

EXPECTED IMPLEMENTATION JULY 2003

~~A460461~~—~~461~~ MULTIROTATIONAL POT-BEARINGS.

—(~~REV 7-7-99~~)(~~FA 7-30-99~~)(~~7-00~~)(~~REV 8-13-11-19-02~~)(~~FA 12-13-02~~)(~~7-03~~)

PAGE 620. The following new Section is added after Section 460:

SECTION ~~A460461~~ MULTIROTATIONAL ~~POT~~-BEARINGS

~~461~~A460-1 Description.

Furnish and install multirotational bearings in accordance with the recommendations of the manufacturer and details shown in the plans. Use multirotational pot *or disc* bearings designed and fabricated by the manufacturer in accordance with ~~FHWA Structural Bearing Specification SBS-1010-93~~ *AASHTO LRFD Bridge Design Specifications* for the loads and movements designated in the plans and A460-2. Submit for the Engineer's approval, shop drawings and design calculations prepared, signed and sealed by a Specialty Engineer prior to fabrication of bearings.

~~461~~A460-2 Materials.

—Provide fixed pot bearings consisting of a sole plate, top plate with piston, a disc of neoprene elastomer in a base plate cylinder with a 1/64 inch [0.4 mm] thick virgin PTFE Polytetrafluoroethylene sheet at the top and bottom, retainer ring and a masonry plate.

—Provide expansion pot bearings, laterally restricted, where required, consisting of a sole plate, steel top plate with a polished stainless steel sheet facing, bearing on a steel piston with a layer of virgin PTFE on its top, a disc of virgin neoprene elastomer in a base plate cylinder with a 1/64 inch [0.4 mm] thick virgin PTFE sheet at the top and bottom of the elastomer, a retainer ring and a masonry plate. Use a piston with a press fit key in the top and a top plate with a keyway to restrict lateral movement, where required. Use a key and keyway designed for a lateral load equal to 10% of the vertical load capacity of the bearing or the lateral load indicated in the plans, whichever is greater.

—Design all bearings to be replaceable without removing the masonry plate or sole plate.

—The PTFE sheet at the top and bottom of the elastomer disc on multirotational bearings may be eliminated when the top and bottom surfaces of the neoprene elastomer are lubricated to prevent galling.

—Ensure that multirotational bearings are designed by the manufacturer for the loads and movements shown on the contract drawings. All multirotational bearings must be manufactured by the same manufacturer. In the design of the bearings, use the following maximum allowable bearing stresses:

—Multirotational Bearings:

—(a) On concrete—The maximum allowable bearing stress shall be in accordance with AASHTO Division I, Article 8.15.2.1.3.

—(b) On confined elastomer—3,500 psi [24 MPa]

—(c) On PTFE sliding surface Filled or Unfilled (Recessed) PTFE—3,500 psi [24 MPa]

Furnish structural steel conforming to ASTM A 709 Grade 50W [ASTM A 709M Grade 345W]. Coat all exposed steel surfaces with a thermal sprayed coating (metalization) and sealer. Blast clean surfaces with grit abrasive in accordance with Steel Structures Painting Council Surface Preparation Specification No. 10, SSPC-SP10, Near-White Blast Cleaning, to a surface profile of .002 - .004 inch [0.05 - 0.10 mm]. Use the electric arc spraying process. Provide wire material for the metalized primer consisting of 85% zinc and 15% aluminum, each being 99.9% pure metal. Apply the metalized primer to obtain a thickness of 0.01 inch [0.3 mm] minimum and 0.02 inch [0.5 mm] maximum. Do not apply when the surface temperature of the steel is less than 5°F [3°C] above the dew point. Apply a seal coating of a

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vinyl wash primer, gray in color, meeting the requirements of SSPC Paint 27 to metalized surfaces within eight hours after spraying and in accordance with the manufacturer's recommendations. Provide the Engineer with a certified statement that the coating applicator has performed successful thermal spray operations within the last 12 months.

Perform any required touchup repair and field metalizing after any field welding with materials and procedures in accordance with 971-15.

Use stainless steel sheet meeting ASTM A 240, Type 316.

Use a stainless steel sheet in the expansion multirotational bearings at least 1/16 inch [1.5 mm] thick and polished to a surface finish of less than 10 micro inches root mean square [$0.2 \mu\text{m } R_a$] on the side of contact with the PTFE.

~~Ensure that the peripheral clearance on pot bearings between the piston and base plate cylinder is no more than 0.03 inch [0.75 mm].~~

Blast clean the surface of the plates to which the stainless steel sheet is to be attached to near white, SSPC-SP10. Abrade the back of the stainless steel sheet that is to be in contact with the steel plate using emery cloth. Position the stainless steel sheet on the steel plate, clamp and bond firmly in place using a quick-set epoxy applied in the center portion only. Apply the stainless steel sheet to the blast cleaned surface of the steel plate as soon as possible after blasting and before any visible oxidation of the blast cleaned surface occurs. Ensure that the epoxy conforms to Federal Specification MMM-A-134 Type I. Weld the stainless steel sheet to the steel plate continuously around its perimeter using a tungsten inert gas, wire fed welder. Weld in a controlled manner using multiple passes or stitch welding techniques to control heat build-up. As a mating surface for the stainless steel sheet, use an unfilled virgin PTFE sheet (recessed) or a glass-fiber filled PTFE sheet (recessed). Obtain the PTFE sheet by skiving fillets formed under hydraulic pressure and heat. The resin shall meet the requirements for ASTM D 1457.

~~Bond the PTFE and the piston using a heat cured, high temperature epoxy capable of withstanding temperatures of -320 to $+500^\circ\text{F}$ [-195 to $+260^\circ\text{C}$] -40°F to 250°F [-40°C to 121°C].~~

~~Use a disc of virgin neoprene elastomer with a hardness of 50 durometer (A Scale).~~

~~Where shown on the plans, provide preformed bearing pads under the masonry plates meeting the requirements of 932-2.2.~~

461-3 Design.

