ITEM 565.14200008 – NON-GUIDED POLYTETRAFLUOROETHYLENE (PTFE) SLIDING BEARING

DESCRIPTION:

The work shall consist of furnishing, placing, and setting Non-guided PTFE Sliding Bearings at the locations shown on the Plans.

The Contractor shall notify the Deputy Chief Engineer, Structures (DCES) of the name and address of the fabricator of all bridge bearings in accordance with §106-01 Sources of Supply.

PTFE sliding bearings shall consist of a lower PTFE surface bonded to a stainless steel backing plate and an upper surface of either a PTFE surface bonded to a stainless steel backing plate or a polished stainless steel sliding plate as shown in the Plans.

PTFE sliding bearings shall be supplied as non-guided expansion bearings, as designated by the Contract Documents.

The non-guided expansion bearings shall allow longitudinal and transverse movement in the bearing plane.

MATERIALS:

All material shall be new and unused, with no reclaimed material incorporated in the finished bearing. Sections 565-2.01, 565-2.04 and 565-2.05 of the Standard Specifications shall apply. In addition to those requirements, the following shall apply.

1. Backing Plate and External Load Bearing Plates:

   Steel backing plate for PTFE sheet and external load bearing plates shall conform to the requirements of ASTM A167, Type 304 or A240, Type 304 and the applicable provisions of the New York State Steel Construction Manual unless otherwise provided for in the Contract Plans.

2. Stainless Steel:

   Stainless steel shall conform to the requirements of ASTM A167 or A240, Type 304. Stainless steel intended as a sliding surface shall be polished to a No. 8, bright mirror finish. The minimum thickness of the stainless steel sliding surface shall be 0.050 inch.

   Stainless steel shall not be painted or coated with rust inhibitors.

3. Polytetrafluoroethylene (PTFE) Sheet:

   Polytetrafluoroethylene (PTFE) sheet shall be manufactured from pure virgin (not reprocessed) unfilled TFE resin or from TFE resin uniformly blended with either 15% glass fiber or 25% carbon (maximum filler, by percent weight.)
PTFE sheet shall be bonded to or recessed into its stainless steel backing plate. Bonded PTFE sheet shall be etched on its bonding side, and shall have a minimum thickness of 1/16”. Recessed PTFE sheet shall have a minimum thickness of 1/8” and recessed for at least one-half of its thickness into the stainless steel plate. Recessing of the PTFE sheet shall only be allowed for the stainless steel sliding surface option and then only when there will be full bearing of the PTFE on the stainless steel sliding surface throughout the bearings design movement range. The mating sliding surface of filled PTFE sheet in contact with stainless steel sliding surface shall be polished or burnished to insure smooth and low friction movement of the bearing.

Finished PTFE sheet and strip shall be resistant to all acids, alkalis and petroleum products, stable at temperatures from -360º to 500ºF, non-flammable, non-absorbing of water and shall conform to the following minimum physical requirements:

<table>
<thead>
<tr>
<th>Physical Property</th>
<th>ASTM Test</th>
<th>Unfilled</th>
<th>15% Glass</th>
<th>25% Carbon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultimate Tensile Strength, psi</td>
<td>D638</td>
<td>2800</td>
<td>2000</td>
<td>1300</td>
</tr>
<tr>
<td>Ultimate Elongation, %</td>
<td>D638</td>
<td>200</td>
<td>150</td>
<td>75</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>D792</td>
<td>2.13</td>
<td>2.18</td>
<td>2.05</td>
</tr>
</tbody>
</table>

**FABRICATION DETAILS:**

Every bearing shall have the Project Identification Number, NYSDOT Lot Number and individual bearing number indelibly marked with ink on a side that will be visible after erection.

The PTFE sheet shall be bonded to its grit blasted stainless steel backing plate using an epoxy resin adhesive under controlled factory conditions in accordance with the instructions of the adhesive manufacturer. Alternately, the PTFE sheet may be recessed into its backing plate for one-half its thickness. The bearing manufacturer shall have the option of bonding the recessed PTFE sheet.

If used, the stainless steel sliding surface plate shall be attached to the stainless steel bearing plate with a full perimeter, continuous weld.

Except as noted, all bearing surfaces of steel plates shall be finished or machined flat within 0.010 inch. Out-of-flatness greater than 0.010 inch of any plate shall be cause for rejection. The bottom surfaces of any lower external load plates (masonry plate) designed to rest on masonry bearing pads shall not exceed an out-of-flatness value of 1/16 inch. Oxygen cut surfaces shall not exceed a surface roughness value of 1 mil, as defined by ANSI B46.1. Repair, when necessary shall conform to the requirements of the NYS SCM.
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Unless otherwise approved by the Regional Director, all welding shall conform to and all welders shall be qualified in accordance with the requirements of the NYS SCM.

