



**CONSTRUCTION SPECIFICATION FOR
SEALING OR REASLING OF JOINTS AND CRACKS
IN CONCRETE PAVEMENT AND CONCRETE BASE**

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369.01 SCOPE

This specification covers the requirements for sealing and resealing of joints and cracks up to 25 mm in width in concrete pavement and concrete base.

369.02 REFERENCES

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

Ontario Provincial Standard Specifications, Construction

OPSS 350	Concrete Pavement and Concrete Base
OPSS 366	Repairing Concrete Pavement and Concrete Base
OPSS 929	Abrasive Blast Cleaning - Concrete Construction

Ontario Provincial Standard Specifications, Material

OPSS 1212	Hot Poured Rubberized Asphalt Joint Sealing Compound
OPSS 1350	Concrete - Materials and Construction

CSA Standards

A23.2-14C Obtaining and Testing Drilled Cores for Compressive Strength Testing*
*[Part of A23.1-19/A23.2-19 - Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete]

369.03 DEFINITIONS

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

Backer Rod means a compressible material inserted into the joint reservoir to achieve the required shape factor for the joint sealing compound and prevent loss of joint sealing compound.

Concrete Base means as defined in OPSS 350.

Concrete Pavement means as defined in OPSS 350.

Effluent means as defined in OPSS 350.

Reservoir means a saw cut cavity used in some existing concrete pavement longitudinal and transverse joints of specific dimensions designed to receive a backer rod and joint sealing compound.

Shape Factor means the ratio of width to depth of a field poured liquid sealant within the reservoir.

369.04 DESIGN AND SUBMISSION REQUIREMENTS

369.04.01 Submission Requirements

369.04.01.01 Joint Sealing Compound

The following joint sealing compound product information shall be submitted to the Contract Administrator prior to the joint sealing operations:

- a) Product name and manufacturer;
- b) The manufacturer's batch or lot number or designation;
- c) The manufacturer's recommended heating time and heating temperature range; and
- d) The manufacturer's installation procedures.

369.05 MATERIALS

369.05.01 Backer Rods

Backer rods shall be made of polyethylene foam, cross-linked polyethylene foam, or polyurethane foam.

369.05.02 Joint Sealing Compound

Hot poured rubberized asphalt joint sealing compound shall be according to OPSS 1212 and shall be on the MTO DSM list designated for use with the joint design specified in the Contract Documents.

369.06 EQUIPMENT

369.06.01 Air Compressor

The air compressor used to supply the hot-compressed air lance shall be equipped with oil and moisture filters and provide a minimum pressure of 700 kPa at a minimum air volume of 4.25 cubic metres per minute (150 cfm).

369.06.02 Heating and Mixing Kettle for Joint Sealing Compound

The heating and mixing kettle shall be used for the hot poured rubberized asphalt joint sealing compound.

The kettles shall be of the double boiler oil heat transfer type with a built-in agitator and equipped with two functional permanently installed dial type thermometers. The thermometers shall measure the temperature of the melted compound and the oil to an accuracy of ± 2 °C. Heating shall be controlled by an automatic thermostat to maintain the temperature of the product used within the range required by the manufacturer. Infrared or direct heat kettles shall not be used.

Certificates of calibration from an organization accredited by the Standards Council of Canada shall be available for review when requested by the Contract Administrator for each gauge certifying that the thermometers can measure the temperature within a tolerance of ± 2 °C.

369.06.03 Hot Compressed Air Lance

The hot compressed air lance shall have an oil free discharge of air at a temperature greater than 200 °C and less than 500 °C, and an air velocity greater than 1,000 m per second.

369.06.04 Sawcutting Equipment

The sawcutting equipment shall be self-propelled, guided, and capable of sawcutting the joints to the dimensions specified in the Contract Documents. The sawcutting equipment shall be capable of sawcutting the joints without causing spalling or damage to the adjacent concrete.

For resealing cracks with an existing reservoir, sawcutting equipment shall be capable of following the path of random cracks to create a reservoir to the dimensions specified in the Contract Documents, without causing spalling or damage to the adjacent concrete.

The saw shall be equipped with a diamond blade.

369.06.05 Thermometer

A separate calibrated thermometer with an accuracy of ± 2 °C for verification of the joint sealing compound temperature shall be available on the job site.

369.07 CONSTRUCTION

369.07.01 General

Joints specified to be sealed as specified in the Contract Documents shall be sealed with hot poured rubberized asphalt joint sealing compound.

Cracks identified to be repaired as specified in the Contract Documents and in the field by the Contract Administrator shall be sealed with hot poured rubberized asphalt joint sealing compound.

The maximum width of repair shall be 25 mm for both transverse and longitudinal joints or cracks. Joints or cracks exceeding the maximum repair width shall be repaired as directed by the Contract Administrator.

