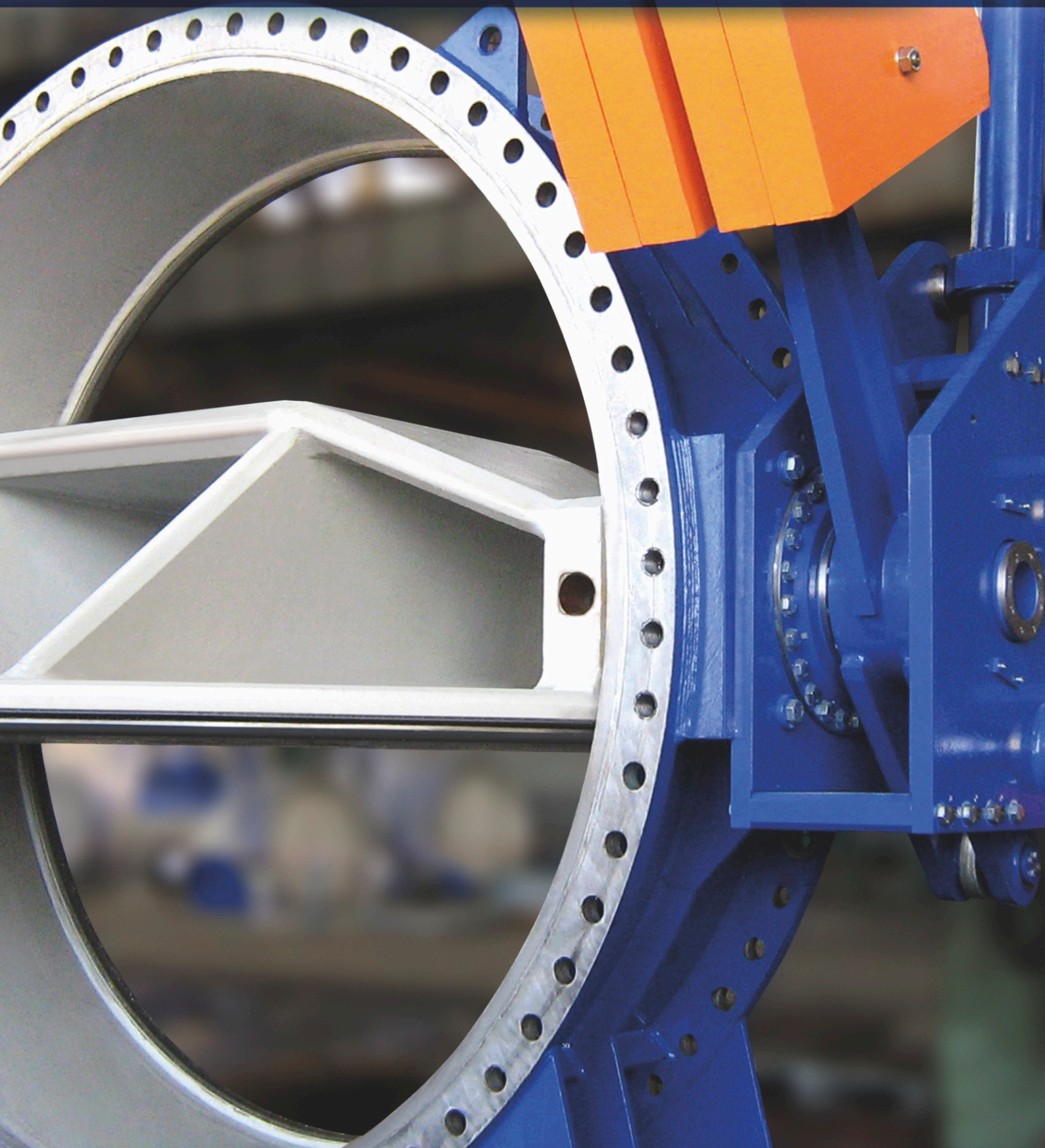
Valves & Gates

VAPTECH

Make what the Planet Needs!



About **VAPTECH**

VAPTECH is a global supplier of equipment and services for hydropower and the metal forming industries. Originating in 1914 the company has its headquarters in Sofia, Bulgaria and a production facility in Pleven. VAPTECH employs more than 270 people and has deliveries worldwide.

