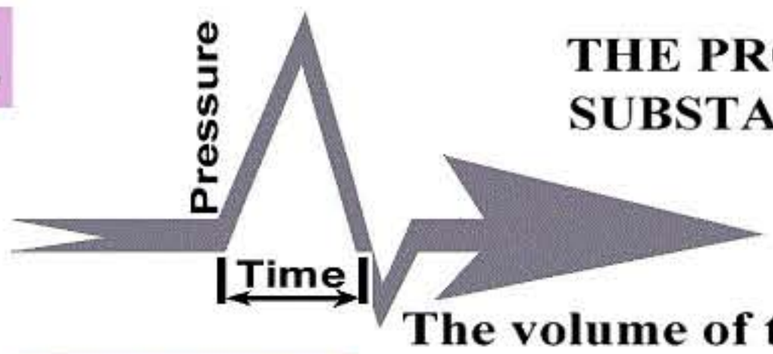
C. Continued - When it is more than transient. D. Importance of smaller pipes.
E. Changes in diameter - Orifices, Eccentric and "Conc" reducers, The 7 Degree taper.
F. ? Accumulator, Orifice Reactive Resonator, or a true Pulsation Damper

The purpose of the analogies is not absolute definition, it is to assist in "visualising" (visualizing) the different phenomena.

C.



THE PROBLEM IS THAT THE PULSE MAY HAVE A SUBSTANTIAL VOLUME as well as pressure amplitude.

When the duration of a pulse is sustained for a measurable length of TIME, the pulse will have VOLUME, it will not simply be a TRANSIENT.

The volume of the damper vessel required to provide sufficient LIQUID COMPRESSIBILIY will be between 10,000 & 100,000 times the volume of the pulse, depending on the pulse characteristics.

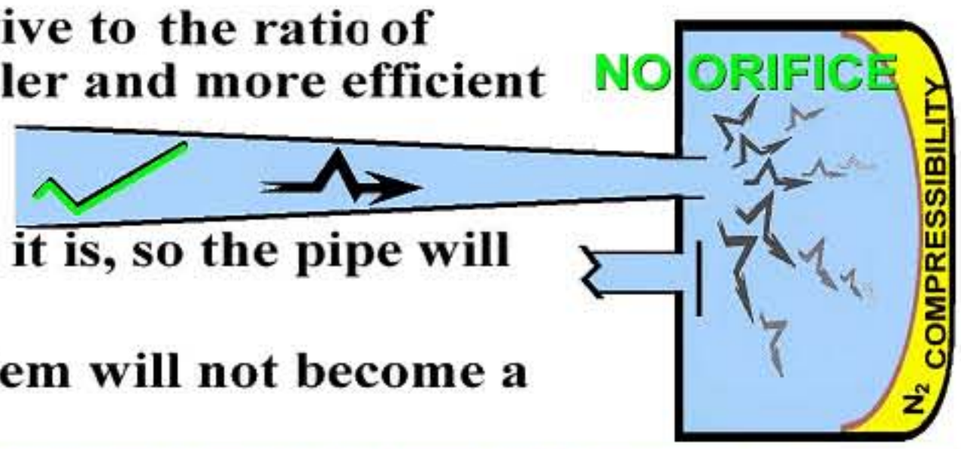
LIQUID CHAMBERS ALONE WILL COST TOO MUCH & BE HUGE

D.

1. As high frequencies die away relative to the ratio of diameters, your dampers will be smaller and more efficient when you keep your pipe sizes down.

2. Even more important is that the smaller the pipe, the more dissipative it is, so the pipe will scrub out some pulsation.

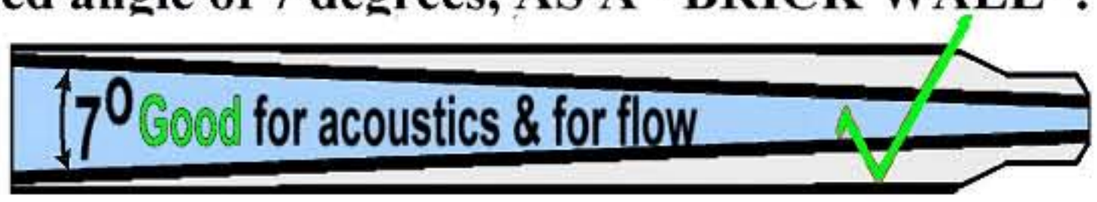
3. Additionally a dissipative pipe system will not become a pulse amplifier.



