



# Iowa Department of Transportation

## DEVELOPMENTAL SPECIFICATION FOR DISC BEARING ASSEMBLY

Effective Date  
October 18, 2005

**THE STANDARD SPECIFICATIONS, SERIES 2001, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.**

### **01063.01 DESCRIPTION**

This item shall include designing, furnishing, testing, and installing complete in-place, factory-produced disc bearing assemblies in accordance with details shown on the contract documents and with the requirements of this Developmental Specification.

Disc bearing assembly design, materials, shop drawings and documentation, fabrication, testing and acceptance, packaging, and installation shall be in accordance with the contract documents and this Developmental Specification as well as the AASHTO Standard Specifications for Highway Bridges, 17th Edition.

Modifications required to meet the height of disc bearing assemblies shown in the contract documents shall be the responsibility of the Contractor with no additional cost to the Contracting Authority.

The disc bearing assembly manufacturer shall supply the complete disc bearing assembly, including, but not limited to, disc bearing, sole plate, guide bars, slider plate, masonry plate, the 1/8" (3 mm) preformed masonry pads, and the anchor bolts.

### **01063.02 DESIGN OF DISC BEARING ASSEMBLIES**

Disc bearing assemblies shall be designed by the Manufacturer for the service loads and movements as shown on the contract documents. The minimum horizontal load capacity of the bearing shall be a minimum of 10% of the vertical capacity.

Polytetrafluoroethylene (PTFE) sliding surfaces for expansion bearings are designed to translate by the sliding of a PTFE surface across a smooth hard mating surface of stainless steel. The maximum coefficient of friction within the range of loads and service temperatures shall be 0.03.

The finished PTFE sheet shall be 1/8 inch (3 mm) to 3/16 inch (5 mm) thick. The PTFE sheet shall be recessed according to Article 18.5.3.2 Div. II of the AASHTO Standard Specifications for Highway Bridges.

#### **01063.03 REQUIREMENTS FOR DISC BEARING ASSEMBLIES**

Disc bearing assemblies shall consist of a polyether urethane structural element (disc) confined by upper and lower steel bearing plates. The disc bearing assembly shall be equipped with a shear restriction mechanism to prevent lateral movement of the disc. Disc bearing assemblies shall adequately provide for the thermal expansion and contraction, rotation, camber changes, and creep and shrinkage of structural members.

Disc bearing assemblies shall be supplied as guided expansion or fixed bearings as designated on the contract documents.

The supplier shall meet Article 18.7.4.8 Div. II of the AASHTO Standard Specifications for Highway Bridges and be approved by the Contracting Authority.

Sliding bearings shall be stiff in shear (i.e. negligible shear displacements shall occur within the load-bearing element).

#### **01063.04 MATERIALS**

Steel components of the disc bearing assemblies shall meet the material requirements as designated on the contract documents.

Anchor bolts shall meet the material requirements as designated on the contract documents.

Stainless steel mating surfaces shall conform to ASTM A 240/A 240M Type 304. The mating surface shall be a minimum No. 8 mirror finish. The minimum thickness of the stainless steel plate shall be 16 gauge.

The PTFE sheets shall be manufactured from pure virgin (not reprocessed) unfilled PTFE resin.

Guiding arrangements shall have PTFE to stainless steel sliding surfaces.

The structural element (disc) in disc bearing assemblies shall be new and unused polyether urethane, with no reclaimed material incorporated into the finished disc bearing assembly, and shall be in accordance with Article 14.6.8.2 of the AASHTO Standard Specifications for Highway Bridges and tested according to ASTM D 2240.

#### **01063.05 SHOP DRAWINGS AND DOCUMENTATION OF DISC BEARING ASSEMBLIES**

Shop drawings shall be prepared in accordance with the requirements of Article 2408.02 of the Standard Specifications. Shop drawings shall be certified by a Professional Engineer licensed in the State of Iowa and shall be submitted with design computations for review for conformance with the loads shown on the contract documents.

#### **01063.06 FABRICATION OF DISC BEARING ASSEMBLIES**

Fabrication of all parts of the disc bearing assembly shall be done in accordance with the approved shop drawings.

During the welding procedure of the stainless steel plates to the backing plate, the surface of the stainless steel plates shall be protected from weld splatter.

