DAMS AND HYDROPOWER CATALOGUE

TALIS

BALL VALVES

BUTTERFLY VALVES

NEEDLE VALVES

CONE OUTLET VALVES

AIR VALVES

DAMS AND HYDROPOWER

CATALOGUE

TALIS

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WHO WE ARE

TALIS is a leading global provider of premium valves, hydrants and other solutions for water flow control.

With a varied range of products, we offer comprehensive solutions for the entire water cycle, from hydrants to butterfly valves, from knife-gate valves to needle valves. Our experience, innovative technology, global expertise and individual consultation process, form the basis for developing sustainable solutions for the efficient handling of the vital resource of water.

With more than nine strong brands and 28 entities in Germany, France, Spain, Portugal, Italy, Great Britain, the Netherlands, Russia, Poland, Israel, China, the Middle East, Mexico, India and Singapore, TALIS is the largest supplier of valve technology and the first choice when it comes to water valves and services for the entire water cycle.

« TALIS STRIVES TO SERVE YOU AS OUR CUSTOMER WITH SUPERIOR QUALITY AND SERVICE.
Continuous innovation of our products and applications paired with technical support allows you to maintain your critical water infrastructure with confidence. »

TALIS Management

OVER 100
worldwide
patents

+100 SALES REPS

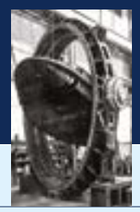
Over
100
SALES
PARTNERS

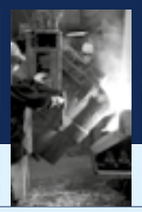
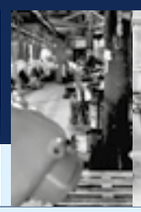
123
COUNTRIES

13
FACTORIES
WORLDWIDE

7 000
CUSTOMERS

1100
EMPLOYEES



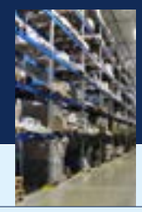




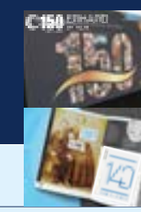












1871	1874	1881	1945	1949	1957	1974	1992	2001	2010	2011/13	2014	2015/16	2017	2018/19	2021
Foundation of ERHARD (DE) Water taps	Foundation of SCHMIEDING (DE) Modern and market orientated solutions	Foundation of BAYARD (FR) Beer taps and water fountains	Foundation of LUDWIG FRISCHHUT (DE) In-house foundry	Foundation of RAPHAEL (ISR) Control valves Foundation of STRATE (DE) Product and problem-solving expertise Sewage industry	Foundation of BELGICAST (ES) Valve manufacturer for the naval industry	Foundation of ATLANTIC PLASTIC (UK) Plastic fittings	Foundation of UNIJOINT (NL) Adapters and extensions, pipe couplings, flange adapters and dismantling joints	Acquisition by Tyco Waterworks	Acquisition by Triton and creation of TALIS	Russia (2011) China (2012) Brazil (2013) Middle East (2013)	Launch of « Smart-Inside » solutions for making our products smarter - South Africa	Mexico (2015) Joint venture with Kc-Val (2016) India (2016) Singapore (2016)	New logistics centre in Germany	TALIS Team in India (2018) Asia (2019) New logistics center in Spain/Bilbao Port (2019)	Celebrating anniversaries 150 years **ERHARD** & 140 years **BAYARD**

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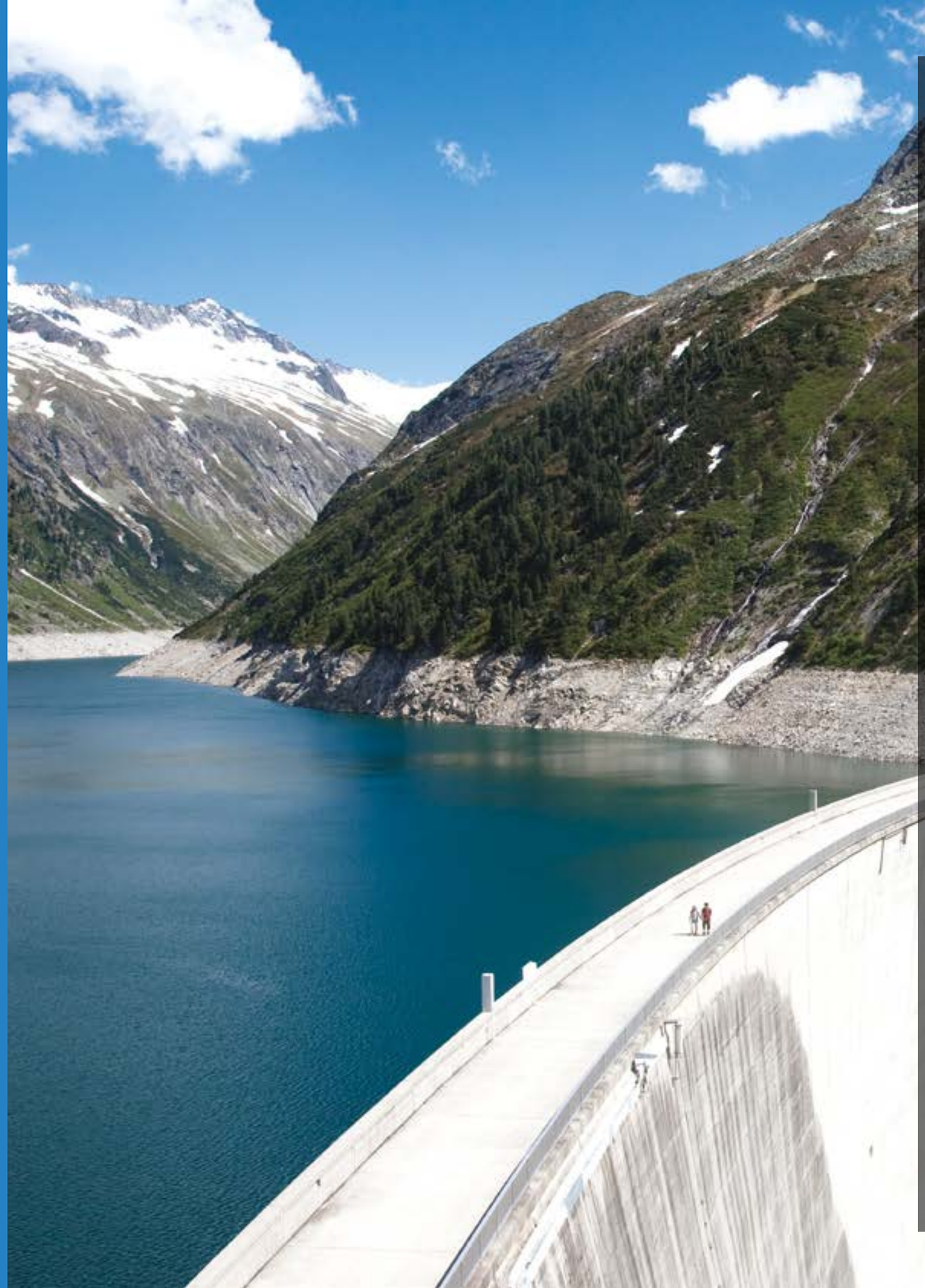

DAMS AND HYDROPOWER

BY EQUIPPING HUNDREDS OF DAMS WORLDWIDE, TALIS HELPS TO GENERATE GREEN ENERGY, AND HELPS TO PROTECT AGAINST THE RISK OF FLOODING AS WELL AS MAKE RIVERS AND CANALS NAVIGABLE.

THANKS TO OUR ABILITY TO OFFER TAILOR-MADE PRODUCTS, WE CAN ASSIST YOU IN ALL YOUR PROJECTS, WHATEVER THEIR SIZE.

Tailor-made solutions

TO ADDRESS YOUR PRESSURE AND DIMENSION CONSTRAINTS

DN3600

BIGGEST VALVE MANUFACTURED

PN160

HIGHEST PRESSURE FOR OUR NEEDLE VALVE

MARKET CHALLENGES

- Finding valves that are compatible with dimensions and pressures required by each project.
- Providing products that can withstand severe conditions and remain reliable and functional.

TALIS' ANSWERS

Thanks to our computer simulation resources, our teams of engineers are able to develop safe valves for all sizes and pressures.

Our products benefit from more than 100 years of experience. Our expertise in valve kinematics and in the choice of materials, allows us to develop safe and reliable products.

