



**CONSTRUCTION SPECIFICATION FOR DECK JOINT ASSEMBLIES,  
PREFORMED SEALS, JOINT FILLERS, JOINT SEALS, JOINT SEALING  
COMPOUNDS, AND WATERSTOPS - STRUCTURES**

---

**TABLE OF CONTENTS**

<b>920.01</b>	<b>SCOPE</b>
<b>920.02</b>	<b>REFERENCES</b>
<b>920.03</b>	<b>DEFINITIONS</b>
<b>920.04</b>	<b>DESIGN AND SUBMISSION REQUIREMENTS</b>
<b>920.05</b>	<b>MATERIALS</b>
<b>920.06</b>	<b>EQUIPMENT - Not Used</b>
<b>920.07</b>	<b>CONSTRUCTION</b>
<b>920.08</b>	<b>QUALITY ASSURANCE</b>
<b>920.09</b>	<b>MEASUREMENT FOR PAYMENT - Not Used</b>
<b>920.10</b>	<b>BASIS OF PAYMENT</b>

**APPENDICES**

<b>920-A</b>	<b>Commentary</b>
--------------	-------------------

**920.01 SCOPE**

This specification covers the requirements for the installation and modification of deck joint assemblies and the placing of preformed seals, joint fillers, joint seals, joint sealing compounds, and waterstops.

**920.01.01 Specification Significance and Use**

This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

## **920.01.02 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.

## **920.02 REFERENCES**

When the Contract Documents indicate that provincial-oriented specifications are to be used and there is a provincial-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.PROV, unless use of a municipal-oriented specification is specified in the Contract Documents. When there is not a corresponding provincial-oriented specification, the references below shall be considered to be to the OPSS listed, unless use of a municipal-oriented specification is specified in the Contract Documents.

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

### **Ontario Provincial Standard Specifications, Construction**

OPSS 501	Compacting
OPSS 904	Concrete Structures
OPSS 914	Waterproofing Bridge Decks with Hot Applied Asphalt Membrane
OPSS 928	Structure Rehabilitation-Concrete Removal
OPSS 929	Abrasive Blast Cleaning - Concrete Construction
OPSS 930	Structure Rehabilitation-Concrete Patches, Refacing, and Overlays

### **Ontario Provincial Standard Specifications, Material**

OPSS 1010	Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
OPSS 1204	Polyvinyl Chloride Waterstops
OPSS 1210	Deck Joint Assemblies
OPSS 1212	Hot Poured Rubberized Asphalt Joint Sealing Compound
OPSS 1302	Water
OPSS 1308	Joint Filler In Concrete
OPSS 1350	Concrete - Materials and Production

### **Ontario Ministry of Transportation Publications**

Laboratory Testing Manual:

LS-407	Method of Test for Compressive Strength of Moulded Cylinders
--------	--

LS-433 Method of Test for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration

**ASTM International**

D 1056-14 Standard Specification for Flexible Cellular Materials, Sponge or Expanded Rubber

**920.03 DEFINITIONS**

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

**Armouring Angle** means the expansion joint angle at the gap.

**Bearing** means a structural device that transmits load while permitting translation or rotation or both.

**Blockout** means a cavity created to permit the installation of deck joint assemblies.

**Certificate of Conformance** means a document issued by the Quality Verification Engineer confirming that the specified components of the Work are in general conformance with the requirements of the Contract Documents.

**Elastomer** means a compound containing virgin polychloroprene (neoprene).

**Joint Seal** means ethyl vinyl acetate foam.

**Joint Sealing Compound** means a hot applied material, which is not preformed, used to seal a joint.

**Nosing Angle** means the angle that forms the outside edges of the blockout.

**Preformed Seal** means an extruded elastomer that, when retained in recesses in the deck joint assembly, prevents the passage of water and other materials.

**Product Drawings** means drawings prepared by the manufacturer that have been approved by the Owner for use with the product.

**Quality Verification Engineer (QVE)** means an Engineer retained by the Contractor qualified to provide the services specified in the Contract Documents.