HYDRO division of VAPTECH

VAPTECH delivers complete electromechanical equipment for hydropower plants with main focus on turbines with high efficiency, valves, gates and automation systems. The experience in turbine production (small, medium and large) is more than 80 years and even today the complete mechanical equipment is manufactured and tested in our own workshop. Only for the past 10 years VAPTECH has delivered more than 200 turbines with a total installed capacity over 400 MW.

Complete electromechanical equipment by VAPTECH

Valves & Gates

VAPTECH has a long experience and traditions in design and manufacturing of a wide variety of valves and gates.

The company is offering closing and isolating structures that are developed for the specific project parameters but we have also developed standardized range of valves based on their main input and design parameters.

The closing structures and their subcom-ponents are stress tested with finite elements method including the use of special software. All the production processes including welding, heat treatment, machining, surface treatment, functional testing and pressure testing are performed in the manufacturing workshop of VAPTECH.

During the manufacturing process VAPTECH applies a strict system of control including mainly destructive testing, non-destructive testing (DT, VT, MT, PT, UT, RT and others). Some of the tests are performed by independent companies and laboratories.

VAPTECH has a rich experience in design and manufacturing of hydraulic steel structures. The image above shows an infrastructure project for strengthening of the banks of Arda River near the town of Kardzhali in Bulgaria. For this project VAPTECH has delivered 9 radial gates with hydraulic and control system

SPHERICAL VALVES

VAPTECH offers a wide range of spherical valves designed mainly for water. They are used as gates and emergency devices at the turbine inlet or at the water intakes. Spherical valves by VAPTECH are designed so that they can securely close under full flow and unbalanced pressure.

Every spherical valve according to VAPTECH procedures is subjected to the following tests:
Strength: under pressure 1,5 x PN
Tightness: under pressure min. 1,1 x PN
Functional

VAPTECH provides spherical valves according to combination of the following main parameters and design features:

Functional testing of specially developed double-sealing Spherical valve DN2100 PN18 that is installed at the turbine inlet in HPP Lajanuri, Georgia. For this project VAPTECH delivered also bypass system, hydraulic pressure unit and control system.

Nominal diameter: From DN 250 to DN 3000 mm

Nominal pressure: Up to PN 100 bar

Nominal flow velocity: Up to 14 m/s (usually up to 12 m/s)

Opening when: Equalized pressure from both sides of the valve; Partially equalized pressure from both sides of the valve

Flow direction: One-way; Both ways

Connection: Flanged with feet

Body type: Monolith with a cover or two halves

Location of the rotation axe: Horizontal

Rotor type: Monolith with spherical exterior surface; Welded structure

Disc placement (disk axe, rotation axe, sealing surface) with respect to the body: Coaxial; Double displacement (double eccentric)

Actuation mode: Manual; Electromechanical; Hydraulic; Hydraulic for opening and closing with a counterweight:
- The weight falls downstream;
- The weight falls upstream

Location of the actuation system: One side of the valve:
- Left side (looking from the flow direction);
- Right side (looking from the flow direction);
Both sides

Sealing number: Single (main) sealing; Double (main and maintenance) sealing

Sealing method: With moveable rings actuated with water; With water inflated elastic sealing; With stationary sealing (for the double-eccentric valves)

Manual locking: For position „open"; For position „closed"; For position „open" and „closed"

Number and type of sensors: For position: from 2 to 4 inductive or mechanical:
- With a sensor for current position;
- Without a sensor for current position;
For position of the moveable sealing rings: 1 or 2 pcs;
For position of the water-oil distributor (for the valves with inflated and moveable sealings): 2 pcs

Additional equipment: Upstream pipe; Downstream pipe; Dismantling pipe; Bypass system; Blocking system against starting of the moveable or inflated sealings when the valve is open; Hydraulic pressure unit; System for automation and control

Standard Spherical valves by VAPTECH | Main parameters and features:

Nominal diameter: From DN 250 to DN 1000 mm

Nominal pressure: PN40 and PN63 bar (PN100 available on request)