UNFORTUNATELY YOU CAN NOT JUST STEP THE PIPE DIAMETER DOWN, THE STEP WILL RETURN THE PULSE.

E.

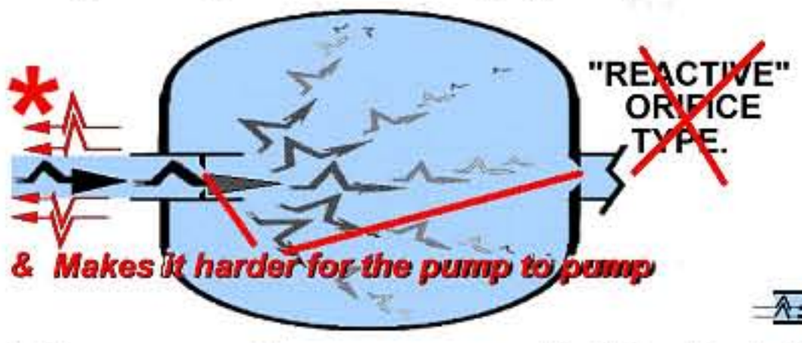
A pressure occurrence - travels at MACH 5, and sees any reduction in cross sectional area that is steeper than an included angle of 7 degrees, AS A "BRICK WALL".



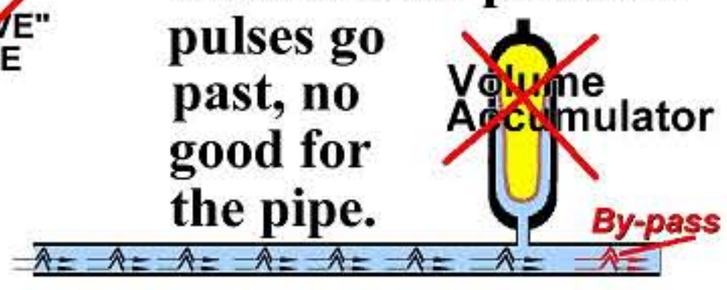
Nearly all of a pressure spike can be caused to go into a damper from a large diameter pipe by compressing it down a 7^0 taper. * **is "PULSE REFLECTION"**

F.

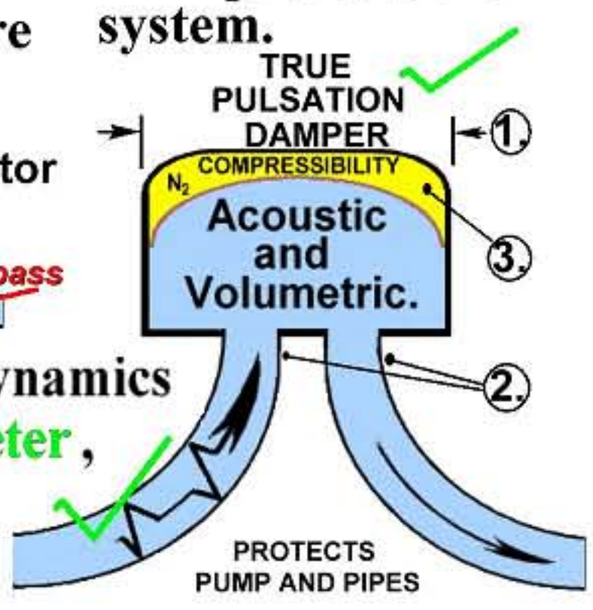
An orifice makes it harder for the pump. It reflects the pulsation, but helps to protect the pipe system.



A gas bag, makes the system soft, which is good for the pump. The residual pressure pulses go past, no good for the pipe.



A true DAMPER helps the pump AND protects the system.



There are dampers available that follow the logic of pump dynamics and of acoustics . In essence a DAMPER is ①large diameter, ②multi ported, and ③has elasticity. An orifice resonator is bad for a pump. Soft accumulators do not protect pipes.

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LIQUID DYNAMICS INTERNATIONAL Inc.
Analysis, Diagnostics, Prediction by Software
Phone USA --910-270-2737 Color Fax --910-270-0320 UK (for EC) --44-161-442-6222 Color Fax --44-161-443-1486
Box 506 Hampstead NC 28443 www.liquid-dynamics.com Box 47, Stockport, SK3-0LH, UK

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