



**CONSTRUCTION SPECIFICATION FOR
DOUBLE CHIP SEAL**

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303.01 SCOPE

This specification covers the requirements for the use of double chip seal.

303.01.01 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 as specified in the Contract Documents.

303.01.02 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.

303.02 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, Material

OPSS 1006	Aggregates - Surface Treatment
OPSS 1103	Emulsified Asphalt

Ontario Ministry of Transportation Publications

MTO Laboratory Testing Manual:

LS-601	Material Finer than 75 μm Sieve in Mineral Aggregates by Washing
LS-602	Sieve Analysis of Aggregates

Ontario Traffic Manual (OTM):

Book 7	Temporary Conditions
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SP-021	Manual for the Condition Rating of Surface Treated Pavement
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European Standards (EN)

EN12272-3:2003	Determination of Binder Aggregate Adhesivity by the Vialit Plate Shock Test Method
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303.03 DEFINITIONS

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

Appurtenances mean maintenance hole, catch basin, valve chamber, and water valve covers and similar Utility access covers located within the paved portion of the roadway.

Double Chip Seal means two successive single chip seals with different aggregate gradations.

Median Size of Aggregate means the aggregate size that is determined by a standard plot of the gradation of the aggregate, using all standard sieve sizes, and then graphically determining the median size, which is the size in mm corresponding to per cent finer than 50%.

Single Chip Seal means a single application of bituminous binder followed by a single application of uniformly graded aggregate.

Single Sized Aggregate means a uniformly graded aggregate with at least two-thirds, by weight, passing through a sieve of the specified size and retained on a sieve no less than 70% of the specified size, when tested according to LS-602. The specified size shall vary according to the design of the chip seal application.

303.04 DESIGN AND SUBMISSION REQUIREMENTS

303.04.01 Design Requirements

To ensure satisfactory performance on the roadway according to the traffic, pavement, and geometric roadway data specified in the Contract Documents, using a recognized chip seal design methodology, a laboratory equipped and staffed to carry out chip seal design shall designate the type and grade of asphalt binder, the class of aggregate, and their application rates.

The laboratory designing the chip seal shall confirm the compatibility for the first application of the asphalt binder and the aggregate used in the chip seal by performing the mechanical adhesivity test as per EN12272-3 and meeting the requirements as specified in the Compatibility of Asphalt binder and Aggregate subsection.

All component materials used in the chip seal design shall be representative of the material proposed by the Contractor for use on the Contract.

Chip seal shall only be placed after the Contract Administrator has issued confirmation in writing within 5 Business Days that the chip seal design has been reviewed and meets the specified requirements.

303.04.01.01 Laboratory Requirements

303.04.01.01.01 General

Equivalent alternate laboratory and technician certifications or laboratory proficiency sample testing programs may be used to demonstrate similar requirements to those specified below provided they are acceptable to the Owner.

303.04.01.01.02 Aggregates

An acceptable laboratory conducting tests for physical properties or consensus properties shall be one that holds a certificate from the Canadian Council of Independent Laboratories (CCIL) as Type D for the applicable test methods and also participates in the annual MTO Proficiency Sample Testing Program.

An acceptable laboratory conducting tests for LS-601 and LS-602 shall be one that holds a valid certificate from CCIL as Type C. Testing for LS-601 and LS-602 shall be conducted by qualified laboratory staff who hold a valid certificate from CCIL in aggregate testing.

303.04.01.01.03 Asphalt Binder

An acceptable laboratory for conducting the tests to ensure the binder meets the requirements of OPSS 1103 shall be an accredited laboratory in Ontario's inter-laboratory correlation program. An accredited laboratory shall be one that maintains a satisfactory rating from the MTO Emulsion Correlation Program.

303.04.01.01.04 Asphalt Binder and Aggregate Compatibility Testing

An acceptable laboratory for conducting a test EN12272-3 shall be one that holds a valid certificate from CCIL as Type A or a laboratory that maintains a satisfactory rating from the MTO Emulsion Correlation Program.

303.04.02 Submission Requirements

303.04.02.01 Chip Seal Design

Ten Business Days prior to the start of the placing of the chip seal, the chip seal design shall be submitted in writing to the Contract Administrator together with supporting test results showing conformance of the asphalt binder and aggregates with the requirements of the Contract Documents. For test EN12272-3, a written report on the test method and the results, including a photographic record, shall be provided.

Prior to making the submission, an Engineer's seal and signature shall be affixed on the chip seal design verifying that the chip seal design is consistent with the requirements of the Contract Documents.

Test data must be legible and signed by the testing laboratory representative.

Representative samples of the materials to be used in the work shall be provided with the chip seal design.

303.04.02.01.01 Material Samples

Samples shall be labelled with the following information:

- a) Contract number.
- b) Material type.
- c) Material source.
- d) Date sampled (i.e., yyyy-mm-dd).
- e) Sample location.

Each material sample shall be packaged separately and the samples shall be in containers that are clean, closed, and rupture proof, when lifted or handled. Each filled sample container shall have a maximum mass of 30 kg.

