MATERIAL SPECIFICATION FOR DECK JOINT ASSEMBLIES

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1210.01 SCOPE

This specification covers the requirements for Materials, design, and fabrication of deck joint assemblies.

1210.02 REFERENCES

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

Ontario Provincial Standard Specifications, Construction

OPSS 906 Structural Steel for Bridges
OPSS 920 Deck Joint Assemblies, Preformed Seals, Joint Fillers, Joint Seals, Joint Sealing Compounds, and Waterstops - Structures

Ontario Provincial Standard Specifications, Material

OPSS 1202 Bearings - Elastomeric Plain and Steel Laminated
OPSS 1203 Bearings - Rotational and Sliding Surface

Ontario Ministry of Transportation Publications

Structural Manual:
Division 1, Exceptions to the Canadian Highway Bridge Design Code CAN/CSA S6 for Ontario

CSA Standards

S6-19	Canadian Highway Bridge Design Code
W47.1-09 (R2019)	Certification of Companies for Fusion Welding of Steel
W59-18	Welded Steel Construction (Metal Arc Welding)

ASTM International

A123-17	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A240-18	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Application
D412-16a	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
D471-16a	Standard Test Method for Rubber Property - Effect of Liquids
D573- 04(2015)	Standard Test Method for Rubber Deterioration in an Air Oven
D832-07 (2018)	Standard Practice for Rubber Conditioning for Low Temperature Testing
D1149-18	Standard Test Method for Rubber Deterioration - Cracking in an Ozone Controlled Environment
D2240-15	Standard Test Method for Rubber Property - Durometer Hardness
F835-13	Standard Specification for Alloy Steel Socket Button and Flat Countersunk Head Cap Screws
F2329-15	Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners
F3125/F3125M-19	Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength

1210.03 DEFINITIONS

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

Armouring means an edging to the deck joint comprising of a steel angle or steel plate permanently attached to the concrete dam corners.

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.

Elastomer means a compound containing virgin polychloroprene (neoprene).

Manufacturer means a fabrication company that is certified according to CSA W47.1, Division 1 or 2.

Nosing Angle means the angle that forms the outside edges of the joint 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.

Separation Beam means a steel section which conveys wheel loads that spans between support bars.

Support Bar means a member upon which a traffic bearing separation beam rests.

1210.04 DESIGN AND SUBMISSION REQUIREMENTS

1210.04.01 Design Requirements

1210.04.01.01 General

Deck joint assemblies shall be designed to function satisfactorily under the critical combinations of loads, translations, and rotations according to CSA S6 and the Structural Manual, Division 1.

1210.04.01.02 Modular Expansion Joints

Loading for modular joints shall be as specified in the Structural Manual, Division 1.

Modular joints shall be equipped with a mechanism capable of ensuring all openings of the joint are of uniform width as follows:

a) Stiffness of the mechanism shall not exceed 8.5 kN per metre along the length of the expansion joint.

b) The width of individual openings shall not vary by more than 6 mm along the length of the joint.

c) The range of widths of openings shall not vary by more than 6 mm.

Field splices in modular joints are not permitted.

1210.04.01.03 Fasteners and Anchorage

Fasteners and anchorage devices shall be designed to transfer all the static and dynamic loads from each side of the deck joint assembly to the structure.

1210.04.01.04 Preformed Seal

All deck joint assemblies and the bearings in modular deck joint assemblies shall be designed so that the entire preformed seal is replaceable without damage to the structure and without removal of any concrete, welds, or anchorages permanently attached to the structure.

Seals shall not be bent in a vertical plane more than 30° at any one location.

1210.05 MATERIALS

1210.05.01 Bearings

All material forming parts of the bearing component of the deck joint assembly shall be according to OPSS 1202 and OPSS 1203.

Virgin polytetrafluoroethylene element shall have a minimum thickness of 1.5 mm.

1210.05.02 Preformed Seal

The preformed seal shall be manufactured from an elastomer with physical requirements according to Table 1.

Manufacturer’s storage and handling requirements shall be followed. The seal shall not be exposed to ultraviolet rays for more than three Days prior to installation.

