

ELASTOMERIC BEARINGS

GENERAL

Elastomeric bearings may be either "plain" (consisting of elastomer only) or "laminated" (consisting of alternating individual layers of elastomer and internal steel laminates) as shown on plans.

The Contractor may select any manufacturer of bearing pads who is able to comply with the specification requirements. Pre-qualification test samples, certifications, and elastomer formulation shall be submitted to the Research and Materials Engineer for approval prior to its first use on Department projects. The materials shall be submitted well in advance of anticipated use and contain certified test results showing the actual test values obtained when the physical properties of the elastomer to be furnished were tested for compliance with the pertinent specification requirement. Pre-qualification test samples shall consist of at least two bearings typical of the formulations and workmanship intended for use on Department projects. Sample size should be no larger than 11 inches x 17 inches (280 mm x 430 mm).

The Department's inspection and acceptance of bearing pads will be in accordance with the "Policy for Inspection and Acceptance of Elastomeric Bearing Pads" latest edition. A list of previously qualified manufacturers may be obtained from the Research and Materials Engineer.

FABRICATION

The bearing pads shall be constructed in conformance with the American Association of State Highway and Transportation Officials (AASHTO) Specification M 251 (latest edition) and in conformance with details shown in the plans, or the AASHTO Specification for Highway Bridges where referenced.

Pin grooves in laminated bearings shall be filled with a vulcanized neoprene or a silicone material capable of bonding and maintaining integrity with the pad.

Materials shall consist of Polychloroprene (Neoprene) Grade 2 elastomer as shown in AASHTO Bridge Specification, Div. I, Table 14.3.2, Temperature Zone B and for Low Temperature Brittleness. In accordance with the Bridge Specification Division II, Section 18 Grade 2 material does not require a brittleness test. The physical properties of the cured elastomer shall comply with the requirements shown in Table I of AASHTO M 251. Reinforced pads shall be 50 or 60 DUROMETER HARDNESS as specifically designated on the plans. Table I in M 251-92 is shown below for ready information.

SUPPLEMENTAL SPECIFICATIONS

TABLE 1 Elastomer Properties

Material Property	ASTM Standard	Test Requirements	Polychloroprene 50 Durometer	Polychloroprene 60 Durometer
Physical Properties	D 2240 D 412	Hardness, Shore Points Min tensile strength PSI (MPa) Min Ultimate elongation %	50 ± 5 2250 (15.5) 400	60 ± 5 2250 (15.5) 350
Heat Resistance	D 573 at Specified Temp	Specified Temperature of the test °F (°C) Aging Time, Hours Max change in durometer Hardness, Shore Points Max change in tensile Strength % Max change in ultimate Elongation %	212 (100) 70 +15 -15 -40	212 (100) 70 +15 -15 -40
Compression Set	D 395 Method B at Specif. Temp	Specified Temp., °F (°C) Max permissible set After 22 hrs. %	212 (100) 35	212 (100) 35
Tear Resistance	D 624 Die C	Min pounds per inch (kN per meter)	180 (31.5)	180 (31.5)
Brittleness	D 2137	Low temp. brittleness At -40°F (-40°C) Method A	Pass	Pass
Ozone Resistance	D 1149	Partial pressure of ozone During test (MPa) Duration of test, Hours Tested at 20% strain 100°F ± 2°F (37.7°C ± 1°C) mounting procedure D 518, procedure A	(100) 100 No Cracks	(100) 100 No Cracks
Other Requirement Bond Strength	M 251-92 Section 8.2.4 & Section 9.2	One pad per lot. Steel reinforced lb/in kN per meter Fabric Reinf. lb/in kN per meter	 40 7.0 30 5.2	 40 7.0 30 5.2

SUPPLEMENTAL SPECIFICATIONS

In addition to the Table 1 requirements, one pad per lot shall be tested for Peel Strength. Peel Strength shall be a minimum of 40 pounds per inch (6.9 kN per meter) as specified in AASHTO M 251-90 (9.3).

The equivalent ASTM D-2000 line call out number would be M2BC515.5A14B14F17G21 plus ozone and peel strength.

