

Standard Guidelines for Product Review

## Bridge Bearings;

### Section 00582

August 12, 2008

## 00582 – Bridge Bearings

ODOT maintains a list of approved Bridge Bearings on the Qualified Products List (QPL). Initially, each manufacturer submits documentation, test reports, and specimens for each bearing they wish to have listed on the QPL. Upon acceptance and placement onto the QPL, the product then becomes available for use on upcoming projects, but certification and additional testing of the actual bearing is required for each project the bearings are proposed for use on.

Bearing Name: \_\_\_\_\_

Check the type appropriate for your submittal:

### Elastomeric

Fabric Pad

Plain

Steel Reinforced

### Composite

Disk Bearings:

Fixed

Guided

Non Guided

Pot Bearings:

Fixed

Guided

Non Guided

Sliding Bearings:

Guided

Non Guided

Spherical Bearings:

Fixed

Guided

Non Guided

## Provide to ODOT for QPL Evaluation:

- [Preliminary Information for Product Evaluation Form.](#)
- Return a copy of this page with the appropriate box checked above. Separate submittals are required for each box you check, or if you have several models for the same category.
- Furnish a current list of 5 recent projects utilizing the type of bearing being submitted. Include names and contact information for the owner of the project.
- 4 copies of Shop Drawings, Brochures, Engineering Calculations, and Product Literature.
- Quality Control Program (QC) – furnish 3 copies. You must have a current QC program.
- Submit 2 specimens (elastomeric bearings only) min. 8" x 16" x 1" thick (max 12" x 16" x 2").
- Provide 3 copies of independent test reports that show compliance with the material requirements of Section 18 of the AASHTO LRFD Bridge Construction Specifications as modified or shown in the Specs. Must be clear, concise, and meet our requirements.

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## Specifications – Elastomeric Bearings

You are urged to review the Materials and Testing section of the Oregon Standard Specifications for Construction for these bearings as shown in Section 02571 of our Specifications (<http://www.oregon.gov/ODOT/HWY/SPECS/>). Our entire specification for Elastomeric Bearings is shown there. In addition you should review our Standard Drawings ([http://www.oregon.gov/ODOT/HWY/ENGSERVICES/bridge\\_drawings.shtml](http://www.oregon.gov/ODOT/HWY/ENGSERVICES/bridge_drawings.shtml)). This document only lists the specifications and test results you will need to submit in order to be considered for placement on the QPL.

**Elastomeric Compound** -The elastomer portion of the elastomeric compound shall be 100% virgin chloroprene (neoprene) meeting the requirements of Section 18 of the AASHTO LRFD Bridge Construction Specifications, including the properties from the following table:

Properties	ASTM Test Method	Requirements
Hardness, Durometer D	D 2240	60 ± 5
Tensile strength, min., psi	D 412	2,250
Ultimate elongation, min., %	D 412	350
Heat Resistance:		
Change in durometer hardness max. points after 70 hr. at 212 °F	D 2240	+15
Change in tensile strength, max. % after 70 hr. at 212 °F	D 573	-15
Change in ultimate elongation, max. % after 70 hr. at 212 °F	D 573	-40
Compressive set, max. % after 22 hr. at 212 °F	D 395 Method B	35
Adhesion: (Peel Test) Bond made during vulcanization, lb/in * modified	D 429 Method B*	40
Tear Resistance, psi	D 624 Die C	180

**Metal Reinforcement** - Metal reinforcement shall be rolled, mild steel sheets, minimum 14 gauge thick, and conforming to ASTM A 1011, Grade 36 Type 1, or ASTM A 1008, Grade 40.

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#### Testing Requirements – Steel Laminated Bearings:

Short-Duration Compression Test – Bring 5 sample bearings to a temperature of 73 °F plus or minus 10 °F and proof load for a compressive loaded to 1.5 times the maximum design load. The load shall be held for five minutes, removed, and then reapplied for second period of five minutes. Maintain the load constant while the bearing is inspected for visual faults. The following will be cause for rejection:

- A bulging pattern or patterns implying lack of bond between the elastomer and the laminate or bulging patterns that imply improper laminate placement.
- Three separate surface cracks which are greater than 0.08 inch wide and 0.08 inch deep, or a single crack 0.1875 inch deep or wider than 0.25 inch.

Peel Strength Test – Obtain 5 specimens randomly cut from a production bearing, and perform the Peel test in accordance with ASTM D 429 Method B. The bond between the elastomer and steel laminate in each specimen shall be not less than 40 pounds per inch.

**Fabric Pad** - Fabric laminates shall be woven from 100% glass fibers of “E” type yarn with continuous fibers. The minimum thread count in either direction shall be 25 threads per inch. The fabric shall have either a crowfoot or an 8-harness satin weave. Each ply of fabric shall have a minimum tensile strength of 800 lbf/in of width in each thread direction, which shall be determined by ASTM D 751.

#### **Specifications – Composite Bearings:**

You are urged to review the specifications for these bearings as shown in Section 02570 of our Standard Specifications for Highway Construction (<http://www.oregon.gov/ODOT/HWY/SPECS/>). Our entire specification for Elastomeric Bearings is shown there. In addition you should review our Standard Drawings:

([http://www.oregon.gov/ODOT/HWY/ENGSERVICES/bridge\\_drawings.shtml](http://www.oregon.gov/ODOT/HWY/ENGSERVICES/bridge_drawings.shtml)). This document only lists the specifications and test results you will need to submit in order to be considered for placement on the QPL.

