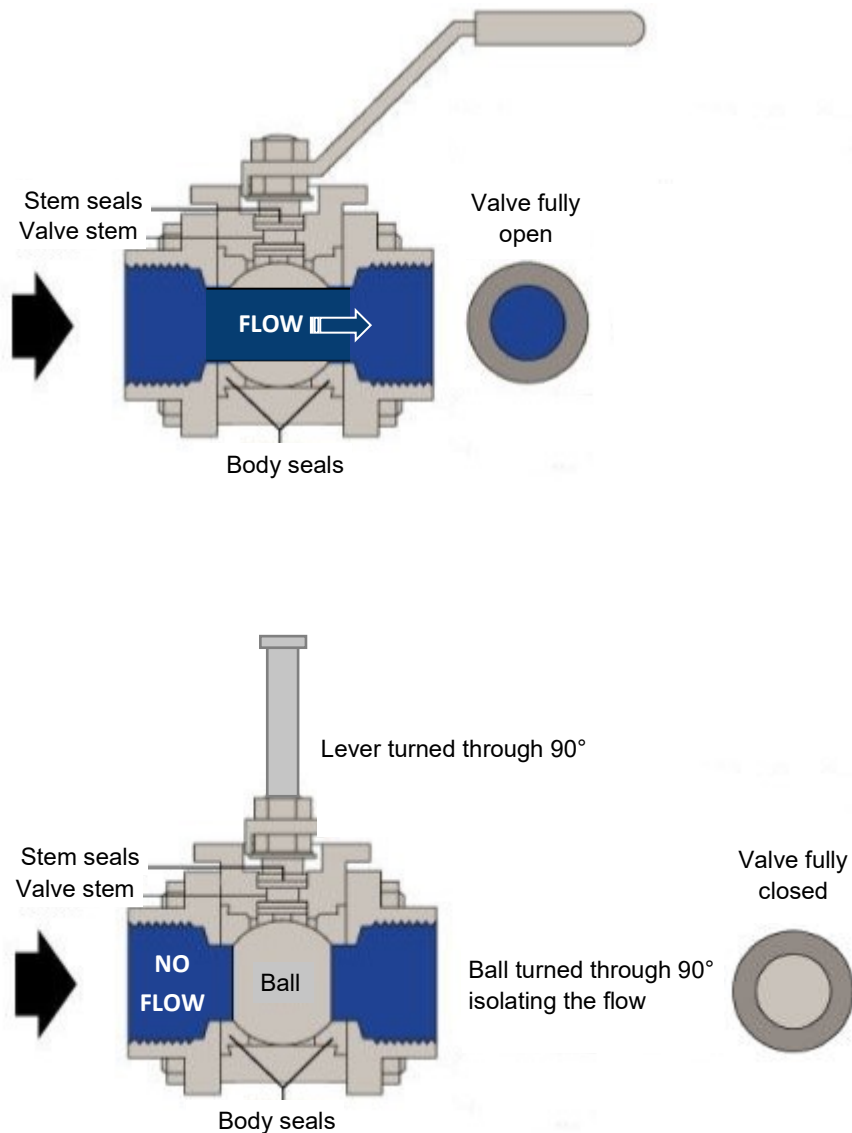


BASIC PRINCIPLE

Typically a ball valve is a device designed to isolate the flow in pipes using a sphere with a hole drilled through it which, when aligned with the connecting pipe(s) allows flow, but when the hole is oriented perpendicular to then pipe, the flow is isolated, using spherical conical seals. The sphere is rotated by a sealed stem which connects it to the turning device, which can be a manually operated lever, or an automatic device called an actuator.