For all welds of stainless steel the contractor shall submit for approval a proposed welding procedure and shop drawings prior to fabrication.

Gross bearing dimensions shall have a tolerance of -0 to +1/8”.

**PERFORMANCE CHARACTERISTICS:**

**Sliding Coefficient of Friction:**

The sliding coefficient of friction shall be calculated as the horizontal load required to maintain continuous sliding of one bearing, divided by the bearing’s design capacity vertical load. The vertical load shall have been applied continuously for a minimum of 12 hours prior to testing. The test results will be evaluated as follows:

a. The measured sliding coefficients of friction shall not exceed 75% of the maximum design coefficient of friction.

b. The bearing will be visually examined both during and after the test. Any resultant visual defects (such as bond failure, cold flow of PTFE, or damaged components) shall be cause for rejection.

**SAMPLING AND TESTING:**

The manufacturer shall furnish the required number of samples to perform the tests as required. A minimum of thirty (30) days shall be allowed for the Department’s inspection, sampling and testing procedures.

All exterior surfaces of sampled production bearings shall be smooth and free from irregularities or protrusions that might interfere with testing procedures.

Bearings with tapered sole plates which are selected for testing by the materials bureau shall be delivered to the test site accompanied by a single unattached matching bevel plate. The plate shall be made of the same material and be the same size and thickness as the tapered sole plate. Additionally, the single beveled plate shall be so constructed that when placed in contact with the tapered sole plate the two shall form a single body, rectangular in shape and uniform in thickness.

The Department’s representative shall select, at random, the required sample bearing(s) from completed lots of bearings, and samples of the PTFE materials for testing by the Materials Bureau. All samples shall be taken in accordance with the Department’s written instructions.
Performance Characteristics:

Bearings shall be tested for performance characteristics by the Materials Bureau, Albany, New York. The contractor shall assume the responsibility and cost of transporting the required bearings from the place of manufacture to Albany and return.

The sampling rate shall be one in every ten in each size category, per project per production run, a minimum of two bearings. All bearings shall be returned to the Contractor.

The testing of the samples shall be as follows:

<table>
<thead>
<tr>
<th>TEST</th>
<th>SAMPLES TESTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sliding Coefficient of Friction</td>
<td>One set of samples per project per size, per production run (1 set equals 2 bearings.)</td>
</tr>
<tr>
<td>Physical Properties of PTFE Sheet</td>
<td>One 10 x 15 inch sheet of PTFE per lot (Note 1.)</td>
</tr>
</tbody>
</table>

Note 1: The Materials Bureau will perform this testing. At the time of inspection, single sheets of PTFE sheets from which the bearing has been fabricated shall be submitted by the Department’s representative. All submitted sample sheets shall be certified by the Manufacturer as having been taken from the same batch of material as was used in the actual production bearings.

DRAWINGS:

The contractor shall submit detailed shop drawings, drawn by the Manufacturer only, in conformance with the applicable requirements of the NYS SCM, for approval by the Regional Director prior to the start of fabrication. In addition, the manufacturer shall note the following on the shop drawings.

1. The total quantity of non-guided PTFE sliding bearings required.

2. The maximum design coefficient of friction.

3. The type of PTFE sheet (filled or unfilled) and, if applicable, the type and amount (by weight) of filler.

4. The type of steel to be used.

5. If applicable, any welding process used in the bearing manufacture or installation that does not conform to or is not addressed in the approved processes of the NYS SCM shall be clearly described and detailed. This shall include any welding of stainless steel.
6. The location of the fabrication plant.

7. The Manufacturer’s name and the name of its representative who will be responsible for coordinating production, inspection, sampling and testing with the Materials Bureau.

The contractor shall also provide the Materials Bureau with written notification within thirty (30) days prior to the start of bearing fabrication. This notification shall include all of the information required by number 1 through 7 above. A copy of this notification shall be sent to the Regional Director.

**BASIS OF ACCEPTANCE:**

Bearings shall be considered for acceptance in project lot quantities, or portions thereof, at the manufacturing site in accordance with the procedural directives of the Materials Bureau.

**CONSTRUCTION DETAILS:**

Bearings shall be installed at locations and in the manner shown in the plans.

**METHOD OF MEASUREMENT:**

This work will be measured as the number of bearings installed in accordance with the Contract Documents. Each bearing consists of two sliding elements.

**BASIS OF PAYMENT:**

The unit price bid for each bearing shall include the cost of all labor, materials, equipment and adjustment necessary to complete the work. All material between the support structure and the supported structure including fasteners and plates shall be included in the price bid for this item.