

### **Hydraulic/Pneumatic ratio effect inside a pressure vessel and why size matters.**

Air pressure tanks or pneumatic pressure tanks are used in a lot of industries for a lot varied applications. In this article we will focus on applications regarding pressure vessels under 100L capacity and used for low and medium viscosity fluids in dispensing, spraying or filling operations.

The basic principle of a pressure container is to hold a certain volume of fluid, using the force of a compressed gas (usually air or nitrogen) to displace it.

Most pressure tanks are supplied equipped with air regulators and gauges which allow the user to regulate the pressure inside the tank. It is this pressure that applies a force to the fluid and causes it to be displaced towards the vessel's output.

With pneumatic systems, the pressure used to compress the fluid as well as the pressure regulator have strong influence on the flow rate of this fluid. This impacts the final outcome of the system. Other elements such as fluid tubing diameter and length also impact the flow rate. In future articles, we will detail the importance of air regulators and fluid tubing but for now we will focus on the basis of a working pressure tank.

Inadequate pressure (too much or too little) can result in the overall system's poor performance, causing production waste or loss.

This is explained by the constant change of volume between gas and fluid contained in the tank during production time.

For instance, at the beginning of a production run, a tank fully filled with fluid will have little room left for the compressed gas which will be set at a pressure to obtain the desired flow rate. During the production run, the volume of fluid decreases but the volume of gas increases, this change in the ratio gas/fluid causes a drop in the gas pressure (as the gas volume goes up) and a decrease of the fluid flow rate.

For applications where the end result does not require any particular level of accuracy, this effect will not cause any issue and might not even be noticed.

However, for applications requiring accurate and metered deposits (ink coating or small delivery applications), this constant change in volume has a large importance.

This is the reason why size matters when choosing a pressure container. Understanding its impact can help prioritising requirements.

We often meet people looking to buy larger tanks than required by the application, only to extend production time. But in a lot of cases, this choice was made at the expense of fluid delivery accuracy.

By choosing the correct pressure reservoir and fluid tubing, it is easy to make significant improvements to a production or dispensing system and reduce the need for additional flow regulators.