

SPECIFICATIONS FOR
SUPPLY, FABRICATION AND INSTALLATION OF EXPANSION JOINTS

1.0 DESCRIPTION

The Work shall consist of:

- .1 Supply, fabrication and installation of expansion joints, cover plate and slider plate assemblies, including epoxy adhesives, grout and pre-formed neoprene joint seals;
- .2 Galvanizing of steel components; and
- .3 Quality control (QC) testing of all materials.

2.0 REFERENCES AND RELATED SPECIFICATIONS

All reference standards and related specifications shall be current issue or latest revision at the date of tender advertisement.

2.1 References

- CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steel
- CAN/CSA G164, Hot Dip Galvanizing of Irregularly Shaped Articles
- CSA W59, Welded Steel Construction (Metal Arc Welding)
- ASTM A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
- ASTM D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
- ASTM D573, Standard Test Method for Rubber—Deterioration in an Air Oven
- ASTM D1149, Standard Test Method for Rubber Deterioration-Surface Ozone Cracking in a Chamber
- ASTM D2240, Standard Test Method for Rubber Property—Durometer Hardness
- OPSS 1210, “Material Specification for Preformed Neoprene Joint Seals”

2.2 Related Specifications

- Specifications for Supply, Fabrication and Erection of Miscellaneous Metal

3.0 SUBMITTALS

The Contractor shall submit the following to the Engineer, in accordance with the Special Provisions:

- .1 Copies of Mill Test Certificates showing chemical analysis and physical tests of all steel prior to commencement of fabrication. Steel without this certification will be rejected.
- .2 Certification of chemical analysis and physical tests for all materials.
- .3 A complete set of Shop Drawings prior to commencement of fabrication. The Contractor shall indicate on the Shop Drawings the necessary material specifications for all materials to be used, fabrication details and proposed field splice details of the steel components. Applicable welding procedures, stamped as approved by the Canadian Welding Bureau, shall be attached to the Shop Drawings.

4.0 MATERIALS

4.1 General

The Contractor shall be responsible for the supply, safe storage, and handling of all materials set forth in this Specification.

4.2 Expansion Joints

.1 General

Modular and strip seal expansion joints shall be as described on the Drawings.

The expansion joints shall be galvanized after shop fabrication in accordance with CAN/CSA G164 to a minimum net retention of 610 g/m².

Expansion joints shall have fabricated cover plates and slider plates as shown on the Drawings.

All fasteners and hardware of the modular expansion joints shall be Grade 316, stainless steel.

.2 Steel

Steel supplied for the fabrication of the expansion joints shall conform to CAN/CSA G40.21, Grade 300W.

.3 Steel Extrusions

Steel for the extrusions shall conform to CAN/CSA G40.21, Grade 230G minimum.

.4 Anchor Studs

Anchor studs shall conform to the requirements of ASTM A108, Grade Designation 1020.

.5 Miscellaneous Steel Items

Rods, cover plates, brackets and washer plates, slider plates, and all other associated steel items shown on the Drawings shall be fabricated from steel conforming to CAN/CSA G40.21, Grade 300W.

.6 Preformed Neoprene Joint Seals

Preformed joint seals shall be manufactured from a vulcanized elastomeric compound using crystallization resistant polychloroprene (neoprene) as the only polymer. The seals shall be supplied in one continuous piece, separate from the steel extrusions or joint. Shop or field splicing will not be allowed in the seals.

The preformed neoprene joint seal shall meet the requirements specified in Table 1. All tests will be made on specimens prepared from the extruded seals.