**Trial Installation** means an installation designated by the Owner for the purpose of proving the performance of a particular joint system.

**Upturn** means an upward vertical change in direction of the seal at the gutter lines.

**920.04 DESIGN AND SUBMISSION REQUIREMENTS**

**920.04.01 Submission Requirements**

**920.04.01.01 Notice of Manufacturer**

Within 30 Days of the Contract award, the name and address of the manufacturer of the deck joint assembly shall be submitted in writing to the Contract Administrator.

**920.04.01.02 Deck Joint Assembly Working Drawings**

**920.04.01.02.01 General**

Prior to commencement of fabrication of the deck joint assembly, 1 hardcopy set and 1 electronic PDF copy of deck joint assembly Working Drawings, shall be submitted to the Contract Administrator for information purposes only. An Engineer shall affix his or her seal and signature on the Working Drawings verifying that the drawings are consistent with the Contract Documents and product drawings.

A sealed and signed copy of these drawings shall be kept at the manufacturing plant during the joint assembly fabrication and at the site prior to and during installation of the deck joint assembly.

**920.04.01.02.02 Modular Expansion Joints**

In addition to the general requirements for modular expansion joints, the deck joint assembly Working Drawings shall also bear the seal and signature of a design-checking Engineer. The deck joint assembly manufacturer shall submit the approved product drawings along with the Working Drawings.

The product drawings shall specify all material properties, dimensions, connection attachments, injection hose system, splices, fasteners and accessories, and the individual alphanumeric identification numbers. The product drawings for modular joints shall bear the seal and signature of an Engineer.

**920.04.01.02.03 Drawing Content**

The deck joint assembly Working Drawings shall clearly indicate the following:

- a) Material properties.
- b) Dimensions.
- c) Connection attachments.
- d) Injection hose system components and name of approved injection company.
- e) Shop, field, and stage construction splices.
- f) Fasteners and accessories.
- g) Installation details.
- h) Individual alphanumeric identification number for each stage of installation.
- i) Handling procedures including lifting points.
- j) Manufacturer's installation procedure
- k) Turn-of-nut procedure specified in the Contract Documents for achieving the required bolt pretension.
- l) For modular joints, the stiffness of the mechanism shall be shown on the Working Drawings.

**920.04.01.02.04 Deck Joint Assembly Modification**

In addition to the requirements of the previous clause, where a deck joint assembly is to be placed over an existing joint, the deck joint assembly Working Drawings shall show all connection details between the new and the existing deck joint assemblies.

**920.04.01.03 Field Dimensions**

Prior to the commencement of fabrication of the deck joint assembly, a drawing showing the actual joint dimensions at the existing deck joint assembly locations shall be submitted to the Contract Administrator.

**920.04.01.04 Cold Weather Protection for Epoxy Injection**

One week prior to the commencement of epoxy injection of the deck joint assembly in cold weather, a description of the method to be used to control the concrete temperature shall be submitted to the Contract Administrator. The submission shall be accompanied by samples of insulation when requested by the Contract Administrator. The description shall contain the following information:

- a) Weather conditions for which the description applies.
- b) Type of insulation, metric R value, and number of layers to be used.
- c) Description of housing and heating.
- d) Method of protection employed to effectively maintain the concrete temperature above 5 °C in the expansion joint blockout during the injection and continuously for a period of 48 hours after epoxy injection.

**920.04.01.05 Interim Inspection After Fabrication of Expansion Joints**

Upon completion of fabrication and prior to delivery, the Quality Verification Engineer shall conduct an interim inspection of the work to verify that the fabrication of the expansion joint has been carried out according to the deck joint assembly Working Drawings and Contract Documents and issue written permission to proceed. A copy of the permission to proceed shall be submitted to the Contract Administrator for information purposes.

**920.04.01.06 Concrete Mix Design**

A mix design shall be submitted according to OPSS 1350 for concrete in deck joint assemblies.

**920.05 MATERIALS**

**920.05.01 Anti-seize Compound**

Anti-seize compound shall be according to OPSS 1210.

