

How It Works

Ball valves

A ball valve is a device with a spherical closure unit that provides on-off control of flow. The sphere has a port, also known as a bore, through the center. When the valve is positioned such that the bore is aligned in the same direction as the pipeline, it is in open position and fluid can flow through it. When rotated 90°, the bore becomes perpendicular to the flow path, meaning the valve is closed and the fluid cannot pass through.

The ball valve, along with butterfly and plug valves, is part of the quarter-turn valve family. Ball valves are known for reliable, bubble-tight sealing and thus are ideal for gas applications where tight shutoff is critical. Because of the potential of constant wearing on the seats, ball valves are not recommended for throttling applications. The body of a ball valve is usually made of steel and can be ruggedized with nickel plating.

The most common ball valve design is two way, which enables flow to linearly travel from the inlet to the exit. Three- and four-way ball valves enable flow to travel in multiple directions, including 90° angles.

Types

There are four general body styles of ball valves: fully welded, three-piece body (also called side or end entry), split body, and top entry. Though these body styles vary in terms of valve manufacturing and assembly, the valve operation is the same in each type. Each design has its benefits.

- **Trunnion-mounted ball valves** have additional mechanical anchoring at the top and bottom on the ball. This special mounting is suitable for larger and higher-pressure valves. Moreover, this design supports the ball in two places, which reduces valve torque. CAMERON T30 Series* fully welded ball valves are trunnion mounted. The trunnion-mounted stem absorbs the thrust from the line pressure, preventing excess friction between the ball and seats so that even at full rated working pressure, operating torque remains low.
- **Floating ball valves** are not held in place by a trunnion and instead are attached only to the stem. This can cause the ball to float slightly downstream. However, when this happens, the ball presses against the seat, creating a positive seal.
- **Rising stem ball valves** incorporate tilt-and-turn operation, eliminating seal rubbing—one of the primary causes of valve failure. When the valve is closed, the core is wedged against the seat, ensuring positive shutoff. When the valve is open, the core tilts away from the seal, and the flow passes uniformly around the core face. Cameron ORBIT* rising stem ball valves employ this operating principle, delivering fast, low-torque operation and long-term, reliable performance. Additionally, the valve is able to eliminate localized high-velocity flow, which typically creates uneven seat wear in ordinary ball, gate, and plug valves.
- **Full-port (fullbore) ball valves** have a bore ID that is approximately equal to the pipeline ID. This helps reduce friction and pressure loss across the valve. With a full-port ball valve, there is no restriction to



The ORBIT rising stem ball valve is ideal for applications that demand zero leakage and frequent operation.

the flow of fluid, but the valve can be more expensive. This type of bore is ideal for situations that can require pigging. Our portfolio of TBV* valves includes split-body, full-port, flanged ball valves that represent the culmination of sealing technology and design expertise with the versatility to solve even the most demanding applications. These valves are widely used in the chemical, petrochemical, and refining industries.

- **Reduced-port (reduced-bore) ball valves** feature a bore that is reduced by one or two nominal sizes. This provides a more restricted flow path, generally resulting in higher energy losses. Cameron TK* trunnion-mounted ball valves are available in both full- and reduced-port valves. Known for their robust design, superior sealing areas, and stainless steel overlays, TK valves are widely recognized as a leading valve solution for severe service applications.
- **V-port ball valves** have a V-shaped ball or seat. This type of valve is also known as a control valve in which the flow velocities need to be controlled as required per the application.

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Applications

Ball valves can be used in a variety of applications and markets, such as transmission and storage, gas processing, industrial, and many more. Ball valves provide reliable leak protection, which is especially beneficial in gas applications, and exhibit low pressure drop and fast opening and closing.

A variety of construction materials, trim options, and designs make these valves extremely versatile. RING-O* subsea valves are commonly used on subsea manifolds that require long service life at high pressures. TBV valves are used in cryogenic applications in which compressed gas must be kept at a stable temperature for efficient movement.



The RING-O subsea valve design is similar to equivalent topside valves, but has additional features to withstand the external pressure caused by the column of seawater at operating depths.

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