ITEM 11565.2201 M - TYPE E.S. NON-GUIDED ELASTOMERIC SLIDING BRIDGE BEARINGS

DESCRIPTION:

The work shall consist of furnishing, placing, and setting Type E.S. Non-guided Elastomeric Sliding Bridge Bearings at the locations shown on the plans.

Elastomeric sliding bearings shall consist of a plain elastomeric element bonded to a lower steel bearing plate. To allow movement, the upper surface of the element shall be faced with a steel backed, polyetrafluoroethylene (PTFE) sheet and support a sliding steel top bearing plate. The mating surface of the top steel bearing plate shall be faced with polished stainless steel.

Elastomeric sliding bridge bearings shall be supplied as non-guided expansion bearings, as designated by the Contract Documents to replace the existing bearings in kind.

The non-guided expansion bearings shall allow rotation, 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. Elastomeric Element.

   The elastomeric element used in the construction of these bearings shall conform to the requirements of 716-10, Plain Elastomeric Bridge Bearings.

2. Steel 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 A36M; A167, Type 304; A240, Type 304 and the applicable provisions of the SCM unless otherwise provided for in the contract plans.

   External load bearing plates fabricated from ASTM A36M steel shall be protected from rust until all exposed surfaces can be field painted. Any rust inhibitor used shall be removed from all surfaces to be welded, prior to welding.

   Steel backing plate that is fabricated from ASTM A167 or A240 steel shall not be painted or coated with rust inhibitors.

3. Stainless Steel

   Stainless steel shall conform to the requirements if ASTM A167 or A240, Type 304. Stainless steel in contract with PTFE sheet shall be polished to a No. 8, bright mirror finish. The minimum thickness of the stainless steel shall be 1.25 mm.

4. 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, percent by weight).

   PTFE sheet shall be bonded to or recessed into its steel backing plate. 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 mating sliding 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 and strip shall be resistant to all acids, alkalis and petroleum products, stable at temperatures from -215° C + 260° C, non-flammable, non-absorbing of water, and shall conform to the following minimum physical requirements:

	ASTM Test	Unfilled	Filled	
Physical Property	Method		15% Glass	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

FABRICATION DETAILS:

The finish of the mold used to produce the bearing elements shall conform to good machine shop practices. 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 elastomeric element shall be fabricated in accordance with the requirements of 716-10. External lower steel bearing plates and steel backing plates for PTFE sheet shall be factory bonded, by vulcanization, to the elastormeric element during the primary molding process.

The PTFE sheet shall be bonded to its grit blasted 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 recessed PTFE sheet.

Stainless steel sheet used for sliding surfaces on upper steel bearing plates fabricated from ASTM A36M steel shall be attached by a full perimeter, continuous weld.

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. The bottom surfaces of lower external load plates (masonry plate) designed to rest on bearing pads shall not exceed an out-of-flatness value of 1.6 mm. Oxygen cut surfaces shall not exceed a surface roughness value of 25μm, as defined by ANSI B46.1. Repair, when necessary, shall conform to the requirements of the SCM.

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 SCM.

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

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PERFORMANCE CHARACTERISTICS :

1. Compressive *Strain*.

   The compressive strain of an assembled bearing shall not exceed 5.0% of the effective rubber thickness of the elastormeric element at a compressive load of 3.45 MPa or 8.0% of the effective rubber thickness at a compressive load of 5.50 MPa. When bearings are designed for loading stresses higher than 5.50 MPa, the compression strain shall not exceed 8.0% of the effective rubber thickness at the higher stress. The bearing and ambient temperature shall be 23° ± 5° C at the time of testing.

2. Compressive Load

   Assembled bearings shall be tested in compression by applying a load corresponding to 150% of the design dead load plus live load capacity.

   The compressive load shall be maintained for five minutes and the test results evaluated as follows:

   a. The bearing shall be visually examined both during and after the test. Any visual defects shall be cause for rejection.

   b. Non-uniform compression deflection at 150% compressive load will be cause for rejection. Deflection will be measured by dial indicators, at 4 locations 90° apart, on the perimeter of the bearing.

3. Sliding Coefficient of Friction

   The sliding coefficients of friction shall be measured a the bearing's design capacity, on the fifth and fiftieth cycles, 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 testing 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, physical destruction, cold flow of PTFE, or damaged bearing components) shall be cause for rejection.

SAMPLING AND TESTING :

The manufacturer shall furnish the required number of samples to perform 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 beveled 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.

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The Department's representative shall select, at random, the required sample bearing(s) from completed lots of bearings, and samples of the elastomer and PTFE materials for testing by the Materials Bureau. All samples shall be taken in accordance with the Department's written instruction0s.

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 per every ten ~~five~~ in each size category, per project per production run, a minimum of two ~~three~~ bearings. All bearings shall be returned to the Contractor.

The testing of the samples shall be as follows:

TEST	SAMPLES TESTED
Compressive Strain	All
Compressive Load	All (Note 1)
Sliding Coefficient of Friction	One set of samples per project per size, per production run. (1 set equals 2 bearings
Physical Properties of Elastomeric Element	One 250 x 375 mm (10 mm min. thickness) sheet of elastomeric material per project, per production run. (Note 2)
Physical Properties of PTFE Sheet	One 250 x 375 mm sheet of PTFE material per project, per production run. (Note 3 ~~2~~)

NOTE 1: Production bearings of such size that cannot be tested by the Materials Bureau at 150% design capacity for compressive load shall be tested at their actual design capacity.

NOTE 2: Single sheets of elastomeric and PTFE material from which the bearing has been fabricated shall be submitted to the Materials Bureau for test. All submitted samples shall be certified by the Manufacturer as having been taken from the same batch of material as was used in the actual production bearings.

NOTE 3: The Materials Bureau will perform this testing. At the time of inspection, single sheets of elastomeric and 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.

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DRAWINGS :

The contractor shall submit detailed shop drawings, drawn by the Manufacturer only, in conformance with the applicable requirements of the 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 elastormeric sliding bearing required.
2. The shape factor, effective rubber thickness, typical laminate thickness, compressive area, and length to height ratio of the elastomeric element. Computations shall be as defined in 716-10.
3. The maximum design coefficient of friction.
4. The type of PTFE sheet (filled or unfilled) and, if applicable, the type and amount (by weight) or filler.
5. The type(s) of steel(s) to be used.
6. If applicable, any welding process used in the bearing manufacture that does not conform to the approved processes of the SCM shall be clearly described and detailed.
7. The location of the fabrication plant.
8. 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 numbers 1 through 8 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 in accordance with all requirements of Section 565-3 of the Standard Specifications.

METHOD OF MEASUREMENT :

This work will be measured in accordance with Section 565-4 of the Standard Specifications.

BASIS OF PAYMENT :

Basis of payment shall be in accordance with Section 565-5 of the Standard Specifications.