**920.05.02 Concrete**

Concrete in which the deck joint assemblies are embedded shall be according to the Materials section of OPSS 1350 with the following additions:

- a) The nominal maximum size of coarse aggregate for concrete shall be 13.2 mm.

- b) The concrete shall have an initial slump of 40 mm ± 20 mm. This slump shall be increased when required by the addition of the superplasticizer at the site according to the written instructions of the superplasticizer manufacturer. The tolerance on measurement of concrete slump after addition of superplasticizer shall be ± 30 mm and the maximum slump including tolerance shall not exceed 180 mm.
- c) The rapid chloride permeability of hardened concrete at 28 to 32 days shall be less than or equal to 2,500 coulombs.

**920.05.03 Deck Joint Assemblies**

Deck joint assemblies shall be according to OPSS 1210.

**920.05.04 Granular A**

Granular A shall be according to OPSS 1010.

**920.05.05 Joint Fillers**

Joint fillers shall be according to OPSS 1308.

**920.05.06 Joint Seals and Joint Sealing Compounds**

Joint seals shall be according to ASTM D 1056 for ethyl vinyl acetate foam. The top surface of the ethyl vinyl acetate foam shall be embossed with the manufacturer's name and product identification.

Joint sealing compounds shall be according to OPSS 1212.

**920.05.07 Lubricant**

The lubricant shall be water soluble, non-adhesive, and non-staining. Lubricants used between the steel components and preformed seals shall not be deleterious to the joint materials or the surrounding concrete.

**920.05.08 Preformed Seals**

Preformed seals shall be according to OPSS 1210. Preformed seals older than two years at the time of installation shall not be used.

**920.05.09 Water**

Water used for curing shall be according to OPSS 1302.

**920.05.10 Waterstops**

Waterstops shall be according to OPSS 1204.

**920.07 CONSTRUCTION**

**920.07.01 Operational Constraints**

During construction, joints shall be protected from chloride ingress during winter weather, extending from November 1 to April 15, by the installation of a temporary joint seal meeting the requirements of this specification.

**920.07.02 Installation of Deck Joint Assemblies**

**920.07.02.01 General**

Concrete work shall be according to OPSS 904, except as specified herein.

The plastic concrete shall be sampled and tested for slump, plastic air content and temperature according to the Materials Sampling and Testing section of OPSS 1350.

Deck joint assemblies shall be installed according to the deck joint assembly Working Drawings.

Any damage to the galvanic corrosion protection coating system, including surface areas of field welds, shall be repaired with 2 coats of brush applied zinc-rich touch-up coating applied according to the coating manufacturer's recommendations.

The threaded portion of the bolts and the underside of bolt heads shall be liberally coated with anti-seize compound immediately prior to installation.

The bolts that have been fully tensioned and require removal after final installation shall not be reused to fasten the clamping bars.

For modular expansion joint installations, the manufacturer's representative shall be present on site during the installation to ensure proper installation.

**920.07.02.01.01 Traffic Restrictions**

Traffic, including construction traffic, shall not be permitted on any part of each stage of the deck joint assembly until all of the following conditions are met:

- a) Concrete has attained a minimum compressive strength of 25 MPa. Early strength determination of concrete compressive strength shall be according to OPSS 904.
- b) Epoxy injection has been completed.
- c) Epoxy has cured for a minimum of 24 hours.
- d) For cold weather, epoxy has cured for 48 hours after epoxy injection or the curing time as specified in the manufacturer's data sheet, whichever is longer.
- e) For Type A joints, the clamping bars have been installed.

**920.07.02.02 Protection**

The deck joint assembly shall be lifted by nylon slings placed at the lifting points indicated on the deck joint assembly Working Drawings.

During storage, the deck joint assembly shall be protected from dirt and deleterious materials and stored so that distortion cannot occur. The deck joint assembly shall be supported on wood blocking spaced a maximum of 2 m apart.

Prefomed seals storage and handling requirements shall be according to the manufacturer's recommendations.

