Pressure tank's efficiency (draw-down)

The efficiency of the pressure tank is the quantity of water (draw-down) that the tank can provide between a max (p2) and a min (p1) working pressure of the pump.

Called:

Va = total volume of the pressure tank
p1 = switch (on) of the pump
p2 = switch (off) of the pump
pc = air precharge pressure

NOTE: All pressure are referred to as gauge pressure.

The formula to calculate the efficiency of the tank is as follows:

$$R = \frac{(p2 - p1) \times (pc + 1)}{(p2 + 1) \times (pc + 1)} \times Va; \qquad \text{Stated } pc = p1$$

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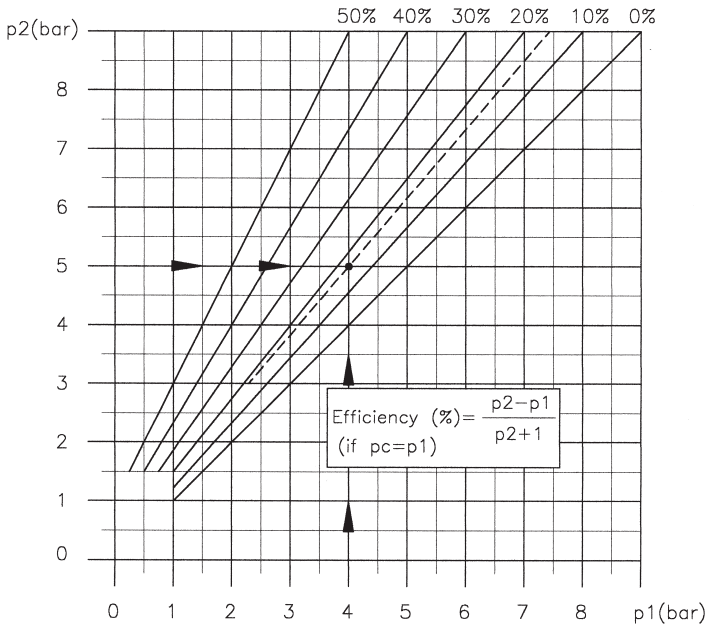


Fig. 1: Table of efficiency

Example:
Va = 750 lt. *P1 = 4 bar* *p2 = 5 bar* *pc = p1 = 4 bar*

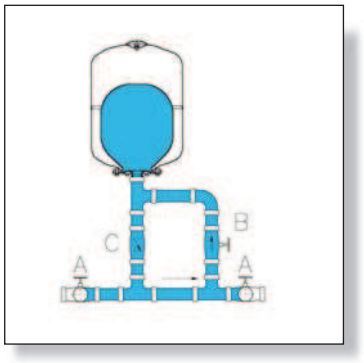
The efficiency of the tank is: $R = \frac{(5 - 4)}{(5 + 1)} \times 750 = 125$ *lt, that's 16%*

The table of efficiency (Fig. 1) shows the efficiency in % according to the min. and max. working pressures of the pump.

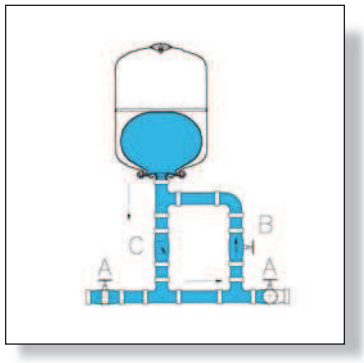
Water hammer: technical data

Water hammer (overpressure shock) is caused by the sudden closing of a valve or similar device in a hydraulic system. The sudden closure causes a sonic pressure wave to travel backward though the pipe system. As the pressure wave hits obstructions in the system, additional pressure waves are reflected back in the opposite direction. These pressure waves will cause loud noises within the system and can lead to physical damage and short system life if left unchecked.
To overcome this problem the system must be equipped with a hydraulic shock absorber able to absorb the pressure wave through the use of an air cushion. The Micron hammer arrestor is the perfect device for this purpose.

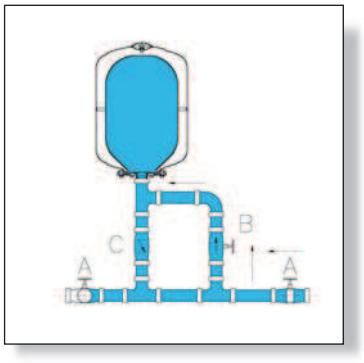
Installation examples of pressure tanks used as shock hammer absorbers:



Constant pressure
The "A" valves are open and the water rate of flow inside the pipeline is constant. During this phase, the vessel gradually fills up until the pressure becomes identical to the systems.



Case Nr. 1
Whenever the "A" valve upstream suddenly shuts down, the water column inside the pipeline follows its course and, in order to avoid a pressure drop at the valve output, i.e. a narrowing of the pipeline, the "C" check valve opens to release part of the stored water.



Case Nr. 2
Whenever the "A" valve downstream suddenly shuts down the water column inside the pipeline preceding the valve creates a pressure wave. This wave reverberates throughout the pipeline; in this case, water can only pass through the "B" narrowing valve, which cushions the water hammer, gradually filling up the vessel in the process.