Water flow velocity: Max. 12m/s

Opening with unequal pressure: Up to 20%

Flow direction: One-way

Connection: Flanged with feet

Body: Welded structure and a cover

Location of the rotation axe: Horizontal;

Rotor type: Monolith with a spherical exterior surface for DN250 – DN400; Welded structure for DN400 – DN1000

Disc placement: Coaxial

Actuation: Opening with a hydraulic cylinder and closing with a counterweight

Direction of counterweight fall: Downstream

Location of the actuation system: Left side or right side (looking from the flow direction)

Number of sealings: Single (main)

Sealing method: With moveable rings actuated with water

Position sensors: Inductive for „open", „closed" and „open in the range 80-95%"

Position sensors for the moveable ring: 2 pcs (for DN500 – DN1000)

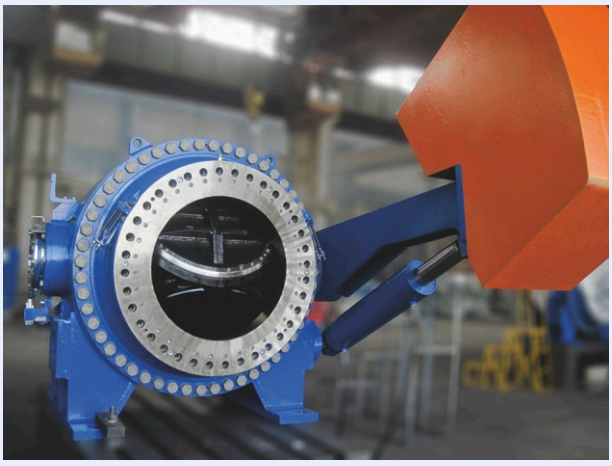
Position sensors for the water-oil distributor: 2 pcs inductive

Blocking system: Against starting of the moveable sealing when the valve is open

Main materials:

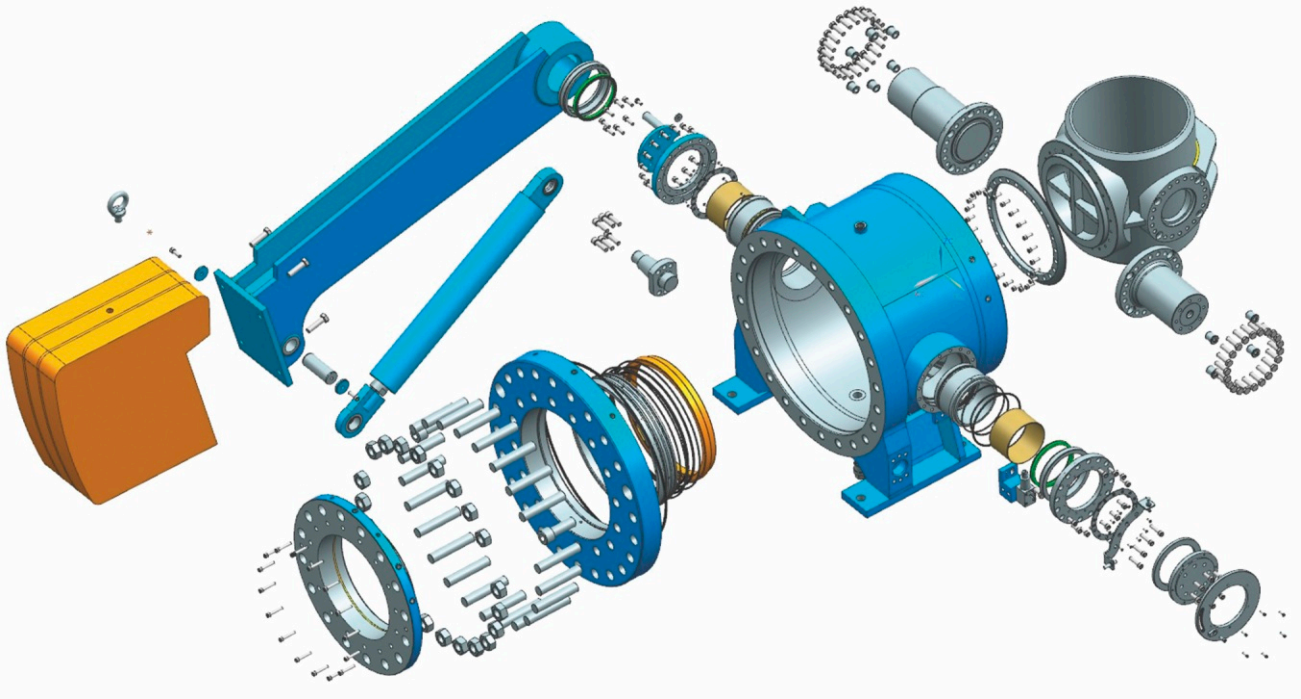
Body: S355JR, EN 10025 or similar
Disc: S355JR, EN 10025 or similar
Stationary sealing ring: X5CrNi 18-10, EN 10088 or similar
Moveable sealing ring: X5CrNi 13-4+QT, EN 10088 or similar
Shafts and axes: X20Cr13+QT, EN 10088, 41Cr4 with stainless overlay or similar
Bearing beds: X5CrNi 18-10, EN 10088 or similar
Fasteners: A2-70, A4-80 and 8.8, galvanized

