

# Valves for Process Engineering Applications

## General Remarks as to what Valve to Choose

Valves are important components in engineering processes with flowing media. The application requirements of valves can cover an enormously wide range and have led to a variety of designs. Besides considering the physical and chemical properties of the flow medium (pressure, temperature, max flow, corrosivity, etc.) the desired (or possible) valve actuation must be chosen. Of course the valve has to accomplish the desired functional task in the process.

At this point, a basic functional distinction can be made; stop valves, which have only two positions, open and closed and control valves, which are able to continuously change their flow transverse area. The latter are used in a control circuit to control a process value according to a preset value.

## Choice of Material

Choosing the material of the body often is the first step in determining the appropriate valve. The current materials can be characterized as follows:

- brass: favoured for neutral media, weather resistant
- bronze: is applied when brass would be over-stressed often for aggressive water and steam
- gray iron and spheriodal graphite cast iron: for neutral media, mostly in flanged valves, spheriodal graphite cast iron has superior mechanical properties to gray iron
- carbon steel: low alloyed carbon steels are superior to the above-mentioned cast materials as to strength and are often preferred for safety reasons. They become brittle under low temperatures!
- stainless steel: favourable chemical resistance due to austenitic structure; can be applied also for low temperatures depending on the alloy used.
- plastic: for chemically aggressive media which are not suitable for metals; very narrow temperature range, limited strength.

The material for the sealing element and the valve spindle (outward shutoff) is often chosen by the manufacturer in accordance with the material for the body. In this connection again some notes:

- PTFE: pure or with fillings (carbon, glass-fibre etc.) as seat sealing material or packing, almost universal chemical resistance, however, elasticity is not as favourable as in the following elastomers
- EPDM: seat sealing material for steam (<150°C), cannot withstand grease or oil
- FKM: most universal chemical resistance of all elastomers, not for steam or hot water
- NBR: suitable for oil or petrol (<90°C)

If the media temperatures exceed 200°C, graphite sealings are used for the spindle, the material for the sealing element then is mostly purely metallic (with increased leakage rate). Our sliding gate valve of the product line GS constitutes a different sealing possibility: two disks acting against each other a carbon material and a hard metal layer, guaranteeing tightness (see data sheets).

## Actuation Modes

Automatic valves are mostly actuated pneumatically or electrically, the pneumatic action having a number of clear advantages in valves of average to high nominal diameters: its construction is simple and therefore fail-safe, quickly actuated and assumes (spring-loaded) a definite safety position in the case of air failure. The only disadvantage is the requirement for compressed air which in addition requires conditioning when positioners are used. In that respect, the electric drive is less problematic. A solenoid valve however, is often restricted to small to minimal nominal diameters. Though the gear motor is more powerful, its positioning velocity is often too slow, a fact which limits its applicability as a drive for control valves.

## Designs

We introduce valve designs which are mainly used for stop valve functions.

# Valves for Process Engineering Applications

## Angled Seat valve type 7010:

The valve is pneumatically actuated and is suitable for high switching rates. Available in nominal diameters between DN 15 and DN 80 the process connection can be threaded or welded. The angle set design has advantages with respect to flow capacity, it also manages slightly contaminated media.

## Flanged valve type 7030:

The flanged valve (nominal diameters DN 15-150) is more easily removed from the tube than a valve with threaded ends, this kind of joint is therefore favoured with larger nominal sizes. As the actuation forces and thus also the valve drive increase at high differential pressures a balanced plug solution can be provided.

## 3/2-way valve type 7080:

The 3/2-way valve can, according to design, have different functions: mixing and distribution of media flow or the admission of flow to a unit or its relief (i.e. cylinder).

## Pinch valve type 7070:

Sometimes media are not suitable for flow through a seat valve. There can be heavy contamination, a high solids content or high viscosities etc. The pinch valve can cope with these circumstances. Due to the fact it has no dead space, it is also applicable in food industry. Pinch valves for endless tubes present a further type, where in the sealing element (tube) and the valve constitute totally discrete units.

## GS-Control Valves:

Our control valves lines are designed according to an alternative concept, the so-called sliding gate principle. Many disadvantages of conventional designs have hereby been overcome. The valves distinguish themselves by featuring small dimensions, very low weight and high operating velocity, besides other exceptional properties.

## GS control valve with diaphragm actuator type 8020:

This control valve is installed in control circuits for neutral and aggressive media in chemical process technology and in plant construction. For precise control, positioners (pneumatic or electropneumatic) are used.

## GS control valve with piston actuator type 8043/44:

The sliding gate principle requires only low actuation forces, allowing the use of a piston actuator. Together with a specially developed top-mounted positioner a very compact unit is possible. This positioner can also be mounted on our angle seat valves (angle seat control valve type 7020).

## GS motor-operated valve Type 8030:

Actuating motors of different capacities allow operation with electrical supply energy. A version is also available for explosion-risked areas.

## Other types:

Designs as manual valves (type 8050/51) and as efficient stop valves (type 8040/41) especially for high pressures and temperatures complete the sliding gate valve program.

## Accessories

For all types (stop and control valves) a vast range of accessories is available. This includes additional manual overrides, limit switches of the most varied designs, various positioners as well as other accessories.

## Fluidic Design

Especially in the case of control valves, sizing, i.e. determination of a Cv or Kv-value plays an important role. More simply, this value determines a valve size which is adapted to the process. We have developed a computer program for use on standard PC's which sizes valves to the internationally recognised standard IEC 534-2. The programs database incorporates data on many fluids and also calculates other significant data such as noise emission.