ITEM 434
ELASTOMERIC BRIDGE BEARINGS

434.1. Description. Furnish and install the following elastomeric bridge bearings:

- **Plain Elastomeric Bearings.** Consisting of elastomer only.
- **Laminated Elastomeric Bearings.** Consisting of alternating individual layers of elastomer and steel laminates, with or without a steel top plate and special components (steel guide bars and bottom plate).
- **Sliding Elastomeric Bearings.** Consisting of a steel top plate with a stainless steel facing (upper component) bearing on a preformed fabric pad bonded to a layer of polytetrafluoroethylene (PTFE) material (lower component), with or without special components (steel guide bars and bottom plate).

Plain and laminated elastomeric bridge bearings are designated by hardness (durometer), size, and configuration and, in the case of laminated bearings, by the thickness of the individual layers of elastomer and the size and position of any steel top plates.


A. **Plain and Laminated Elastomeric Bearings.** Furnish bearings produced by a manufacturer prequalified by the Construction Division.

1. **Elastomer.** Provide elastomer for bearings formulated from previously unvulcanized 100% virgin polychloroprene rubber polymers meeting the requirements of AASHTO M 251, Table 1, unless otherwise shown on the plans. Do not provide bearings containing previously vulcanized synthetic rubber or other synthetic rubber-like polymers. Perform material tests on the finished product in accordance with the applicable test methods. Do not use standard laboratory test slabs for this purpose. Prepare test specimens from the finished product in accordance with ASTM D 3183.

Obtain approval for each elastomer formulation before use on Department projects. To prequalify and obtain approval of a particular formulation, submit certified test results to the Construction Division. Show actual test values obtained and the required values for the physical properties of the elastomer when tested for compliance with the minimum requirements of AASHTO M 251, Table 1.

Forward samples (freight prepaid) to the Construction Division, Materials and Pavements Section.

Adhesion testing of laminated prequalification samples will be performed by the Department in accordance with Tex-601-J. Submit only elastomer of the type or types to be supplied. Presence of chlorinated compounds (neoprene) in the elastomer will be verified by the Department in accordance with Tex-601-J. Submit prequalification samples consisting of 2 finished bearings typical of the formulation and workmanship for Department projects. When laminated and plain bearings are required, submit 2 samples of each type.

Plain sample bearings must measure 9 in. × 19 in. × 1 in. with 70-durometer hardness. Laminated sample bearings must measure 9 in. × 14 in. × 1-1/2 in. with the following number of steel laminates:

- 50 durometer—3 steel laminates and
- 60 durometer—2 steel laminates.

Certify that the submitted samples are of the same basic elastomer formulation and of equivalent cure as the finished products to be furnished on Department projects.

Complete prequalification testing will be performed for each formulation at least once every 2 yr. and when necessary.

2. **Steel Laminates.** Provide steel laminates, for laminated bearings, of commercial grade steel strip or sheet with a thickness of 0.105 ±0.015 in.

3. **Steel Top Plates.** Provide steel top plates, when required for laminated bearings, in accordance with ASTM A 36.

4. **Special Components.** Provide steel guide bars and bottom plates, when required for laminated bearings, in accordance with the plans.
B. Sliding Elastomeric Bearings.

1. Lower Component.
   a. **Preformed Fabric Pad.** Provide preformed fabric pads manufactured of new materials and composed of multiple layers of prestressed duck, 64 plies per inch of finished pad thickness, impregnated and bound with a high quality rubber compound, containing rot and mildew inhibitors and antioxidants, compounded into resilient pads of uniform thickness. The Shore A durometer hardness of the pad must not be less than 85 nor more than 95. Breakdown must not occur when the preformed fabric pad is subjected to a minimum 10,000-psi compressive stress when tested in accordance with Tex-622-J.
   
b. **PTFE.** Furnish PTFE materials that are pure virgin polytetrafluoroethylene fluorocarbon resin, unfilled. Provide finished PTFE sheet between 1/16 and 1/8 in. thick. The finished materials must exhibit the physical properties shown in Table 1.