### **920.07.02.03 Splicing**

The location and number of field and stage construction splices and method of splicing of metal components shall be as detailed on the deck joint assembly Working Drawings. Field splicing of modular joints shall not be permitted. For new construction, where the length of the expansion joint is greater than 15 m and a splice is required, a splice shall be located at a lane demarcation line near the centreline of the structure.

The prefomed seal shall be continuous with no splices.

### **920.07.02.04 Placing**

The deck joint assemblies shall be placed after the asphalt paving operation has been completed.

A blockout shall be formed for the deck joint assembly during concrete construction of the deck, ballast wall, and barrier or parapet wall. When new barrier or parapet walls are to be constructed, bulkheads shall be used to form blockouts in the barrier or parapet wall for the deck joint assemblies. The dimensions of the blockout in the barrier or parapet wall shall not be greater than those of the blockout in the deck and ballast wall except for the modular joints in structures. The removal of concrete required to prepare the blockout shall be carried out prior to the paving operation.

Prior to filling the blockout, the expansion joint gap shall be plugged to support the material placed in the blockout. The method used to plug the gap shall accommodate the anticipated movement of the structure and retain the blockout material until the joint is to be placed. Granular A shall be used to fill the blockout and then compacted to 100% of the maximum dry density according to OPSS 501. Granular A shall be placed as follows:

- a) When only construction vehicles and equipment are going to use the bridge and cross over the blockout prior to asphalt paving, the Granular A shall be placed from the top of the plug up to a height that is level with the top of the adjacent concrete.
- b) When traffic is to be maintained on the bridge and cross over the blockout prior to asphalt paving, the Granular A shall be capped with 50 mm of cold mix or hot mix asphalt placed level with the top of the adjacent concrete. The top surface of the asphalt shall be maintained smooth and level with adjacent concrete and shall not ravel.

Prior to asphalt paving, the edges of the blockout shall be accurately marked and the markings shall be visible after paving so that the joint location can be accurately identified. The paving operation shall be continuous over the area, which includes the deck, approach slabs, and 20 m beyond the end of each approach slab. Transverse joints in the asphalt pavement shall not be permitted.

When bridge deck waterproofing and asphalt paving are part of this Contract, all material used to fill the blockout shall be removed within 10 Days of asphalt being placed, as follows:

- a) The new asphalt pavement shall be saw cut full depth at the limits of the blockout.



- b) The asphalt from the blockout areas shall be removed and temporary wood angles with a minimum thickness of 19 mm shall be placed to protect the saw cut asphalt edges for the full depth of asphalt.
- c) All the material used to fill the blockout and to plug the expansion gap, including any supports or bracing, shall be removed to the depth of the bearing seat.
- d) Asphalt residue shall be cleaned from the steel reinforcement.

Before placing the steel reinforcement, and not more than 48 hours prior to placement of concrete in the blockout, the concrete faces of the blockout shall be abrasive blast cleaned according to OPSS 929. After completion of this work, the deck joint assembly shall be placed in the blockout 3 mm below the elevation of asphalt pavement and in the position specified in the deck joint assembly Working Drawings.

Immediately prior to placing the concrete in the blockout, the top setting devices shall be adjusted to give the specified setting width required by the deck joint assembly Working Drawings. The setting devices shall then be tightened and the deck joint assembly secured at the correct width, line, and grade by welding the loop anchors and stud anchors to the steel reinforcement. The location of these welds shall be at least 100 mm below the top of the end dams and the spacing shall be at approximately 500 mm centres.

All concrete surfaces to receive concrete shall be maintained in a wet condition for a period of 1 hour prior to placing any new concrete. Immediately prior to wetting the concrete surface, all dust and loose material shall be removed from the prepared surface by using compressed air. Prior to placing concrete, excess water shall be removed from the surface using compressed air.

Concrete shall be placed and consolidated to minimize voids under the deck joint assembly and shall be hand finished with a wooden float. All steel surfaces that are going to be in contact with the preformed seal shall be protected during concrete placement.

After concrete placement, the exposed faces of the structural steel shapes shall be cleaned to remove any concrete and deleterious material. The setting devices shall be flame cut at the gap between 2 to 4 hours after the concrete placement.

