GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Transportation and Works
Highway Design Division

SECTION 912
BEARINGS

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912.01 SCOPE

The scope of this specification is to cover the supply, fabrication and installation of all plain and steel reinforced elastomeric bearings and pot bearings in structures. Pot bearings shall be defined as free sliding, constrained sliding and/or fixed structural bearings consisting of a metal piston supported by a single moulded disc of unreinforced elastomer that is confined within a metal cylinder.

Bearing materials, manufacture, fabrication and installation shall comply with the latest edition of CAN/CSA-S6 or OPSS 1202/1203 for elastomeric and pot bearings respectively. In the event of a conflict between the two, the more severe criteria shall control.

912.02 MATERIALS

All materials shall be new and unused with no reclaimed material incorporated in the finished bearing.

912.02.01 Elastomeric Bearings

Bearings shall be fabricated from elastomeric materials. Virgin natural polyisoprene (natural rubber) or virgin polychloroprene (neoprene) shall be the only raw polymer permitted.

Internal steel plates shall be not less than 3mm thick nor greater than 5mm. Plates shall be mild steel and conform to CSA-G40.21-M87.

The elastomer compound shall exhibit grade 5 low temperature behaviour. Both natural rubber and neoprene shall be either 50 ± 5 or 60 ± 5 durometer as stated on the contract drawings. The shop drawings shall indicate the low temperature behaviour grade and durometer number.

912.02.02 Pot Bearings

The Contractor shall furnish a manufacturer's certification that materials proposed for use on the project have been pretested and will meet the requirements as set forth in the manufacturer's current literature.

Elastomer and rubber components shall meet Grade 5 classification as per CAN/CSA-S6-88.

Sliding pot bearings shall have a PTFE and stainless steel interface.

912.03 MANUFACTURE AND APPROVAL

912.03.01 Elastomeric Bearings

912.03.01.01 Manufacture

All pads shall have a smooth finish. Any steel plates shall be free from burrs and sharp edges; all laminations shall have a uniform thickness.

Steel laminated bearings shall be moulded as a single unit under pressure and heat, steel plates shall be completely bonded on all surfaces.

912.03.01.02 Approval

Bridge bearings shall be as designated in the contract or from an approved source. Bearings shall be approved by shop drawings and the manufacturer shall supply the Engineer with a catalogue.

Six copies of drawings shall be forwarded for approval and three weeks is necessary for this approval.

The following information is needed:

1) Dimensions

2) ULS/SLS load capacity in compression

3) Compression stiffness

4) Maximum movement capacity in shear

5) Shear stiffness

6) Rotation capacity

912.03.01.03 Identification

All bearings shall be indelibly marked with the name of the manufacturer, the part number, bearing identification number, elastomer type, elastomer grade and the date of manufacture on the side visible after erection.

912.03.01.04 Quality Assurance

The manufacturer shall submit a certificate of compliance to the Engineer prior to installation. The certificate of compliance shall contain

the material properties, grades and relevant standards of all bearing materials. The manufacturer shall certify the bearing(s) meet the design requirements.

912.03.02 Pot Bearings

912.03.02.01 Fabrication and Manufacture

This work shall consist of the fabrication, manufacture and finishing of pot type structural bearing devices of the type shown on the plans for the locations as shown on the plans. These structural bearings shall adequately provide for all movements, loads, forces and rotations of structural members where applicable.

Bearings shall be factory set and clamped for equal expansion and contraction and plant assembled. Temporary connections shall not be removed until the bearings are set in their final positions.

The stainless steel sliding surface interface sheet shall conform to ASTM A167 Type 304 with a bright annealed mirror Number 8 finish on one side and continuously welded to the top plate.

All pot bearings shall have a minimum rotational capacity of ±0.02 radians. All elements shall be capable of maintaining its initial uniform contact at ± 0.02 radians rotation. The coefficient of friction between the PTFE and stainless steel plates at maximum permissible bearing load shall be 0.03 or less. Pot bearings are to be lubricated and unfilled. Exposed steel surface shall be coated with cold galvanizing compound (2 coats).

The bearing device manufacturer shall be pre-qualified with a five year proven history of successful product manufacture.

All welding shall be in accordance with CSA W59-M. The company undertaking welding fabrication shall be certified in Division 1 or Division 2.1 of CSA W47.1.

Unidirectional or constrained sliding bearings should be manufactured with a gap tolerance at the guides of 0.5 mm. All bearing surfaces of steel plates shall be finished flat within 0.25 mm. Overall manufacturing height tolerance shall be ± 3 mm.

Anchorage pins, studs and connections shall be designed and supplied by the fabricator for the maximum horizontal force and minimum/maximum vertical force indicated on the drawings.