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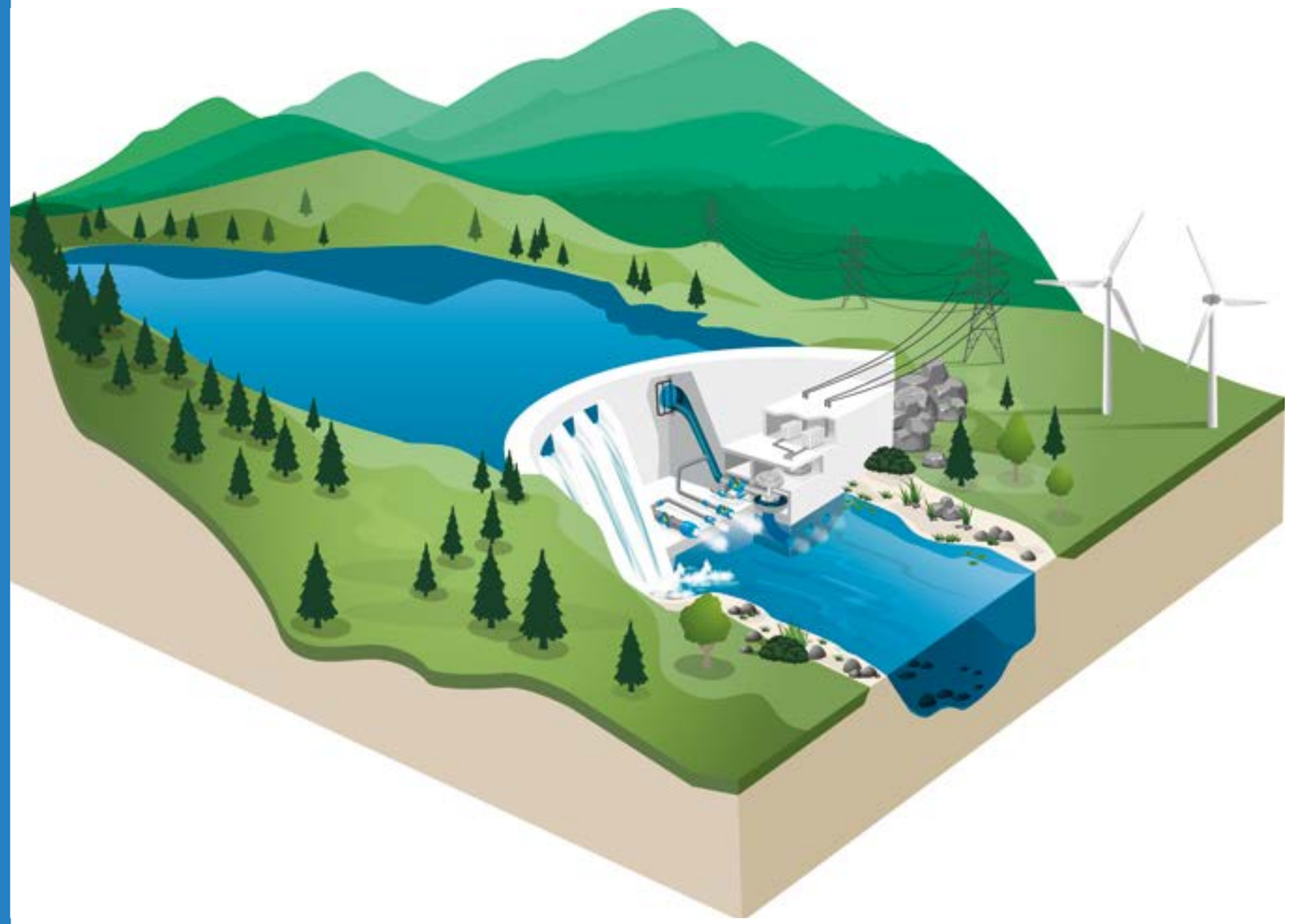
BALL VALVES

DOUBLE ECCENTRIC BUTTERFLY VALVES

NEEDLE VALVES

CONE OUTLET VALVES

CENTRIC BUTTERFLY VALVES



DAMS & HYDROPOWER

Dams are usually built as infrastructure to provide crucial water resources for agriculture, homes and industry or for flood control purposes and more and more, their function is to provide renewable electrical energy.

Renewable hydropower is a reliable, versatile and low-cost source of clean electricity generation and responsible water management.

Modern hydropower plants are helping to accelerate the clean energy revolution, providing essential power, storage, flexibility and climate mitigation services.

When using dams for hydropower purposes, two basic types of power plants can be distinguished.

STORAGE HYDROPOWER: typically a large system that uses a dam to store water in a reservoir. Electricity is produced by releasing water from the reservoir through a turbine, which activates a generator. Storage hydropower provides base load as well as the ability to be shut down and started up at short notice according the demands of the system (peak load). It can offer enough storage capacity to operate independently of the hydrological inflow for many weeks or even months.

PUMPED STORAGE HYDROPOWER: provides peak-load supply, harnessing water, which is cycled between a lower and upper reservoir by pumps that use surplus energy from the system at times of low demand. When electricity demand is high, water is released back to the lower reservoir through turbines to produce electricity.

In terms of the challenges for the installed valves, in many cases, the pumped storage plants have a higher operating pressure and either high capacity pump turbines or a dedicated pumping station. This leads to valves with a higher pressure rating as well as pump protection features in additiona to the valves required in the hydropower plant itself.

RESILIENT SEATED GATE VALVES

PENSTOCKS

CHECK VALVES

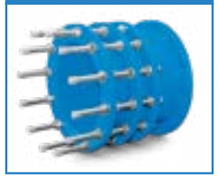
AIR VALVES

CONTROL VALVES

FOOT VALVES

STRAINERS

DISMANTLING JOINTS



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APPLICATION MATRIX

TYPE OF VALVE	BUTTERFLY VALVE (SAFETY VALVE)	BALL VALVE (SAFETY VALVE)	NEEDLE VALVE (SAFETY VALVE)	CONE OUTLET VALVE	BUTTERFLY VALVE	BALL VALVE	NEEDLE VALVE	CENTRIC BUTTERFLY VALVE	RESILIENT SEATED GATE VALVE	PENSTOCK	CHECK VALVE	AIR VALVE
												
INTAKE												
Intake valve					X	X			X	X		
PENSTOCK												
Main shut-off valve					X	X				X		
Safety valve (emergency shut-off valve)	X	X										
TRANSMISSION PIPELINES												
Safety valve (emergency shut-off valve)	X	X										
Vacuum breaker & air control												X
Drainage						X			X			
TURBINE												
Main inlet valve	X	X										
Turbine inlet valve by-pass	X	X					X					
Pelton turbine braking jet shut-off valve						X						
Turbine by-pass, quick opening function	X	X	X									
PUMPING STATION DISCHARGE (PUMPED STORAGE POWER PLANT)												
Discharge valve for pumps with variable flow rate												
└ Combined start-up & check valve		X										
└ Start-up valve & separate check valve					X	X					X	
Discharge valve with constant flow rate												
└ Combined start-up & check valve			X									
└ Start-up valve & separate check valve							X				X	
Pump recirculation bypass valve					X	X	X					X
DAM DISCHARGE & ENVIRONMENTAL FLOW MANAGEMENT												
Free discharge valve (bottom or intermediate outlet)				X			X					
Safety valve (emergency shut-off valve)	X	X										
Vacuum breaker & air control												X
Environmental flow valve							X					
AUXILIARY												
Auxiliary & service circuits					X	X	X	X	X		X	X