The setting device boltholes for all nosing angles, as well as for the armouring angles, of the joints shall be drilled to a depth of 20 mm, air blast cleaned, and immediately filled with epoxy.

After installation of the deck joint assemblies, a 20 mm wide groove shall be saw cut for the full depth of asphalt adjacent to each steel nosing angle. If the previously saw cut face is undamaged and within 5 mm of the specified location, the Contractor may elect to form the groove. The grooves shall be cleaned, dried, and filled with hot poured rubberized joint sealing compound according to OPSS 914.

#### **920.07.02.05                      Concrete Curing**

Curing shall be according to OPSS 904 with the exception that the moist curing period shall be 7 Days.

#### **920.07.02.06                      Epoxy Injection**

##### **920.07.02.06.01                  General**

Epoxy shall be injected into the injection hose system once concrete in the expansion joint blockouts has reached a minimum compressive strength of 25 MPa and curing of concrete has been completed. Early strength determination of concrete compressive strength shall be according to OPSS 904.

The epoxy shall be kept at a temperature of 20 °C ± 5 °C prior to its use.

#### **920.07.02.05.02 Injection Method**

Only the supplier of the expansion joint system or an agent approved by the supplier shall inject the epoxy used in the injection hose system.

Epoxy shall be mixed and pressure injected according to the manufacturer's specifications.

Injection shall start at the injection fitting at one end of a 2 m section of hose to initially fill the hose and continue until the epoxy discharges from the other injection fitting of the same section. Injection shall then alternate at both fittings of the same section until the epoxy emanates from the voids in the concrete or at the interface between the steel angles and concrete or both. The injection fittings shall then be plugged.

The above procedure shall be repeated in each section of hose until the full length of the expansion joint system has been filled with epoxy. The top surface of the blockout shall be thoroughly cleaned to remove any excess epoxy prior to hardening.

After the epoxy has set, all adapters and injection fittings shall be removed and the ends of each hose shall be filled with epoxy.

The deck joint assembly shall be checked for voids remaining under the angles. Holes shall be drilled in angles where voids are detected and voids and boltholes shall be filled with epoxy.

#### **920.07.02.05.03 Cold Weather Epoxy Injection Requirements**

Epoxy injection shall not be performed without protection when the ambient air temperature is below 5 °C or is likely to fall below 5 °C within 48 hours immediately following the epoxy injection.

When the epoxy injection is to be performed under cold weather conditions, the temperature of the concrete in the expansion joint blockout shall be a minimum of 5 °C prior to the commencement of the injection. The temperature shall be maintained at a minimum of 5 °C for a period of 48 hours after injection or the curing time as specified in the manufacturer's data sheet.

#### **920.07.03 Modification of Deck Joint Assemblies**

##### **920.07.03.01 General**

The requirements of the Installation of Deck Joint Assemblies subsection apply to the Modification of Deck Joint Assemblies subsection.

Before installation of a new deck joint assembly and new steel reinforcement, the existing steel reinforcement, structural steel, and existing concrete against which new concrete is to be placed shall be abrasive blast cleaned according to OPSS 929.

Where a new joint assembly is to be welded to existing hardware, the surface of the existing hardware that is going to be in contact with the new joint assembly shall be abrasive blast cleaned according to OPSS 929.

##### **920.07.03.02 Drilling and Preparation of Holes**

The edge of drilled holes shall not be permitted within 70 mm of a concrete edge.

Holes for dowels or anchor bolts embedded in epoxy shall be impact drilled. The holes shall be cleaned of all deleterious material by air blasting and shall be dry when the epoxy is placed.

#### **920.07.04 Repair of Existing Deck Joints**

Repair of existing deck joint assemblies shall be according to the Installation of Deck Joint Assemblies and the Modification of Deck Joint Assemblies subsections and as specified in the Contract Documents.

When required, repairs to existing concrete within the blockout shall be as directed by the Contract Administrator. Concrete removal and repairs shall be according to OPSS 928 and OPSS 930.

#### **920.07.05 Field Installation of Preformed Seals and Bolted Components**

Preformed seals shall be installed with lubricant in one continuous piece.

