

**ITEM 10565.1424 M - UNI-DIRECTIONAL CENTER GUIDED
POLYTETRAFLUOROETHYLENE (PTFE) SLIDING
BEARINGS**

DESCRIPTION:

The work shall consist of removal of the roller nest portion of existing bearings and the furnishing and setting of replacement bridge bearings at the locations where these roller nests have been removed.

Bearing Type. The type of bearing to be used is a PTFE Sliding Bearing. The bearings will accommodate rotation via the pin attaching the existing bearing shoe to the truss and longitudinal movement by means of a sliding interface of stainless steel and polytetrafluoroethylene (PTFE) to accommodate movement. The bearings will be guided, allowing one directional movement.

MATERIALS:

Scope. Bearings furnished under this specification shall adequately provide for the thermal expansion and contraction of structural members.

General. The top half of the bridge bearings shall consist of a polytetra fluoroethylene (PTFE) sheet bonded to a steel top load plate. The bottom half shall consist of a bottom load plate faced with polished stainless steel. The bearings shall accommodate rotation via the pin attaching the existing shoe to the truss. To restrict transverse movement between load plates, the bearings shall be equipped with a shear restriction mechanism. Materials shall conform to the requirements of the NYSDOT STANDARD SPECIFICATIONS dated January 2, 1995 with current additions and modifications.

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

Steel. All steel except stainless steel components of the bearing shall conform to the requirements of the type of steel designated on the Contract Plans and applicable provisions of the New York State Steel Construction Manual.

Stainless Steel. Stainless steel shall conform to the requirements of ASTM A-167, or ASTM A-240, Type 304. Stainless steel in contact with PTFE shall be polished to a No. 8, bright mirror finish. The minimum thickness of the stainless steel shall be 1.25 mm.

Polytetrafluoroethylene 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, percent by weight).

PTFE sheet shall be bonded to or recessed into its steel substrate. Bonded PTFE sheet shall be etched on its bonding side, and shall have a minimum thickness of 1.6 mm. Recessed PTFE sheet shall have a minimum thickness of 3.0 mm and be recessed for at least one-half its thickness into its steel substrate. The surface of filled PTFE sheet in contact with stainless steel shall be polished or burnished to insure smooth and low friction movement of the bearing.

Finished PTFE sheet shall be resistant to all acids, alkalis and petroleum products, stable at temperatures from -215°C to +260°C, non-flammable, non-absorbing of water, and shall conform to the following requirements:

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MINIMUM REQUIREMENTS

Physical Property	ASTM Test Method	Unfilled	Filled 15% Glass	Filled 25% Carbon
Ultimate Tensile Strength , MPa	D638M	19.3	13.8	9.0
Ultimate Elongation, %	D638M	200	150	75
Specific Gravity	D792	2.13	2.18	2.05

Vertical Load Transmitting Devices (Bearing Pads). NYSDOT Standard Specifications, Subsections 728-01, 728-02 or 728-03.

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. Steel components of bridge bearings shall be fabricated in accordance with the applicable requirements of the N.Y.S. Steel Construction Manual (SCM). In addition, component parts of the individual bearings shall meet fabrication details as shown in the contract documents.

The PTFE shall be bonded to its grit blasted steel substrate 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 steel substrate for one-half its thickness. The bearing manufacturer shall have the option of bonding recessed PTFE sheet.

All steel surfaces exposed to the atmosphere, except stainless steel surfaces, shall be shop painted with one coat of coal-tar epoxy. Coal-tar epoxy paint shall meet the requirements of SSPC Paint Specification No. 16, and be applied at a minimum wet film thickness of 0.25 mm. Prior to painting, the exposed steel surfaces shall be cleaned in accordance with the recommendations of the coating's manufacturer.

Except as noted, all bearing surfaces of steel plates shall be finished or machined flat within 0.25 mm. Out-of-flatness greater than 0.25 mm on any plate shall be cause for rejection. Oxygen cut surfaces shall not exceed a surface roughness value of 25 μ m, as defined by ANSI B46.1. Repair, when necessary, shall conform to the requirements of the New York State Steel Construction Manual (When the SCM requires DCES approval, *delete* the term "DCES" and *replace it with* "the Regional Director.")

Gross bearing dimensions shall have a tolerance of -0, +3.0 mm.

Sliding Coefficient of Friction. For all guided bearings, the coefficients of friction shall be measured at the bearing's design capacity, on the fifth and fiftieth cycle at a sliding speed of 25 mm per minute.

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:

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

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

Drawings and Calculations.

The Contractor shall submit detail shop drawings, drawn by the Manufacturer only, in conformance with the applicable requirements of the New York State Steel Construction Manual, for approval by the Regional Director prior to the start of fabrication.

In addition to the above requirements, the Manufacturer shall note the following on the shop drawings.

