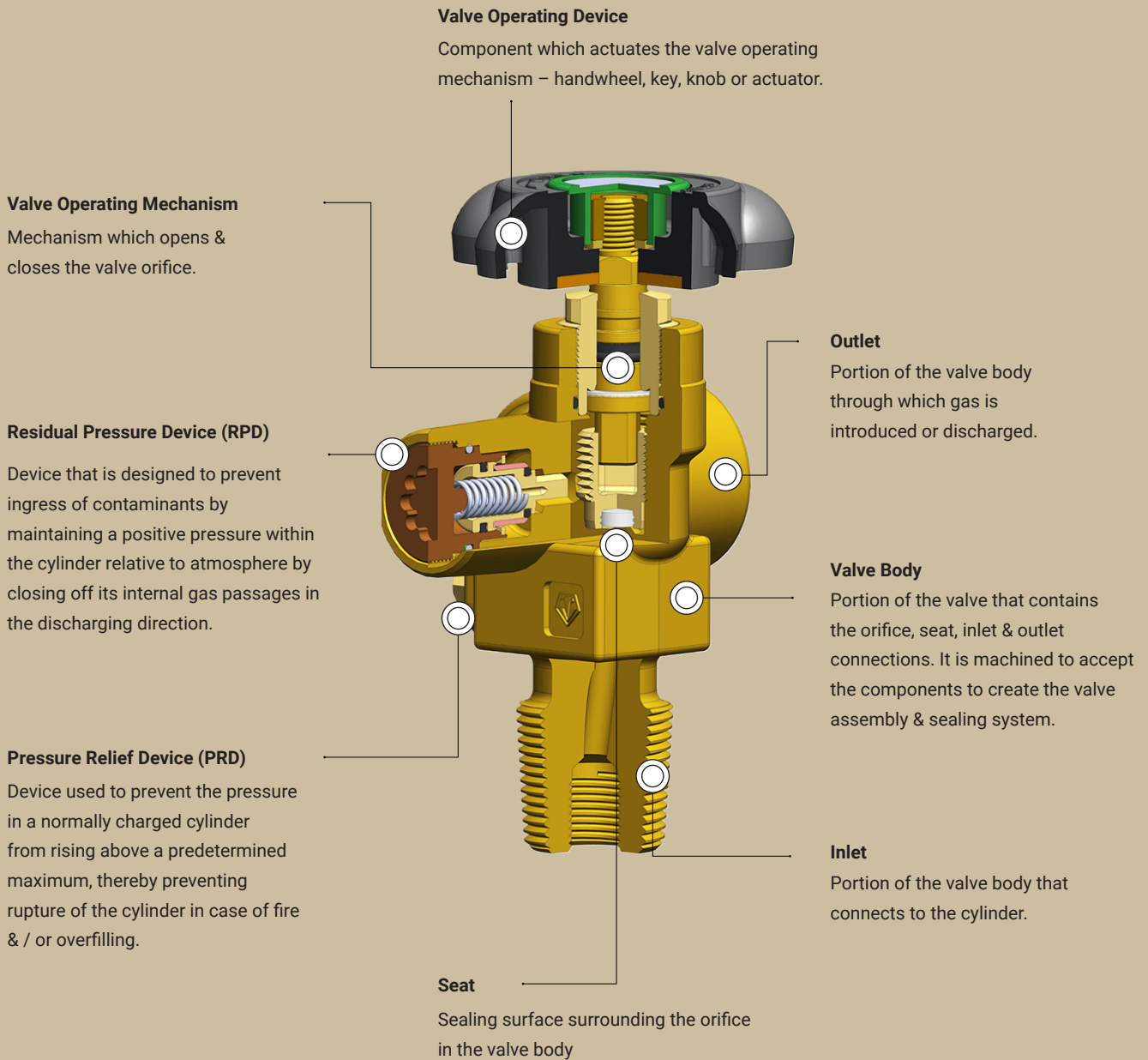


Cylinder Valves Designs

Nomenclature

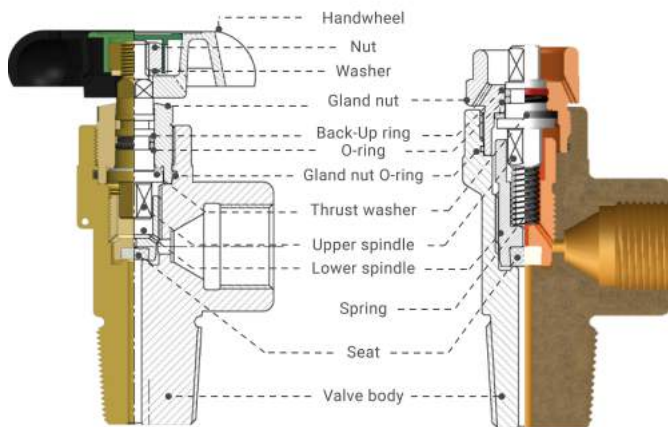
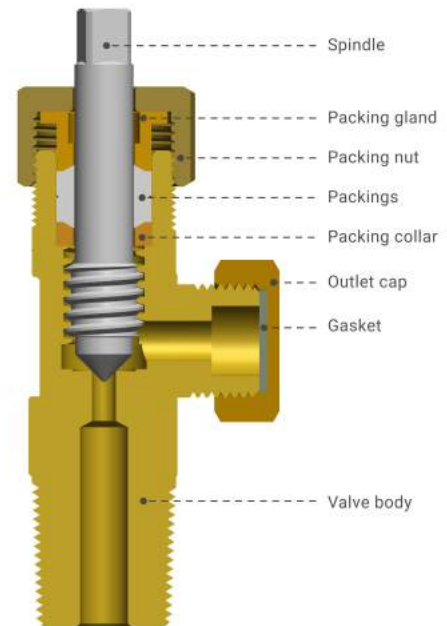


Compression Packed Valves

01

(Key Operated, Single Spindle, Metal Seated)

These valves, available in Brass, Al-Si Bronze and Carbon Steel, use compressed packing to make a seal around the valve spindle & body. To ensure a good seal, the packing nut is tightened to compress the packing against the spindle. As this results in higher torques, the valve is operated with wrench. The design allows for tightening of the gland nut in case of leakage past the packings. These valves are used for corrosive gases because of the ability of the operating mechanism to withstand higher torques to overcome any build-up of salts or contaminants in the seating area. These valves are generally used up to valve test pressure of 50 bar & not preferred for high purity applications because of particulate generation from valve seat & packing wear.



Handwheel
Operation

Key
Operation

O-ring Seal Valves

02

(Two-piece Spindle, Soft Seated)

These valves, available in brass body, have a non-rising upper spindle & threaded lower spindle. It uses O-ring/s to create a seal around the upper spindle. These valves are easier to operate than packed valves due to absence of packing load on the upper spindle & hence used for a wide