Prior to installation of the preformed seal, all steel surfaces in contact with the preformed seal shall be cleaned and the gap completely clear for its full length and width to the depth of the bearing seat. The preformed seal and bolted components shall be installed according to the deck joint assembly Working Drawings. Adhesives and sealants shall not be used.

#### **920.07.06 Placing Joint Fillers and Waterstops**

Joint fillers and waterstops shall be firmly fixed in position before any concrete is placed so that their final position in the concrete remains as shown in the Contract Documents and are true to line and grade.

Field splicing of waterstops shall be by heat fusion.

#### **920.07.07 Placing Joint Seals and Joint Sealing Compounds**

##### **920.07.07.01 Preparation of Joint**

Concrete at all joints shall be sound, clean, dry, and free of all dust, debris, and deleterious material.

The joint face shall be true to line such that the joint seal shall bear on the joint face fully and uniformly.

##### **920.07.07.02 Placing Joint Seals**

Gaps forming longitudinal joints between structures shall be sealed with a joint seal installed with the laminations horizontal.

Prior to installation of the joint seal, the joint recess shall be abrasive blast cleaned and air blasted according to OPSS 929 to remove laitance and deleterious material.

Adhesive shall be applied liberally to both vertical sides of the joint seal and to both vertical faces of the joint recess. Excess adhesive shall be removed immediately.

The joint seal shall be installed such that it remains below the level of the concrete surface when fully compressed.

The joint seals shall not be field spliced.

##### **920.07.07.03 Placing Hot Poured Rubberized Asphalt Joint Sealing Compounds**

Hot poured rubberized asphalt joint sealing compound shall be installed according to OPSS 914 except that the temperature of the air and the materials that is going to be in contact with the sealing compound shall be 2 °C or greater at the time of installation.

**920.07.08 Trial Installations**

Only deck joint assemblies pre-approved for trial installation by the Owner shall be used. The installation procedures shall be according to the manufacturer's detailed instructions, the Contract Documents, and this specification.

**920.07.09 Corrective Work for Initial Acceptance**

All defects or deficiencies identified in the Criteria for Initial Acceptance of the Deck Joint Assembly subsection shall be repaired according to the requirements of this specification and to the satisfaction of the Contract Administrator.

**920.07.10 Sampling for Quality Assurance Testing**

**920.07.10.01 Preformed Seal**

Preformed seal samples shall be taken by the Contractor from the extra length of preformed seal supplied for each joint delivered to the Working Area.

The Contractor shall cut the extra 1 metre length of preformed seal, supplied according to OPSS 1210, in the presence of the Contract Administrator.

From time of sampling and through shipping, the seal shall be stored at a temperature between 10 and 50 °C and shall not be exposed to ultraviolet rays. The seal shall be placed in an opaque container or bag in the presence of the Contract Administrator and sealed and labeled immediately. The label shall have the fabrication company name, seal type, Contract number, lot, and location clearly marked.

The seal shall be delivered by the Contractor to:

Head, Concrete Section  
145 Sir William Hearst Avenue, Room 15  
Downsview, Ontario, M3M 0B6

**920.07.10.02 Concrete Compressive Strength, Air Void System and Rapid Chloride Permeability**

The Contractor shall cast, cure and transport acceptance cylinders for compressive strength, air void system and rapid chloride permeability testing by the Owner according to the Materials Sampling and Testing section of OPSS 1350 with the following exceptions and additions:

- a) A lot shall be all the concrete placed in the expansion joints in one bridge in one day.
- b) One set of three 100 mm diameter x 200 mm long cylinders shall be cast for acceptance testing of 28-Day compressive strength for each lot. Every time a set of acceptance cylinders is cast, a second set of cylinders shall be cast for referee testing purposes.
- c) One 100 mm diameter x 200 mm long cylinder shall be cast for evaluation of air void system parameters for each lot.
- d) One 100 mm diameter x 200 mm long cylinder shall be cast for acceptance testing of rapid chloride permeability for each lot. Every time an acceptance cylinder is cast, a second cylinder shall be cast for referee testing purposes.