PTFE sheet bonding shall be performed at the expansion bearing manufacturer's factory under controlled conditions and in accordance with the written instructions of the manufacturer of the approved adhesive system.

After completion of the bonding operation, the PTFE surface shall be smooth and free from bubbles.

#### **01063.07 SURFACE COATING OF DISC BEARING ASSEMBLIES**

The exposed surfaces of steel components of the disc bearing assemblies, except for the stainless steel surface and the masonry plate, shall be shop primed and painted in accordance with the Standard Specifications. The masonry plate shall be galvanized in accordance with ASTM A 123.

#### **01063.08 TESTING AND ACCEPTANCE OF DISC BEARING ASSEMBLIES**

Each manufactured lot of disc bearing assemblies shall be accompanied by a manufacturer's certificate stating that the steel, neoprene elastomer, and PTFE material meet the requirements of the materials specified above, showing actual test results for the materials used in the manufacture of the disc bearing assemblies.

Acceptance of disc bearing assemblies will be based on satisfactory manufacturer's certification, acceptable test results, and inspection at the time of installation.

##### **A. PTFE Sliding Surfaces**

The manufacturer shall furnish facilities for and perform the testing and inspection of the completed disc bearing assemblies or representative samples in their plant or at an independent test facility in accordance with Article 18.7.4.2 of the AASHTO Standard Specifications for Highway Bridges.

##### **B. Disc Bearing Assemblies**

The manufacturer shall furnish facilities for the Contracting Authority or an independent agency to perform the testing and inspection of the completed disc bearing assemblies or representative samples in their plant or at an independent test facility in accordance with Article 18.7.4.8 of the AASHTO Standard Specifications for Highway Bridges. These tests shall include a dimensional check (Article 18.7.2.3 of the AASHTO Standard Specifications for Highway Bridges), a clearance test (Article 18.7.2.4 of the AASHTO Standard Specifications for Highway Bridges), bearing horizontal capacity test (Article 18.7.2.9 of the AASHTO Standard Specifications for Highway Bridges) and a short-term compressive proof load test (Article 18.7.2.5 of the AASHTO Standard Specifications for Highway Bridges). This does not include a long-term deterioration test (Article 18.7.2.8 of the AASHTO Standard Specifications for Highway Bridges).

Disc bearing assemblies represented by the test specimen passing the above requirements will be approved for use in the structure, subject to on-site inspection for visible defects.

#### **01063.09 PACKAGING**

Disc bearing assemblies damaged during handling, transporting or storing shall be replaced by the Contractor at no expense to the Contracting Authority.

#### **01063.10 INSTALLATION OF DISC BEARING ASSEMBLIES**

The bridge bearings are not designed to accept bending stresses and must be fully supported over the entire area of the bottom and upper surfaces at all times when under load.

The bearing masonry plate shall be set to line and grade. The Contractor shall locate the disc bearing assemblies at the proper elevation and orient them in the proper direction. The location and orientation of

the bridge disc bearing assembly shall be approved by the Engineer. The upper part of the disc bearing assembly shall be located relative to the base of the disc bearing assembly according to the Engineer's recommendations for the temperature at the time of erection.

Disc bearing assemblies shall not be disassembled without the permission of the Engineer.

It is necessary to exercise care in aligning both the base and upper part of the guided expansion bearing as detailed on the contract documents, otherwise a wedging action will occur and unsought horizontal forces will result.

The Contractor shall avoid scratching, gouging, or otherwise marking the PTFE or mating stainless steel surfaces of the disc bearing assemblies during handling or erection. The Contractor shall use whatever means necessary to protect the disc bearing assemblies from dirt, grout, or other foreign materials during the construction of other elements of the structure.

#### **01063.11 METHOD OF MEASUREMENT**

The quantity of disc bearing assemblies will be the quantity shown in the contract documents.

#### **01063.12 BASIS OF PAYMENT**

Disc bearing assemblies completed and in place will be paid for at the contract unit price. Payment shall include the 1/8 inch (3 mm) preformed masonry pad, anchor bolts, work and materials required to drill and fill the anchor bolt holes with approved grout, surface preparation, and painting of steel surfaces as described herein.