Design all bearings to be replaceable without removing the masonry plate or sole plate. Ensure that multirotational bearings are designed by the manufacturer for the loads and movements shown on the contract drawings. Obtain all multirotational bearings from the same manufacturer.

Design guided multirotational bearings for a lateral load equal to 10% of the vertical load capacity of the bearing or the lateral load indicated in the plans, whichever is greater.

461-4 Testing and Certification.

Ensure the manufacturer verifies the adequacy of the bearings by testing random samples manufactured for this project for the following conditions:

(a) Test the bearings for a period of 24 hours under the maximum vertical load with the maximum rotational displacements applied. The maximum reactions, rotations and movements are shown in the plans for each type of bearing.

(b) In addition, test expansion bearings under maximum vertical load during six cycles of maximum longitudinal movement (One cycle shall consist of starting with the bearing elements centered, moving the maximum distance (half the total longitudinal movement) in one direction, then moving back through the center point to the maximum distance in the opposite direction and then back to the starting point).

(c) In addition test the lateral capacity of bearings with laterally restricted movement by applying the maximum vertical load and the required lateral load. Apply and release the lateral load six times in a direction 90 degrees from the bearing's unrestricted longitudinal movement direction. Apply

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and release the required lateral load 6 times in a direction 180 degrees from the initial lateral load direction.

Based on the maximum loads and movements shown on the plans, group the bearings into common design types for both fixed and expansion bearings. Clearly indicate this grouping on the shop drawing for approval by the Engineer. One bearing of each type and size so designated must be tested. All test results must comply with the manufacturer's design data as shown in the approved shop drawings; the bearings tested must show no visible deficiencies including extrusion of the elastomer between the piston and the base plate cylinder and the PTFE surfaces shall show no deterioration. Prior to shipment to the project site, submit the test data for the bearings tested to the Engineer with the manufacturer's certification of specification compliance for all bearings. Unsatisfactory test results will be cause for rejection of all multirotational bearings represented by the test. Any observed separation between the rotational element and the bearing plate will be cause for rejection.

Provide written certification from the manufacturer that the multirotational bearings have been fabricated and installed in accordance with the specification requirements and manufacturer's requirements prior to acceptance by the Department.

461-5A460-3 Construction.

Store multirotational bearings delivered to the bridge site under cover on a platform above the ground surface. Protect bearings at all times from damage and ensure they are clean, dry and free from dirt, oil, grease or other foreign substances before placement. Install the bearings in accordance with the recommendations of the manufacturer, contract drawings, and as may be directed by the Engineer. If there is any discrepancy between the recommendations of the manufacturer, these Specifications, and contract drawings, the Engineer will be the sole judge in reconciling any such discrepancy.

Obtain the services of a representative, employed by the manufacturer of the bearings, to supervise the installation of the bearings. Do not install the bearings until the representative is on the job site. Assume this responsibility at no further expense to the Department.

Ensure the manufacturer verifies the adequacy of the bearings by testing random samples manufactured for this project for the following conditions:

(a) Test the bearings for a period of 24 hours under the maximum vertical load with the maximum rotational displacements applied. The maximum reactions, rotations and movements are shown in the plans for each type of bearing.

(b) In addition, test expansion bearings under maximum vertical load during six cycles of maximum longitudinal movement (One cycle shall consist of starting with the bearing elements centered; moving the maximum distance (half the total longitudinal movement) in one direction, then moving back through the center point to the maximum distance in the opposite direction and then back to the starting point).

(c) In addition test the lateral capacity of bearings with laterally restricted movement by applying the maximum vertical load and the required lateral load. Apply and release the lateral load six times in a direction 90 degrees from the bearing's unrestricted longitudinal movement direction. Apply and release the required lateral load 6 times in a direction 180 degrees from the initial lateral load direction.

Based on the maximum loads and movements shown on the plans, group the bearings into common design types for both fixed and expansion bearings. Clearly indicate this grouping on the shop drawing for approval by the Engineer. One bearing of each type and size so designated must be tested. All test results must comply with the manufacturer's design data as shown in the approved shop drawings; the bearings tested must show no visible deficiencies including extrusion of the elastomer between the piston and the base plate cylinder and the PTFE surfaces shall show no deterioration. Prior to shipment to the project site, submit the test data for the bearings tested to the Engineer with the manufacturer's certification of specification compliance for all bearings. Unsatisfactory test results will be cause for

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rejection of all multirotational bearings represented by the test. Any observed separation between the rotational element and the bearing plate will be cause for rejection.

Provide written certification from the manufacturer that the multirotational bearings have been fabricated and installed in accordance with the specification requirements and manufacturer's requirements prior to acceptance by the Department.

461-6A460-4 Basis of Payment.

Prices and payments will be full compensation for furnishing all labor, materials, tools, equipment, testing, manufacturer's installation supervision, and incidentals to complete the work in accordance with the Contract drawings, the manufacturer's requirements, and these Specifications.

Payment will be made under:

~~Item No. 460-113 Multirotational Bearing Assembly Fixed - each.~~

~~Item No. 2460-113 Multirotational Bearing Assembly Fixed - each.~~

~~Item No. 460-114 Multirotational Bearing Assembly Expansion - each.~~

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Item No. 461-113 Multirotational Bearing Assembly - Fixed - each.

Item No. 2461-113 Multirotational Bearing Assembly - Fixed - each.

Item No. 461-114 Multirotational Bearing Assembly - Expansion - each.

Item No. 2461-114 Multirotational Bearing Assembly - Expansion - each.