

GENERAL ADVICE before PRE-FILLING PULSE DAMPERS

PG-136^{pf - 1}

With Nitrogen cushion gas. *As 93% of all dampers have had to be selected without pipe system information in most cases even pressure is not known, it is important that you know the subject.*

When all the results of fabrication have been flushed from the system, and the test block has been removed from the piping base, the damper bolted in its place, & BEFORE liquid is pumped, (which would decrease the gas volume by moving the membrane, and would **PROBABLY RUPTURE IT**;) you are ready to address pre-filling with nitrogen :-

OFTEN IGNORED - WHEN PROCEEDING STRAIGHT TO THE 3 PAGES OF GRAPHICS

- A. If the damper is ONLY for discharge system purposes, then by the difference between theoretical 100% efficient flow rate, and the actual or calculated rate, you establish the loss. If the loss is less than 5%, then a discharge system damper may be all you need.
- B. Establish the degree to which pre-fill pressure must be modified due to temperature. Cool nitrogen into a damper that runs hot, will need a lower pre-fill pressure, because when hot, pressure rises. At a higher pressure than pumping, the damper does nothing.
- C. Consider, that too low a pre-fill pressure, effectively makes the damper smaller; this would cause the membrane deflection to be farther, which decreases life.
- D. Correct pre-fill selection, is irrelevant if wrongly installed more than 12 pipe diameters from the cause of pulse excitation; similarly if membrane response characteristics were ignored.
- E. To monitor damping performance, and establish that the correct pre-fill pressure was chosen, do not use a gauge on the gas cushion. a). It will mislead because it tells little, other than gauge response characteristics, unless the pipe system is depressurized, and even then - b) will reflect TEMPERATURE change. *Pressure too high or too low can be misinterpreted.* To determine performance, use a rapid response pressure transducer and data capture at kilohertz taken from within the liquid system. Much damping is from dimensions - not gas.
- F. Gas, being lighter than liquid causes bladders and gas balloons, to try to float. If you are pre-filling a horizontal mounted damper of the PipeGuard or PipeHugger range, check with the factory that they weighted the anti-extrusion plate to compensate for floatation. In 40 years, we have failed to ever get mounting orientation information before supply..
- G. REMEMBER, YOU THE INSTALLER, ARE THE ONLY PERSON WHO CAN ENSURE PERFORMANCE.

PRE-FILLING PULSE DAMPERS With Nitrogen cushion gas.

1. WORKING OVER A RANGE OF PRESSURES, without resetting the N₂ pre-fill pressure
The damper should have been oversized, relative to the residual flow fluctuation allowable:-
By the ratio of highest operating pressure divided by pressure at which damping is to begin.
If that was the case, then the pre-fill pressure is 80% of the pressure at which damping is to begin.
2. The use of "CUSHION FLUID"
Where the ratio established in 1 above is greater than 4:1 with PipeGuard flow smoothers, 6:1 with PipeHugger dampers, 8:1 with FlexOrber dampers, 3.5:1 with PumpGuard dampers THEN: it is advantageous for membrane life, to introduce some suitably compatible liquid into the cushion gas side of the membrane. This prevents "Over Stretch". The Volume of this "Cushion side liquid" is respectively - For 4:1 use 20% of the nominal cushion volume. 6:1 use 12%, 8:1 use 10%, 3.5:1 use 25%.
3. The 8:1 statement applies to *Flexorber* dampers, that have the stroke* limiter shown below.

