JARRET STRUCTURES

# VISCOUS DAMPERS


JARRET STRUCTURES

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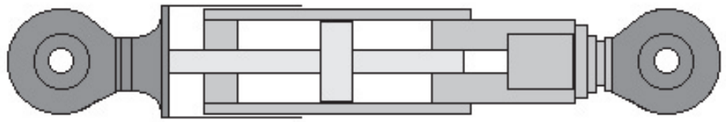
# Damper

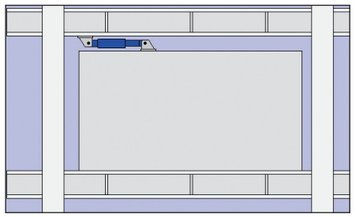
A JARRET STRUCTURES damper is designed to dissipate seismic or dynamic energy on a structure. JARRET STRUCTURES dampers work in tension and compression. The dampers can reduce longitudinal and transverse or vertical displacement of a deck. They can be installed, for example, longitudinally between the deck and the abutment, or in transverse between the deck and the pier structure.

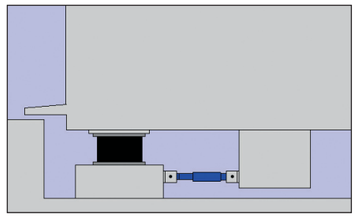
Dampers can be installed at different locations in a building for brace isolation or base isolation systems. Seismic energy is dissipated in the damper unit instead of being dissipated in the concrete or steel structure. JARRET STRUCTURES can accommodate transverse and longitudinal seismic displacement, and at the same time allow longitudinal displacement such as creep shrinkage and thermal expansion or contraction of the structure.

## Working Principle

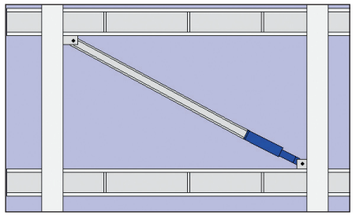
A JARRET STRUCTURES damper works on the principle that rapid passage of viscous fluid through a narrow orifice or port generates high resistance, which then dissipates a large amount of energy as heat.

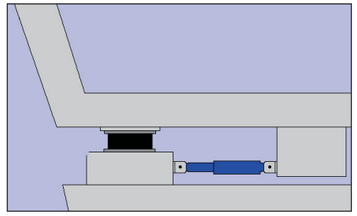




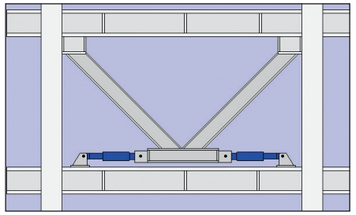


Base isolation for building

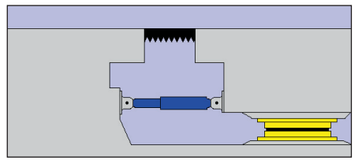




Transverse protection for bridge



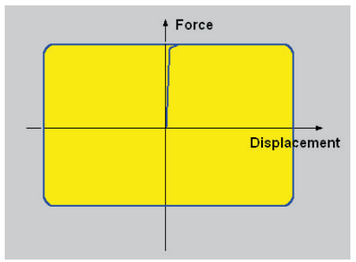
Protection of a building by frame isolation or brace isolation systems