The minimum emulsified asphalt sample quantity shall be 4 litres evenly split between 2 containers.

Aggregate sample quantities shall be a minimum of 25 kg of each aggregate.

Samples for all other materials to be used in the chip seal applications shall be provided in quantities large enough to allow confirmation of the design.

303.04.02.02 Calibration Records for Distributors and Aggregate Spreaders

Prior to the start of the work of chip sealing, calibration records shall be submitted, in writing, to the Contract Administrator.

303.05 MATERIALS

303.05.01 Asphalt Binder

The asphalt binder shall be a rapid setting polymer modified emulsified asphalt according to OPSS 1103.

303.05.02 Aggregates

303.05.02.01 General

Aggregates for both applications of chip seal shall be of the same geological parent produced from the same source.

Aggregates shall be obtained from a source listed on the MTO's Designated Sources List for coarse aggregates for HL 1 or Superpave 12.5 FC1 hot mix.

In areas north of North Bay, where FC1 aggregates may not be available, the aggregates shall meet the physical requirements of OPSS 1006.

Aggregates containing slag are not permitted for use in a chip seal application.

303.05.02.02 Physical Requirements

The physical requirements of the aggregates for the first application of chip seal shall be according to those of a Class I aggregate according to OPSS 1006.

303.05.02.03 Gradation Requirements

303.05.02.03.01 First Application

Aggregate for the first application of chip seal shall be single sized aggregate determined by the chip seal design with the following additional requirements:

- a) The aggregate shall be no finer than the gradation of a Class 1 aggregate according to OPSS 1006.
- b) The maximum median size shall be 13.6 mm.

303.05.02.03.02 Second Application

The gradation requirements of the aggregate for the second application of chip seal shall be determined by the chip seal design with the following requirements:

- a) The gradation of the aggregate shall be 100% passing the 9.5 mm sieve and a maximum 1% passing the 75 µm sieve.
- b) The median size of the aggregate shall be 40 to 55% of the median size of the aggregates used in the first application.

303.05.03 Compatibility of Asphalt Binder and Aggregate

Adhesivity values or % aggregate retentions of the selected binder-aggregate combination determined by the mechanical adhesivity test in EN12272-3 shall be minimum 90%.

303.06 EQUIPMENT

303.06.01 Pilot Vehicle

The pilot vehicle shall be equipped according to the requirements of the OTM, Book 7.

303.07 CONSTRUCTION

303.07.01 Operational Constraints

Public traffic shall only be permitted to travel on the final compacted surface of the second application of chip seal.

The work shall not be carried out when the ambient temperature is less than 10 °C or when climatic or site conditions preclude the curing of the binder.

The application of binder and aggregate shall terminate 1 hour before sunset.

Chip sealing shall not be carried out prior to May 15th south of a line drawn through Pembroke, Magnetawan, and Pointe au Baril Station or prior to June 1st north of the line.

After September 1st, written approval shall be obtained from the Contract Administrator prior to chip sealing.

303.07.02 Calibration of Distributors and Aggregate Spreaders

Within 14 Days before the start of the work of chip sealing, all distributors and aggregate spreaders to be used in the work shall be calibrated using a recognized calibration method.

303.07.03 Traffic Convoy

The Contractor shall convoy traffic according to the OTM, Book 7.

The pilot vehicle shall guide one-way traffic through or around construction. The maximum speed of the convoy shall be 30 km/h.

Convoying shall be maintained until such time as the chip seal is able to carry traffic without damage.

303.07.04 Quality Control

The Contractor shall conduct such quality control procedures, including sampling and testing, as is necessary to ensure that all aggregates and all asphalt binder to be used in the work conform to the requirements of the Contract.

Upon request of the Contract Administrator, the Contractor shall supply copies of any or all test results.

303.07.05 Surface Preparation

The area to receive chip seal shall be thoroughly cleaned using a rotary power broom to remove all sand, dirt, and other debris. Areas inaccessible to a rotary power broom shall be manually cleaned.

All roadway appurtenances within the chip seal area shall be properly covered and protected immediately prior to chip sealing.

303.07.06 Chip Seal Application

A double application of asphalt binder and aggregate shall be placed according to the Contract Documents in the location and to the length and width requirements specified in the Contract Documents.

303.07.07 Joints

Longitudinal joints shall be placed on lane lines.

Longitudinal joints, on the second application, shall have an overlap of 50 to 100 mm.

303.07.08 Appearance

The longitudinal and transverse joints shall be neat and uniform in appearance, with no excessive build-up, uncovered areas, or unsightly appearance.

The chip seal edge shall be neat and uniform along the roadway lane, shoulder, and curb lines.

303.07.09 Clean-up

Areas not to receive chip seal shall have the chip seal material removed immediately.

Appurtenances shall be free of chip seal and left in an operable condition.

303.07.10 Management of Excess Material

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

303.08 QUALITY ASSURANCE

303.08.01 Sampling and Testing

The Contract Administrator reserves the right to request samples of field asphalt binder and aggregate for quality assurance testing purposes. Material samples shall be according to the Material Samples clause.