<table>
<thead>
<tr>
<th>Physical Property</th>
<th>Test Method</th>
<th>Value (Unfilled)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile strength, psi</td>
<td>ASTM D 4894</td>
<td>2,800 min.</td>
</tr>
<tr>
<td>Elongation, %</td>
<td>ASTM D 4894</td>
<td>200 min.</td>
</tr>
<tr>
<td>Melting point</td>
<td>ASTM D 4894</td>
<td>622 ±4°F</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>ASTM D 792</td>
<td>2.16 ±0.03</td>
</tr>
</tbody>
</table>

2. Upper Component.
   a. **Steel Plates.** Provide steel plates, unless otherwise shown on the plans, in accordance with ASTM A 36, finished to ANSI #500 or better on the surface interfacing with the stainless steel.
   
b. **Stainless Steel.** Provide Type AISI 304 stainless steel sheet in accordance with ASTM A 240. The minimum thickness must be 1/16 in., unless otherwise shown on the plans.

3. Special Components. Provide steel guide bars and bottom plates, when required, in accordance with the plans.

434.3. Construction.

A. **Plain and Laminated Elastomeric Bearings.** Before fabrication of laminated elastomeric bearings with special components, prepare and submit clear and legible shop drawings for the complete assembly in accordance with Section 441.3.A.6.b.(2), “Non-Bridge Structures.”

Mold together components of a laminated bearing to form an integral unit free of voids or separations in the elastomer or between the elastomer and the steel laminates or plates, unless otherwise shown on the plans. Provide well vulcanized elastomer between the laminates or plates and on the outer surfaces of the bearing that is uniform and integral and resists separation by mechanical means into separate, definite, well defined elastomeric layers. Evidence of this layered construction, either at the outer surfaces or within the bearing, will be cause for rejection. Repair of damaged elastomer on sides of laminated bearings is not allowed for product acceptance. Repair of damaged elastomer on top or bottom surfaces of laminated bearings is allowed when approved.

Cover edges of steel laminates with 1/8 in. to 1/4 in. of elastomer except that exposure of the laminates will be permitted at approved laminate restraining devices and around holes entirely enclosed in the finished structure. Position laminates within 1/8 in. of plan location.

Plain bearings may be molded individually, cut from previously molded strips or slabs molded to the full thickness of the finished bearings, or extruded and cut to length. The finish of cut surfaces must be ANSI 250, or smoother. The finished bearings must have no voids or separations detectable either at the bearing surfaces or within the bearing. Plain elastomeric bearings must be well vulcanized, uniform and integral units of such construction that the bearing is incapable of being separated by any mechanical means into separate, definite and well defined elastomeric layers. Evidence of layered construction either at the outer surfaces or within the bearing will be cause for rejection.
The permissible variation from the dimensions and configuration shown on the plans for both plain and laminated bearings will be as listed in AASHTO M 251, Table 2. Flash tolerance, finish, and appearance must meet the requirements of the latest edition of the Rubber Handbook published by the Rubber Manufacturers Association, Inc., RMA F3 and T.063 for molded bearings and RMA F2 for extruded bearings.

Perform required welding in accordance with Item 441, “Steel Structures.” Manufacture guide bars, when required, so that adjacent top and bottom bar surfaces are parallel to within 1/16 in. in the assembled position. The tolerance for diameter of anchor bolt holes is +1/8 in., −0. The maximum deviation for flatness of steel plates is 1/16 in. in any 24 in. or as shown on the plans.

1. **Markings.** Mark the bearing type on the surface of each bearing as shown on the plans. The marking must remain legible until placement in the structure. Permanently mark, in addition, laminated bearings with:
   - manufacturer’s name or trademark,
   - lot number,
   - date of manufacture (month-year), and
   - direction of slope.

   Place this permanent marking on a face which is visible after erection of the bridge, unless otherwise shown on the plans.

2. **Testing and Acceptance.** The sampling, testing, and inspection of plain and laminated bearing production, after prequalification approval, will be as follows:
   a. **Plain Bearings.** A minimum of 1 plain bearing will be taken by a representative of the Construction Division from each batch or lot. Routine tests for compliance with the requirements of AASHTO M 251 will be performed by the Department. Samples will not be returned.
   b. **Laminated Bearings.** Subject each laminated bearing to an average compression of 2,250 psi or a stress approved by the Engineer. Provide calibrated equipment per ASTM E 4 for this compression testing. Each bearing will be acceptable if there is no visible evidence of bond failure or other damage, and if the finished bearing meets other pertinent portions of this Item. Samples may be taken if the quality of production becomes questionable.
   c. **Documentation.** Furnish certified laboratory test results on the elastomer properties of each batch or lot of compound for both plain and laminated bearings. Provide copies of certified mill test reports for laminated bearing steel top plates and any required steel special components.

