

577.4.01 Limits

General Provisions 101 through 150.

577.5 Payment

Each of the three types of metal drain inlet installation, measured for payment as described above, will be paid for at the Contract Unit Price per each.

Payment of each Metal Drain Inlet—Complete Assembly will include both the First Stage and Second Stage Construction outlined above.

When First Stage Construction is completed and the installation is satisfactory to the Engineer, 50 percent of the bid price for each such Unit will be included for payment on the next statement.

When the Second Stage Construction is completed and the installation is satisfactory to the Engineer, the remaining 50 percent of the Bid Price for each Unit will be included for payment on the next statement.

All other Items needed to complete the installation and that are eligible for payment will be paid for according to the applicable Specification for such items.

Payment will be made under:

Item No. 577	Metal drain inlet—complete assembly	Per each
Item No. 577	Metal drain inlet—stage 1 construction	Per each
Item No. 577	Metal drain Inlet—stage 2 construction	Per each

577.5.01 Adjustments

General Provisions 101 through 150.

Section 581—Pot Bearings**581.1 General Description**

This work includes furnishing and installing pot bearings (fixed and expansion types). Use the quality, type, and size designated in this Specification, on the Plans, or ordered by the Engineer.

581.1.01 Definitions

General Provisions 101 through 150.

581.1.02 Related References**A. Standard Specifications**

Section 501—Steel Structures

Section 506—Expanded Mortar

Section 535—Painting Structures

Section 851—Structural Steel

Section 852—Miscellaneous Steel Materials

Section 885—Elastomeric Bearing Pads

Section 886—Epoxy Resin Adhesives

Section 887—Bearing Plates with Polytetrafluoroethylene Surfaces

B. Referenced Documents

ASTM A 709 Grade 36 (ASTM A 709M Grade 250)

A 709 Grade 50 (A 709M Grade 345)

581.1.03 Submittals

Provide the following reports to the Project Engineer and the Office of Materials and Research:

- Certified test reports
- Materials certificates
- Certificate of Compliance to conform with the requirements in this Specification
- Shop drawings
- Certification

A. Shop Drawings

Before fabricating the bearings, submit to the Engineer Shop Drawings according to Subsection 501.1.03.B, “Shop Drawings.” Include the following on the drawings:

- Bearing plan and elevation
- Complete details and sections that show the materials incorporated into the bearing
- ASTM or other material designations
- Vertical and horizontal load capacity
- Rotation and translation capacity
- Compression stress on sliding surfaces and elastomeric surfaces at maximum and minimum design loads
- Complete design calculations
- Complete erection and installation procedure

B. Certification

Have the pot bearing manufacturer furnish the following to the Project Engineer and the Office of Materials and Research:

- Certified test reports
- Material certificates
- Certificate of compliance to conform with these Specifications for each bearing furnished

581.2 Materials

Ensure that materials meet the requirements of the following Specifications:

Material	Section
Painting	535
Structural Steel	851
Anchor Bolts, Nuts, and Washers	852.2.02
Elastomeric Bearing Pads	885
Epoxy Resin Adhesives	886
Bearing Plates with PTFE Surfaces	887

A. Metals

Use the stainless steel sliding surfaces indicated below:

- Stainless Clad Steel Plate: Minimum eight percent stainless steel conforming to the requirements of ASTM A 264 (both Shear Strength and Bond Strength tests in 8.13 and 8.14 of ASTM A 264 are required). Use stainless steel cladding that meets Type 304. Use backing steel (base metal) that meets ASTM Designation A 709 Grade 50W(A 709M, Grade 345 W).
- Stainless Steel Plate Welded To A Steel Backup Plate: Use at least 16 gage (1.6 mm) thickness of the stainless steel plate that meets ASTM 240 Type 304. Use steel backing plate that meets ASTM Designation A 709 Grade 50W (A 709M Grade 345W) unless otherwise indicated on the Plans. Use qualified welders to weld the stainless steel plate to the steel backing. Furnish welding procedures and welder qualification documents to the

Department for review and approval prior to fabrication. Weld entirely around the perimeter of the stainless steel plate.

