

An introduction to...

# Cylinder valves & regulators

## Residual pressure valves

The concept of a cylinder valve that retains a small positive pressure in a gas cylinder has gained importance in the past few years; these valves offer many benefits over their conventional equivalents.

Increasingly, medical and food gases are reportedly mandating the use of Residual Pressure Valves (RPV). According to industry data, approximately 30% of all cylinder incidents reported were the result of internal corrosion. This is one of the reasons why gas companies are introducing RPV, to avoid internal contamination.

Gases are 'slippery' and they behave with 'Brownian motion' – that is, they fill every corner of every space and try to go everywhere. Gases kept within a container or gas supply system are constantly seeking ways to escape – and other gases present in the atmosphere are, equally, trying to enter the container or system.

Unintended mixtures and contamination of gases is not what a gas company or client wants to achieve and use of the correct regulators and valves can help to keep gases under control.

Escaping gas can potentially cause serious health, safety and environmental issues, in addition to obvious financial implications (wasted gas means wasted money). Gas entering the cylinder or the supply system can cause contamination to the system and increase the risk of failure to whatever task is trying to be achieved.

In particular, when we look at specialty gases applications, high purity gases with low parts per million (ppm) levels of impurities are often involved – and these extremely low impurity levels are easily destroyed by contamination. When calibration of instruments is involved, highly sensitive and high precision gas mixtures with intentional ppm and parts per billion (ppb) or parts per trillion (ppt) levels of calibration components are used – and these can be depleted by reaction with contaminant gases.

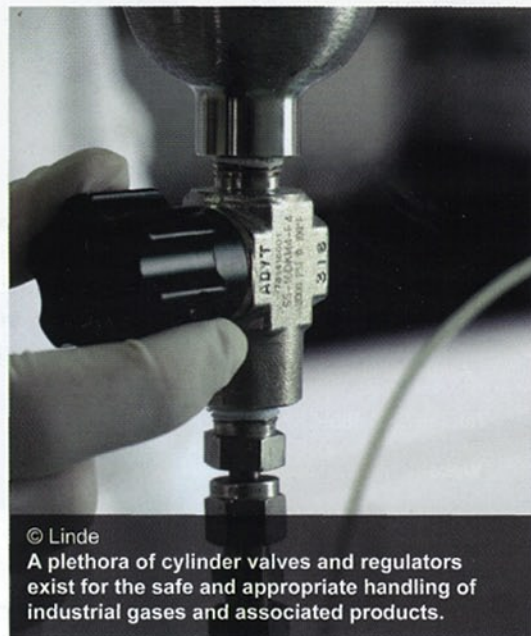
When the intention is to expel gas out of a cylinder, regulators to control pressure and valves to control flow rate are needed. These are separate tasks and need multiple devices to successfully achieve this. However, there are some innovative, convenient solutions that combine these together – and also combine them within the cylinder.

When a user needs to get specific gases from a cylinder to the precise place where it is used, this also requires a range of valves and regulators, additional piping – and sometimes the inclusion of other gases and correct procedures – for example, certain purge techniques to achieve the correct result.

## Fundamental

There is a range of connections from cylinder valves to a gas delivery system based on national or international standards, which are designed to keep gases that should not be mixed separated from each other – for example, separate connections for oxygen and flammable gases.

This can make gas supply systems quite complex and costly, but is obviously necessary to avoid potentially catastrophic and fatal accidents



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A plethora of cylinder valves and regulators exist for the safe and appropriate handling of industrial gases and associated products.

from occurring.

'Valves are the most important parts in the cylinders,' is perhaps not an understatement. Compressed gas cylinders require the installation of at least one valve. A valve allows the cylinder to contain gases and allows gas to be filled into or emptied from the cylinder and is perhaps the most vulnerable part of the cylinder, requiring a thorough understanding to maximise its performance.

There are three basic valves used in the compressed gas industry: the pressure seal valve; the packed valve; and the diaphragm valve. There are several versions or designs within each of the three basic formats.

Gas pressure regulators meanwhile, are used to reduce the pressure of gas supplied from a high-pressure cylinder of gas to a workable level that can be safely used for operating equipment and instruments. The primary function of a regulator is to reduce high-pressure gas in a cylinder or process line to a lower, usable level as it passes from the cylinder to a piece of equipment.

The materials that valves and regulators are constructed of are key to success. Unsuitable materials will be eaten away by corrosive gases and others will allow inappropriate contamination. For safe and successful outcomes, a range of materials are required depending on the gases being handled. This can sometimes mean a complete range of equipment needs to be at the user's disposal, but it is necessary to achieve the correct results safely. □

gasworld would like to thank Linde Gas for contributing considerably to this article.