

VARIETY OF VALVES

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Valves are a part of many daily functions, from ensuring your car does not overheat to successfully operating a chemical plant. They have been designed to perform a variety of functions such as stopping and starting, throttling, or acting as a non-return for flow.

Isolation Valves

Used for systems that do not need the flow throttled and allow the flow and closes to stop flow.

Throttle Valves

Used to control the speed and capacity of flow through the system.

Non-Return Valves

Used to control the direction of flow. Flow in the desired direction opens the valve, while flow in the oppose direction forces the valve closed.

Gate Valves

Linear motion valves used for isolation. The valve is completely opened when the disc is removed from the flow stream. Classification of gate valves is made by the type of disc used: solid wedge, flexible wedge, split wedge, or parallel disc.

Advantages:

- No resistance to flow when open.
- Small pressure drop.
- Bidirectional.
- Available in large sizes.



Disadvantages:

- Flow changes nonlinearly with stem travel.
- Vibration/cavitation when partially open.
- Low pressure limitations.
- Slow open and close time.

Globe Valves

Linear motion valves used to isolate and throttle flow. The disc moves perpendicular to the seat to open or close the flow so the annular space between the disc and seat ring gradually changes. There are three body designs for globe valves: Z-body, Y-body, and angle. There are three designs for the disc: ball disc, composition disc, and plug disc.

Advantages:

- Throttling and regulating flow.
- Less seat leakage than Gate Valve.
- Precise control.
- Can be used in high-pressure systems.



Disadvantages:

- High head loss due to flow direction changes.
- Dynamics can create pulsation and damage trim/packing/actuators.
- Noisy in high pressure applications.
- Low coefficient of flow.

Ball Valves

Rotational motion valves used to isolate and throttle flow. It uses a ball shaped disc with a hole in it. When the valve is opened the hole of disc is turned in-line with the direction of the flow. When the valve is shut, the ball is rotated so that the hole is perpendicular to flow direction.

Advantages:

- High pressure, and high temperature flow.
- Permits inspection and repair of seats and seals without removing the valves' body from the line.
- Low torque.
- Quick action on/off ¼ turn.
- Tight sealing.



Disadvantages:

- Relatively poor for throttling.
- Throttling leads to seat erosion.
- Difficult to clean, leads to contamination.

Diaphragm Valves

Linear motion valves that are used for throttling. The disc is flexible and seals with the seat in an open area at the top of the valve body.

Advantages:

Well-suited for difficult environments (corrosive chemicals, slurries, radioactive fluids).

Ability to throttle.

Tight shut-off.

Repairs can be made without interrupting the pipeline.



Disadvantages:

Can only be used in moderate temperature.

Can only be used in moderate pressures.

The body must be made of corrosive resistant material.

Butterfly Valves

Rotary motion valves that can be used in on-off and throttling systems. They are quick and easy to operate. The flow control element is on either a vertical or horizontal axis and is opened when the handle is rotated 90 degrees and closed when the valve is turned an additional 90 degrees.

Advantages:

On/off as well as throttle/regulate.

Good for slurries/suspended solids.

Easily/quickly operated, 1/4" turn.

Available in large sizes.

Good for large flow/low pressure applications due to saving in weight/size/cost.



Disadvantages:

Throttling limited to low differential pressure.

Unguided disc movement is affected by flow turbulence.

Potential for cavitation and choke.