JARRET STRUCTURES

VISCOUS DAMPERS FOR CABLE STAYS

JARRET STRUCTURES

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Damper

The large global development of the technology for stay cables has created a need for damping. Initial attempts to adapt commercial dampers failed to meet the specific requirements of the bridge industry because they were not appropriate for bridges.

JARRET STRUCTURES has developed a new generation of dampers in order to meet the special requirement of damping stay cables.

Because long-term vibrations due to wind and rain create fatigue stress in the cables, the idea is to offer a very reliable unit which is able to smoothly damp vibrations without creating any additional stress to the structure.

Working Principle

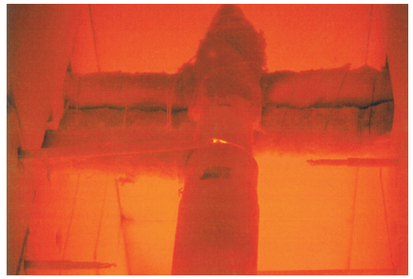
The JARRET STRUCTURES damper works on the principle that the rapid passage of viscous fluid through a narrow orifice or port generates high resistance which then can dissipate a large amount of energy. The energy is dissipated in heat.

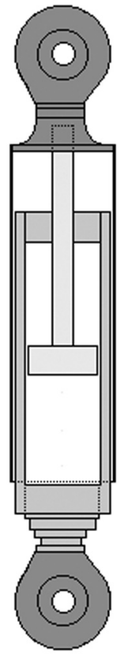
In order to avoid any possible leakage, the body of the unit in made of a single stainless steel part. A piston head is moving through the viscous fluid, and the lamination of the fluid creates the viscous damping. A specially developed seal installed on the top of the body allows for the long-term microscopic movement of the damper caused by the normal displacement of the deck.

The behavior law of the viscous damper is $F = C.V^{\alpha}$. According to the specifications required of a particular application, JARRET STRUCTURES can provide a value for the coefficient alpha which can range from 0.3 to 2. A pure linear damper F = C.V can also be provided.

Temperature and Aging

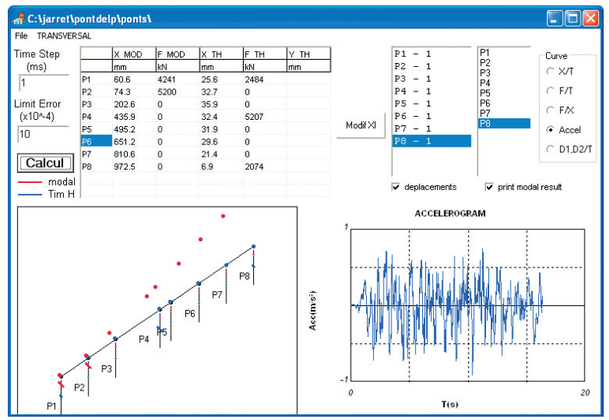
A variation of the outside temperature, which can range from -55°C to + 80°C, does not change the amount of energy dissipated per cycle. There is no aging of the silicone fluid. The JARRET STRUCTURES units have been tested in very severe environmental conditions, including fire.





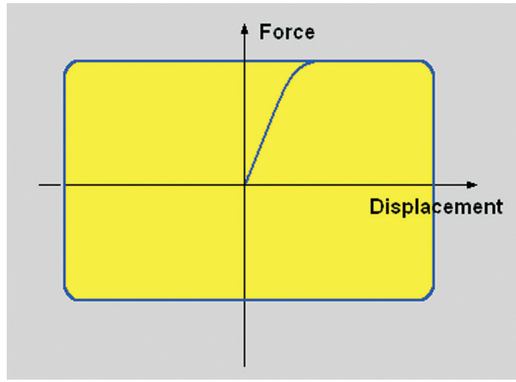
Selection of Unit

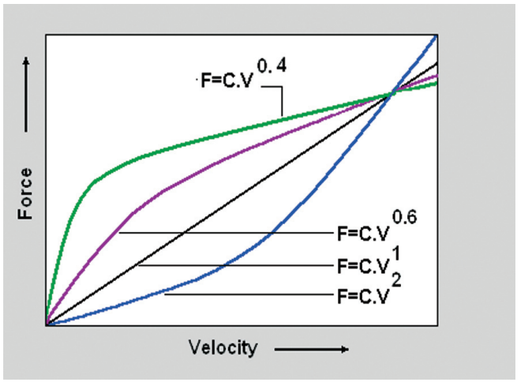
The selection of the appropriate unit must be done by implementing the behavior law of the unit into dynamic analysis software. The behavior law of a JARRET Damper is $F = C.V^{\alpha}$. This is a non-linear behavior law. The value of alpha can vary from 0.3 to 2. A modal analysis will not be possible 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. This pre-selection 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 stay cables and the structure. The result of the analysis will provide the energy capacity required to protect the structure, as well as the appropriate specifications and dimensions of the units required.



Performance

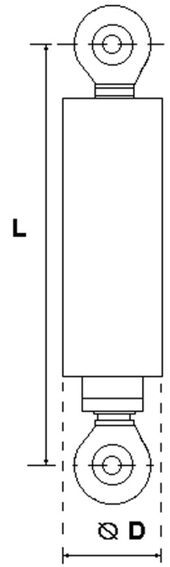
The graphs below show the performance generated by the damper during a dynamic event at a frequency of 1 Hertz. The value of the velocity exponent of JARRET STRUCTURES's damper can vary from 0.3 to 2. As the velocity increases, the force increases.





Dimension of Units

Unit	L (mm)	D Ø (mm)	Stroke (mm)	RM (KN)	Mass (Kg)
AVE5-100	525	127	100	5	50
AVE6-100	525	127	100	6	50
AVE7-100	525	127	100	7	50
AVE8-100	525	127	100	8	50
AVE9-100	525	127	100	9	50
AVE10-100	525	127	100	10	50
AVE12-100	525	127	100	12	50
AVE15-100	525	127	100	15	50
AVE20-100	525	127	100	20	50
AVE25-100	525	127	100	25	50
AVE30-100	525	127	100	30	50
AVE35-100	525	127	100	35	50
AVE40-100	525	127	100	40	50
AVE45-100	525	127	100	45	50
AVE50-100	525	127	100	50	50
AVE55-100	525	127	100	55	50
AVE60-100	525	127	100	60	50



L = total length , at mid stroke, for C = 50 mm or +/-25 mm
For C <or> 50 mm, L = L + 3,5 (C - 50) All dimensions are indicative and can be subject to modification*

Installation

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

Maintenance

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