

TENDER DOCUMENTS

SUBSECTION 6.92 SEALING OF ASPHALT PAVEMENT CRACKS

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SUBSECTION 6.92 SEALING OF ASPHALT PAVEMENT CRACKS

6.92.1 GENERAL

6.92.1.1 This subsection describes the requirements relating to the sealing of asphalt pavement cracks covered by this Contract.

6.92.1.2 The sealing of cracks consists in sealing the cracks of an asphalt pavement without milling the cracks.

6.92.2 MEASUREMENT UNITS

6.92.2.1 The measurement units and respective symbols thereof used in this subsection are described as follows:

Measurement Unit	Designation	Symbol
length	meter	m
length	millimeter	mm
volume	cubic meter	m ³
pressure	kilopascal	kPa
temperature	Celsius degree	°C
time	hour	h
time	minute	min
time	second	s
speed	meter per second	m/s

6.92.3 REFERENCE STANDARDS

6.92.3.1 The **Contractor** shall carry out the crack sealing in accordance with the requirement of the following standards and documents, to which the provisions of this Contract are added:

6.92.3.1.1 (ASTM) ASTM International:

- ASTM D5167 *Standard Practice for Melting of Hot-Applied Joint and Crack Sealant and Filler for Evaluation.*

6.92.3.1.2 (MTQ) Ministère des Transports du Québec:

- MTQ – *Cahier des charges et devis généraux (CCDG);*
- MTQ – *Normes – Ouvrages routiers – Tome II – Construction routière;*
- MTQ – *Normes – Ouvrages routiers – Tome VI – Entretien;*
- MTQ – *Normes – Ouvrages routiers – Tome VII – Matériaux;*

- (LC) Laboratoire des chaussées du MTQ:
 - *LC Guide d'entretien et de Réhabilitation des chaussées en béton de ciment;*
 - *LC Manuel d'identification des dégradations des chaussées en béton de ciment.*

6.92.4 MATERIALS

- 6.92.4.1 The **Contractor** shall use sealing materials made from bitumen modified by the addition of polymers and other additives in accordance with MTQ standard 4401.
- 6.92.4.2 The sealing material shall be prepared and hot-applied in accordance with the manufacturer's recommendations.
- 6.92.4.3 The non-stick paper shall be a 75 µm thick single-sheet absorbent hygienic paper of an approximate width of 100 mm.

6.92.5 EQUIPMENT AND TOOL

6.92.5.1 COMPRESSOR

- 6.92.5.1.1 The compressor used for supplying the hot air lance with air shall provide air free of oil, fat and humidity.
- 6.92.5.1.2 The compressor shall provide the volume of air and the air pressure required to meet the requirements for the hot air lance.
- 6.92.5.1.3 The compressor must have sufficient power for a swept volume of 297 m³/h.

6.92.5.2 CLEANING DEVICES

- 6.92.5.2.1 The **Contractor** shall provide a cleaning device of the type self-propelled compact vacuum sweeper equipped with a vacuum system capable of completely emptying the cracks from dust and loose materials.

6.92.5.3 HOT AIR LANCE

- 6.92.5.3.1 The hot air lance required shall be LAB Hot Air Lance, Model B, manufactured by LAB, or equivalent authorized by the Engineer.
- 6.92.5.3.2 The hot air lance shall be capable of providing a jet of hot air with the following characteristics:
- 6.92.5.3.2.1 a temperature of 300°C;
 - 6.92.5.3.2.2 a flow of 3.5 m³/min;
 - 6.92.5.3.2.3 a pressure of 600 kPa;