### **920.07.11 Expansion Joint Water Test Preparation**

The Contractor shall prepare the Expansion Joint Water Test for evaluation by the Contract Administrator, as follows.

The air, concrete, and deck joint assembly temperature shall be 2 °C or higher at time of testing. The water test and any related corrective work shall be completed prior to any seasonal shutdowns. Where this is not feasible, a proposal detailing an alternative solution shall be submitted to the Contractor Administrator for approval.

After the epoxy has set and before acceptance, the joint shall be water tested over its entire length where there are no upturns. Where there are upturns, the joint shall be tested between the gutter lines. The water shall be continuously ponded for a minimum of 1 hour, maintaining a minimum depth of 25 mm along the tested length and a minimum depth of 100 mm above the deck joint assembly at the gutter lines. For superelevated decks, only the lower gutter line requires the testing at a depth of 100 mm. The width shall extend 50 mm beyond the concrete dams on both sides of the deck joint assembly. When the staging of traffic is required, the joint shall be tested in overlapping sections.

For expansion joints installed at the ends of approach slabs, the expansion joint water test shall not be required.

### **920.07.12 Certificate of Conformance Upon Completion of the Work**

Upon completion of installation of expansion joints, a Certificate of Conformance sealed and signed by a Quality Verification Engineer shall be submitted to the Contract Administrator. The Certificate of Conformance shall state that the work is in general conformance with the requirements of the Contract Documents.

### **920.07.13 Management of Excess Materials**

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

## **920.08 QUALITY ASSURANCE**

### **920.08.01 Acceptance of the Preformed Seal**

Each preformed seal sample shall be tested according to Table 1 of OPSS 1210 by the Owner. Preformed seals shall be acceptable if the sample tested meets the requirements of OPSS 1210. Unacceptable preformed seals shall be removed and replaced at the Contractor's expense. Preformed seals with a date of manufacture of more than two years earlier than the date of sampling shall not be accepted.

A defective seal constitutes grounds for rejection of other seals from the same lot identified by the marking on the seal, within the same Contract.

#### **920.08.01.01 Retesting**

The Contractor may request, in writing, retesting of any sample within five Business Days of receiving notification of rejection of the seal. The results of the retest shall be used for acceptance determination and shall be binding on both parties. If the retesting results in rejection of the seal, the Contractor shall bear the cost of the retesting. If the retesting results in the material passing all test criteria, the retesting charge shall be paid by the Owner.

## **920.08.02 Acceptance of Concrete Compressive Strength**

Compressive strength shall be determined according to LS-407.

The compressive strength result of a lot shall be the average of the set of 3 acceptance cylinders made from the lot, rounded to one decimal place.

The individual test results shall be forwarded to the Contractor, as they become available.

Concrete compressive strength for the lot shall be considered acceptable when it meets all of the following:

- a) The average compressive strength tests shall be equal to or greater than the specified strength.
- b) No individual strength test shall be more than 4.0 MPa below the specified strength.

Unacceptable lots shall be removed and replaced.

The Contractor may submit an alternative remedy in writing for the Owner's consideration for unacceptable concrete.

### **920.08.02.01 Referee Testing**

Referee testing and referee testing cost for concrete compressive strength shall be according to OPSS 1350.

## **920.08.03 Acceptance of Air Void System in Hardened Concrete**

Acceptance of air void system, including referee testing, shall be according to OPSS 1350 with the following exceptions:

- a) The lot size shall be according to this specification.
- b) One cylinder is tested per lot rather than cores. All references to cores in the Acceptance of Air Void System in Hardened Concrete of OPSS 1350 are replaced by cylinder.

## **920.08.04 Acceptance of Rapid Chloride Permeability**

The cylinder representing the lot shall be tested for rapid chloride permeability according to LS-433. Acceptance testing shall be carried out at 28 to 32 Days. Two 50 mm long samples shall be cut from one of the cylinders representing a lot and tested to determine the acceptance of the lot. The other cylinder shall be retained for referee testing.