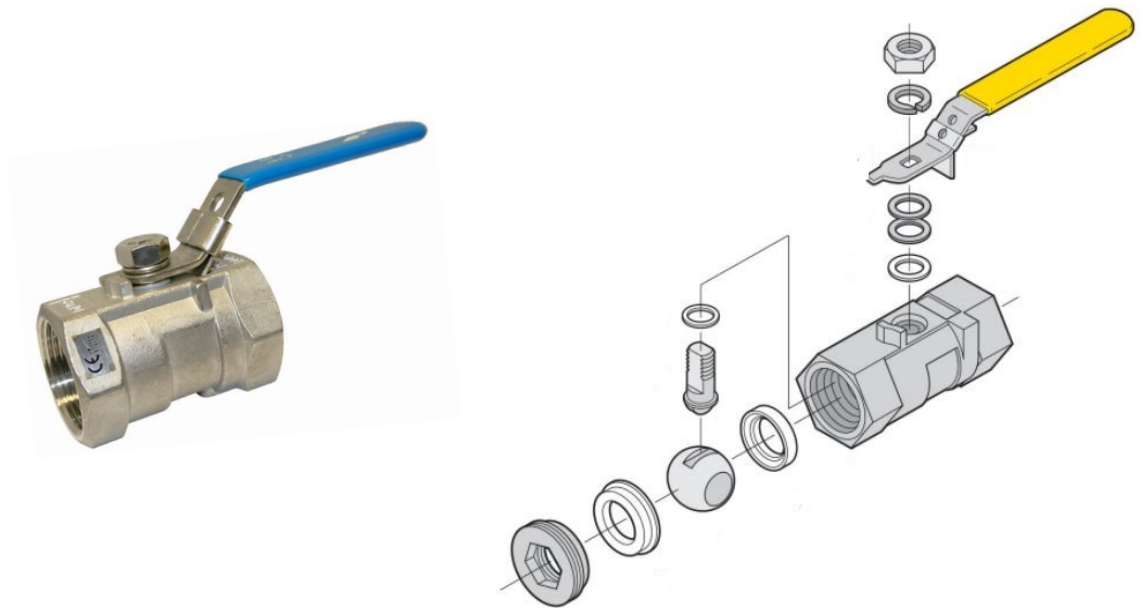
Nowadays, ball valves are used in vast numbers because with correctly matched materials of construction to their intended application, they offer a reliable and effective means of controlling flow in pipes. With several different designs that achieve the same objective, ball valves vary enormously in price from very low cost throw-away types for simple, basic water isolation applications to very expensive, specialist valves for the most demanding and critical applications.

BASIC TYPES

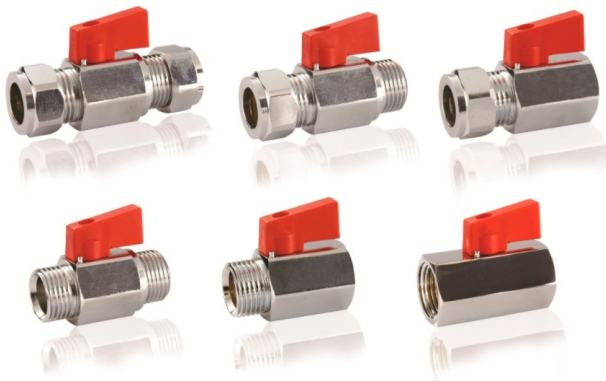
The majority of ball valves are covered by 5 basic construction types, 1 piece, 2 piece, 3 piece, top entry and multi-port.

1 Piece Construction

1 Piece construction ball valves have a single body into which the ball, stem and seals are inserted from one end, and retained by an end insert. Typically this design is used in low cost mass brass ball valves for light duty isolation. Flow is generally restricted as the bore through the ball is smaller than the bore of the connecting pipes, and is referred to as a reduced bore ball valve. Below shows an image and exploded view of a 1 piece stainless steel ball valve.



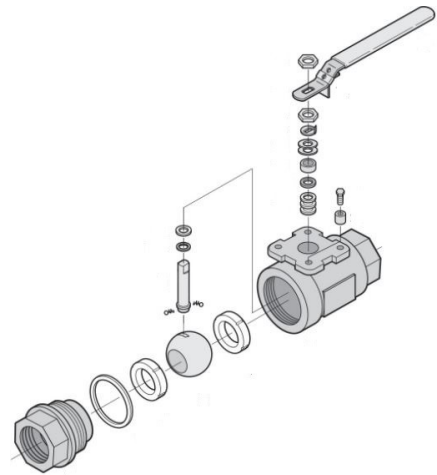
Other typical 1 piece valves in common use:



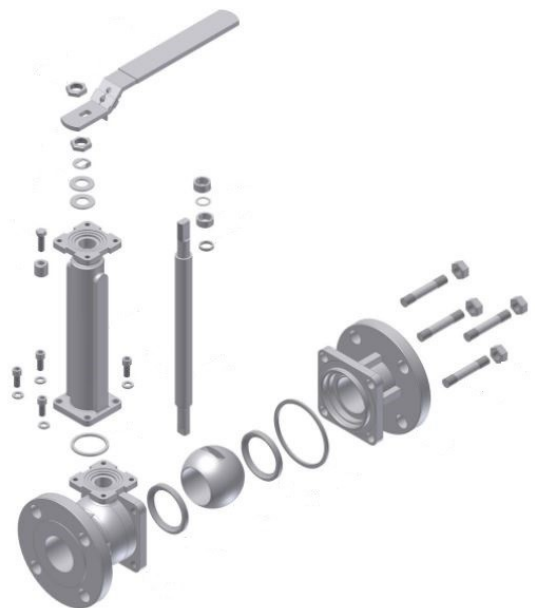
One piece ball valves cannot be maintained in-line, they need to be removed from the pipe for repair or replacement. Typically they are not cost effective to repair.