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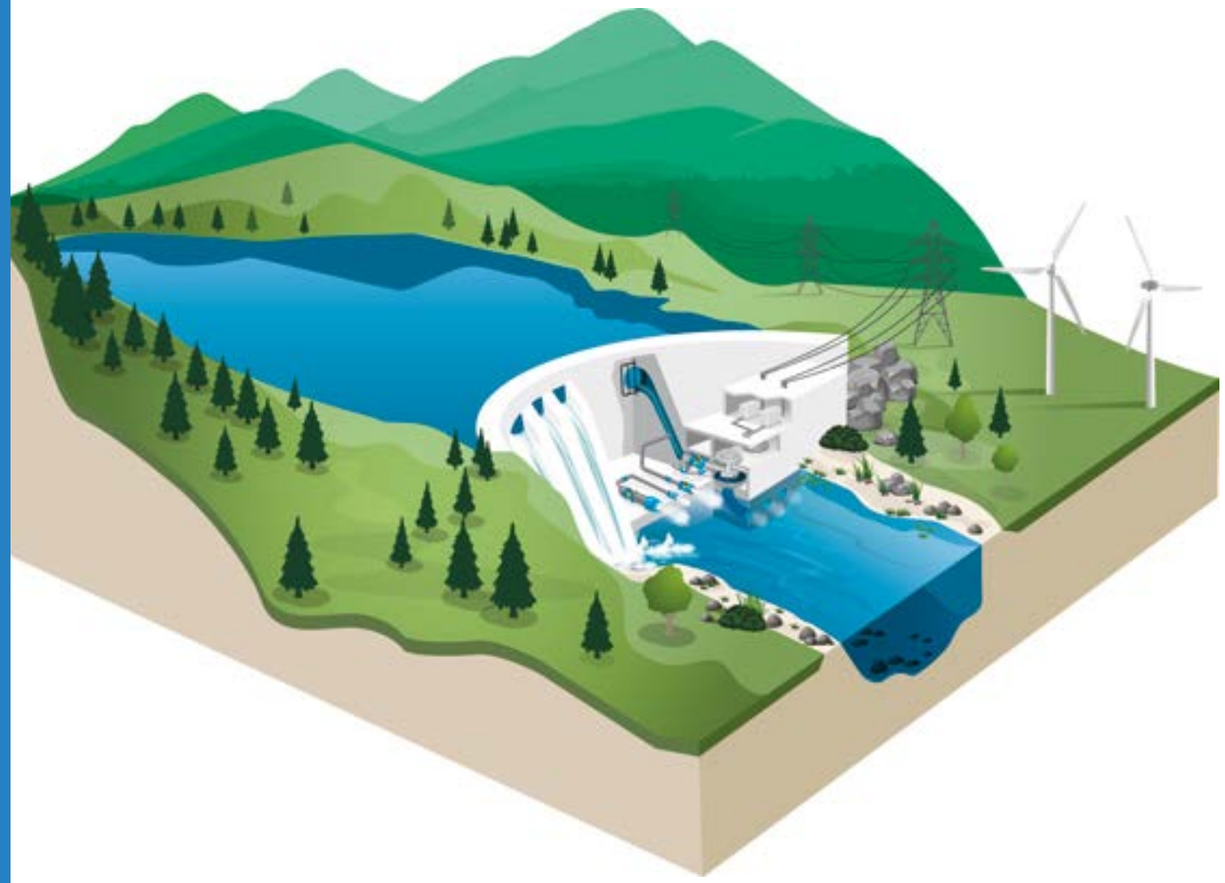
CHALLENGES TO VALVES IN DAMS AND HYDROPOWER PLANTS

When we see imposing dams, with their concrete faces holding back huge amounts of water, probably the last thing we think of are the installed valves. But large dams, especially those providing hydroelectric power, are full of valves of all sizes and types, allowing the plant to work effectively.

1. INTAKE
2. TRANSMISSION PIPELINES
3. (REVERSIBLE PUMP-) TURBINE
4. PUMPING STORAGE DISCHARGE (PUMPED STORAGE POWER PLANT)
5. DAM DISCHARGE AND ENVIRONMENTAL FLOW MANAGEMENT

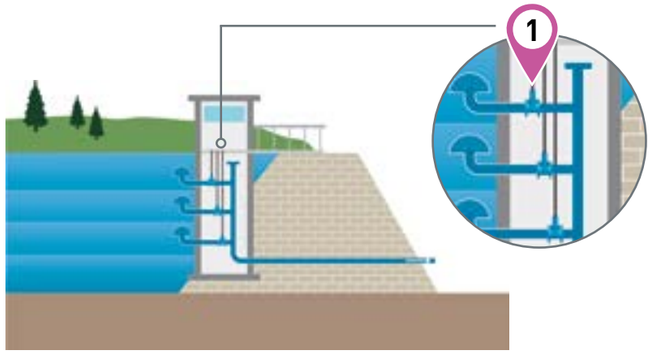


1. INTAKE

The basic function of intake structures is to safely withdraw the dammed water and then to conduct this water into the penstock or transmission pipelines.

1.1 INTAKE TOWERS

Intake towers make it possible to draw water from different depths in a controlled manner. The water from the reservoir is withdrawn through intake pipes located at different levels connected by a common vertical pipe. The INTAKE VALVES located in the intake pipes have to resist the raw water quality with adequate coating and materials. Operating these these valves without electricity is often requested, since the tower can also flood. TALIS supplies butterfly valves and gate valves for intake towers, either with manual actuation with spindle extensions or double-acting hydraulic actuators.



1
BUTTERFLY VALVE + HYDRAULIC ACTUATOR

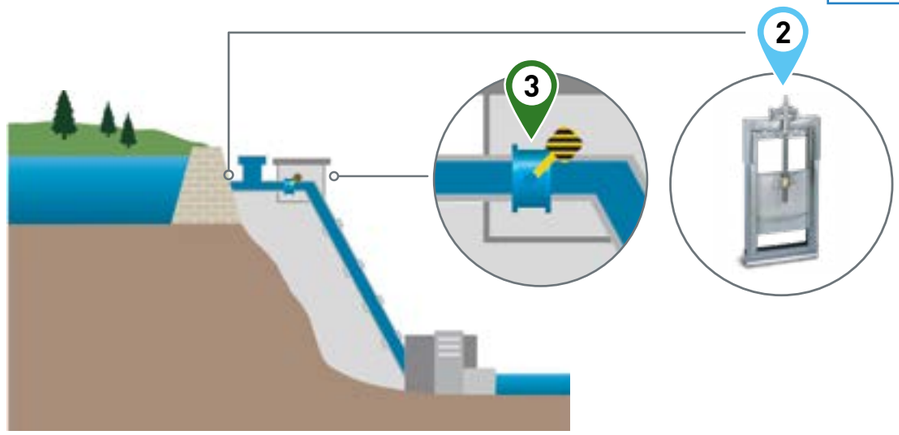
1
GATE VALVE + STEM EXTENSION

1.2 INTAKE STRUCTURES INTEGRATED INTO GRAVITY DAMS

In the case of gravity dams, water can alternatively be withdrawn from the reservoir through outlets or sluiceways which are constructed as an integral part of the concrete dam. This kind of intake is usually equipped with VERTICAL GATES (also called penstocks or sluice gate valves) as INTAKE VALVES.

1.3 PENSTOCK

The penstock is a conduit or pipe that conducts water from the intake to the (pump-) turbines of a hydropower plant. Penstocks can be made out of concrete inside the dam body (gravity dams) or as separate large tubes that guide water to the turbines, depending on the configuration of the hydropower plant.
When the intake valves on the dam open, water flows down the penstock to the turbine. To prevent heavy damage in case of a penstock pipeline break, a SAFETY VALVE, mostly a butterfly valve with overspeed detection, alternatively a ball valve, is installed on a top position of the penstock. These valves close automatically without human interaction when the water velocity exceeds a certain set value.



