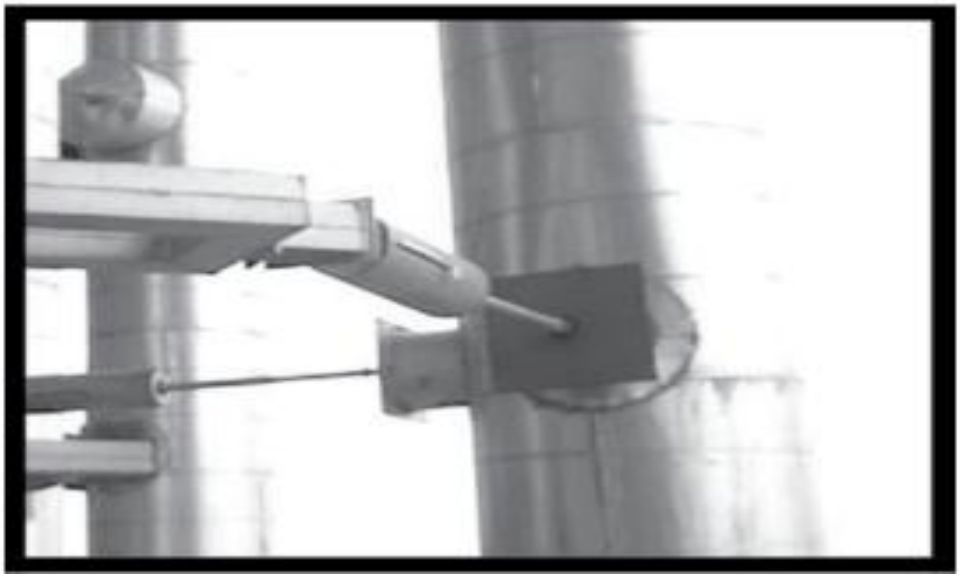
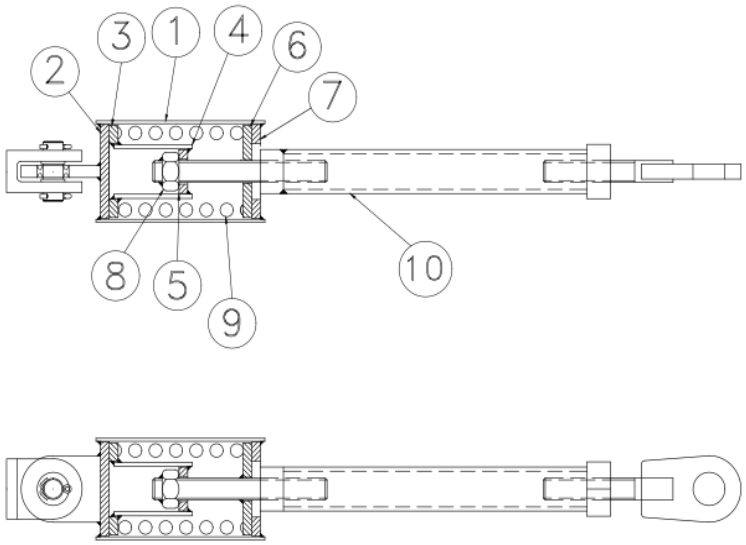
PIPE HANGERS AND SUPPORTS PVT. LTD.

SWAY BRACES

A standard variable spring hanger unit is used to support tensile loads (Hanging types) or compressive loads, (Foot mounted type), but never a combination of both.

Sway braces are essentially double acting variable spring units which means they can handle both tensile & compressive loads.





ITEM NO.	DESCRIPTION
1.	CAN SECTION
2.	TOP PLATE
3.	TOP PR, PLATE
4.	INNER TUBE
5.	INNER END PLATE
6.	BOTTOM PR. PLATE
7.	BOTTOM PLATE
8	FULL NUT
9	SPRING
10	ROD COUPLING

The construction is fairly simple, the unit has 2 pressure plates one on either side of the helical coil compression spring connected by a single piston rod.