369.07.02 Operational Constraints

Joints may be sealed prior to or after grinding, milling, or grooving operations. Cracks shall be sealed after grinding, milling or grooving operations are completed.

Joint sealing compound shall not be placed until new concrete has cured for a minimum period of 7 Days.

Joint sealing compound shall not be placed when the ambient air or concrete pavement surface temperatures are less than 5 °C.

Joints and cracks shall be sealed between 24 and 48 hours after completion of the water flushing.

Cracks and joints shall be kept in a dry condition for a minimum period of 24 hours prior to joint sealing compound installation. This time period shall be extended only if necessary to ensure the joint or crack is dry.

For newly constructed joints, joints shall be sealed within the same calendar year in which they are constructed. For crack and joint resealing, cracks and joints shall be resealed within the same calendar year in which the existing sealant is removed.

369.07.03 Removal of Existing Sealant and Seals

All existing sealant, seals, bond breaker tapes, and backer rod shall be removed without damaging the adjacent joint or crack faces.

369.07.04 Sawcutting

369.07.04.01 Reservoir

For resealing joints with a reservoir cut or cracks with a reservoir cut, sawcutting equipment shall be used to create a reservoir with the dimensions specified in the Contract Documents. Routers shall not be used for creating the reservoir.

The shape factor for hot poured rubberized joint sealing compound shall be 1H:1V.

When resealing joints and cracks, if the existing reservoir is determined by the Contract Administrator to be in an acceptable condition with minimal spalling, with no joint sealant adhered to the side of the joint and with proper dimensions, sawcutting shall not be required. The existing reservoir shall be cleaned according to the Joint or Crack Cleaning clause.

When sawcutting existing joints, the least amount of concrete shall be removed to meet the specified requirements.

369.07.04.02 New Longitudinal and Transverse Joints

New longitudinal and transverse joints, in newly constructed and repair areas of concrete pavement and concrete base shall be sawcut to the dimensions specified in the Contract Documents.

Sawcutting equipment shall be used to create the joints. Routers should not be used for creating the joints.

The initial sawcut for longitudinal and transverse joints shall be carried out as soon as the joint can be sawcut without ravelling the joint or damaging the concrete surface, and prior to any cracks developing.

Longitudinal and transverse sawcutting operations shall be carried out concurrently. Sawcutting of the joints to the specified dimensions may be done with the initial sawcut or in two parts with an initial sawcut and a final sawcut. The initial sawcut, and final sawcut, if applicable, shall be a minimum of one third the depth of the concrete slab and shall not be so deep as to cut the tie bars or dowel bars.

369.07.05 Joint or Crack Cleaning

Cleaning of joints or cracks shall remove all sawcut slurry, grinding and grooving effluent, if applicable, and any other debris from the joint or crack. Cleaning of joints or cracks shall consist of flushing the joints or cracks with water in one direction to remove slurry, effluent and debris. Additional methods of cleaning the joints or cracks may be required and shall be approved by the Contract Administrator.

Cracks shall be cleaned at a minimum at between 24 and 48 hours before sealing. Joints shall be cleaned at a minimum at each of the following times:

- a) Immediately after each sawcutting operation.
- b) Immediately after final texturing for unsealed joints.
- c) Between 24 and 48 hours before sealing.

Immediately prior to sealing operations, all new or existing joint and crack faces shall be abrasive blast cleaned according to OPSS 929.

The new or existing joint or crack and adjacent concrete pavement surface shall then be blown clean and dried, using a hot compressed air lance.

When resealing joints and cracks, cleaning shall remove all existing joint sealing compound.

369.07.06 Backer Rod Installation

Backer rod installation is required when a reservoir cut is used.

Backer rods shall have a minimum diameter of 25% greater than the reservoir width. They shall be installed immediately after cleaning and drying of the joints before joint sealing compound installation. Backer rods shall be inserted uniformly to the required depth to achieve the required shape factor.

Backer rods shall be inserted using a double wheel steel roller and shall not be punctured or stretched during the installation process.

369.07.07 Joint Sealing Compound Installation

369.07.07.01 General

Transverse joints shall be filled prior to longitudinal joints.

Joint sealing compound shall be installed according to the manufacturer's recommendations and as specified in the Contract Documents.

369.07.07.02 Joint Sealing Compound Preparation and Installation

The joint sealing compound shall be slowly melted with constant agitation until it is in a lump-free, free-flowing state, within the application temperature range recommended by the manufacturer for application.

The Contract Administrator shall be informed at least 24 hours prior to the initial charging of the empty kettle with joint sealing compound. The initial charge of material shall be placed in an empty kettle. The Contract Administrator shall be granted access to witness the empty kettle and initial charge of joint sealing compound upon request.

Joints and cracks shall be clean and dry when the joint sealing compound is placed.