- 6.92.5.3.2.4 a speed of 300 m/s.
- 6.92.5.3.3 The hot air lance shall be equipped with the safety devices required by the government safety standards to ensure the safety of the operator and of the public.
- 6.92.5.4 KETTLE
- 6.92.5.4.1 The kettle used for heating the sealing material shall be double-walled, of the oil bath-type and equipped with a device for continuous stirring of the thermal oil and also equipped with a circulating pump. The kettle shall also be equipped with thermometers and with an automatic temperature control device for controlling the temperature of the oil and of the sealing material and also equipped with automatic control devices on the heating system.
- 6.92.5.4.2 The sealing material mixing system of which the kettle is equipped shall meet the recommendations of each sealing material manufacturer.
- 6.92.5.5 APPLICATION EQUIPMENT
- 6.92.5.5.1 The injection nozzle for the sealing material application shall make it possible to control the quantity and profile during application thereof and shall be equipped with a scraper for smoothing the flat surfaces and removing any sealing material surplus on the horizontal surface.
- 6.92.5.5.2 Such scraper shall be large enough to cover the edges of the groove, so that the walls thereof are well covered. The shape of the scraper shall make it possible to cover the crack with a thickness of 3 to 4 mm over a width of 40 mm, symmetrically on both sides of the crack (approximately 20 mm on each side).
- 6.92.5.5.3 The temperature of the material shall, at all times, be maintained within the limits prescribed by the manufacturer through the recirculation of the product in the kettle.
- 6.92.5.5.4 The use of pouring containers and spreaders on wheels is prohibited.

6.92.6 EXECUTION OF WORK

- 6.92.6.1 TECHNICAL DATA SHEETS
- 6.92.6.1.1 At least fourteen (14) days prior to the start of the sealing of cracks work, the **Contractor** shall submit to the Engineer, for review, the technical data sheets for the materials and equipment that the **Contractor** intends to use for the sealing of cracks.

6.92.6.2 CERTIFICATE OF CONFORMITY

6.92.6.2.1 At least fourteen (14) days prior to the start of the sealing of cracks work, the **Contractor** shall provide the Engineer with a dated and signed certificate of compliance from the manufacturer's laboratory manager for each sealant production batch and containing the following information, without however being limited thereto:

6.92.6.2.1.1 the name of the manufacturer;

6.92.6.2.1.2 the date of manufacture;

6.92.6.2.1.3 the product name;

6.92.6.2.1.4 the production batch number;

6.92.6.2.1.5 the maximum heating temperature according to standard ASTM D5167;

6.92.6.2.1.6 the minimum product application temperature according to standard ASTM D5167.

6.92.6.2.2 The information described above shall be indicated on each container or packaging of sealing materials.

6.92.6.3 CLEANING OF CRACKS WITH COMPRESSED AIR

6.92.6.3.1 The **Contractor** shall carry out the primary cleaning of the cracks using compressed air.

6.92.6.3.2 The cleaning with compressed air shall allow the removal of dust, debris and other dirt from the cracks.

6.92.6.3.3 The compressed air hose shall be positioned 2 to 5 cm above the crack to be cleaned. It shall be tilted and moved so as to direct the cleaning from the center of the roadway towards the shoulders for the transversal cracks, and in the direction of traffic for the longitudinal cracks.

6.92.6.3.4 The **Contractor** shall take the necessary measures to prevent dust from stirring up and dispersing during this operation.

6.92.6.4 CLEANING OF THE CRACKS WITH THE HOT AIR LANCE

6.92.6.4.1 The **Contractor** shall carry out the final cleaning and drying with the hot air lance so as to remove the moisture in the cracks.

6.92.6.4.2 The jet of hot air shall be set at a temperature of about 300°C so as not to burn the pavement.

6.92.6.4.3 The lance may be mounted on a wheeled trolley in order for a distance of a few centimeters to be maintained between the lance nozzle opening and the pavement.