If a tensile load is applied, the top pressure plate is pulled down causing the spring to compress & if a compressive load is applied the thrust nut / rod coupling pushes the bottom pressure plate causing the spring to compress. Therefore in both cases the spring gets compressed but due to design (See cut away section above) the unit is capable of handling compressive & tensile movements / forces.

As the name suggests, “sway” braces are spring loaded units mounted on pipe work to limit the swaying or vibration induced by external forces by applying an opposing force on the pipe. A sway brace will try & prevent the pipe vibrating at its resonant frequency (if the pipe vibrates at its resonant frequency, the amplitude will multiply & can lead to failures in supporting structure & attached equipment).

<u>The sway brace will not stop the pipe from vibrating:</u>

The pipe will continue to vibrate as long as the force inducing the vibration is present. Typical examples are using sway braces in the pipe line feeding the flare stack in a refinery. When gases at very high pressures are passed in the pipe line in the flare stack, it tends to vibrate & the sway brace will try & limit the vibrations.

Sway brace is used to restrain piping or equipment and is not intended to support:
The construction of the sway brace enables a pre-loaded spring which sustains both compression and extension displacement to provide a pre-determined restoring force.

For example, a pipe that is exposed to cross wind will sustain high transverse force during strong winds. If the pipe is subject to thermal expansion and contraction it will have a certain amount of flexibility. If allowed to displace freely during strong winds the pipe may become unstable and possibly sustain permanent deformation.

By installing a sway brace the pipe can be held in position during the application of forces less than the pre- set force within the spring. At higher forces the pipe will be allowed to displace but the further from its neutral position it is pushed the greater the restoring force will become. When the storm recedes the sway brace will push or pull the pipe back to its neutral position.

Specifying Sway Braces:
Like all devices that exert a restoring force to a pipe, the magnitude of force that can be applied and the amount of acceptable displacement will be decided by the allowable stresses within the pipe. This information will be defined by piping engineer during his analysis of the system.

The level of pre-load within the sway brace shall be defined by the minimum force required to restore the pipe to its neutral position; it may be a function of the dead weight of the piping and the magnitude of frictional resistance thus created at sliding surfaces or it may be the amount of force required to restore an unstable, out of balance mass.

For simplicity if we consider a pipe crossing a bridge structure; thermal expansion of the pipe is predominantly in the axial direction and so the pipe is carried on three sliding supports each having a coefficient of friction of 0.1
The total supported mass of the pipe is 10,000kg, therefore the frictional resistance in the transverse plane is 1000kg.

If we select a sway brace that delivers a pre-load of 1000kg and has a spring stiffness of 100kg /mm the minimum transverse resistance to sliding is 2000kg increasing by 100kg/mm of displacement.

Assume now that the wind pressure on the pipe exerts a force of 2500kg; the pipe will displace by 5mm. If the pipe is sufficiently flexible and without the influence of the sway brace, it may not be able to generate sufficient elastic energy within itself to return to its neutral position. Subsequent axial loading may then cause further deformation of the pipe because it is not offering a rigid shape to the applied force.

With the sway brace installed the restoring force is at least that which is necessary to overcome friction and so the pipe is returned to its neutral position. When in the neutral position the sway brace exerts zero restoring force and so the pipe is free once again to move with the thermal cycle.

Any practical combination of pre-load and spring stiffness may be defined and any spring within our standard range of variable and constant efforts supports can be applied to the product.

In our catalogue we offer a basic range of sway braces but it will normally be necessary to design the device to suit the specific requirements of the customer.

Neutral Adjustment:
After installing sway braces & when the plant starts operating, the pipe may have thermal movements. This may cause the spring in the sway brace to compress by an amount equal to the thermal movement. At this point the sway brace will be exerting a force on the pipe line equal to the pre-load +movement X spring constant.

The load has to be released by doing “Neutral adjustment “. This is achieved by rotating the Rod coupling shown above in a direction such that the piston plate gets released & rests against the end plate. In this condition the sway brace will not exert any force on the pipe. During shut down, as the pipe cools & gets in to the cold position, the sway brace will exert a force on the pipe as the spring will get compressed.