- **Solid Stainless Steel Plate:** Mill-finish the stainless steel sliding surfaces to a maximum surface roughness of 20 micro-inches (0.50 μ m), RMS, according to the requirements of ANSI Standard B 46.1. Remove and replace, at no additional cost to the Department, bearing plates whose stainless steel sliding surfaces have been scratched or damaged.

B. Structural Steel

Use structural steel for the masonry plates and the components of the bearings that meet the requirements of these ASTM Specifications:

- ASTM A 709, Grade 36 (ASTM A 709M, Grade 250)
- A 709, Grade 50 (A 709M, Grade 345)

Machine the base pot from a solid steel plate.

C. Anchor Bolts

Use anchor bolts, including nuts and washers, that meet the requirements of Subsection 852.2.02.

D. Elastomeric Material

Ensure that the elastomeric material used as the confined medium within the pot is 100 percent virgin chloroprene (“Neoprene”) that meets the requirements of Section 885. Ensure that the elastomer is a minimum Grade 2 and has a durometer hardness of 50 \pm 5.

Ensure that the sealing rings for containing the elastomer in the pot bearings are as specified by the pot bearing manufacturer, and meet the following requirements:

- Made of brass or stainless steel
- Withstands and transmits all imposed loading
- Allows free movement of the piston
- Contains the elastomer within the pot under the maximum static and dynamic loading
- Prevents contamination of the elastomer with foreign matter

E. Expanded Mortar

Set anchor bolts in preformed or drilled holes using expanding mortar that meets the requirements of Section 506.

F. Paint

Paint exposed steel of each bearing assembly other than stainless steel according to System VI of Section 535. Take care to keep Polytetrafluoroethylene (PTFE) or sliding surfaces free of paint.

G. Design and Applicable Codes

Design, fabricate, and erect pot bearings according to these Specifications and the applicable requirements of the following Standard Codes and Specifications.

- Section 501, including supplements
- Current AASHTO Standard Specifications for Highway Bridges

Additional design parameters with which the pot bearing manufacturer must comply:

1. **Bearing on Concrete:** Maximum bearing pressure is as indicated in AASHTO.
2. **Elastomeric Disc:** Design compressive strength is 3,500 psi (25 MPa).
3. **Sliding Surfaces:** Accommodate translation by sliding of a hard mating surface of stainless steel across a PTFE surface.
 - a. **Stainless Steel Sliding Surface:** Accurate, flat surface with Brinnell hardness of 125 minimum.
 - 1) Stainless steel sliding surface to completely cover PTFE surface in all operating positions of the bearing.
 - 2) Position the stainless steel sliding surface so that the sliding movement causes the dirt and dust accumulation to fall from the surface of the stainless steel.
 - b. **PTFE Sliding Surface:** Do not use holes or slots in the PTFE sliding surface.

- c. Static Coefficient of Friction: Under a load of 3,500 psi (25 MPa), do not exceed 4 percent for unfilled PTFE nor 8 percent of filled PTFE surfaces.
- d. Rotation: 0.015 radians.
- e. Piston-Cylinder Clearance: Limit clearance to 0.30 in (0.76 mm). Use a brass or stainless steel sealing ring to prevent extrusion of the elastomeric material.

H. Substituted Bearings

Pot bearings with a design similar to that shown on the Plans may be used provided the bearings to be substituted are approved by the State Bridge Engineer and comply with the following:

1. Equal or better load carrying and moment capacity.
2. All control dimensions are maintained and bearings fit within the limits of detailed masonry plate.
3. Use filled or unfilled (recessed) PTFE.
4. Piston-cylinder clearance is limited to 0.030 in. (0.76 mm) and a brass or stainless steel sealing ring shall be used to prevent extrusion of the elastomeric material.
5. Elastomeric material is used as a confined medium within the pot.
6. The elastomeric disc is lubricated by a means acceptable to the Engineer.
7. Do not use aluminum or aluminum alloy.
8. Equal or better than the pot bearings shown on the Plans in all structural respects and meets all design requirements.

581.2.01 Delivery, Storage, and Handling

A. Assembling and Marking

Have each pot bearing assembled at the plant, marked for identification, and delivered to the construction site as a complete unit.

Each bearing shall be marked with permanent match-marks to indicate the normal position of the bearing.