- 6.92.6.4.4 The lance shall be tilted so as to direct the cleaning from the center of the roadway towards the shoulders for the transversal cracks, and in the direction of traffic for the longitudinal cracks.
- 6.92.6.4.5 The lance shall be moved at the speed required to avoid burning and oxidizing the pavement.
- 6.92.6.4.6 In no case shall the **Contractor** direct the nozzle towards pedestrians and automobiles.
- 6.92.6.4.7 The crack sealing work shall be authorized by the Engineer before proceeding with the sealing.
- 6.92.6.5 HEATING OF THE SEALING MATERIAL
- 6.92.6.5.1 The sealing material shall be heated in a double-walled kettle equipped with two (2) thermometers, one for the heat-transfer oil and the other for the sealing material, and with an automatic temperature control device. The **Contractor** shall comply with the sealing material supplier's recommendations regarding the upper and lower heating and application temperature limits.
- 6.92.6.5.2 The sealing material shall be heated in accordance with the period of time recommended by the manufacturer.
- 6.92.6.5.3 The sealing material that has been heated to a temperature above the recommended temperature will be immediately rejected by the Engineer and shall immediately be disposed of at the **Contractor's** expense.
- 6.92.6.5.4 If, during the day, the **Contractor** needs to add sealing material in the kettle, the **Contractor** shall ensure that the material at the kettle outlet is at the right application temperature, failing which the work shall be stopped until the temperature stabilizes within the allowable limits recommended by the manufacturer.
- 6.92.6.5.5 The Engineer reserves the right to collect three (3) samples in the kettle (lower, middle and upper thirds) to ensure that the material is not oxidized, while being applied at the right temperature.
- 6.92.6.5.6 The kettle shall be emptied at the end of each day.
- 6.92.6.6 APPLICATION
- 6.92.6.6.1 All single cracks with an opening between 3 and 20 mm wide shall be sealed.
- 6.92.6.6.2 Within a maximum of five (5) minutes after the cracks have been cleaned by means of a hot process, the sealing material shall be placed in the crack up to the level of the existing paving and shall be smoothed using a scraper which, in addition to covering the edges of the groove, ensures a thickness of 3 to 4 mm on the crack over a width of approximately 20 mm on both sides of the crack.

- 6.92.6.6.3 When the crown or gradient of the roadway is sharp, in order to avoid that the sealant flows down the slope and that the crack empties, the product temperature may be lowered by a few degrees. The **Contractor** shall however obtain authorization from the Engineer before proceeding.
- 6.92.6.6.4 When the application is completed, any overflow of sealant on each side of a crack shall be removed while the product is still hot.
- 6.92.6.6.5 Any streaks of sealing material from one crack to another shall be avoided by the proper operation of the stop valve. If there is a streak, it shall be removed immediately.
- 6.92.6.6.6 The **Contractor** shall apply the sealing material when the air temperature is above 7°C and below 30°C and when it hasn't rained in the last twelve (12) hours. These conditions shall be checked at the beginning of each workday.
- 6.92.6.6.7 If it proves necessary to apply a second layer of sealing material to ensure that the crack is properly filled or to avoid overflows, the interval between each application shall not exceed five (5) minutes in order to avoid any possible loss of adhesion between the layers.
- 6.92.6.6.8 The hot cleaning of the cracks and application of the sealing material shall be carried out simultaneously, within a period of less than five (5) minutes, to prevent dust or dirt from settling again on the cleaned cracks.
- 6.92.6.6.9 The **Contractor** shall prohibit any traffic on the sealing material for at least thirty (30) minutes following the application. The **Contractor** shall therefore plan the signage accordingly and shall also provide for an adequate number of cones to divert traffic.
- 6.92.6.6.10 The **Contractor** is required to proceed with the application of non-stick paper to prevent the freshly applied sealing material from sticking to the tires of vehicles. The non-stick paper shall be applied a few minutes after the application of the sealing material. The **Contractor** shall be careful not to press on the paper roll too much in order not to crush the product.
- 6.92.6.7 FINAL CLEANING
- 6.92.6.7.1 The **Contractor** shall remove any substances or foreign materials from its sealing of cracks work that are on the roadway and shall dispose of it at its expense.
- 6.92.6.7.2 No later than one (1) hour after the end of the sealing of cracks works, the **Contractor** shall proceed with the cleaning of the roadway and sidewalks.
- 6.92.6.7.3 If the roadway has been damaged by substances or foreign materials and the **Contractor** does not carry out the requested repairs, the **Owner** can carry out the necessary repairs at the **Contractor's** expense.

6.92.7 QUALITY CONTROL

6.92.7.1 For the acceptance of the sealing of asphalt pavement cracks work, the Engineer shall proceed with the following checks, without however being limited thereto:

6.92.7.1.1 the compliance of the products used;

6.92.7.1.2 the quality of the sealing material after heating in accordance with the CCDG;

6.92.7.1.3 the adhesion of the sealing material;

6.92.7.1.4 the maximum thickness of 4 mm of the sealing material above the crack on a width of about 40 mm;

6.92.7.1.5 the cleanliness of the site at the end of the work.

END OF SUBSECTION