**Elastomer** - Elastomer for elastomeric discs of pot bearings shall be 100% virgin natural polyisoprene (natural rubber) or 100% virgin chloroprene (neoprene) meeting the requirements of Section 18 of the AASHTO LRFD Bridge Construction Specifications, including the properties from the following table:

#### **NATURAL POLYISOPRENE (Natural Rubber):**

<b>Physical Properties</b>	<b>ASTM Test Method</b>	<b>Value</b>
Hardness, Durometer D	D 2240	50 ± 5
Tensile strength, minimum, psi	D 412	2250
Ultimate elongation, minimum, %	D 412	450

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#### Heat Resistance

Change in durometer hardness, maximum points (70 hour)	D 573	+10
Change in tensile strength, at 158 °F maximum, %		-25
Change in ultimate elongation, maximum, %		-25

#### Compression Set

22 hours at 158 °F, maximum, %	D 395, Method B	25
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#### Ozone

25 pphm ozone in air by volume, 20% strain, 100 °F ± 2 °F 48 hours mounting Procedure D518, Procedure A	D 1149	No Cracks
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#### Adhesion

Bond made during vulcanization, lb/in	D 429 Method B	40
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#### Low Temperature Test

Brittleness at -40 °F	D 746 Procedure B	No Failure
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### VIRGIN CHLOROPRENE (Neoprene):

Physical Properties	ASTM Test Method	Value
Hardness, Durometer D	D 2240	50 ± 5
Tensile strength, minimum, psi	D 412	2250
Ultimate elongation, minimum, %	D 412	400

#### Heat Resistance

Change in durometer hardness, maximum points	D 573 70 hour	+15
Change in tensile strength, maximum, %	at 212 °F	-15
Change in ultimate elongation, maximum, %		-40

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#### Compression Set

22 hours at 212 °F, maximum, %	D 395, Method B	35
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#### Ozone

100 pphm ozone in air by volume, 20% strain, 100 °F ± 2 °F 100 hours mounting Procedure D518, Procedure A	D 1149	No Cracks
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#### Adhesion

Bond made during vulcanization, lb/in	D 429 Method B	40
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#### Low Temperature Test

Brittleness at --40 °F	D 746, Procedure B	No Failure
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When test specimens are cut from the finished product a 10% variation in physical properties will be allowed.

**Polyether Urethane** - The properties of polyether urethane for polyether urethane discs of disc bearings shall meet the values of the following tests:

Property	Test Method	Range of Values
Hardness, Durometer D	ASTM D 2240	65 ± 5
Tensile stress, psi at 100% elongation	ASTM D 412	2300 min.
at 200% elongation		4000 min.
Tensile strength	ASTM D 412	6000 min.
Ultimate elongation %	ASTM D 412	220 min.
Compression set, 22 hrs. at 158 °F	ASTM D 395	40 max.

#### Testing Requirements:

The manufacturer shall have a typical bearing either tested and certified by an independent testing laboratory, or shall test a typical bearing with the test witnessed and attested to by an independent testing laboratory, for compliance with specified performance requirements as listed below. Tests shall have been performed within five years before this submittal.

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**(a) Friction Test** - The coefficient of friction between the sliding surfaces shall not be greater than 0.06 when the maximum working stress for the polytetrafluoroethylene (PTFE) surface is 2,000 psi. It shall not be greater than 0.045 when the maximum working stress for the PTFE surface is above 3000 psi. Determine the coefficient of friction at 68 °F, according to the requirements of section 18.3.4.3.2 of the AASHTO LRFD Bridge Construction Specifications.

**(b) Proof Load Test:**

**(1) Vertical Proof Load Test** - Apply a vertical load equal to 150% of the vertical design capacity of the tested bearing for a period of one hour. Place the bearing in a rotated position during the test. Rotation shall be 0.015 radians or the design rotation, whichever is greater. The test bearing shall show no indication of failure or other defects such as weld cracking, plate distortion, extrusion of the elastomer or bearing material, or displacement of the elastomer seal while under load or subsequently upon disassembly and inspection.

The bearing tested for vertical proof load shall have a vertical design capacity no more than 50% greater or no less than 50% smaller than the capacity of the required bearing. The successful test of a bearing with a vertical design capacity of 50 tons or less will be accepted as qualification for all bearings of a similar design with a lesser design capacity.

**(2) Horizontal Proof Load Test** - A horizontal proof load test is required when the design horizontal capacity exceeds 10% of the design vertical capacity and no engineer's calculations are submitted. Apply a horizontal load equal to 100% of the horizontal design capacity while also applying a vertical load equal to 100% of the dead load for a period of two minutes. The bearing does not need to be in the rotated position. The bearing shall show no indication of failure or other defects such as weld cracking, plate distortion, extrusion of the elastomer or bearing material, or displacement of the elastomer seal while under load or subsequently upon disassembly and inspection.

The bearing tested for horizontal proof load must be a type bearing with both a vertical design capacity and a horizontal design capacity within 10% of the design capacities of bearings specified for use on the Project.

These Guidelines are for your convenience. You are urged to review our Specifications. These Guidelines are secondary and the Specifications govern. You are responsible to furnish products that meet current ODOT Specifications.

Submit documentation and submittal forms to:

ODOT Materials Lab  
Oregon DOT - Product Evaluation Coordinator  
800 Airport Road SE  
Salem OR 97301-4798

<http://www.oregon.gov/ODOT/HWY/CONSTRUCTION/QPL/QPIndex.shtml>