2
PENSTOCK

3
SAFETY BUTTERFLY VALVE

3
SAFETY BALL VALVE

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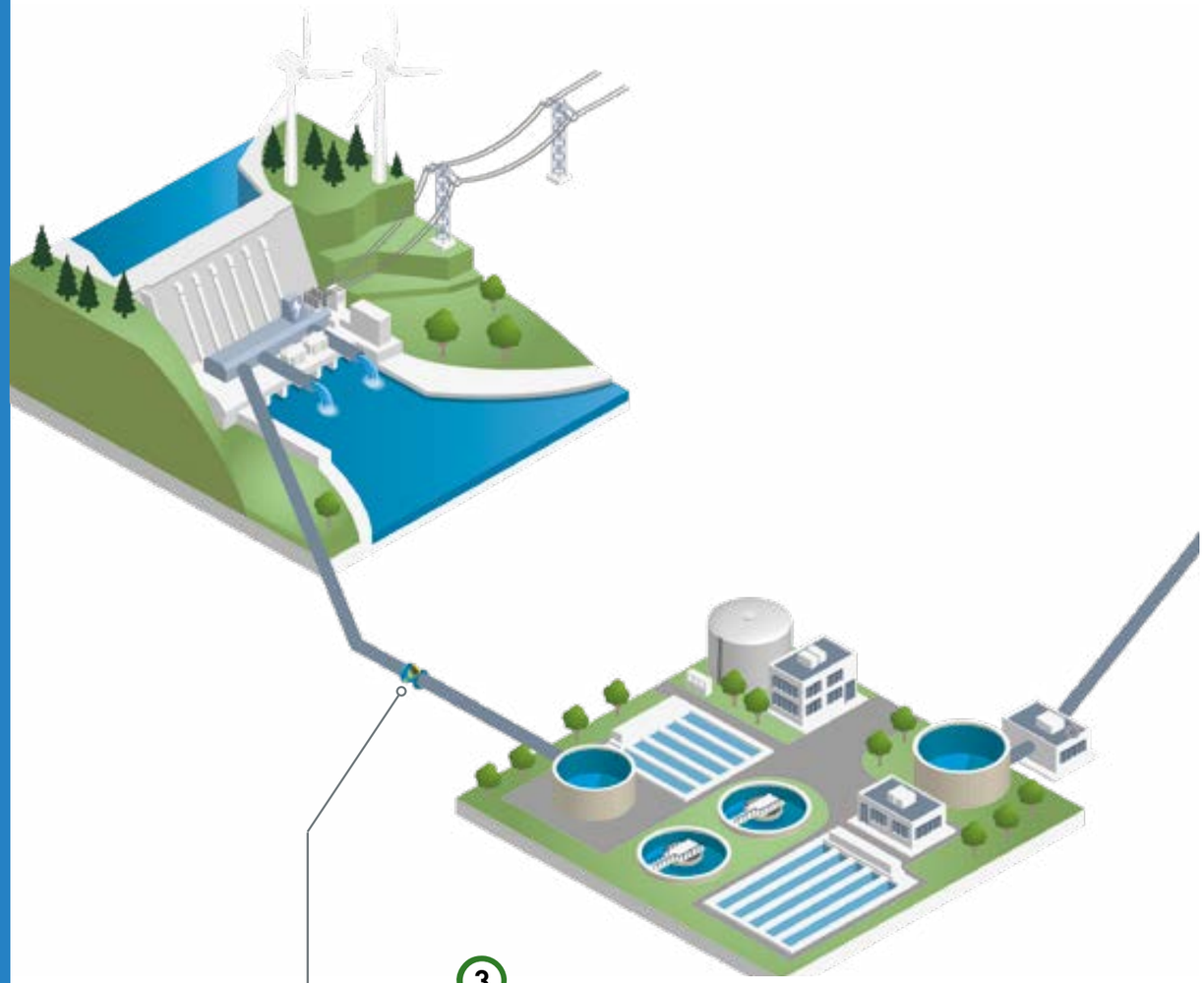
2. TRANSMISSION PIPELINES

After dams for water storage, transmission pipelines transport the stored raw water from the reservoir, usually to municipal water treatment plants.



2.1 BURST PIPE PROTECTION

In such pipelines, SAFETY VALVES with weight-loaded actuator are installed to protect buildings and traffic routes from flooding in case of a pipe burst downstream of the valve. At the same time, they prevent the reservoir from being emptied by an emergency shut-off.

Upstream of the valve, an OVERSPEED DETECTION DEVICE triggers the weight drop.

Downstream, a VACUUM BREAKER allows the inlet of air, preventing the pipe from collapsing. An important feature of this specific application is the total independence of external energy sources for triggering the closing, since these valves are often located far away from energy infrastructure.

2.2 DRAINAGE

When performing maintenance or construction works on transmission pipelines, huge volumes of water have to be drained out in a short period of time.

When draining water with a high differential pressure, a control valve is usually the best choice. In case of cavitation risk, a needle valve would be best. Nevertheless, with transmission pipelines with their high water volumes and the need to empty the pipeline as fast a possible, an isolation valve with a full bore is recommended.

Depending on the differential pressure given by the volume in the pipeline and the height difference to the drainage valve, gate valve or ball valves are recommended for the use as DRAINAGE VALVES. When there is a major differential pressure, the robust ball valve is the safe choice in terms of vibrations.

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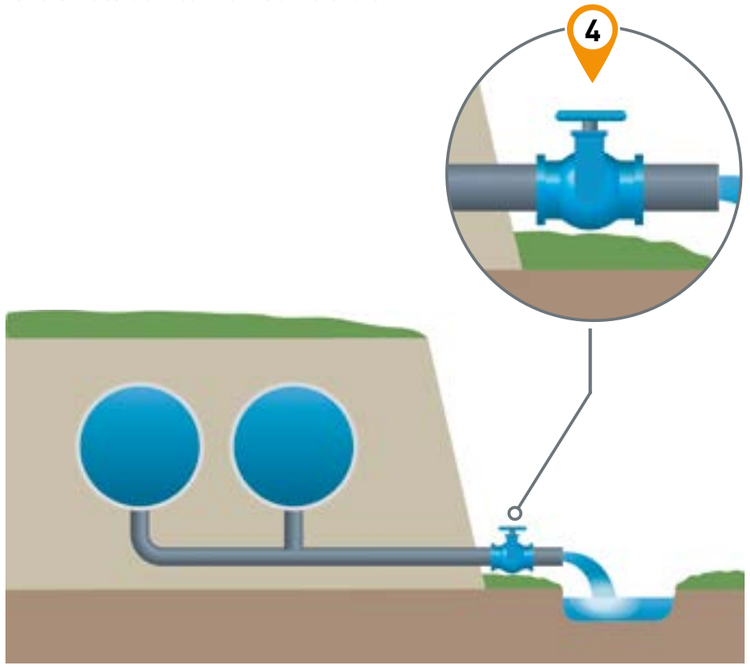


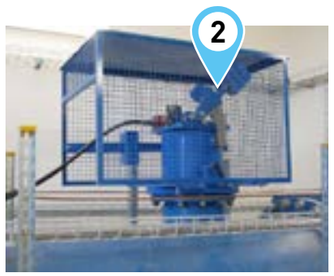
1 **SAFETY BUTTERFLY VALVE**

2 **PADDLE TRIP**

3 **WELDED AIR VALVE**

4 **BALL VALVE**

4 **RESILIENT SEATED GATE VALVE**



REAL-LIFE TALIS EXAMPLES OF SAFETY VALVES IN TRANSMISSION PIPELINES.

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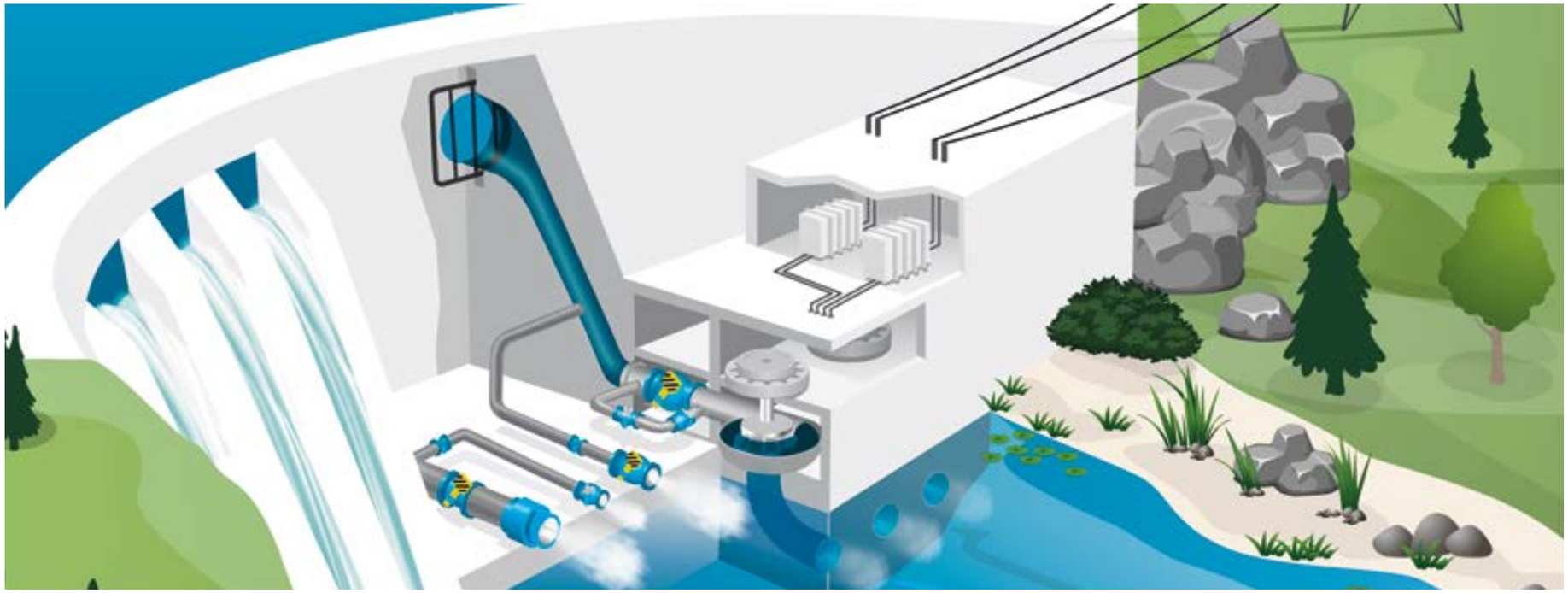


3. (REVERSIBLE PUMP-) TURBINE

The turbine and the generator are the heart of a hydroelectric power plant.