Table 1: Physical Requirements

PROPERTY	PHYSICAL REQUIREMENTS	TEST PROCEDURE*
1.Tensile Strength	Minimum 13.5 MPa	ASTM D412 OPSS 1210.07.03.01.02
2.Elongation at Break	Minimum 250 Percent	ASTM D412 OPSS 1210.07.03.01.02
3.Hardness, Type A Durometer	55 +7 Points -5	ASTM D2240 OPSS 1210.07.03.01.03
4. Oven Aging Test 70 Hour at 100°C Reduction in Tensile Strength Reduction in Elongation Increase in Hardness	Maximum 20 Percent Maximum 20 Percent Maximum 10 Points	ASTM D573
5. Permanent Set at Break	Maximum 10 Percent	ASTM D412
6. Low Temperature Stiffening Hardness, Type A Durometer	Maximum 15 Points	ASTM D2240 OPSS 1210.07.03.01.03
7. Oil Swell, ASTM Oil No. 3 70 H at 40°C (wipe with toluene to remove surface contamination)	No Cracks	ASTM D1149
9. **Safe Compressibility Test (Z min) Bridge Seal ≤ 63.5 mm > 63.5mm	Min. 50% Min. 55%	OPSS 1210.07.03.01.04
10. **Pressure Generation at 15 Percent Deflection	Min. 20 kPa	OPSS 1210.07.03.01.04
11. **Recovery 22 h at —28°C 70 h at —10°C 70 h at + 100°C	Min. 80% No Cracking Min. 88% Splitting or Min. 85% Sticking	OPSS 1210.07.03.01.05

* ASTM - American Society for Testing and Materials

OPSS - Ontario Provincial Standard Specification

** This physical requirement not applicable to lock-in type joint seals

4.3 Welding

Welding shall be of a low hydrogen classification. Manual electrodes shall be E7016 or E7018. All welding shall be in accordance with CSA W59.

4.4 Field-Applied Galvanizing

Field-applied galvanizing must be approved as identified in MIT's Approved Products List and shall be approved for use by the Engineer. Any field-applied galvanizing that is not in MIT's Approved Products List will be subject to approval by the Engineer.

4.5 Epoxy Adhesive

Epoxy adhesive must be approved as identified in MIT's Approved Products List and shall be to the satisfaction of the Engineer. Any epoxy adhesive that is not in MIT's Approved Products List will be subject to approval by the Engineer.

4.6 Epoxy Adhesive Strip

Epoxy adhesive strip shall be 50 mm wide Flex-Tred nonslip adhesive strip or equal as accepted by the Engineer.

4.7 Epoxy Grout

Epoxy grout must be approved as identified in MIT's Approved Products List and shall be to the satisfaction of the Engineer. Any epoxy grout that is not in MIT's Approved Products List will be subject to approval by the Engineer.

4.8 Grout

Grout shall be non-metallic and non-shrink. Grouts must be approved as identified in MIT's Approved Products List and shall be to the satisfaction of the Engineer. Any grout that is not in MIT's Approved Products List will be subject to approval by the Engineer.

5.0 CONSTRUCTION METHODS

5.1 Fabrication

Care shall be taken to ensure that all members are straight and flat and free from twists, bends, and distortions due to welding. The units shall be shop assembled and checked for matching of sliding surfaces, correct cross-fall and skew angle, as well as accurate positioning and alignment of supporting brackets.

All metal surfaces to be galvanized shall be cleaned thoroughly of rust, rust scale, mill scale, dirt, paint, and other foreign material by commercial sand, grit or shop blasting, and pickling prior to galvanizing. Heavy deposits or oil and grease shall be removed with solvents prior to blasting and pickling.

Weldments shall not be substituted for extrusion shape.

Matching expansion joints shall be assembled and bolted together for shipping. Expansion joint assemblies shall be match marked.

5.2 Installation of Expansion Joints

The Contractor shall exercise care in the handling of all units to prevent twists, bends, and warping.

The Contractor shall install expansion joints as shown on the Drawings and shall be responsible for the correct matching and seating of parts. The expansion joints shall be checked for accurate matching of sliding plates with the expansion joints installed at the specified skew angle and cross-fall.

5.3 Galvanizing Touch-up Prior to Placement of Concrete

All areas where the galvanizing has been damaged and all field welds shall receive field-applied galvanizing to touch-up the uncoated areas.

Surfaces to receive field-applied galvanizing shall be cleaned using a wire brush, a light grinding action, or mild blasting to remove loose scale, rust, paint, grease, dirt, or other contaminants. The surface shall be preheated to 315°C and wire brushed during preheating. The Contractor shall rub the cleaned preheated area with the repair stick to deposit an evenly distributed layer of zinc alloy, and spread the alloy with a wire brush, spatula, or similar tool. Field-applied galvanizing shall be blended into existing galvanizing of surrounding surfaces and shall be buffed and polished if required to match the surrounding surfaces. Care shall be taken to not overheat surfaces beyond 400°C and to not apply direct flame to the alloy rods.