range of pressure & non-corrosive gas applications where low torque operation is desired. The top spindle is designed to fail first, allowing valve maintenance & package content recovery in the event of a failure, even when the cylinder is full. These valves come in key, toggle, handwheel & handle operation.

a) Key Operation

The upper spindle is usually manufactured from Stainless steel as the valves are expected to withstand high torques in the field.

b) Handwheel Operation

The upper spindle is fitted to a handwheel to operate the valve by hand. This restricts imparting of high torques by the user to operate the valve, preventing damage to the operating mechanism & facilitating high cycle life.



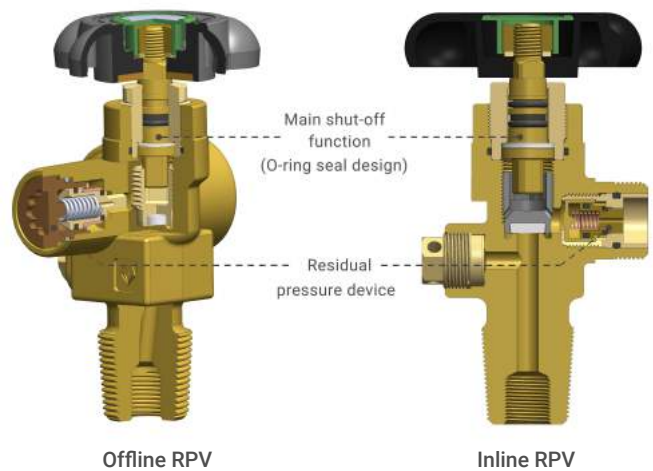
03

Residual Pressure Valves (RPV)

These are handwheel operated O-ring seal valves fitted with an offline or inline Residual Pressure Device (RPD). The RPD has a built in Non-Return Valve (NRV) function to prevent backflow of downstream contents preventing contamination risks as a result of positive pressure always present in the cylinder. RPV technology provides improved safety of the cylinder & ensures purity of gas contents eliminating the need to purge cylinder each time it comes back for filling. The user needs a filling connector consisting of a projected "Pin" during filling & evacuation to neutralize the NRV function.