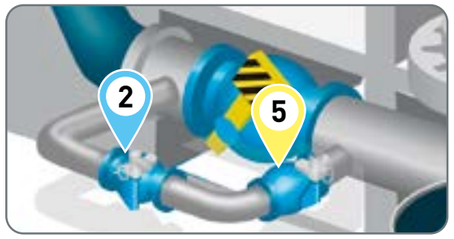
3.1 TURBINE INLET

The function of the MAIN INLET VALVES is to isolate the unit and completely cut off the water flow to the turbine. They usually serve as a safety device capable of executing emergency closing and are able to close at the maximum water discharge.

Turbine inlet valves have to withstand high pressures and flow velocities and be absolutely reliable in order to protect the core element of the power plant, the turbine.

3.2 TURBINE INLET VALVE BYPASS

Main inlet valves often have a bypass connecting the upstream and downstream side, to equalize the pressure on both sides. This relieves the valve from large loads during normal opening and closing. The bypass is also used to fill the turbine area. A needle valve regulates the flow and avoids cavitation. To shut off the bypass during maintenance, a ball valve is installed upstream of the needle valve.



3.3 QUICK OPENING BYPASS

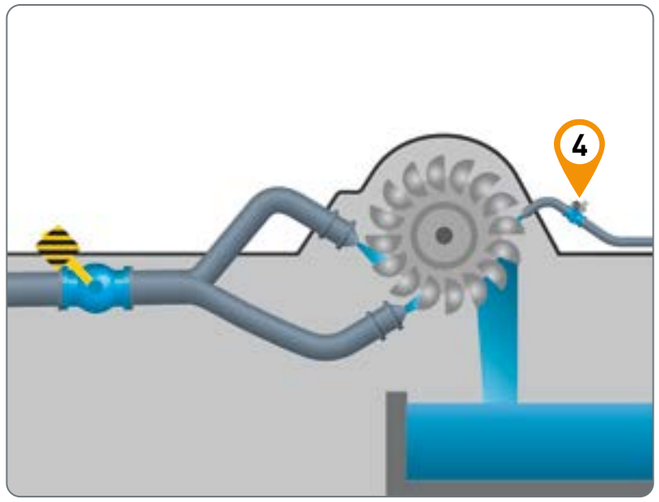
When a stop command is sent to the turbines, the safety valves open immediately and simultaneously and – as a TURBINE BY-PASS, WITH QUICK OPENING FUNCTION – re-route the corresponding volume of water directly into the tail water pool. These safety valves are equipped with a weight-loaded actuator, which causes the signal to drop based on the turbine operability.

3.4 PELTON TURBINE BRAKING JET SHUT-OFF VALVE

When the flow is cut off, it will take a long time for the turbine to come to rest due to the high inertia. To prevent this, a braking jet is used which directs a jet in the opposite direction and stops the rotation.

As Pelton turbines are used in high head power plants, the jet to stop the rotation of the turbine also requires a high-pressure pipeline and lowest possible head loss.

This pipeline is equipped with a high performance ball valve as an isolation valve for maintenance purposes, called the BRAKING JET SHUT-OFF VALVE.



1 SAFETY BALL VALVE

1 SAFETY BUTTERFLY VALVE

2 4 BALL VALVE

3 SAFETY NEEDLE VALVE

5 NEEDLE VALVE

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4. PUMPING STORAGE DISCHARGE (PUMPED STORAGE POWER PLANT)

Pumped storage hydropower plants are similar to conventional hydropower plants, but they operate with two reservoirs, a lower and an upper one. The two reservoirs are connected to each other through tunnels or penstocks.

In production mode, the plant operates like a conventional hydroelectric plant. In pumping mode, electrical energy from the grid is used to pump the water from the lower reservoir to the upper one, usually during off-peak periods using surplus electricity generated by other power plants.

In regard to the pumping system, the choice is between reversible pump turbines able to work in both directions or a separate pump and turbine. Separate pumping stations are more common for heads higher than 600 to 700 m or when a conventional hydroelectric plant is rebuilt into a pumped storage plant and there are restrictions on the available space or building size.

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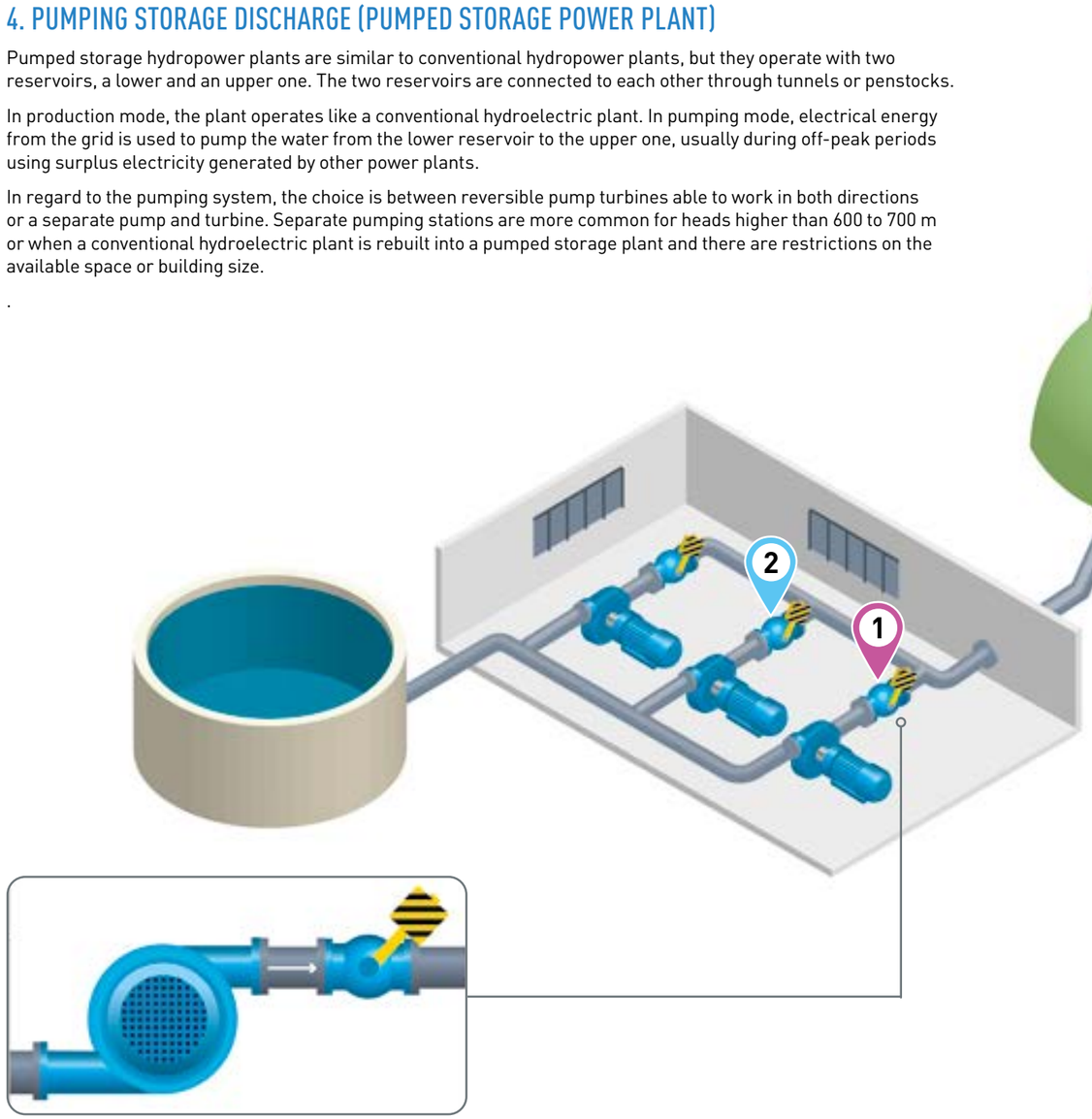


4.1 DISCHARGE VALVE FOR PUMPS WITH VARIABLE FLOW RATE

Every pump is equipped with a suction valve and a DISCHARGE VALVE, cutting the flow around the pump during start-up and shutdown. When starting up the pump, it is necessary to regulate the flow until the pump reaches its operating condition. If the pump is equipped either with a variable frequency drive (VFD) or a frequency conversion, the pump itself varies the flow rate during start-up. In this case, the discharge valve is an isolation valve, followed by a non-return check valve, i.e. a START-UP VALVE AND SEPARATE CHECK VALVE. The check valve prevents water from flowing back into the pump and forcing it to spin backwards when the discharge valve is open.