B. Transportation, Storage, and Handling During Construction

Follow these guidelines to transport, store, and handle pot bearings during construction:

1. Protect each pot bearing from dust and moisture.
2. Store the PTFE surface in the shade to avoid the damaging effects of ultraviolet rays.
3. Protect the pot bearings from damage during construction and prevent contamination of the various components of the pot bearings.

Ensure that the Fabricator also follows the above requirements.

During transportation and storage, cover the bearings with moisture-proof and dust-proof covers.

581.3 Construction Requirements

581.3.01 Personnel

A. Skilled Representative

Have the bearing manufacturer provide a skilled representative who is certified by the manufacturer to be experienced in similar installations.

The representative shall:

- Give aid and instruction during the pot bearing installation.
- Be present during the initial bearing installation.
- Be present during welding of the pots to the masonry plates, if not performed in the manufacturer's shop.
- Remain on the job until the bearing installation proceeds without trouble and until the workmen are experienced with the work for each installation as determined by the Engineer.

Arrange to have the manufacturer's skilled representative present whenever requested by the Engineer.

581.3.02 Equipment

General Provisions 101 through 150.

581.3.03 Preparation

General Provisions 101 through 150.

581.3.04 Fabrication**A. Polytetrafluoroethylene (PTFE)**

Ensure that the PTFE, including its connection to its backup material, conforms with the requirements of Section 887, except as modified in this Specification.

Have the PTFE sliding surface bonded under factory controlled conditions, or mechanically connect it to a rigid backup material that can resist bending stresses of the sliding surfaces.

As an alternate, PTFE material of twice the thickness specified above may be recessed for half its thickness in the backup material. Ensure that it is at least 1/8 in (3 mm) thick.

1. When shown on the Plans, weld the pot to the masonry plate before installing the elastomer.
If welding procedures established and approved by the Engineer restrict the temperature of the bond area to no greater than 300 °F (150 °C), welding to steel plates with a bonded PTFE surface is permitted.
Use temperature-indicating wax pencils or other suitable means to determine the temperature.
2. After fabricating the backup material, plane it before bonding the stainless steel or PTFE to a true plane surface.
3. Have the PTFE sheets bonded at the bearing manufacturer's factory under controlled conditions according to the approved adhesive system manufacturer's written instructions.
4. When epoxy bonding PTFE sheets, ensure that the side of the PTFE sheet to be bonded to the metal is factory treated by the sodium naphthalene or sodium ammonia process.
5. After the bonding operation, ensure that the PTFE surface is smooth, flat, and bubble free. Polish the filled PTFE surfaces.
6. Positively locate the elements of the bearing in the bearing manufacturing and assembling.
7. If using bearing other than those detailed on the Plans, obtain approval before constructing the substructure upon which the bearings will be installed.
8. Have each bearing assembled at the manufacturer's plant, marked for identification, and delivered to the construction site as a complete unit.
Ensure that the bearings have permanent match-marks to indicate the normal position of the bearing.

581.3.05 Construction**A. Erection**

Place bearings at their proper locations before erecting the superstructure supported by the bearings.

1. Install Pier Tops
Install pier tops horizontal at the correct elevation with a plus or minus tolerance of zero. Do not install the masonry plates until the Engineer accepts the pier tops.
2. Install the Anchor Bolts
Cast anchor bolts in the concrete or set them in preformed holes, unless otherwise shown on the Plans. If setting them in preformed holes, fill the preformed holes in the concrete substructure with epoxy grout.
 - a. Insert the anchor bolts to the prescribed depth.
 - b. Place additional grout as required in the annular space around the anchor bolts until the grout is well packed and flush with the top surface of the concrete.
 - c. Wipe clean the exposed surfaces of the anchor bolts and substructure. Do not allow a load on grout that has not been in place at least 7 days.
3. Install Masonry Plates
Set the masonry plates to the proper elevation on the previously finished concrete pads.
4. Install the Bearings
 - a. Place the bearing at the predetermined locations when erecting the superstructure.
 - b. Remove the temporary restraints as directed by the bearing manufacturer.