General arrangements and large-scale details.

Tables showing load capacity and movement rating of each bearing, including initial offset required at various ambient temperatures.

The total quantity of bearings required grouped first according to type (load range) and then by actual design capacity.

The maximum design coefficient of friction.

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

The type(s) of steel(s) to be used.

If applicable, any welding process used in the bearing manufacture that does not conform to the approved processes of New York State Steel Construction Manual shall be clearly described and detailed.

The location of the fabrication plant.

The Manufacturer's name and the name of the manufacturer's 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 thirty (30) days prior to the start of bearing fabrication. This notification shall include all of the information required by numbers 1 through 9 above. A copy of this notification shall be sent to the Regional Director.

B. Calculations will be required showing conformance of the bearings to the design loadings, movements and other specified requirements.

Sampling and Testing

Lot Size. Sampling, testing and acceptance consideration will be made on a lot basis. A lot shall be defined as those bearings presented for inspection at a specific time or date. A lot shall be further defined as the

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smallest number of bearings as determined by the following criteria:

A lot shall not exceed a single contract or project quantity.

A lot shall not exceed 25 bearings.

A lot shall consist of those bearings of the same type, regardless of load capacity. Bearing types shall be fixed type bearings or expansion type bearings.

TABLE 1 SAMPLING AND TESTING REQUIREMENTS

Test	Performed By	Samples Required
Coefficient of Friction	Manufacturer	One production bearing per lot (Note 1)
Physical Properties of PTFE Sheet	Materials Bureau	One 250x375 mm sheet of PTFE per lot. (Note 2)

Note 1: Bearings which are tested at actual design capacity will be tested at that capacity because it is not possible, or not practical in the Department’s opinion to test them at a higher capacity. Therefore, bearings tested at 150% design capacity which are rejected, will not be retested below 150% design capacity for the purpose of rendering such bearings acceptable. Sample production bearings that cannot be tested by the manufacturer at their actual design capacity for friction shall be tested by an outside laboratory selected by the Materials Bureau. Rotation is accommodated via the Shoe Pin, therefore, testing for rotation is not required. The Manufacturer shall assume the cost of this testing and submit the certified results to the Materials Bureau.

Note 2: Single sheets of PTFE Material from which the bearing has been fabricated may be submitted to the Materials Bureau for consideration of multiple lot acceptance, provided that the thickness of the material does not vary from lot to lot. All submitted sample sheets shall be certified by the bearing manufacturer as having been taken from the same batch of PTFE material as was used in the actual production bearings.

Sampling and Testing Requirements. The manufacturer shall furnish the required number of samples to perform testing in accordance with Table 1.

A minimum of thirty (30) days shall be allowed for the Department’s inspection, sampling and testing of production bearings and component materials.

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

The manufacturer shall select, at random, the required sample bearing(s) from the completed lots of bearings for testing by the manufacturer. The manufacturer shall complete the required testing and determine compliance with this specification before submitting the lot(s) for inspection, sampling and acceptance consideration.

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.

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The Contractor shall assume the cost of transporting all samples from the place of manufacture to the Materials Bureau and return, or, if applicable, to the project site.

Basis of Acceptance. Bearings will 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.

Shipping. Each bearing shall be shipped as an assembled unit. Bearings shall be packed in such a manner to protect all sliding surfaces from the intrusion of outside material.

CONSTRUCTION DETAILS:

Bearing Dimensions. The Contractor prior to jacking the structure to remove the roller nest shall measure the vertical dimension between the top of the existing masonry plate and the bottom of existing bearing shoe. Changes to the roadway profile will not be allowed, and all elevation adjustments necessary to maintain the profile shall be made to the top and bottom load plates. The Contractor shall notify the Engineer of all required changes to these items. All adjustments will be made at no additional cost to the State.

Bearing Installation and Alignment. The maximum variation from perfect alignment between the fixed portion and moveable portion of the bearing device, taking into account the effect of temperature and load at the time of measurement, shall not exceed plus or minus 13mm longitudinally. This variation shall be measured as the horizontal distance between the centerline of the pin attaching the existing bearing shoe to the truss and the centerline of the PTFE bearing.

Welding. No welding will be allowed between the existing bearing shoe, the new PTFE bearing components and the existing masonry plates.

Final Verification. Prior to final acceptance of the bridge, the Contractor will verify to the Engineer that all necessary adjustments have been made; that all load plates are properly attached to the existing bearing and masonry plates; and that all other work required to make the bearings completely functional has been completed.

METHOD OF MEASUREMENT:

Measurement will be taken as the number of bearings installed in accordance with the Contract Documents.

BASIS OF PAYMENT:

The unit price bid for each bearing shall include the cost of all labor, materials and equipment, including the removal of existing bearings and adjustment necessary to complete the work.