3. **Storage.** Plain and laminated bearings must be protected from sunlight until placement in the structure.

4. **Field Methods.** Provide concrete surfaces for bearing areas under plain and laminated elastomeric bearings in accordance with Section 420.4.H, “Treatment and Finishing of Horizontal Surfaces Other Than Bridge Slabs.”

   Do not damage the elastomer when welding near bearings. Replace bearings damaged by field welding at the Contractor’s expense.

B. **Sliding Elastomeric Bearings.** Before fabrication of sliding elastomeric bearings, prepare and submit clear and legible shop drawings for the complete assembly in accordance with Section 441.3.A.6.b(2), “Non-Bridge Structures.”

Attach the stainless steel sheet to the steel plate by continuous fillet-welding around the edges with an approved welding electrode. Do not extend the weld above the sliding surface. Protect the sliding surface from weld spatter. Provide the finished stainless surface flat to a tolerance of 1/32 in. After attachment to the steel plate, polish the stainless steel sheet to a bright mirror finish less than 20 micro-in. rms and solvent-clean to remove traces of polishing compound.

Provide preformed fabric pads within the following tolerances from plan dimension:
   - length and width: +1/4 in., −0 in., and
   - thickness: ±5%.
Bond the PTFE material to the preformed fabric pad using approved adhesive methods or by vulcanizing through an appropriate polychloroprene interlayer.

Perform required welding in accordance with Item 441, “Steel Structures.” Manufacture guide bars, when required, so that adjacent top and bottom bar surfaces are parallel to within 1/16 in. in the assembled position. The tolerance for diameter of anchor bolt holes is +1/8 in., -0 in. The maximum deviation for flatness of steel plates, except at stainless steel attached surfaces, is 1/16 in. in any 24 in.

1. **Testing and Acceptance.** Manufacture 1 additional bearing lower component for testing purposes. After bearings have been manufactured for a project, notify the Construction Division, who will sample a bearing lower component at random from the lot.

Determine adhesion between the PTFE material and preformed fabric pad by the 90° peel test specified in ASTM D 429, Method B. The test sample will be 2 in. x 4 in. in size, and must obtain a minimum peel strength of 25 lb. per inch.

Perform check tests, if necessary, on the steel, preformed fabric pads, or PTFE material to verify the properties required under Section 434.2.B, “Sliding Elastomeric Bearings.”

Bearings represented by test specimens passing the above requirements will be approved for use in the structure subject to on-site inspection by the Engineer for visible defects.

Furnish copies of certified mill test reports for the stainless steel, upper component steel plates, and any required steel special components. Provide a manufacturer’s certification that the preformed fabric and PTFE material meet the requirements of this Item.

2. **Storage.** Store sliding elastomeric bearings horizontally in a dry, sheltered area. Provide moisture and dust resistant wrapping maintained in good condition until installation. Lift bearings only from the undersides. Protect bearings from damage, dirt, oil, grease, and other foreign substances.

3. **Field Methods.** Provide concrete surfaces for bearing areas under sliding elastomeric bearings in accordance with Section 420.4.H, “Treatment and Finishing of Horizontal Surfaces Other Than Bridge Slabs.”

Avoid damage to the preformed fabric pad when welding near bearings. Bearings damaged by field welding will be replaced by the Contractor at his expense.

434.4. Measurement.

A. **Plain and Laminated Elastomeric Bearings.** When plain and laminated elastomeric bearings are specified on the plans to be a pay item, measurement will be by each bearing.

B. **Sliding Elastomeric Bearings.** Sliding elastomeric bearings will be measured by each bearing.

434.5. Payment.

A. **Plain and Laminated Elastomeric Bearings.** Plain and laminated elastomeric bearings used with precast prestressed concrete or rolled steel members will not be paid for directly but will be subsidiary to the pertinent Items.

For plain and laminated elastomeric bearings used with post-tensioned concrete superstructures, and with steel girders when specified as a pay item, the work performed and materials furnished in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid for “Elastomeric Bearing” of the type specified. This price is full compensation for materials, including anchor bolts, top plates, steel special components; installation; and tools, equipment, labor, and incidentals.

B. **Sliding Elastomeric Bearings.** The work performed and materials furnished in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid for “Sliding Elastomeric Bearing” of the type specified. This price is full compensation for the stainless steel faced plate, the PTFE faced preformed fabric pad, the steel special components, the anchor bolts required to connect the bearing between superstructure and substructure, installation, materials, equipment, labor, tools, and incidentals.