

Seismic Isolation Bearing Systems

Bridges



Bridge the World with Leading Infrastructure Solutions

Product Description

Lead-Rubber Isolation Bearings are specially designed Elastomeric Bearings that isolate structures from ground movement.

Lead-Rubber Isolation Bearings consist of three components: rubber, steel plates and a lead core. Rubber provides flexibility allowing deformation of the bearing, memory to allow the bearing to recover after deformation and accommodates superstructure rotation. The internal steel plates provide vertical stiffness to handle the dead and live loads of the structure but their horizontal orientation allows movement in the lateral direction. The lead core has a high initial stiffness used to resist service level lateral loads without the use of guides or restraints and also provides damping by deforming when the isolator moves laterally during an earthquake. The lead core transforms the kinetic energy of an earthquake into heat but at a level insufficient to damage the isolator. Due to the ductility of pure lead and assisted by the heat generated during the earthquake, the lead-rubber isolators will be ready for aftershocks and subsequent earthquakes with their original properties and without need for replacement.



The isolation bearing system works by lengthening the fundamental period of the structure, thereby reducing the acceleration input into the building, bridge or equipment. The damping

achieved by the isolation system further reduces the acceleration input and reduces the displacements across the isolation system.



Seismic Isolation Bearing Cutaway

Advantages

- Maintenance-free
- Proven performance (shake-table + real earthquakes)
- Effective isolation in all seismic zones and soil types
- No corrosion, stick-slip, wear or aging effects
- Practically infinite choice of stiffness, damping and other properties
- Good for life-span of structure
- No need for replacement after earthquake



Applications

- **Function Critical Structures**
 - Lifeline bridges, hospitals, emergency and first response structures
- **Critical Operational Structures**
 - Data storage centers
 - Utilities
 - Communication towers
 - Military or scientific structures
 - Piers
- **Historical or High-Value Structures**
 - Historical bridges and buildings
 - Museums, mints, national treasures
 - Petroleum, gas, chemical structures

Isolator Characteristic Analysis

Axial Load Capacity

PMAX = 0 to 2000 k

Sometimes multiple isolators are “nested” to support very high loads

Displacement Capacity

DMAX = up to 36 in

Maximum displacement limited by: stability (Axial Load) shear strain (displacement+rubber thickness)

Maximum Shear Force

FMAX ≈ 2 to 700 kips

Shear force transmitted to structure at DMAX

Characteristic Strength (Qd)