For the pumping stations in high-pressure pumped storage power plants, TALIS recommends combining the function of DISCHARGE VALVES and non-return valves, i.e. a COMBINED START-UP AND CHECK VALVE in one product. This can be performed by means of a ball valve with safety valve features, mainly the weight-loaded actuator, with the movement of the actuator synchronised with the start-up of the valve. A butterfly valve can also be installed in this position, but the ball valve with the full bore and thus a minimum head loss is the better option for pumps and turbines.

1 **SAFETY BALL VALVE**

2 **SAFETY NEEDLE VALVE**

3 **NEEDLE VALVE**

4 **BALL VALVE**

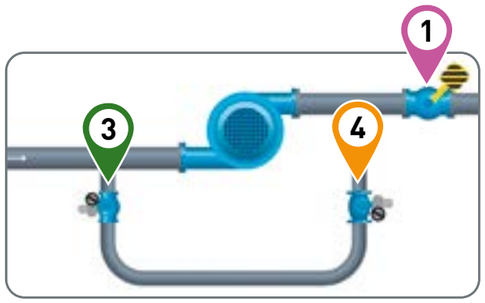
4.2 DISCHARGE VALVE WITH CONSTANT FLOW RATE

If the pump has a constant flow rate and no internal flow regulation then the flow has to be regulated by means of a valve.

In this case, the DISCHARGE VALVE is a control valve, followed by a non-return check valve, i.e. a START-UP VALVE AND SEPARATE CHECK VALVE. The check valve prevents water from flowing back into the pump and forcing it to spin backwards when the discharge valve is open. The function of the control valve and the non-return valve can also be combined as mentioned in the application of pumps with variable flow rate, i.e. a COMBINED START-UP AND CHECK VALVE in one product. In order to prevent cavitation, TALIS recommends using needle valves with customised cylinder types as a control valve.

4.3 OPTIONAL RECIRCULATION LINE FOR PUMP PROTECTION

In addition to flow regulation by a control valve in line with the pump, an optional RECIRCULATION LINE for safe pump start-up might also be needed. The task of the recirculation pipeline is to guide the flow inside a small closed loop, preventing cavitation and increasing flow rate and pressure step by step until the pump reaches its desired operating point. This measure increases the pump efficiency for pumps without fully flexible speed adjustment. Within the recirculation pipeline, there is a CONTROL VALVE for flow regulation and a BALL VALVE for shut-off purposes.



SAMINA PUMPED STORAGE PLANT WITH RECIRCULATION LINE

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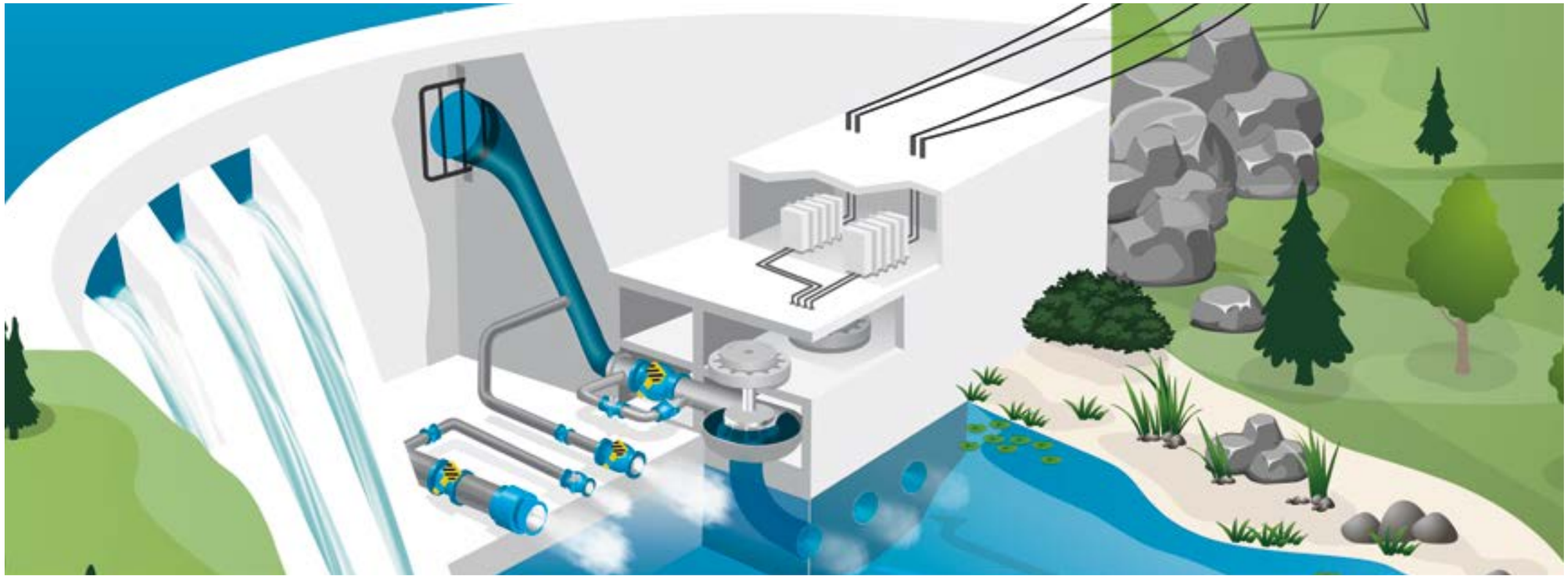
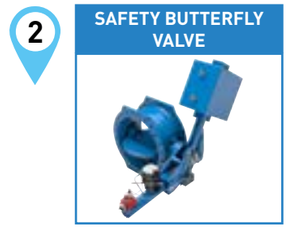




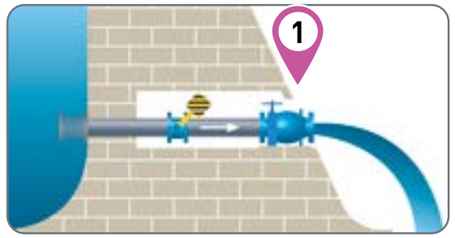
5. DAM DISCHARGE AND ENVIRONMENTAL FLOW MANAGEMENT

Dams of substantial size need to have a way of releasing water in controlled amounts because of changing reservoir capacities, downstream water demands or minimum stream flow requirements. These situations call for special valves designed to dissipate the large amount of energy created by the high head of water in the dam.

5.1 DISCHARGE THROUGH BOTTOM OR INTERMEDIATE OUTLET

Bottom and intermediate outlets generally perform the following functions:

- Controlling the rise of the water body during the first reservoir filling
- Lowering the reservoir level to allow the structures to be visited and maintained
- Flushing out sediments from the bottom of the reservoir
- Spilling part of large floods as an auxiliary spillway



Bottom and intermediate outlets generally consist of one or more steel or concrete pipes crossing the dam bypassing the dam. They are closed upstream by a SAFETY VALVE and downstream by a DISCHARGE VALVE. In such pipelines, SAFETY VALVES with weight-loaded actuator are installed to perform an emergency shut-off in case of failure of either the discharge valve or a burst pipe, preventing the reservoir from being emptied. Ball valves or butterfly valves are both suitable for this task. The DISCHARGE VALVE needs to facilitate cavitation- and vibration-free energy dissipation at the end of the line, handling huge volumes of water. TALIS recommends cone outlet valves for this purpose, but needle valves are also a viable option.

5.2 ENVIRONMENTAL FLOW MANAGEMENT

Dams divert water or store it temporarily for later use or release, thus smoothing out natural variations in flow regimes. Consequently, the river course downstream of dams is fundamentally different from the natural state. Sustainable water resource development therefore requires reservoir operations that provide environmental flows to support the downstream riverine ecosystem, nowadays often a governmental pre-requisite when building a new dam.

Dams often only have the capacity to release water through the spillway or by discharge through a valve at the bottom of the dam. Spillway and bottom outlets are usually not suitable for precisely controlling the flow as is required to meet the needs of downstream ecosystems, and agriculture and people.

The task of an ENVIRONMENTAL FLOW VALVE is to regulate the flow precisely to the needed value, and it operates free of cavitation and aerates the water, if this is required. An option for pumps and turbines.

