1- BLADDER VESSELS

A bladder surge vessel has the same mission with regard to surge control as the traditional compressor vessel.

The objective of this pneumatic solution is to simplify the method of regulation.

In a similar way to a vessel controlled by compressors, a pre-charge pressure is calculated to give the required elasticity to push the water into the system following a pump shut down or power cut.

The major difference being that the liquid is contained within a rubber bladder (compatible with drinking water). Therefore, as there is no contact between the compressed air and the water there is no dissolution. There is thus no requirement for a permanent regulation system including compressors, etc...

Once the vessel has been commissioned and the correct precharge has been introduced, the vessel will operate automatically emptying when called upon and refilling with the return waves until naturally refinding its steady state balance.

Charlatte have been successfully manufacturing bladder vessels for over 30 years form 8 to 80000 litres.

2 - CONCEPTION OF A BLADDER VESSEL

The vessel can either be horizontal or vertical. It is constituted of a steel vessel containing a rubber bladder made from butyl rubber, (suitable for use with drinking water) and a flanged connection pipe equipped with anti-extrusion grill.

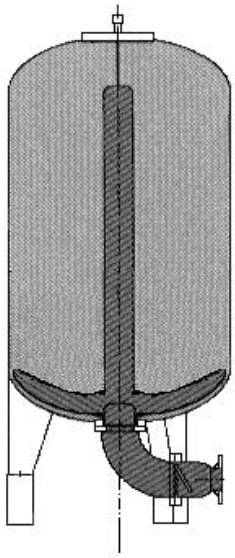
The vessels are treated internally with food quality epoxy paint as corrosion protection and externally to client specification.

In order to verify the level in the vessel it is normally equipped with a level indicator as well as a manometer to verify the initial precharge pressure.

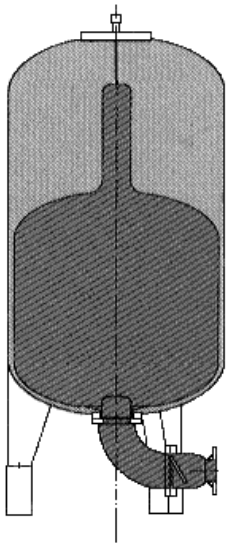
If hydraulically required the vessel will be equipped with a non return valve with an incorporated bypass in order to kill the over pressure by consuming the energy of the flow reversal.

3 - OPERATION

The installation of such a surge vessel is very simple, but must be performed with care. If well done, future checking of the vessel will be very easy.

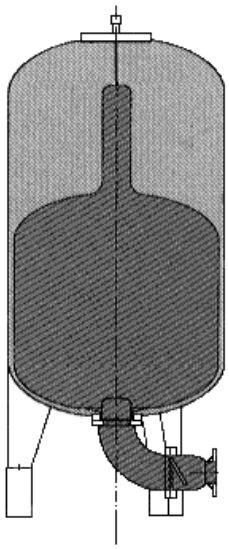


3.1 Initially the precharge pressure must be adjusted to the value resulting from the hydraulic analysis (prechage can be either compressed air or nitrogen). the bladder contains no volume at all.

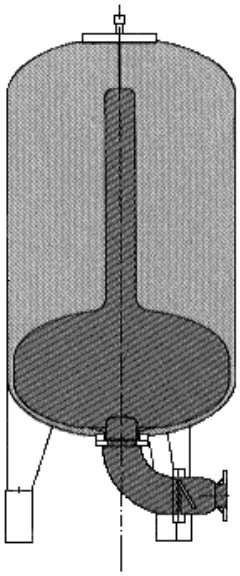


3.2 When the gate valve is opened the water will enter the vessel under static conditions, and begin to compress the gas (static pressure is always higher than precharge pressure)..

3.3 The water entering the vessel will further compress the precharged gas until a balance between the liquid and the compressed gas is reached.



3.4 Immediately after a pump stop the pressure in the line will start to decrease ant the elastic energy in the vessel will discharge the water from the vessel into the line.This prevents dangerous low pressure along the pipe work.



3.5 As the pressure way become very low, the flow will reverse, this will then enter into the vessel via a reduced diameter (drilled non return valve or bypass) if hydraulically required. Several oscillations may occur before static state is reached.

3.6 When the pumping station will restart, the vessel will continue to fill until dynamic steady state is reached and it is then once again prepared for the next pump stop.