Functional and pressure testing of VAPTECH standard spherical valve.



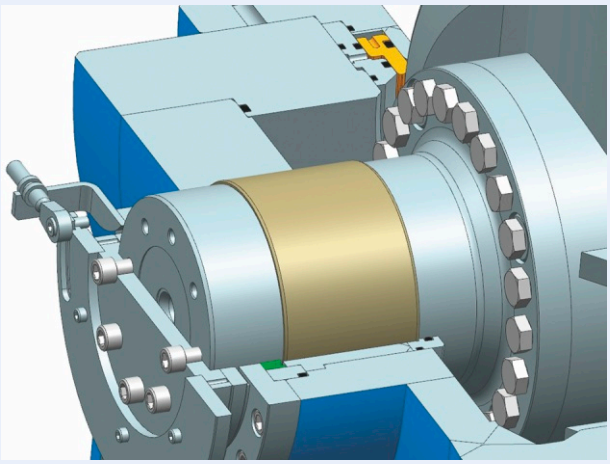
Body: Welded structure with main body integrated stationery sealing ring and bearing beds and a cover.

Rotor: Welded structure with integrated groove for the stationery sealing ring and beds for installation of the shafts.



Explosion of the components of VAPTECH standard spherical valve.

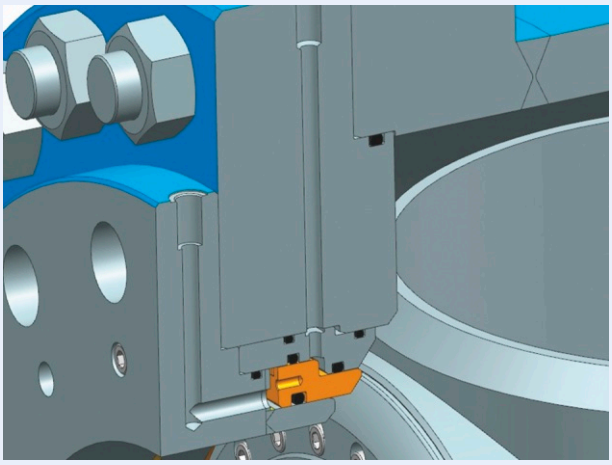
Bearing system of VAPTECH standard spherical valve.



Bearing: The radial and axial bearing of the rotor shafts are self-lubricated type. The shaft bearing bushings are type DEVA and they are inserted in stainless steel cassettes that protect from admission of hard particles.
Shaft sealing: Safe standard seals inserted in grooves in stainless steel chambers and allow for replacement on site without dismantling of the butterfly valve.

Hydraulic cylinder: Piston type PN 160, knuckle-jointly fastened to the valve body and to the counterweight arm. The cylinder bearing is self-lubricating type
- **Operational pressure for the oil:** 70 bar
- **Maximum pressure for the oil:** 100 bar

Main sealing: A set of stationery and moveable rings made of stainless steel with different roughness. The stationery ring is installed in the rotor and the moveable ring is inserted in the downstream side of the rotor cover. The sealing rings can be replaced at site without dismantling of the spherical valve.



Sealing system of VAPTECH standard spherical valve.