TALIS recommends needle valves for this purpose. Cone outlet valves are not suitable, since the regulation precision is far below that of the needle valve. The ENVIRONMENTAL FLOW VALVE can be placed as a by-pass, either from the discharge line or from the turbine line or as an independent line.

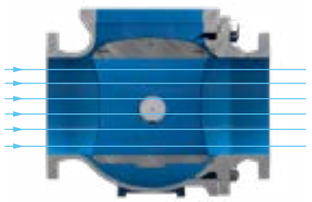
MBR_TALIS_211119_DAMS_AND_HYDROPOWER_EN

BALL VALVE

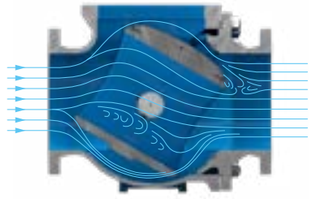
For more than 50 years, the ERHARD ball valve has shown its unique strengths exactly where other valves reach their limits. Ball valves are used as safety and shut-off equipment for turbines and pumps in conditions under high operating pressures up to 160 bar and flow velocities up to 15 m/s.
Its very low resistance coefficient compared to other valve types has a strong impact on the energy inputs of pumps in closed pipe systems.
In direct comparison with other isolation valves, it becomes evident that the purchase costs will mostly amortise in the first years of usage.

CHARACTERISTICS

- Low construction height and full straight-through bore, minimum head loss in open position.
- Ball plug with simple and solid cast design.
- Minimum gasket wear: seal ring releases after opening 3° due to the double eccentric design.
- Soft transitions, no non-turbulent flow conditions are necessary upstream or downstream of the valve.
- Stable dynamic behaviour and high deformation resistance: The medium flows around the eccentrically mounted ball plug.
- Even after long periods without operating, the valve works smoothly and is tight in both directions.
- At the end of the line, when the flow goes into the atmosphere (e.g. velocity of 20 - 25 m/s) the ball valve and the pipeline do not start to oscillate, having a positive effect on the lifetime of all mechanical parts.
- 100% tested according to DIN EN 12266, type tests according to DIN EN 1074.
- Made in Germany.



OPEN



HALF-OPEN

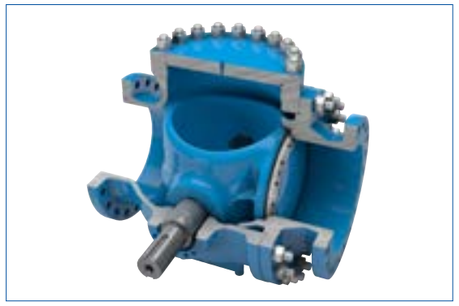
CLOSED

TECHNICAL DATA

- **Face-to-face dimension**
  DIN EN 588 series 26
- **Sizes**
  DN 80 - DN 1200
  PN 10 - PN 160
- **Flange drilling**
  PN10 to PN 160
  acc. to EN 1092-2 ANSI or individual flanges
- **Medium temperature**
  -10°C to 60°C
- **Coating**
  Epoxy 250 µm GSK or up to 500 µm
  EPC for abrasive or sea water

USES

- **Dams and hydropower:**
  With the full bore and literally no head loss, the ERHARD ball valve is the perfect match for hydropower plants which require zero energy loss in the pump and turbine area.
- **Penstocks:**
  - Safety valve for emergency shut-off for pipe burst protection.
  - Suitable for up to 20 m/s flow velocity.
- **Transmission pipelines:**
  - Safety valve for emergency shut-off for pipe burst protection.
  - Drainage valve for transmission lines under pressure.
- **Turbine:**
  - Turbine main inlet valve.
  - Turbine inlet valve by-pass.
  - Pelton turbine braking jet shut-off valve.
- **Pumping station:**
  - Discharge valve as a combined start-up and check valve.
  - Discharge valve with separate check valve.
- **Dam discharge:**
  - Safety valve for emergency shut-off in case of failure of the discharge valve or a burst pipe.

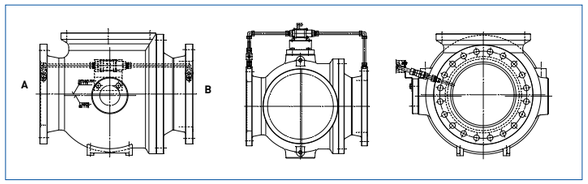


ADVANTAGES

- **Double eccentric design:**
  Seal ring releases immediately when the valve is opened
  Minimum wear due to double offset
  Plug is flushed and self-cleaned
- **Literally no headloss:**
  Energy-efficient use of pumps
  Insensitive to dirt, suitable for sewage
  Piggable
- **Maximum safety:**
  Force-locked connection of shaft and plug with friction-fit wedges, backlash free, even under high pressure or mechanical load
- **Easy maintenance:**
  Optional inspection cover for maintenance and dirt removal
  Simple exchange of seal ring in installed position

OPTIONAL BY-PASS

An upstream bypass connection can be provided on the body for easy filling and draining of the pipeline, balancing the pressure.
For space reasons, the downstream connection must always be attached to the pipe.



OPTIONAL INSPECTION COVER

ERHARD ball valves are optionally equipped with an inspection cover.
This opening can be used to quickly inspect, readjust or replace the ball seal ring after depressurising the pipeline. Additionally, dirt, deposits or obstacles can easily be removed in this way. This makes the ball valve highly suitable for sewage applications.

MBR_TALIS_211119_DAMS_AND_HYDROPOWER_EN

RKV NEEDLE VALVE

The RKV Needle valve is the ideal valve to use whenever pressure heads or flow rates need to be safely and reliably reduced and controlled. For this purpose, the cross-section of the internal valve body is constricted by an axial piston, thus changing both the pressure and the quantity of flow and velocity.

Safe energy transformation without cavitation damage is enabled thanks to the ring-shaped cross-section existing in every position. Depending on the application field, other control inserts, such as vaned rings, slotted cylinders or perforated cylinders are also available apart from the standard seat ring.

CHARACTERISTICS

- Optimised flow performance and flow guiding for practical zeta values, minimum pressure losses when fully opened.
- Control inserts for safe and reliable pressure reduction to prevent cavitation damage in every application: seat ring, vaned ring, slotted cylinder, perforated cylinder and other special inserts.
- Wide range of pressure ratings, nominal sizes and designs. Adapted solutions for numerous special applications.
- Perfect adaptation to all installation situations with a standardised connection for all type of actuators.
- Proven design, reliability, and experience: more than 100 years of experience with needle valves.
- 100% tested according to EN 12266 and EN 1074.
- Made in Germany

TECHNICAL DATA

- **Face-to-face dimension**
  DIN EN 588 to DN 300
- **Sizes**
  DN 100 - DN 2000
  PN 10 - PN 40
  Higher pressure ratings available on request
- **Flange drilling**
  PN10 to PN 40
  acc. to EN 1092-2
- **Medium temperature**
  0°C to 60°C
- **Coating**
  Epoxy 250 µm

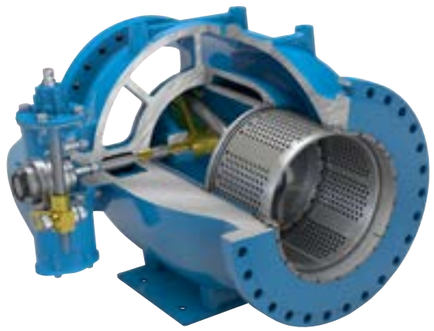
ADVANTAGES

- **Efficiency:**
  Optimised flow performance and flow guiding with the best hydraulic performance when fully open for optimum energy efficiency and savings.
- **Precise flowcontrol:**
  With a control range up to 96%, the RKV guarantees optimal flow control thanks to the mechanism of the SKG slider crank. In addition to optimisation of the regulation range, the SKG slider crank allows for a slow speed closing speed to prevent water hammer risk.
- **Prevention of cavitation damage:**
  Thanks to a large control insert range. In addition to the 70+ years experience and proven site operation, ERHARD continuously conducts hydraulic tests and numerical fluid simulations to further optimise cavitation control.
- **Durability:**
  Long operational life guaranteed thanks to at least 4 guiding main gaskets in cavitation-free area.

USES

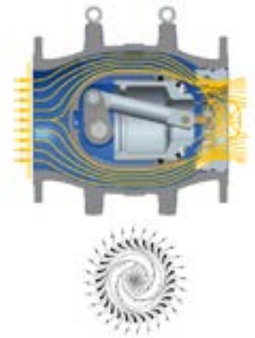
For small, medium, and large installations, ERHARD is a key partner for hydropower plants. Thanks to the different options, it allows for a large range of uses and adapts to the application conditions.