912.03.02.02 Approval

The pot bearing manufacturer shall be as designated in the contract documents or an approved equal. Bearings shall be approved by shop drawings and the manufacturer shall supply the Engineer with a catalogue.

Six copies of drawings shall be forwarded for approval and three weeks is necessary for this approval.

The following information is needed:

(1) Dimensions of each component including: top plate, sliding surface, bearing surface, piston, elastomeric disc, base pot, anchor pins, anchor studs and welds and the overall dimensions of the finished bearing. Dimensions refer to length, width, diameter and thickness.

(2) Minimum and maximum horizontal and vertical load capacity, both SLS and ULS.

(3) Longitudinal and transverse movement capacity.

(4) Bearing rotation capacity in radians.

(5) Sketch indicating bearing locations, orientation and movement.

(6) The shop drawings shall contain a detailed bill of materials.

912.03.02.03 Identification

All bearings shall be indelibly marked with the name of the manufacturer, the part number, bearing identification number, elastomer type, elastomer grade and the date of manufacture on the side visible after erection.

912.03.02.04 Quality Assurance

The manufacturer shall submit a certificate of compliance to the Engineer prior to installation. The certificate of compliance shall contain the material properties, grades and relevant standards of all bearing materials. The manufacturer shall certify the bearing(s) meet the design requirements.

912.04 INSTALLATION

All welding within three (3) metres of any bearing shall be specifically prohibited unless written approval is obtained from the Engineer. Such approval will require specific measures to protect the bearings where so required by the Engineer.

912.04.01 Elastomeric Bearings

Bearings when received on site shall be stored in a location and under conditions approved by the Engineer.

The bearings shall be installed in the exact location as called for in the contract.

Tolerances of installation (including manufacturing tolerances) shall be ± 5mm.

Variation from a dead level plane shall not exceed 1mm in 50mm.

Any abnormal appearance of the bearings shall be cause for rejection.

912.04.02 Pot Bearings

The manufacturer shall ship each bearing fully assembled. The bearings are not to be disassembled prior to final installation without the knowledge of the design authority and manufacturer.

Bearings when received on site shall be unloaded and stored in accordance with the manufacturers recommendations. The Engineer shall approve the same.

The bearings shall be installed in the location and orientation as indicated on the contract drawings. Constrained sliding or uni-directional bearings shall be properly aligned to allow for the movement of the structure as indicated on the contract drawings. The bearings shall not be installed in the field prior to the Engineer's approval.

Where the bearings are of a guided or constrained type, the Contractor shall establish the bearing alignment using surveying instruments. The tolerance for variation in alignment, i.e. plan view, is ± 0.0067 radians (0.382 degrees) where the bearing is required to move 75 mm or less. The bearings shall have dead level bearing surfaces, i.e. top and bottom plates. Dead level shall be defined as ± 0.001745 radians (0.10 degrees), i.e. ± 1.745 mm in 1000 mm.

In positioning, the bearing centre of the base should correspond to the centre of the support. Rotation of the bearing should not be permitted to occur during concrete placing operations. The top plate shall be supported on all sides to prevent deflection of the same during the concrete placing operations.

The base plate shall be bedded by the contractor on non-shrink grout. It is of extreme importance that the final bedding be free from high or hard spots, voids, etc. The Contractor shall supply durable load bearing wedges to support all bearings when they are placed on the non-shrink grout pad. Wooden wedges are not acceptable. The bearing base plate shall be set in position using a flowable non-shrink grout unless otherwise indicated on the shop drawings. For uni-directional and multi-directional bearings, adjust the upper plate to proper setting as

instructed by the field Engineer prior to affixing to the structure. Ensure form work is well sealed to prevent concrete from flowing onto the bearing prior to placing deck concrete.

Installation requirements shall be written on the shop drawings. Bearings are to be installed as per the manufacturer's recommendations.

912.06 MEASUREMENT FOR PAYMENT

Each individual bearing fully assembled shall be considered as one unit regardless of the bearing type, kind, size, capacity, function, location of installation in the structure or source of manufacture. Measurement for payment purposes shall be the total number of such units installed.
Bearings used against concrete creep blocks and concrete corbels shall not be included in measurement for payment and are incidental to the works.

912.07 BASIS OF PAYMENT

Payment at the contract price for "Supply And Install Bearings" shall be full compensation for all labour, equipment, materials and services required to supply, fabricate, transport to the job site, store on site, handle and install the bearings in the specified locations. Any anchorages, grout and dowel pins required are considered incidental and no separate payments will be made.

The tendered price per each unit for "Supply and Install Bearings" shall be the average price per unit regardless of the bearing type, kind, size, capacity, function, location of installation in the structure or source of manufacture excluding bearings used against creep blocks and concrete corbels which are incidental to the works.

Any necessary engineering and adjustment shall be considered incidental to the work.

No payment will be made until a certificate of compliance has been received by the Engineer.