



Viscous Wall Dampers

Superior Earthquake Protection
For Flexible Buildings.



DYNAMIC ISOLATION SYSTEMS



Introduction

Dynamic Isolation Systems (DIS) is the leader in seismic isolation with over 300 building and bridge projects completed worldwide. DIS now has damping technology that benefits taller, flexible structures.

The DIS Viscous Wall Damper (VWD) has been used extensively in Japan for more than 20 years and in more than 100 projects. The DIS VWD uses design methods, details and materials that were developed in Japan. DIS is licensed to introduce this innovative technology to the United States. The first wall damper project in the U.S. is a hospital in San Francisco.

Adding damping to a structure reduces the lateral displacements caused by earthquakes and wind by absorbing energy. When the lateral displacements are reduced the stresses in the superstructure are reduced by more than 50%. The reduction in structural cost more than offsets the cost of VWDs. The result is a better-performing and more economical structure.

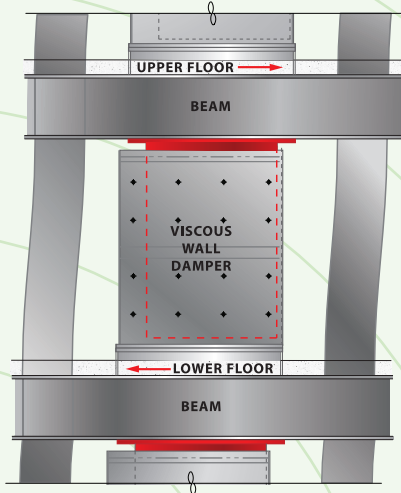


Over 300 Viscous Wall Dampers are in service worldwide.



How Does The Viscous Wall Damper Work?

Each VWD consists of a narrow steel tank connected to the lower floor, an inner steel plate (vane) connected to the upper floor, and a viscous fluid in the small gap between them. During seismic excitation, the relative floor movement causes the vane to move through the viscous fluid. The damping force from the shearing action of the fluid is dependent on the displacement and velocity of the relative motion. Wall dampers are used to reduce the seismic accelerations and inter-story drifts by over 50% as well as reduce wind-induced vibration.



Viscous Wall Dampers can also be constructed with 2 vanes. In the case of the double-vane damper there are 3 plates that form the tank. A double-vane VWD gives twice the damping force with only a small increase in plan size.

The viscous fluid used for wall dampers is a non-toxic, odorless, transparent fluid with a viscosity of 90,000 poise. The wall can be made to fit typical openings in the building. Dampers with widths of 6' to 20' and heights of 6' to 14' (with spacers) have been used in buildings. The force of the damper is proportional to the effective area of the vane.



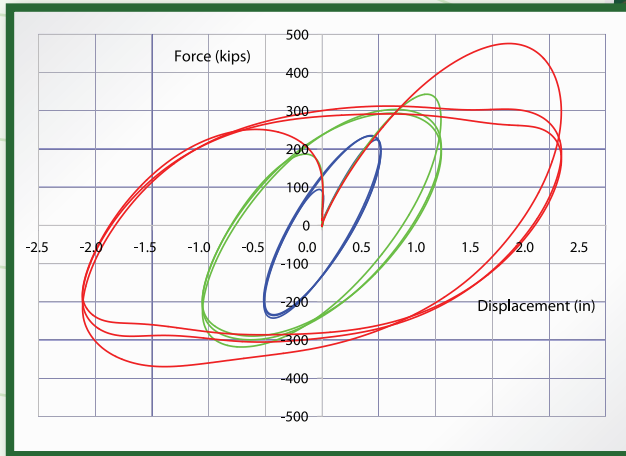
Viscous Wall Damper Testing

The first U.S. project is a California hospital scheduled to be completed in 2012. As part of rigorous OSHPD review, prototype tests on 4 dampers were performed at UC San Diego's SRMD testing facility. The dampers were tested to a variety of displacements and velocities (sinusoidal and earthquake motion) in single and bi-directional conditions.

Over 100 cycles of seismic displacement tests demonstrated stable performance by the damper. Further, a 2,000-cycle wind displacement test per ASCE 7-05 was performed to confirm the adequacy of the damper for wind conditions. Sample test results are presented here:



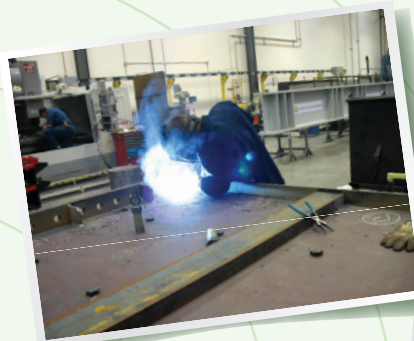
VWD shake table testing at UCSD.



Test results for a 7' x 9' VWD.

Types of Buildings That Benefit From Viscous Wall Dampers

- ◆ Hospitals
- ◆ Flexible Medium To High-Rise Buildings
- ◆ Buildings With High-Content Value
- ◆ Buildings Requiring Continuous Operation
- ◆ Retrofits



Benefits

- ◆ **Cost Savings**
 - ◆ Viscous Wall Dampers reduce the weight of structural steel and the total cost of the building.
- ◆ **Architectural Flexibility**
 - ◆ The compact rectangular shape of the VWD gives greater architectural freedom in laying out the structure. The VWD is easier to accommodate compared to diagonal braces or dampers.
- ◆ **Better Performance**
 - ◆ Viscous Wall Dampers provide superior seismic protection for the structure and its contents by reducing inter-story drift.
- ◆ **Maintenance-Free Design**
 - ◆ Viscous Wall Dampers operate at very low pressure and do not have seals. The VWDs have no pressure under everyday conditions in a building.
- ◆ **Retrofits**
 - ◆ Viscous Wall Dampers are ideal for retrofits. They are easy to install and avoid the strengthening of beam column joints necessary with other types of damping solutions.



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