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## TROUBLE FREE USE AND STABILIZATION OF PIPELINE SYSTEMS

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The control of fluid dynamics is essential to ensure efficient, reliable and safe operation of pumping systems. A pump puts fluid in motion by adding energy to it. This kinetic energy, observed as pressure, is carried in the fluid and slowly lost to friction in the piping system. Uncontrolled fluid in motion can physically destroy the pump, piping, valves, meters and other system components.

Positive displacement pumps create destructive pulsation and hydraulic shock due to the reciprocating nature of their stroking action, potentially damaging piping and system components. Pulsation Dampeners and Surge Suppressors remove virtually all system shock, enhancing the performance and reliability of fluid flow. Function:

- Protect pumps, piping, valves, fittings, meters and in-line instrumentation from damaging pulsations, cavitation, thermal expansion, hydraulic shock and water hammer.
  - Prevent destructive pressure surges caused by pump startup and shutdown.
  - Prevent hydraulic shock resulting from emergency valve closure and other equipment shutdown.
  - Prevent agitation, foaming, splashing and degradation of product.
  - Ensure accuracy, longevity and repeatability of flow meters and pressure gauges.
  - Ensure a smooth steady flow in metering and chemical injection processes.
  - Ensure uniform and continuous application in spraying and coating processes.
  - Ensure proper measurement, flow and filling applications of food and pharmaceutical products.
  - Ensure consistent flow when dosing, blending or proportioning process additives
- Ensure a smooth transfer of viscous or abrasive fluids.

Surge suppressor is a one commonly used solution for controlling hydraulic shocksurge suppressor. This device is similar in construction to a pulsation dampener but sized and installed differently. The surge suppressor acts as a reservoir or accumulator to absorb and release fluid as needed. By doing so, it controls the rate of velocity change to a level slow enough to prevent water hammer.

Three guidelines must be followed when using surge suppressors to prevent or minimize water hammer:

- The device must be located in the correct area.
- It must be sized properly to accumulate the correct amount of liquid.
- It must be pre-charged with nitrogen to provide the proper shock control.

Positive displacement pumps contain an inlet valve that alternately opens and closes, creating an acceleration and deceleration of fluid into the pump. Inlet

Stabilizers minimize these pressure fluctuations and acceleration head losses by preventing fluid column separation at the pump's inlet. Function:

- Protect pumps, valves, diaphragms and pistons from excess stress and strain.

- Protect inlet system components from vibration and fatigue.
- Prevent premature system component failure and cavitation.
- Prevent gauge damage due to vibration.
- Ensure steady inlet flow conditions to extend pump diaphragm life.
- Ensure complete chamber fill to maximize component service life.
- Ensure accuracy of inlet side gauges.

Without proper protection, process fluids regularly contaminate and damage in-line instrumentation. The strength and durability of Diaphragm Seals protect and isolate all forms of system instrumentation from the hazards of corrosive process fluids. Function:

- Protect gauges and other pressure instrumentation from process fluid contamination and corrosion.

- Prevent erratic pressure surges and clogging due to solids in process fluids.
- Protect gauges from freezing and slurries.
- Ensure gauge and switch accuracy.
- Ensure accurate and consistent readings with corrosive or solids-laden fluids.

Diaphragm pressure relief valves are designed to continuously regulate fluid flow to protect pumping systems from over-pressure damage caused by defective equipment or a blockage in the pump system line.

Diaphragm back pressure valves enhance system performance by applying a continuous back pressure to the system pump. Eliminating fluctuations in downstream pressure prevents siphoning and eliminates varying dosage rates, and the continuous back pressure ensures proper check valve operation in metering pumps when system pressure is too low.

Diaphragm failure in air operated diaphragm pumps allows process fluid to escape through the pump's air exhaust port. Unmonitored, the spill can result in significant expense to your company due to lost product, hazardous material cleanup, EPA reporting and system downtime. Leak Containment System prevents hazardous and costly spills by capturing the expelled process fluid and automatically shutting down the pump.

Leak Containment System attaches directly to the exhaust of an air operated diaphragm pump. When pump diaphragms fail, Leak Containment System captures dangerous and/or expensive process fluid in an internal receptacle while raising a float switch to automatically shut down the pump.

Leak Containment System can also be configured to sound a warning alarm and/or initiate a backup pump switchover.

Every fluid system is different and many can be complicated and the goal was to provide useful information on design criteria for efficient and effective liquid handling systems.