The process is to be repeated as required to achieve a thickness comparable to the original galvanizing.

5.4 Placement of Concrete at Expansion Joints

The assemblies shall be set in position such that they will remain true to line and elevation during the placement of concrete.

Before concreting, the expansion joint opening shall be set to give the correct width for the mean concrete temperature of the deck. The width shall be obtained from the installation temperature table given on the Drawings.

Immediately prior to placement of concrete at the expansion joints, all metal contact surfaces between the expansion joint and concrete shall be coated with epoxy adhesive.

Care shall be taken during compaction of the concrete to ensure that there are no voids in the concrete under and around the structural steel components.

5.5 Epoxy Grout

Epoxy grout shall be used to fill any bolt holes left after the removal of Manufacturer's clamping channels.

5.6 Installation of Seal

The preformed neoprene joint seal at each expansion joint unit shall be installed in accordance with the Manufacturer's instructions and as one continuous piece after completion of all concreting operations. Joint seals shall not be installed prior to casting of the expansion joints into the concrete.

6.0 QUALITY CONTROL/QUALITY ASSURANCE

6.1 Quality Control

The supply of materials, shop fabrication and installation shall be done by or under the direct supervision of a trained factory representative, who shall be responsible for the joint installation procedure. Testing procedures shall be in accordance with the testing methods indicated on Table 1.

All joint seals shall be identified as to the Manufacturer by means of a continuous permanent mould mark. The mould marks shall be submitted to the Engineer and shall be used on all seals produced by the respective Manufacturer. The seal shall also be permanently marked, on the side of the seal, with the date of production and the batch/lot, at intervals of not more than 1.2 meters.

The Contractor shall supply to the Engineer a summary of the seals identifying the date of manufacture, the batch/lot, and the proposed installation location.

6.2 Quality Assurance

The Contractor shall supply sample material to the Engineer for quality assurance testing. The samples shall be 1.5 meters in length. Each sample will represent not more than three expansion joint seals of the same size, lot and make and shall be continuous until sampled by the Engineer. As soon as the seals to be used in the joint assemblies have been manufactured, they shall be available to the Engineer for sampling.

Testing procedures will be in accordance with the testing methods indicated on Table 1. All materials failing to meet the Specification requirements will be rejected.

Lots rejected may be culled by the supplier and, upon satisfactory evidence of compliance with the Specifications, will be accepted.

7.0 METHOD OF MEASUREMENT

7.1 Modular Expansion Joints

Supply, fabrication and installation of modular expansion joints will be measured on a unit basis. The total number of modular expansion joints to be paid for will be the total number of modular expansion joints shown on the Drawings and accepted by the Engineer.

7.2 Strip Seal Expansion Joints

Supply, fabrication and installation of strip seal expansion joints will be measured on a unit basis. The total number of strip seal expansion joints to be paid for will be the total number of strip seal expansion joints shown on the Drawings and accepted by the Engineer.

8.0 BASIS OF PAYMENT

8.1 Modular Expansion Joints

Supply and fabrication of modular expansion joints will be paid for at the Contract Unit Price for "Supply and Fab Modular Expansion Joints", measured as specified herein, and will be payment in full for performing all operations herein described and all other items incidental to the Work.

Installation of modular expansion joints will be paid for at the Contract Unit Price for "Erect Modular Expansion Joints", measured as specified herein, and will be payment in full for performing all operations herein described and all other items incidental to the Work.

8.2 Strip Seal Expansion Joints

Supply and fabrication of strip seal expansion joints will be paid for at the Contract Unit Price for "Supply and Fabrication of Expansion Joint", measured as specified herein, and will be payment in full for performing all operations herein described and all other items incidental to the Work.

Installation of strip seal expansion joints will be paid for at the Contract Unit Price for "Erection of Expansion Joint", measured as specified herein, and will be payment in full for performing all operations herein described and all other items incidental to the Work.