1210.05.03 Steel

Structural steel components shall be according to OPSS 906, Grade 300W.

Stainless steel shall have a minimum corrosion resistance according to ASTM A240, Type 304.

Steel fasteners other than stainless steel shall be according to ASTM F3125 (Grade A325M, Type 1, galvanized) or ASTM F835 (zinc phosphate coated).

1210.05.04 Anchors

Anchors shall be headed type stud shear connectors according to CSA W59, Annex H.

1210.05.05 Anti-seize Compound

Anti-seize compound shall be LOCTITE Moly 50 manufactured by Henkel Corporation or an alternative acceptable to the Owner.

1210.05.06 Injection Hose System for Deck Joint Assembly

The injection hose system shall be installed on the deck joint assembly for both nosing and armouring angles. This system shall be long enough to extend between the barrier or parapet walls on each side of the structure, including the sidewalks and curbs.

The nosing and armouring angles shall not contain bleeder holes.

1210.07 PRODUCTION

1210.07.01 General

The deck joint assembly manufacturer shall have a copy of the deck joint assembly Working Drawings specified in OPSS 920 at the manufacturing plant during the deck joint assembly fabrication.

1210.07.02 Welding

Welding of structural quality steels shall be according to CSA W59.

Welding of stainless steel shall be according to OPSS 1203.

1210.07.03 Fasteners

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

1210.07.04 Steel Fabrication

Machining shall be carried out after welding, whenever possible.

All rough flame cut surfaces and metal-to-metal contact surfaces shall be machined ground smooth.

Re-entrant corners that are cut shall be free from notches and shall have the largest practical radius with a minimum radius of 14 mm. Bearing surfaces shall be in contact over the full area of the mating surfaces.

1210.07.05 Corrosion Protection

All structural steel components of the deck joint assembly shall be hot dip galvanized according to ASTM A123 after fabrication. Hardware shall be galvanized according to ASTM F2329.

1210.07.06 Preformed Seal

The preformed seal shall exceed the required length by at least 1 m to provide a sample to be submitted for testing that includes the entire identification label, which includes the name of manufacturer, product identification, the lot and date of manufacture.

1210.07.07 Identification

Each deck joint section shall be marked with the date of manufacture (i.e., yyyy-mm-dd-), and an individual alphanumeric identification. The alphanumeric identification shall consist of the identification letters of the supplier and source, followed by a sequential number. The characters shall be die stamped into an exposed surface at the gutter line at the barrier wall or curb. The characters shall not be less than 10 mm high with the indentations not less than 0.5 mm in width and 0.2 mm in depth.

The preformed seal shall be clearly and indelibly marked at one metre intervals indicating manufacturer, lot number, date of manufacture (i.e., yyyy-mm-dd), and model number.

1210.07.08 Designation of Lifting Points

The lifting points shall be clearly marked on the deck joint assembly.

TABLE 1
Preformed Seal Physical Requirements

Preformed Seal Physical Requirements Property	Physical Requirements	Test Procedure
Tensile Strength	Minimum 13.5 MPa	ASTM D412 Test Method A
Ultimate Elongation	Minimum 250%	ASTM D412 Test Method A
Hardness,	55 Shore A, + 7, -5	ASTM D2240
Oven Aging Test, 70 h @ 100 °C Change in Tensile Strength	Maximum 20%	ASTM D573 ASTM D412 Test Method A
Change in Elongation	Maximum 20%	ASTM D412 Test Method A
Change in Hardness	Maximum 10 points	ASTM D2240
Permanent set at break	Maximum 10%	ASTM D412 Test Method A
Low Temperature Crystallization Hardness, Shore A 7 d @ -10 °C Change in Hardness	Maximum 15 points	ASTM D832 ASTM D2240
Oil Swell, ASTM Oil No. 3, 70 h @ 100 °C Weight Change	Maximum 45%	ASTM D471
Ozone Resistance, 20% Strain, 150 pphm in air 70 h @ 40 °C	No cracks	ASTM D1149 Method B, Procedure B1
Notes: A. All tests shall be made on specimens prepared from the preformed seals.		