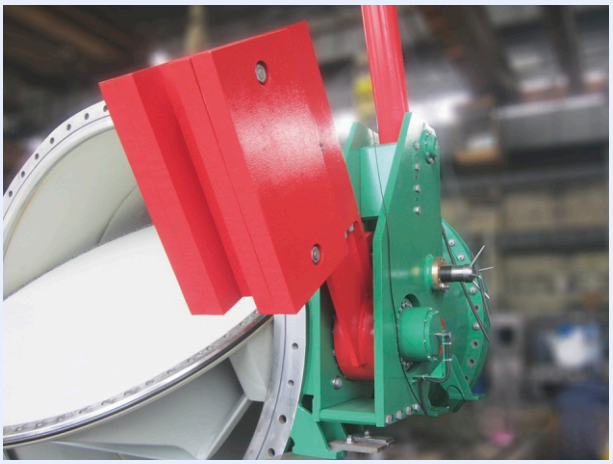
Sealing operation: When sealing of the valve in closed position the moveable ring is moved by water under pressure that is taken from the upstream side of the valve. When the water is admitted to the backside chamber of the moveable sealing ring it moves until it reaches the stationery sealing ring.
The control on the water that moves the sealing ring is realized by a three-way two-position (3/2) water-to-oil distributor (WOD) that is switched to the relevant position by pressurized oil from external hydraulic pressure system.
The releasing of the sealing is realized as the water from the backside chamber of the moveable sealing ring is drained through the WOD that is switched to the relevant position. Then the pressurized water inside the valve exercises pressure on the front side of the moveable sealing ring and it moves back inside the chamber of the valve body.
The control of the WOD requires a separate module of the external hydraulic pressure unit with a four-way two-position (4/2) direct driven hydraulic distributor. The oil pressure needs to be minimum 40 bar.
WOD and the relevant water pipes and steel structure are delivered along with the spherical valve. The pipes are made of stainless steel.
The valve is equipped with a hydraulic blocking system. It allows the switching of the WOD for activating the sealing of the moveable ring only when the rotor is closed even if the command is wrongfully given.

BUTTERFLY VALVES

VAPTECH offers a wide range of disc valves designed mainly for water.

Butterfly valves by VAPTECH are designed so that they can securely close under full flow and unbalanced pressure. Every butterfly valve according to VAPTECH procedures is subjected to the following tests:
Strength: under pressure 1,5 x PN
Tightness: under pressure min. 1,1 x PN
Functional

These valves can be specified according to a combination of the following main parameters and design features:



Functional testing of butterfly valve DN2400 PN6, designed for the intake chamber of HPP Chitahevi in Georgia. The scope of supply includes also upstream and downstream pipe, bypass system, air-relief valve, hydraulic pressure unit and control system.

Nominal diameter: From DN 300 to DN 5000 mm

Nominal pressure: From PN 2,5 to PN 30 bar

Nominal flow velocity: Up to 10 m/s (usually 6 m/s)

Opening when: Equalized pressure from both sides of the valve; Non-equalized pressure from both sides of the valve; Partially equalized pressure from both sides of the valve (when equalization of the pressure is practically impossible)

Flow direction: One-way; Both ways

Connection: Flanged; Between flanges; Flanged with feet

Body type: Monolith; Two halves

Location of the rotation axe: Horizontal; Vertical

Disc type: Lens; Lattice

Disc placement (disk axe, rotation axe, sealing surface) with respect to the body: Coaxial; Single displacement (eccentric); Double displacement (double eccentric); Triple displacement (triple eccentric)

Actuation mode: Manual; Electromechanical; Hydraulic; Hydraulic for opening and closing with a counterweight:
- The weight falls downstream;
- The weight falls upstream

Location of the actuation system: One side of the valve:
- Left side (looking from the flow direction);
- Right side (looking from the flow direction);
Both sides

Sealing number: Single (main) sealing; Double (main and maintenance) sealing

Manual locking: For position „open”; For position „closed”; For position „open” and „closed”

Sensors for position: From 2 to 5 inductive or mechanical: With sensor for current position; Without sensor for current position

Additional equipment: Upstream pipe; Downstream pipe; Dismantling pipe; Bypass system; Hydraulic pressure unit; System for automation and control