Qd = 0 to 200+ kips

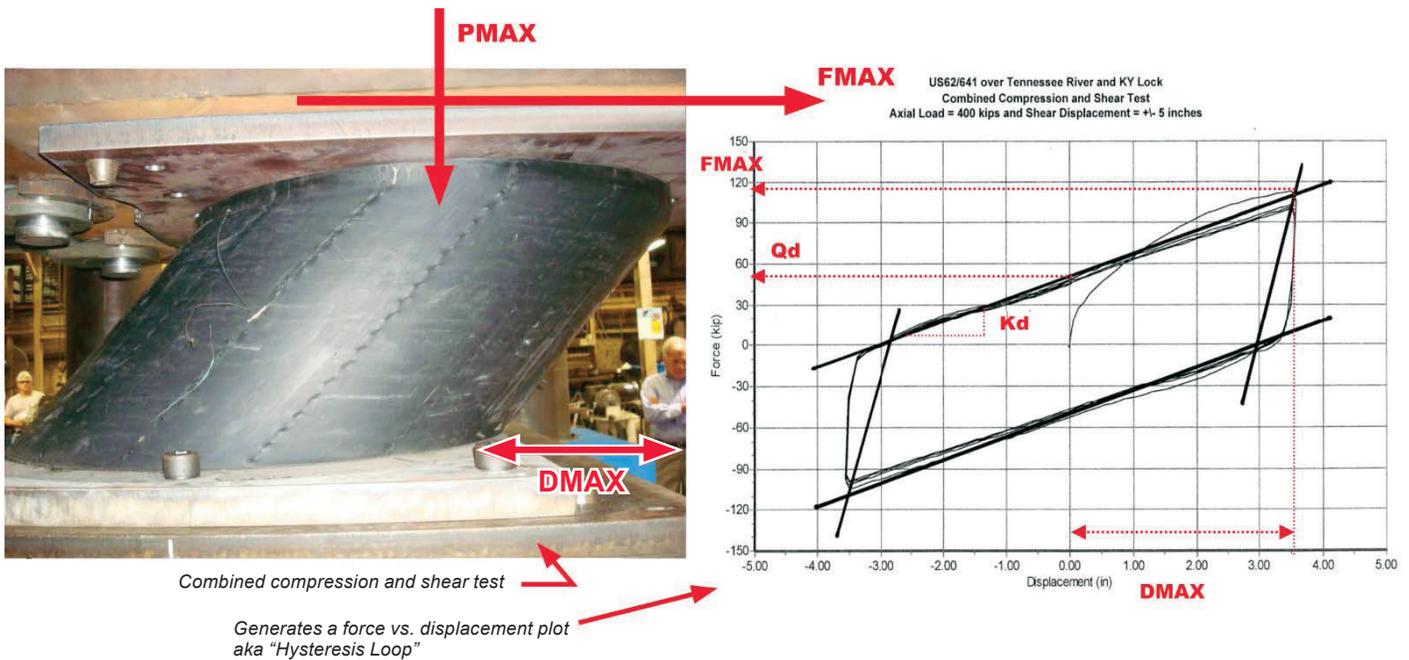
Elastic resistance of lead core, limited by plan size of the isolator

Post-elastic Stiffness (Kd)

Kd = 1 to 14 kip/in

A function of plan size, height of rubber, and rubber stiffness

We design and/or fabricate isolators to meet your exact project criteria. Please contact us for a no-cost, no-obligation isolator system design for your structure. We will work with you to develop isolator characteristics for use in your analysis



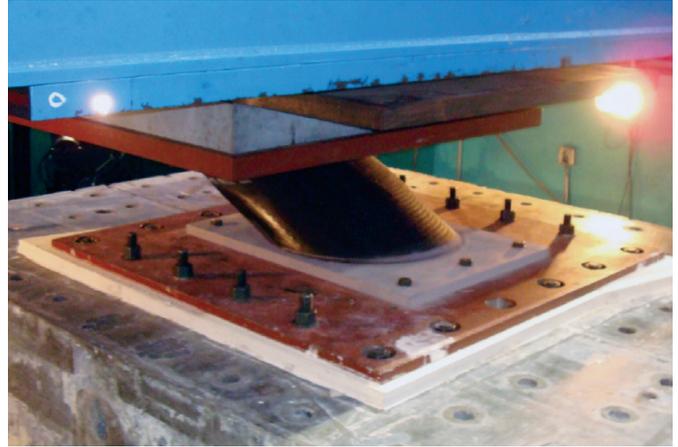
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Testing



Quality control shear testing at D.S. Brown, Athens, TX



High speed testing at UC San Diego

D.S. Brown Signature Projects

Golden Gate Bridge South Approach |
San Francisco, CA

Carquinez Bridge | Contra Costa & Solano Counties, CA

Eads Bridge | St. Louis, MO

I-93 Mass Avenue Interchange | (Central Artery Tunnel)

Throgs Neck Bridge | Queens, NY

Schuylkill River Bridge | Montgomery County, PA

Bridge over Rio Grande | De Anasco, Puerto Rico

Passaic River Bridge | Newark, NJ

Ben Sawyer Bridge | Charleston, SC

Murray Morgan Bridge | Tacoma, WA

Tamarac Bridge | Vancouver, BC



Throgs Neck Bridge, Queens, NY



Golden Gate Bridge South Approach, San Francisco, CA



Eads Bridge, St. Louis, MO



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