2 Piece Construction

2 Piece construction ball valves have a split body which allows a larger ball to be installed with a bore through the ball that matches the bore of the connecting pipe, giving a smooth unrestricted flow through the ball valve, and referred to as a full bore ball valve. The 2 body pieces are typically screwed together in valves with threaded end connections, and bolted together where the end connections are flanged. Below are examples with typical exploded views.



Typically, 2 piece screwed ball valves cannot be maintained in-line, they need to be removed from the pipe for repair or replacement. They are not generally cost effective to repair.



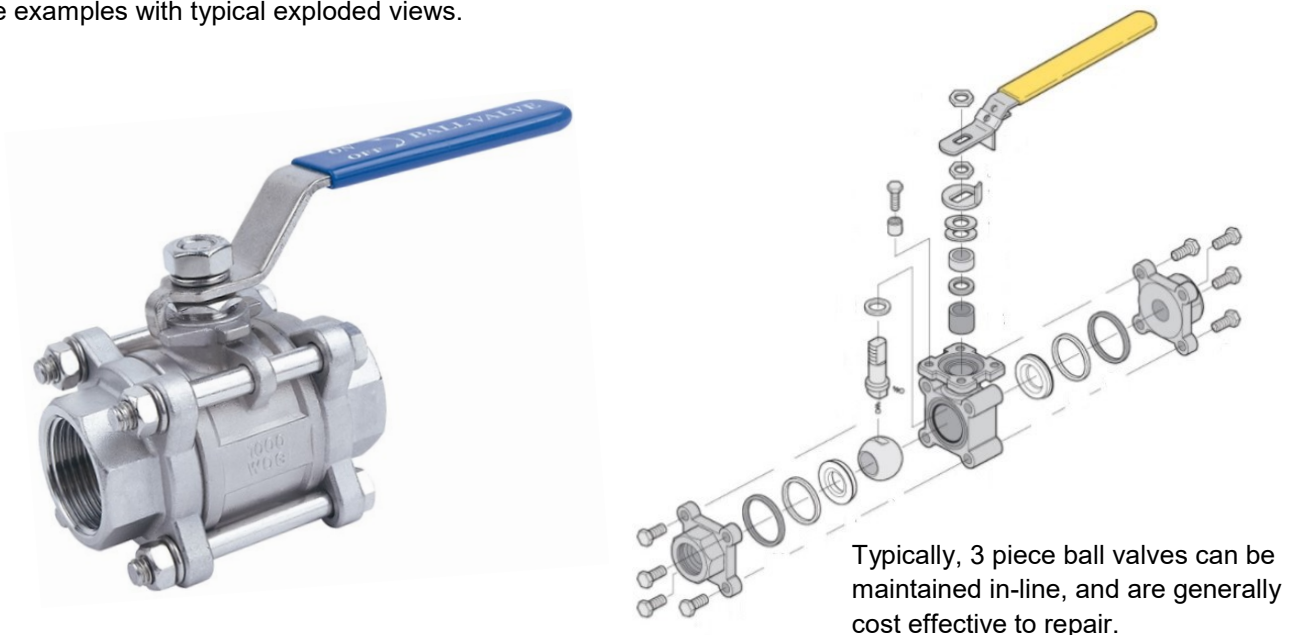
Typically, 2 piece flanged ball valves cannot be maintained in-line, they need to be removed from the pipe for repair or replacement. They are however, generally cost effective to repair.

3 Piece Construction

3 Piece construction ball valves have a centre section body into which the ball is installed, typically with a bore through the ball that matches the bore of the connecting pipe, giving a smooth unrestricted flow through the ball valve, and referred to as a full bore ball valve. Individual ends are then bolted to this centre section creating 3 parts, or 3 pieces.

A significant advantage of this design is that the centre section can be swung out of the line, without disturbing the end connections, enabling the ball valve to be maintained in-line. 3 Piece ball valves are available in a variety of materials but are readily available in mass produced CF8M cast stainless steel.

Below are examples with typical exploded views.



3 Piece ball valves are available with a variety of end connections and internals to cover a wide range of applications in many different industries.