Standard Butterfly valves by VAPTECH | Main parameters and features:

Nominal diameter: From DN 300 to DN 1600 mm

Nominal pressure: PN6, PN10, PN16 and PN25 bar

Water flow velocity: Max. 8 m/s

Opening with unequal pressure: Up to 35% difference

Flow direction: One-way

Connection: Flanged with feet

Body: Monolith

Location of the rotation axe: Horizontal

Disc: Lens

Disc placement: Double displacement (double eccentric)

Actuation: Opening with a hydraulic cylinder and closing with a counterweight

Direction of counterweight fall: Downstream

Location of the actuation system: Left side or right side (looking from the flow direction)

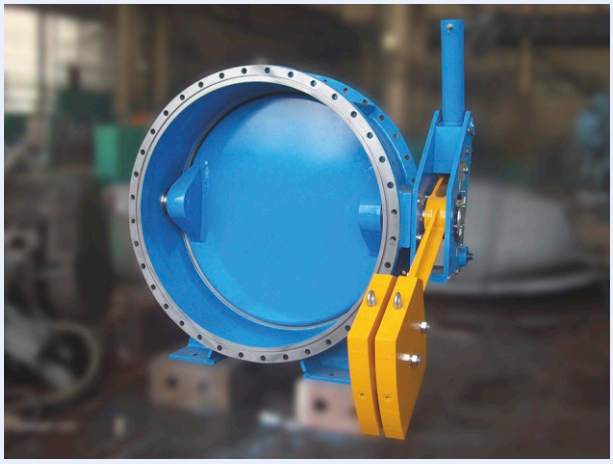
Number of sealings: Single (main)

Position sensors: Inductive for „open", „closed" and „open in the range 80-95%"

Main materials:

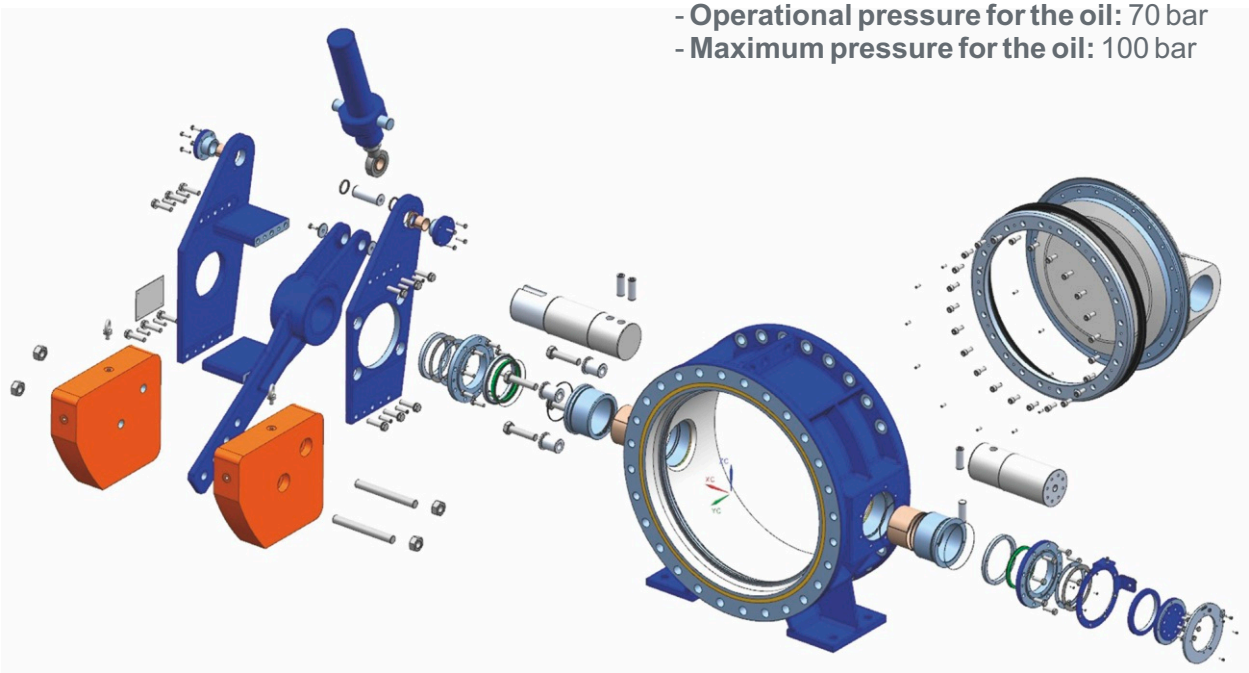
Body: S355JR, EN 10025 or similar
Disc: S355JR, EN 10025 or similar
Stationary sealing ring: X5CrNi 18-10, EN 10088 or similar
Shafts and axes: X20Cr13 +QT, EN 10088 or similar
Clamping ring: X5CrNi 18-10, EN 10088 or similar
Bearing beds: X5CrNi 18-10, EN 10088 or similar
Main sealing: Rubber 70 Shore
Fasteners: A2-70, A4-80 and 8.8, galvanized