The joint sealing compound shall be placed by a manual pouring cone or hose and wand fitted with a tip from a low pressure pump connected to the heating kettle. The tip shall be small enough to fit inside the joint or crack and extend to the bottom of the sawcut or, when specified, to the top of the backer rod.

When filling joints or cracks with a reservoir, the tip of the cone or wand shall be placed to the top of the backer rod to ensure uniform application.

When filling joints without reservoir, the tip of the cone or wand shall be placed at the bottom of the sawcut to ensure uniform application.

Joints and cracks shall be filled with joint sealing compound so that upon cooling, the joint sealing compound is recessed 3 to 6 mm below the adjacent concrete pavement surface. If the initial placement of material subsides below the required recess depths, additional joint sealing compound shall be placed within 8 hours of the original placement.

Joint sealing compound shall be fully adhered to the concrete on both sides of the joint or crack.

Joint sealing compound damaged by construction traffic or by the Contractor's operations shall be removed and replaced.

Any spilled material or excess material in the joints or cracks shall be removed immediately and the concrete pavement surface cleaned.

The material heated shall be placed on the same Day. Excess heated material shall be disposed of and shall not be used on subsequent Days.

369.07.08 Material Sampling and Testing

369.07.08.01 Sampling of Hot Poured Rubberized Joint Sealing Compound

During the installation of the joint sealing compound, a 4-litre sample of the joint sealing compound shall be submitted to the Contract Administrator, upon request, for testing by the Owner. The joint sealing compound shall be sampled from the heating kettle.

All containers used for sampling shall be metal, with double tight lids. The Contract Administrator shall be allowed to examine the sample containers prior to sampling to ensure they are clean and free of debris.

Samples shall be accompanied by a sample data sheet and WHMIS label. Samples shall be delivered with a transmittal form identifying the following information:

- a) Contract number.
- b) Name of Contractor and a contact person's name and telephone number.
- c) Contract Administrator's name and telephone number.
- d) Quantity, type of sample, and product name.
- e) Date sampled (yyyy-mm-dd).
- f) Temperature of the joint sealing compound in the heating kettle at the time of sampling.
- g) Date shipped.
- h) Sample location.

369.07.08.02 Coring for Cleaning and Sealing Inspection

After sealing operations are complete, the Contract Administrator may require that cores be taken at joint or crack locations to evaluate the acceptability of the joint or crack cleaning and sealing.

Coring shall be carried out according to CSA A23.2-14C. The cores shall be 100 mm in diameter and shall be drilled through the full depth of concrete pavement or concrete base, perpendicular to the surface of the concrete pavement or concrete base. No core shall be taken within 250 mm of any joint or edge of slab.

If the samples show that the joint or crack cleaning and sealing are not according to this specification, additional cores may be required at no additional cost to the Owner to determine the extent and locations of the improperly cleaned or improperly sealed joints.

Core holes shall be repaired according to OPSS 1350.

369.07.09 Management of Excess Material

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

369.08 QUALITY ASSURANCE

369.08.01 Acceptance of Hot Poured Rubberized Joint Sealing Compound

When hot poured rubberized joint sealing compound is tested, acceptance shall be according to OPSS 1212. Unacceptable hot poured rubberized joint sealing compound shall be removed and replaced.

369.08.02 Acceptance of Cleaning and Sealing

During and after sealing operations, the Contract Administrator will inspect the joints and cracks including any cores taken at joint or crack locations to evaluate the acceptability of the joint cleaning and sealing. The Contract Administrator will reject all or a portion of the work if the inspection shows that the joint or crack cleaning and sealing is not according to this specification. Rejected portions of the work shall be removed and replaced.

369.09 MEASUREMENT FOR PAYMENT

369.09.01 Actual Measurement

369.09.01.01 Sealing of Cracks

Measurement of sealing of cracks in existing concrete pavement or concrete base shall be by length in metres measured along the centreline of the crack.

369.09.01.02 Resealing of Joints and Cracks

Measurement of resealing of joints and cracks in existing concrete pavement or concrete base shall be by length in metres measured along the centreline of the joint or crack.

369.09.02 Plan Quantity Measurement

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

369.10 BASIS OF PAYMENT

**369.10.01 Sealing of Cracks - Item
Resealing of Joints and Cracks - Item**

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material required to do the work.

Sawcutting, cleaning and sealing of joints in new concrete pavement shall be paid under the Concrete Pavement item according to OPSS 350.

Sawcutting and cleaning of joints in new concrete base shall be paid under the Concrete Base item according to OPSS 350.

Sawcutting, cleaning and sealing of joints for concrete pavement repairs and the sawcutting and cleaning of joints for concrete base repairs shall be paid under the appropriate tender items according to OPSS 366.

When the maximum width of repair is greater than 25 mm for both transverse and longitudinal cracks and joints, the work directed by the Contract Administrator shall be administered as a Change in the Work.

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