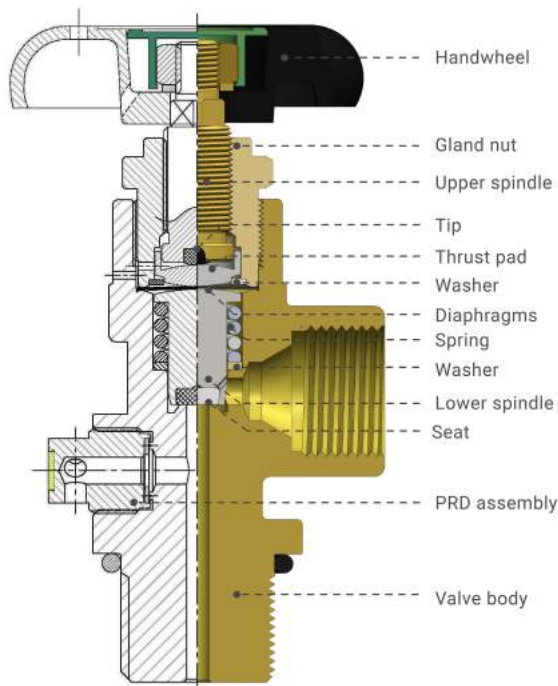
Inline RPV

The RPD is contained within the outlet & therefore is mainly used for external threaded outlet requiring sealing on the face. Due to limitation of the volume within which the inline RPD have to be accommodated, they have greater flow limitation than the offline version.



Offline RPV

The outlet is offset with respect to the inlet plane & the RPD is backside of the outlet. Offline valves can be designed for any outlet connection but are mainly used for outlet with internal threads & for external threaded outlet requiring sealing in the cone. They are less restrictive on the flow passage of the valve.



Diaphragm Seal Valves

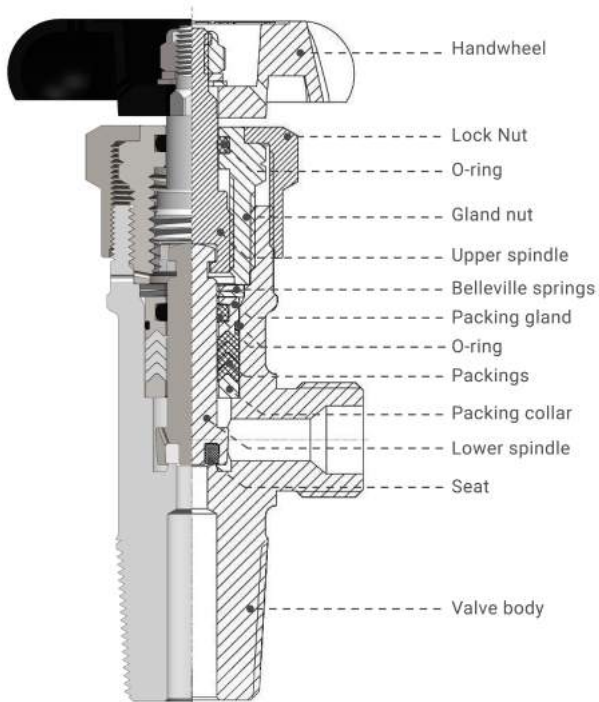
(Handwheel Operated, Two-piece Spindle, Soft Seated)

These valves, available in brass & stainless steel body, use diaphragms for gland sealing. The gland nut threads into the valve body & clamps the outer edges of the diaphragms against a ledge in the valve body to form a seal. The lower spindle assembly is non-threaded & encased in a spring which forces it away from the seat when the valve is opened. The upper spindle is threaded into the gland nut.

The replacement of elastomeric seals with metal diaphragms gives the valve superior leak integrity. The lower spindle is non-threaded & non-lubricated making the design highly suitable for toxic, pyrophoric & high purity gas. The valve opening is restricted by the stroke of the diaphragm, limiting the flow through the valve. Due to high torque required to close the valve by overcoming cylinder pressure X area of the diaphragm plus the spring force, the use of these valves is limited to cylinder pressure up to 200 bar.



05



Compression Packed Valves with O-ring Seal

(Handwheel Operated, Two-piece Spindle, Soft Seated)

These valves, available in Brass, Al-Si Bronze, Carbon Steel & Stainless Steel body, combine compressed gland packing & O-ring technology to gland seal the valve. The lower spindle connects to the upper spindle via a slip joint. The lower spindle assembly seals against the seat without rotating, reducing wear & particle generation. The gland nut is usually secured by a lock nut having threads in the opposite direction to prevent accidental loosening of the gland nut.

Unlike the single spindle packed valve, the packing is smaller, better contained, spring loaded & backed by O-ring/s. This allows the mechanism to seal with handwheel up to 200 bar & eliminates the need to retighten gland nut making the design very suitable for toxic & corrosive gases.

Reverse Seated Valves

These are brass valves & use an O-ring to seal around the valve spindle. Pressure tends to keep the valve shut & as the cylinder pressure decreases, the total force available to sustain valve shut-off also decreases & seat closure is achieved by spring force. If there is a leak at the seat when the valve closes, there is no way to manually apply more force.

This design is used for squeeze grip carbon dioxide valves for firefighting application where quick release of gas content is desired.

06