Standard VAPTECH Butterfly valves.



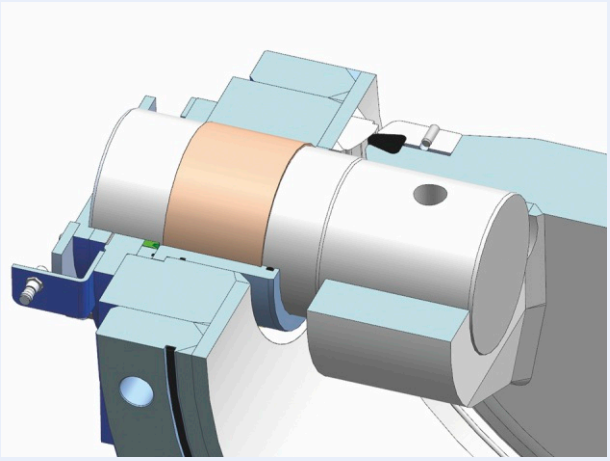
Body: welded structure with integrated stationery sealing ring and bearing beds.
Shaft sealing: safe standard seals inserted in grooves in stainless steel chambers and allow for replacement on site without dismantling of the butterfly valve.

Disc: welded structure with integrated bed for the main seal and beds for attaching of the rotor shafts.
Hydraulic cylinder: piston type PN 160, knuckle-jointly fastened to the valve body and to the counterweight arm. The cylinder bearing is self-lubricating type
- **Operational pressure for the oil:** 70 bar
- **Maximum pressure for the oil:** 100 bar



Explosion of the components of VAPTECH standard butterfly valve.

Bearing system of VAPTECH standard butterfly valve.



Bearing: the radial and axial bearing of the rotor shafts are self-lubricated type. The shaft bearing bushings are type DEVA and they are inserted in stainless steel cassettes that protect from admission of hard particles.
Main sealing: continuous fixed sealing contour type rubber-to-stainless steel. The main rubber sealing is attached to the rotor disc through a stainless steel clamping ring and allows for additional tightening during the operation. The sealing can be replaced on site without dismantling of the butterfly valve.

PLUNGER VALVES “LARNER-JOHNSON”

Plunger valves are used as main valves for low and average pressure with large discharge. Their strongest advantage is the excellent throughput of the flow and its precise regulation through the whole stroke of the plunger.

These valves are used as main discharge valves at dams and for flow regulation with a various application: industrial and domestic water supply, pump- and irrigation systems and so on.

VAPTECH offers a wide range of plunger valves designed mainly for water. These valves can be specified according to a combination of the following main parameters and design features:

Nominal diameter: From DN 500 to DN 2000 mm
Nominal pressure: Up to PN 25 bar
Nominal flow velocity: Up to 15 m/s (usually up to 12 m/s)
Opening and closing: With unequal pressure
Flow direction: One-way
Connection: Flanged with feet
Location of the rotation axe: Horizontal; Vertical
Actuation mode: Manual; Electromechanical, Hydraulic; Hydraulic for opening and closing with a counterweight: - The weight falls downstream - The weight falls upstream
Location of the actuation system: One side of the valve: - Left side (looking from the flow direction) - Right side (looking from the flow direction)

Plunger valve DN1400 PN10 with electromechanical actuator.

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