Tolerance in dimensions of completed pads shall be as listed in Table 2 of AASHTO M 251 as shown below for information:

TABLE 2 Tolerances

	Inches:	(mm)
1. Overall vertical dimensions:		
Design thickness 1 ¼ in. (32mm) or less	-0, +1/8	(-0,+3)
Design thickness over 1 ¼ in. (32 mm)	-0, +1/4	(-0,+6)
2 Overall horizontal dimensions:		
36 in. (914mm) and less	-0, +1/4	(-0,+6)
Over 36 in. (914mm)	-0, +1/2	(-0, +12)
3 Thickness of individual layers of elastomer (Laminated bearings only) at any point within the bearing	± 20% of design value but no more than ± 1/8" (3)	
4 Variation from a plane parallel to the theoretical surface: (as determined by measurements at the edge of the bearings):		
Top	Slope relative to the bottom of no more than 0.005 radians	
Sides	¼	(6)
5 Position of exposed connection members	1/8	(3)
6 Edge cover of embedded laminates of Connection members	-0, +1/8	(-0, +3)
7 Size of holes, slots, or inserts	± 1/8	(± 3)
8 Position of holes, slots, or inserts	± 1/8	(± 3)

ACCEPTANCE TESTING

Acceptance shall be based on either Level I or Level II testing. Level I testing is applied to all bearings and Level II shall, at the discretion of the Engineer, be applied to the more critical or unusual bearings. It shall also be used to resolve differences over acceptance of bearings under Level I.

Level I testing shall be performed as stated in Section 8.2 of AASHTO M 251 except that only 10% of the bearings are required to undergo the compressive test. Results of the compressive stress-strain curve shall be submitted for record.

Level II certification requires that all Level I conditions are satisfied, except that individual conditions may be waived by the Engineer if Level II certification is used as an arbitration of disputes. As a minimum, shear modulus and compressive stiffness shall be determined in accordance with ASTM D4014. The shear modulus may be determined by testing a piece of the finished bearing as specified on D 4014, or at the discretion of the Engineer, a comparable non-destructive test may be performed on the complete bearing. Compressive stiffness tests shall be performed on the complete bearing. The shear modulus shall fall within ± 15 percent of the value specified in the design document or within the limits of the shear modulus table contained in AASHTO M 251 if no value for shear stiffness is specified. The compressive stiffness shall vary by no more than ± 10 percent from the median value of all bearings, nor ± 20 percent from the design value, if specified. However, a compressive stiffness and a shear stiffness shall not both be specified for the same bearing.

CERTIFICATIONS

The bearing manufacturer shall certify that all of the prequalification samples submitted are of the same elastomer formulation and of equivalent cure to that used in the finished products to be furnished on Department projects.

The producer may be required to perform the complete prequalification testing procedure again during later production should the Research and Materials Engineer feel such action appropriate based on performance of the pad in service.

After prequalification approval, the inspection, sampling, and testing of actual bearing production will be performed by the manufacturer with certified laboratory test results of the following:

1. Elastomer properties on each batch or lot of elastomer used in the manufacture of the bearings, as contained in Table 1
2. One peel test per lot of reinforced bearings.
3. Compressive load results required by Level I testing which requires each bearing to be load tested at 150% of maximum design load.

INSTALLATION

All bearing surfaces under elastomer must be plane to within 1.5 mm and horizontal to within 0.01 radians in accordance with Project plans. Elastomeric bearings shall bear directly on the concrete surface.

Nuts for anchor bolts shall be tightened finger tight then back off 1/16 inch (2 mm). The threads shall then be burred with a sharp pointed tool or peened.

When sole plates are attached to the beam flange they are to be placed so as to be aligned with the anchor bolts after the dead load deflection has occurred if the dead load deflection and slope produce a change in length of more than ¼ inch (6 mm).

Caution shall be exercised where a field weld or shop weld will be made while elastomeric bearing pad is in contact with metal. In no case shall the elastomer or elastomer bond be exposed to instantaneous temperatures greater than 400°F (204°C). Any damage to elastomeric bearing due to welding will be cause for rejection. Temperature shall be controlled by use of heat crayons furnished by the Contractor.

METHOD OF MEASUREMENT

Elastomeric bearing shall be measured by each bearing pad which conforms to the size and dimensions specified on the plans.

METHOD OF PAYMENT

All cost for furnishing and placing elastomeric bearings shall be included in the unit price bid for that item. Payment for the steel sole plate shall be included in the unit price bid for structural steel if structural steel beams are used or in the price bid for prestressed concrete beams if prestressed beams are used.

<u>Item No.</u>	<u>Pay Item</u>	<u>Pay Unit</u>
7093100	Elastomeric Bearing	Each