581.3.06

- c. Adjust the bearings as follows:
 - Adjust the expansion bearings from the normal position at 60 °F (15 °C) to allow for the ambient temperature during erection or casting.
 - Adjust the pot bearings to allow them to move when dead loads are applied. Ensure that the bearing is properly positioned and parallel (free from rotation) after applying the dead load.
 - Adjust the bearings horizontally on the masonry plate to properly fit the superstructure members being erected.
- d. After adjustments and approval by the Engineer, weld the bearings to the masonry plate.

581.3.06 Quality Acceptance

Instruct the manufacturer to furnish facilities to test and inspect the completed bearings in the plant or at an independent test facility. An approved testing laboratory or the manufacturer supervised by an approved independent expert shall perform the testing.

Follow these testing guidelines:

- Instruct the manufacturer to allow the Engineer and Inspectors access to the plant and test facilities.
- Furnish certified test reports, materials certificates, and a certificate of compliance to conform with the requirements in the Specifications.
- Perform testing according to Section 887 and this Specification. The Department reserves the right to sample and test the material and pot bearing assemblies as shown in Section 106.
- Test complete bearing assemblies or a specially manufactured pot bearing prototype that has a capacity of 400 kips (181 000 kg).

Successfully tested full-size bearings that meet the requirements of this subsection and have no damaged components, finishes, or surfaces may be used in construction. Provide prototype pot bearings, if used, at no additional expense to the Department.

Specific Items tested are as follows:

A. Coefficient of Friction

Perform tests to determine the static coefficient of friction of the first movement under a load of 3,500 psi (25 MPa) on a piston area applied continuously for 12 hours before testing. Determine under a load of 2,000 psi (14 MPa) on a piston area the following:

1. The static coefficient of friction value shall not exceed 10 percent for filled PTFE surfaces and 6 percent for unfilled PTFE surfaces.
2. The first movement static and dynamic coefficient of friction at a sliding speed of less than 1 in per min (0.4 mm per sec). Values shall not exceed 10 percent for filled PTFE surfaces and 6 percent for unfilled PTFE surfaces.
3. The static and dynamic coefficient of friction is determined after the bearing is subjected to 100 design movements at a speed of less than 1 ft per min (5 mm per sec). Values shall not exceed those indicated in step 2 above. Signs of bond failure or other defects are cause for pot bearing rejection.

B. Proof Loading

Perform, under maximum design loads, proof loading and compression deflection tests on a full-size pot bearing.

C. Cold Flow

Subject an approved sample of filled PTFE or unfilled PTFE to a static pressure of 3,500 psi (25 MPa) for at least 24 hours. Ensure that the PTFE material is bonded or mechanically connected to its backup material in the same way as the pot bearing.

Apparent cold flow of the PTFE material is cause for pot bearing rejection.

581.3.07 Contractor Warranty and Maintenance

General Provisions 101 through 150.

581.4 Measurement

Pot bearing assemblies are measured by Lump Sum for each bridge. Determine the actual quantities required before submitting the bid.

581.4.01 Limits

General Provisions 101 through 150.

581.5 Payment

The work in this Specification will be paid for on a Lump Sum basis.

Payment is full compensation for:

- Furnishing materials and equipment including structural steel components of the bearings, masonry plates, top plates, sole plates, PTFE, elastomers, anchor bolts, and welding
- Designing the pot bearing
- Performing tests
- Furnishing prototype bearings and test samples
- Performing Work as described and specified in this Specification or the Plans
- Providing incidentals to complete the work

Payment will be made under:

Item No. 581	Pot bearings, bridge No. ____	Per lump sum
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581.5.01 Adjustments

General Provisions 101 through 150.

Section 600—Controlled Low Strength Flowable Fill

600.1 General Description

This work consists of furnishing and placing Flowable Fill as an alternate to compacted soil as approved by the Engineer. Applications for this material include beddings, encasements, and closures for tanks and pipe, and general backfill for trenches and abutments.

600.1.01 Definitions

General Provisions 101 through 150.

600.1.02 Related References**A. Standard Specifications**

Section 500—Concrete Structures

Section 801—Fine Aggregate

Section 830—Portland Cement

Section 831—Admixtures

Section 880—Water

B. Referenced Documents

SOP 10

General Provisions 101 through 150.

600.1.03 Submittals

Mix designs for flowable fill, and other documentation listed in Subsection 500.1.03.