Individual test results shall be forwarded to the Contractor, as they become available.

Acceptance of rapid chloride permeability shall be based on the average of result obtained on the cylinder representing the lot. Lots with an average value of rapid chloride permeability less than or equal to 2,500 coulombs are acceptable. Lots with an average value of rapid chloride permeability exceeding 2,500 coulombs and less than or equal to 3,500 coulombs shall be accepted with a payment adjustment. Lots with rapid chloride permeability value exceeding 3,500 coulombs shall be considered unacceptable. Unacceptable concrete shall be removed and replaced at the Contractor's expense.

For the purpose of calculating the payment adjustment, the Contract Administrator shall determine the quantity of concrete in the lots using the dimensions as specified in the Contract Documents.

The payment adjustment shall be calculated and applied as follows:

$$Pa = (C-2500)/5$$

Where:

Pa = payment adjustment in \$/m<sup>3</sup>

C = average rapid chloride permeability of a lot, coulombs

$$\text{Payment reduction per lot} = \text{lot quantity (m}^3\text{)} \times Pa$$

#### **920.08.04.01 Referee Testing**

Referee testing and referee testing cost for rapid chloride permeability shall be according to the procedure used for high performance concrete in OPSS 1350 with the exception that referee testing is done on the reserved cylinder for the lot rather than the reserved core.

#### **920.08.05 Acceptance of Expansion Joint Water Test**

The deck joint assembly shall be acceptable if there is no leakage of water. Leakage of water through the deck joint assembly during this test, including the interface between the preformed seal and the seal retainers, concrete to steel interfaces, and the concrete construction joints, shall constitute failure of the deck joint assembly.

If such failure occurs, the deck joint assembly is to be repaired or replaced and the water test repeated. The method of repair shall be submitted in writing to the Contract Administrator for review prior to commencement of repair work.

#### **920.08.06 Acceptance of Deck Joint Assembly**

On completion of the deck joint assembly installation, the assembly shall be free of the following defects or deficiencies:

- a) Defective preformed seals.
- b) Cracks wider than 0.3 mm and voids in concrete end dams.
- c) Defective coating.
- d) Seal not completely held in retainer.
- e) Turn-of-nut procedure for bolt installation not followed.
- f) Defective, loose, or missing structural components and welds.
- g) A line parallel to the centreline of the structure joining the tops of all steel components of the deck joint assembly that deviates from a line parallel to the pavement profile between nosing angles by more than 3 mm, at any location along the length of the expansion joint.
- h) For modular joints, at any location along the length of the deck joint assembly, the relative difference in the opening between the steel retainers exceeds the narrowest width by 6 mm. This dimension shall be measured at the level of the road surface, perpendicular to the centreline of the expansion joint, and at the inner faces of the retainers.

- i) Any portion of the deck joint assembly is extending above the finished road surface.
- j) For expansion joints installed at the ends of approach slabs, joints will be accepted based on visual acceptance by the Contract Administrator to verify seal integrity and retention.

**920.10 BASIS OF PAYMENT**

**920.10.01 Deck Joint Assemblies, Installation - Item  
Deck Joint Assemblies, Modification - Item**

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

**920.10.02 Repair of Existing Deck Joints - 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.

When the repairs are not specified in the Contract Documents, payment for the cost of repairing existing deck joints and of repairing concrete prior to the installation of deck joint assemblies or preformed seals in existing structures shall be administered as a Change in the Work.

**920.10.03 Repairs of Defects and Deficiencies**

Repair of defects or deficiencies identified during the inspection for acceptance of deck joint assemblies shall be completed with no additional cost to the Owner.

**920.10.04 Preformed Seals, Joint Fillers, Joint Seals, Joint Sealing Compounds, and Waterstops**

Payment for the tender items in which preformed seals, joint fillers, joint seals, joint sealing compounds, and waterstops are placed shall include full compensation for all labour, Equipment, and Material to do the work of placing these materials.



**Appendix 920-A, November 2016  
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**

No information provided here.

**Related Ontario Provincial Standard Drawings**

No information provided here.