303.08.02 Initial Acceptance

At the completion of the chip sealing operations, the completed surface course shall not have distresses with higher severity than slight flushing, slight streaking, or slight loss of cover aggregate, including delamination, as described by SP-021.

303.08.03 Warranty Requirements

303.08.03.01 Warranty Period

The Warranty Period shall be 24 months.

303.08.03.02 Warranty Repairs

The Owner shall inform the Contractor in writing any time within the first 23 months of the Warranty Period of surface defects requiring repair.

In addition, a survey of surface defects shall be completed by the Owner at the end of 1 year and a second survey of surface defects a minimum of 45 Days prior to the end of the Warranty Period. The results of both surveys shall be sent to the Contractor.

The types of surface defects, their severity, their density or extent, and the exact dimensions of the warranty repairs shall be determined by the Owner and recorded according to Table 1.

If the Owner determines that the surface defects pose a hazard to the travelling public at any time during the Warranty Period, the Contractor shall make the repairs in accordance with this specification within 14 Days of being notified. In all other cases, repairs shall be completed no later than 14 Days prior to the warranty expiration date.

Repairs shall be made according to Table 1.

The length of a repair shall be sufficient to eliminate all surficial defects as described.

The width of a repair area shall not be less than one lane width unless approved by the Owner

Materials used in the repair area shall be consistent with those originally used on the Contract. The use of alternate aggregates meeting the aggregate requirements of the Aggregates subsection may be used in the repair area with the approval of the Owner.

Repairs shall be to the approval of the Owner.

Repair areas shall not have transverse or longitudinal ripples of 6 mm or more as measured with a 3 m straight edge.

303.08.04 Completion of Warranty Period

At the end of the Warranty Period, the work shall meet the provisions of the Performance Requirements subsection in order for the Contractor to be released from responsibility and ensure return of the performance bond or letter of credit or certified cheque.

303.08.05 Performance Requirements

The chip seal shall be free from any:

- a) Aggregate loss that is moderate to severe.
- b) Flushing that is moderate to severe.
- c) Streaking that is moderate to severe.

Shaving of the chip seal surface during snow-plough operations (snow-plough damage) is exempt from the Performance Requirements and Warranty Requirements.

303.09 MEASUREMENT FOR PAYMENT

303.09.01 Actual Measurement

303.09.01.01 Double Chip Seal

Measurement of the chip seal placed shall be by area in square metres.

303.09.02 Plan Quantity Measurement

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

303.10 BASIS OF PAYMENT

303.10.01 Double Chip Seal - 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.

Repair, removal, disposal, and replacement of any damaged or defective chip seal shall be at no extra cost to the Owner.

**TABLE 1
Chip Seal Repair**

Surface Defect	Severity	Density or Extent per 100 m of lane length	Required Repair
Loss of Cover Aggregate	Slight	Intermittent, frequent, or extensive	No action required.
	Moderate or Severe	Intermittent or frequent	Single chip seal with top aggregate of the affected area applied manually or by machine.
	Moderate or Severe	Extensive (Note 1)	Double chip seal of the affected area.
Flushing	Slight	Intermittent, frequent, or extensive	No action required.
	Moderate	Intermittent (Note 2) Frequent or extensive (Note 1)	Single chip seal with top aggregate of the affected area.
	Severe	Intermittent (Note 2) Frequent or extensive (Note 1)	Remove and replace the double chip seal of the affected area.
Streaking	Slight	Intermittent, frequent, or extensive	No action required.
	Moderate	Intermittent (Note 2) Frequent or extensive (Note 1)	Single chip seal with top aggregate of the affected area.
	Severe	Intermittent (Note 2) Frequent or extensive (Note 1)	Sand seal followed by double chip seal of the affected area.

Notes:

1. Area of the repair or replacement shall not be less than one lane width x 50 m in length.
 2. Area of the repair or replacement shall not be less than one lane width x 10 m in length. If there is less than 10 m between 2 sections in the lane designated for repair or replacement, the repair or replacement shall be continuous.
- A. Descriptions of surface defects and severity are according to SP-021.

Appendix 303-A, November 2018 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

Chip seal is a preventive maintenance or holding strategy used to preserve and extend the life of an existing road surface.

The designer should specify the following in the Contract Documents:

- Traffic data (e.g., AADT, % Commercial traffic, and intersections with heavy commercial traffic turning movements). (303.04.01)
- Pavement data (e.g., existing pavement type, type of treatment applied to the existing pavement and the year of application, and conditions and problems with the existing pavement (e.g., occurrences of flushing). (303.04.01)
- Geometric data (e.g., maximum grade). (303.04.01)
- Location, length, and width requirements of area to receive chip seal. (303.07.06)

To achieve pavement preservation benefits, chip seal must be carried out when the level of pavement distress is low.

Significant deficiencies in the pavement surface (i.e., deformations, rutting, cracks, potholes, subgrade failures, drainage, and excess asphalt on patches and joints) should be repaired before applying chip seal to the roadway.

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

Related Ontario Provincial Standard Drawings

No information provided here.