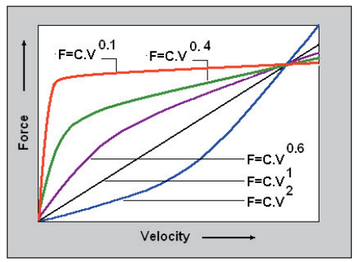


Longitudinal protection for bridge

## Performance

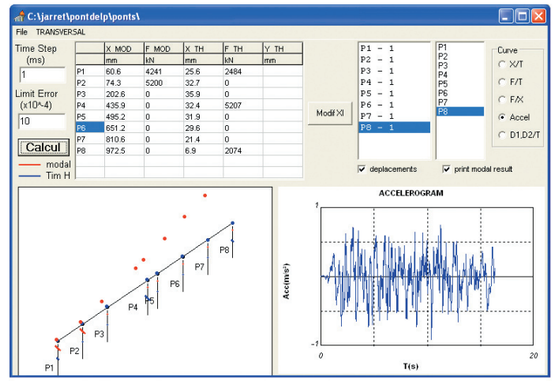
The graphs to the right show the performance generated by a damper during a dynamic event at 0.2 m/second velocity. The value of the velocity exponent of a JARRET STRUCTURES damper can vary from 0.1 to 0.4. As a result, significant damping force levels are achieved at much lower velocity values, while at the same time limiting the amount of force increase at higher velocities.



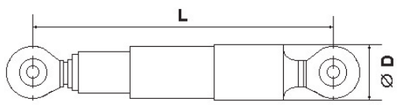



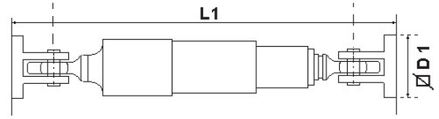

## Selection of Unit

The selection of the appropriate unit must be done by implementing the behavior law of the unit into dynamic analysis software. The behavior law of a JARRET STRUCTURES damper is $F = C.v^{\alpha}$. This is a non-linear behavior law. The value of $\alpha$ can vary from 0.1 to 0.4. A modal analysis will not be possible with a non-linear model. It is necessary to run a time-step analysis. In order to assist its customers, JARRET STRUCTURES is able to run such a pre-sizing analysis in order to determine the most appropriate unit to protect a structure. This preselection will have to be validated afterwards by the designer. In order to do such analysis, JARRET STRUCTURES needs to receive the main geometrical data of the structure and of the ground. The result of the analysis will provide the energy capacity required to protect the structure, and the specifications of the units required. All information such as force induced to the structure and displacement is also provided.




## Dimension of Units




| Unit | L (mm) | L1 (mm) | D (mm) | D1 (mm) | Stroke (mm) | RM (KN) |
|---|---|---|---|---|---|---|
| ASR50-100 | 450 | 540 | 60 | 110 | 100 | 50 |
| ASR100-100 | 490 | 610 | 90 | 110 | 100 | 100 |
| ASR150-100 | 620 | 740 | 115 | 144 | 100 | 150 |
| ASR300-100 | 720 | 860 | 155 | 176 | 100 | 300 |
| ASR500-100 | 800 | 1000 | 170 | 210 | 100 | 500 |
| ASR750-100 | 860 | 1110 | 230 | 280 | 100 | 750 |
| ASR1000-100 | 930 | 1200 | 250 | 340 | 100 | 1000 |
| ASR1250-100 | 1000 | 1300 | 280 | 340 | 100 | 1250 |
| ASR1500-100 | 1050 | 1350 | 310 | 340 | 100 | 1500 |
| ASR2000-100 | 1150 | 1470 | 430 | 360 | 100 | 2000 |
| ASR2500-100 | 1250 | 1660 | 440 | 460 | 100 | 2500 |
| ASR3000-100 | 1350 | 1760 | 450 | 460 | 100 | 3000 |

*L = total length , at mid stroke, for S = 100 mm or +/-50 mm*
*For S < or > 100 mm, L = L + 2.5 (S - 100) All dimensions are subject to modification.*

## Temperature and Aging

A variation of the outside temperature, which can range from -55°C to + 80°C, does not change the amount of energy dissipated per cycle. There is no aging of the silicone fluid. The JARRET STRUCTURES units have been tested in very severe environmental conditions, including fire.

## Installation

A damper can be installed easily with standard anchors. An installation manual is provided.

## Maintenance

JARRET STRUCTURES dampers are maintenance free. A regular visual inspection can be done on a periodic basis in order to check the corrosion protection system.