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## How to chose a valve

### Valves in general

The various types of valves can be classified depending on:

- whether they are used for flow control or not
- whether the closing device travels in a linear or angular position
- whether the flow direction is parallel or perpendicular to the travel of the closing device.

The latter factor can be subdivided in:

1 - The closing device travels perpendicularly to the flow direction. This concerns full opening gate valves:

- wedge gate valves, either solid or flexible wedges.
- parallel seated valves: parallel slide valves, double disc valves, slab gate or through conduit valves.

2 - The closing device travels parallel to the flow direction. This concerns globe valves:

- straight pattern globe valves
- Y-pattern globe valves

3 - The closing device performs a rotation compared with the flow direction. This concerns:

- automatic valves: swing check and non-slam tilting disc check valves.
- non-automatic valves: ball, plug, and butterfly valves.

### How to chose a valve

The use of a certain type of valve for a specific purpose is described as follows, with advantages and disadvantages.

#### 1 - Fluid control

Gate valves are not recommended due to a quick wear of the seats. Two valve types should be used: globe and butterfly valves.

##### Globe valves

These valves are commonly used in sizes ranging from 1½" to 14". In case of a precise control being required, a ball type disc should be used. The pressure drop due to the change of the flow direction is the main disadvantage. The Y-pattern type globe valve should be preferred.



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### Butterfly valves

Butterfly valves in size 14" and upwards are the supplement to globe valves. The flow does not change direction and the flow drop is therefore reduced. Another improvement is the use of a streamlined disc. Two types of butterfly valves should be considered: metal- or rubber-seated butterfly valves. Have either a metal-to-metal seat or a soft seal (Viton®, Teflon®, other depending on the working conditions).

## **2 - Valves are subject to changes of temperature.**

The gate or the body seats must withstand the stresses of the body and supply excellent seating. Two valves types should be used: parallel slide and flexible wedge gate valves.

### Parallel slide valves

Two gates are pushed against the seats by means of a center spring. The closing device is designed as such to absorb all stresses. The major disadvantages of these valves are the fact that during the closing and opening the gates remain in contact with the body seats. The seats are therefore worn out rather quickly.

### Flexible wedge gate valves

They supersede the parallel slide valves more and more, particularly when working temperatures do not exceed 400°C. They present the following advantages: The flexible wedge only seat when the valve is nearly closed. There is no scoring and the seats therefore last longer, and though flexible, the wedge is one piece and manufactured as such.

## **3 - The line must be pigged**

In this case the valve hubs and the seat area, both upstream and downstream, must have a full bore in order to avoid obstruction. Different valves could be used: full bore wedge gate valves, through conduit valves and ball valves.

### Full-bore wedge gate valves

These valves have reamed seat rings, in order to meet the pipe diameter. They are not expensive, but they have some disadvantages: between upstream and downstream hubs there is an important restricted bottom, so that, when pigged various residues can deposit in this area, and the gate is not always in contact with the seats and dirt between seat and gate causes scoring and finally leakage.

### Through conduit valves

They are also known under the name of full opening slab gate valves. They consist of chrome plated and smooth finished slab gate against which the seats are pushed by means of springs. The seats are continuously in contact with the gate even when the valve is open. The only inconvenience to take in consideration is the excessive overall dimensions.



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Ball valves

The ball is continuously in contact with the seats. The valves are also full opening and have reduced overall dimensions. The torque is particularly high in the larger sizes and, when motorized, ball valves can be very expensive.

**4 - Double block valves are required.**

This type of valves is used for on-stream equipment isolation, for product segregation, for safety and to prevent contamination. In the past two valves were installed in a line one after the other. Nowadays only one valve is used for the same purpose. A choice is normally made between the following types: soft seal gate valves, slab gate or through conduit valves and ball valves.

Soft seal gate valves

A soft seal gate is defined as a standard gate valve which has been fitted with a supplementary soft sealing (Teflon®) ring in each of the body seats (block & bleed system). The cost of this valve is not high as the soft seal ring in the body seat is the only additional feature compared with a standard gate valve. A perfect tightness can be achieved, but it is recommended to thoroughly clean, flush and drain the line before the valve is installed to avoid any deterioration of the soft sales.

Slab gate and through conduit valves

These valves offer the advantage of the seats being pushed against the gate by means of springs as well as by the flow pressure. Soft seal o-rings inserted in the body seats can achieve a supplementary tightness.

Ball valves

Ball valves are used more and more due to their quick opening and closure time. Up to 8" can be operated by a quarter of turn. Larger sizes require a gearbox. However all ball valves do not offer a perfect sealing. Under pressure the ball moves to the downstream seat so that the upstream seat is subject to leakage. A bubble tight shut-off can be achieved with ball valves having the seats pushed against the ball by means of springs.

**5 - When to chose an automatic valve**

For sizes 1½" and larger two types of valves can be chosen: swing check or non-slam tilting disc check valves.

Swing check valves

These are the most utilized because of their low cost. During the change of the flow direction the disc hits the body seat. The closing effect can be either reduced by a dashpot or accelerated by a lever with counterweight. When required for pigging the full opening swing check valve should be specified. In this case the disc clears the orifice entirely.



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Non-slam tilting disc check valves

They are utilized in lines where the flow changes frequently direction. The closure is much smoother than the swing check valve's and, with a streamlined disc, the loss in pressure is less important.

*Disclaimer: This information has to be intended as a general guide. Therefore their use is always at user's responsibility.*