Sanitary Application



Flanged Ends



Tank Bottom Valve

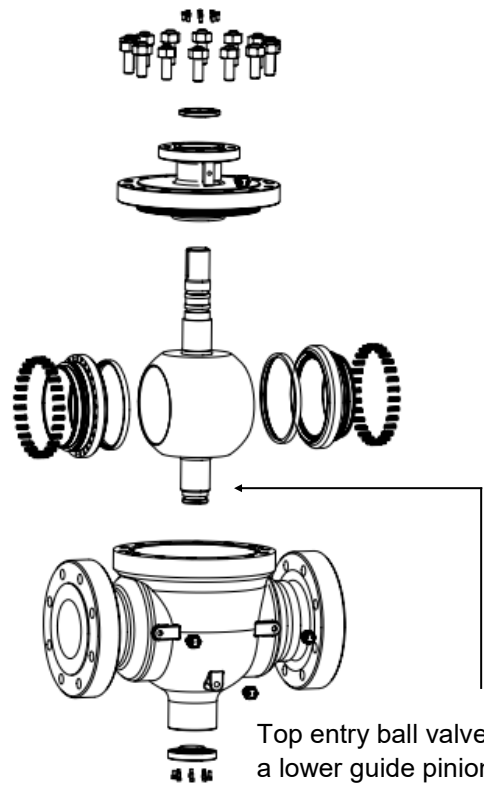
Top Entry Construction

Top entry construction ball valves have a centre section body into which the ball is installed, typically with a bore through the ball that matches the bore of the connecting pipe, giving a smooth unrestricted flow through the ball valve, and referred to as a full bore ball valve. A cover is then bolted on. A significant advantage of this design is that the ball, stem, ball seats and stem seals can be replaced without disturbing the end connections, enabling the ball valve to be maintained in-line.

Below are examples with typical exploded views.

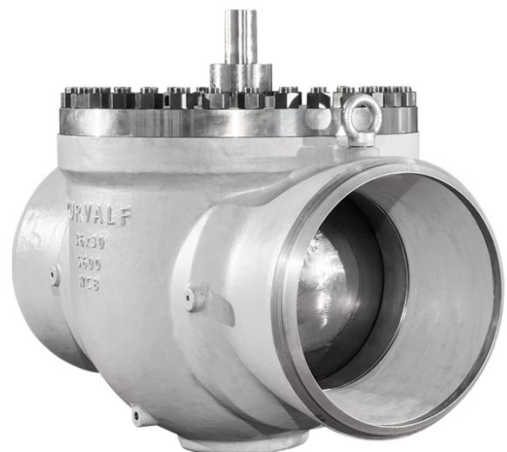


Typically, top entry ball valves are used in the oil and gas industry and can be manufactured in very large bore sizes.



Top entry ball valves have a lower guide pinion and are referred to as trunnion mounted.

Other examples of top entry ball valves



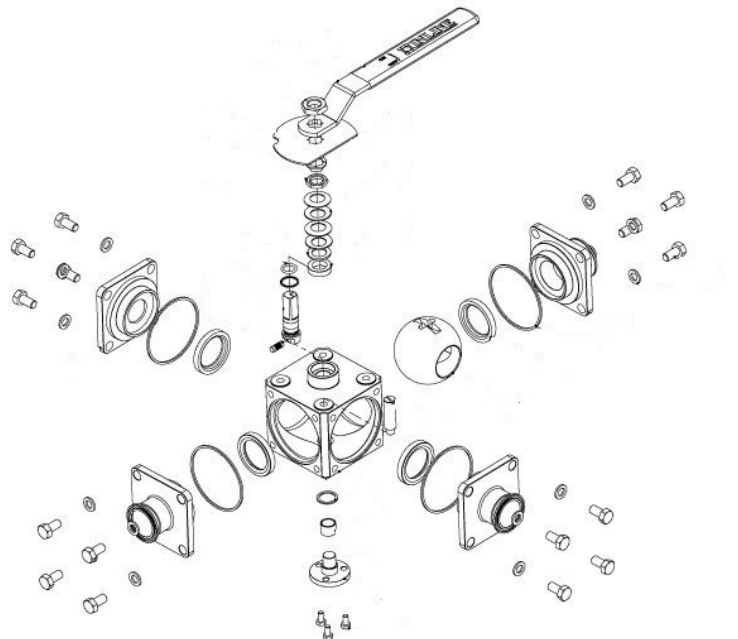
Multi-port Ball Valves

Multi-port ball valves are used to change the direction of flow in pipes as opposed to 2port ball valves which are generally used to isolate flow. The most common multi-port ball valve is the 3 way ball valve as the 2 porting types offer good options for mixing or diverting. 4 and 5 way valves are available, but less common.

For pure diverting duties, an L port 3 way ball valve is applied, the ball being bored in the shape of a letter 'L'. T Port 3 way ball valves have a 'T' bored ball and can be configured to give either mixing or diverting flow.

3 Way ball valves are available in a wide variety of materials and pressure classes to cover a huge range of applications in many different industries.

Below are examples with typical exploded views.



Other examples of multi-port ball valves

