repairs

- 6.3.1 The Engineer may inform the Contractor of necessary warranty repairs in writing anytime during the warranty period.
- 6.3.2 The Contractor shall repair and correct surface defects or deficiencies in the Work within 30 days of notification from the Engineer.
- 6.3.3 If the Contractor fails to complete the repairs or to complete the repairs to the satisfaction of the Engineer, the Performance Bond will be called upon to ensure completion of the repairs.
- 6.3.4 Warranty repairs shall be made according to Table 4220.6.T3.

TABLE 4220.6.T3

WARRANTY REPAIRS

Surface Defect	Severity	Description	Required Repair
Loss of Cover Aggregate	Minor	Seal Coat aggregate has begun to wear away but has not progressed significantly. This would represent roughly 20% or less of aggregate loss.	No action required
	Severe	Seal Coat aggregate has worn away with extensive loss of coarse aggregate. This would represent greater than 20% aggregate loss.	Seal Coat of the affected area
Bonding		Seal Coat has separated from the underlying surface.	Existing Seal Coat to be removed and affected area to be resealed.
Flushing, Bleeding or Streaking	Minor	Seal Coat surface presents uneven discoloration due to excess Binder.	No action required.
	Severe	Seal Coat surface has a shiny appearance due to excess Binder. Aggregate may be obscured by excess Binder and tire marks may become evident in warm weather. Frequent, or extensive (Note 1) Intermittent (Note 2)	Seal Coat of the affected area
Notes: 1. Area of the repair or replacement shall not be less than one lane width by 50 m in length. 2. Area of the repair or replacement shall not be less than one lane width by 10 m in length. If there is less than 10 m between two sections in the lane designated for repair or replacement, the repair or replacement shall be continuous.			

- 6.3.5 The length of a repair shall be sufficient to eliminate all surface defects as described.
- 6.3.6 The width of a repair area shall not be less than one lane width unless approved by the Engineer.
- 6.3.7 The method of repair shall be approved by the Engineer, and be compatible with the Seal Coat system.
- 6.3.8 Repairs shall be approved by the Engineer.

6.4 Performance Bond and the Labour & Materials Payment Bond

- 6.4.1 The Performance Bond and the Labour and Materials Payment Bond shall remain in full force and virtue until the end of the warranty period.

7 MEASUREMENT

- 7.1 Seal Coat and Seal Coat Including Processing Aggregate will be measured in square metres.

8 PAYMENT

- 8.1 Payment for Seal Coat or Seal Coat Including Processing Aggregate will be at the contract unit price per square metre and will include compensation for all Work except where specific provision for payment is made in this section.
- 8.2 The processed Seal Coat aggregate and hauling of Seal Coat aggregate will be paid for on an interim basis on progressive estimates.
 - 8.2.1 Interim payments will be made in accordance with the Rates and Surcharges in the Special Provisions.
 - 8.2.2 Quantities for interim payments will be limited to the tendered quantity of Seal Coat multiplied by 20 kilograms.
 - 8.2.3 Payments pursuant to the above will be deducted from subsequent progressive estimates as the aggregate is incorporated into the Work and these payments will not appear on the final estimate.