- **Turbine:**
  - Turbine inlet valve by-pass regulating flow and avoiding cavitation.
  - Quick opening turbine by-pass, as safety valve with weight-loaded actuator.
- **Pumping station (for pumps with constant flow rate):**
  - Discharge valve as a combined start-up and check valve.
  - Discharge valve with separate check valve.
  - Pump recirculation by-pass valve.
- **Dam discharge:**
  - Free discharge valve at bottom dam outlet.as a combined start-up and check valve.

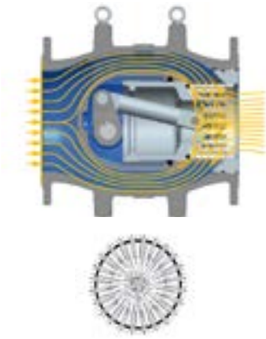


DEPENDING ON THE NOMINAL SIZE AND DESIGN, ERHARD RKV NEEDLE VALVES ARE AVAILABLE AS SINGLE OR MULTI-PART TYPES

CYLINDER SPECIALLY DESIGNED TO CENTRALISE THE CAVITATION IN THE MIDDLE OF THE PIPELINE



Vaned ring

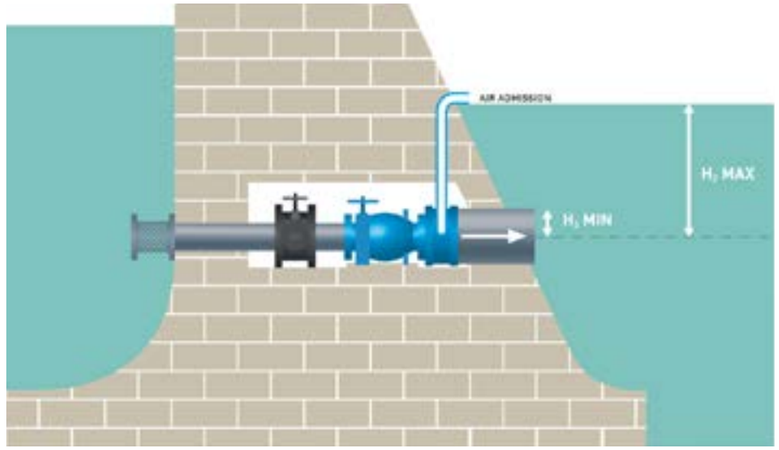


Slotted and perforated cylinder

GOOD TO KNOW

There are different ways to manage cavitation risks, for example with the choice of the cylinder or with an air admission device.
The proper solution must consider the application conditions. Our technical team supports you in selection of the appropriate solution.

AIR ADMISSION OPTION



ROCO WAVE

Proven design, reliability and experience:
Minimised pressure losses and high energy-efficiency are two key properties for which this valve was developed. The patented polygon connection of shaft and disc provides uninterrupted corrosion protection and optimal torque transmission at the same time.

In addition to the standard shut-off task, ROCO WAVE is suitable for use as safety equipment in emergency shut-off situations and delivers absolute reliability in case of a penstock rupture.

CHARACTERISTICS

- Highly energy efficient, with superior zeta and Kv values
- Patented seat geometry and increased seat diameter for best hydraulic performance
- Polygon shaft with patented plug connection provides uninterrupted corrosion protection, completely free of play
- Closed disc eyes
- Patented seat geometry minimises head losses
- SKG gearbox with unique slider crank mechanism protects against water hammer with gradually slowed closing
- Proven design, reliability and experience: more than 70 years of experience with butterfly valves
- 100% tested according to DIN EN 12266, type tests according to DIN EN 1074
- Made in Germany

TECHNICAL DATA

- **Design standard**
  DIN EN 593
- **Face-to-face dimension**
  EN558 series 14
- **Sizes**
  DN 80 - 3000 PN 10 - 16
  DN 80 - 2000 PN 25
  DN 150 - 2000 PN 40
- **Medium temperature**
  -10°C to 60°C, higher temperatures on request
- **Flange drilling**
  EN 1092-2 (PN 10 - 40), ANSI or customised
- **Coating**
  Epoxy 250 µm GSK Enamel
  EPC for abrasive or sea water
  Hard rubber for chemical, thermal or mechanical exposure
  Other on request

ADVANTAGES

- **Efficiency:**
  Flow-optimised disc and seat design combine stability with the best hydraulic performance for optimum energy efficiency and savings.
- **Power:**
  The high-precision polygonal plug connection of shaft and disc is absolutely free of play and reliably transmits the drive torque without losses.
- **Safety:**
  ROCO Wave reliably seals even under the highest dynamic loads. The SKG gearbox minimises the risk of water hammer, due to its two-step closing action.
- **Durability:**
  Long-lasting, high-quality components make ROCO Wave the premium product of your choice.

USES

- **Dams and hydropower:**

Butterfly valves are optimally suited to critical situations and stand out due to their performance, ease of operation and low-pressure loss, and offer absolute safety in all operating conditions.

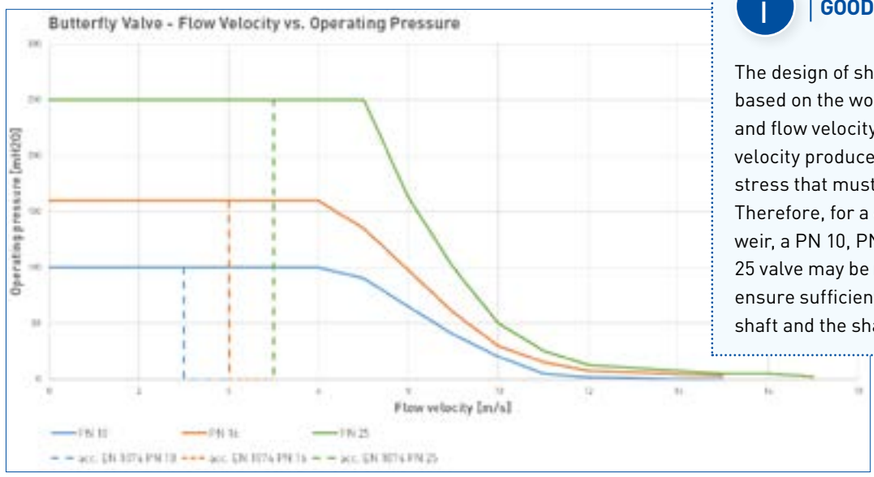
- **Intake towers:**
  - Intake valve resists raw water abrasion.
  - Suitable for up to 20 m/s flow velocity.
- **Penstock and transmission pipelines:**
  - Flexible actuation options, if electricity is not acceptable.
- **Turbine:**
  - Turbine main inlet valve.
- **Pumping station:**
  - Discharge valve as a combined start-up and check valve.
  - Discharge valve with separate check valve
- **Dam discharge:**
  - Safety valve for emergency shut-off in case of failure of the discharge valve or a burst pipe.

OPTIONAL THREE-POINT LOCKING

Prevents accidental opening of the butterfly valve in case of revisions of the pipeline system. Inspection of the pipeline can take place safely, even in the event of an operating error on the drive.

The locking device consists of two fixed and one movable end stop. The locking withstands the maximum actuating torque of the actuator at any time. Even if the drive shafts fail, the valve remains safely closed and thus provides the highest degree of safety. Further blocking versions are available on request.

THE PIN POSITIONS CAN OPTIONALLY BE EQUIPPED WITHLIMIT SWITCHES.



GOOD TO KNOW

The design of shaft and disc is based on the working pressure and flow velocity. The flow velocity produces a dynamic stress that must be endured. Therefore, for a 60 m (6 bar) weir, a PN 10, PN 16 or PN 25 valve may be required to ensure sufficient stability of the shaft and the shaft sealing.

CONE OUTLET VALVE

The cone outlet valves (also known as Howell Bunger valves) are the ideal product for use under extreme conditions.
They can discharge a continuous flow rate or regulate the flow in order to maintain given water levels securely, discharge large water volumes under high pressure and operate free of cavitation or vibration.
This demands an efficient conversion of energy.
This valve is also sturdy enough to withstand foreign bodies such as rocks, wood etc. in the high velocity water jet, as it is common for bottom outlets. The design of this valve is therefore simple yet rugged.

CHARACTERISTICS

- Sizing is based on the specific flow rate and adapted regulating range, with actually required DN.
- Ribs at the face of the inlet side machined in a streamlined manner. No turbulant or breakaway flow, no cavitation or vibration.
- Guide rails at the body made of stainless steel or bronze. Low wear, good running properties.
- Stiffening ring at the obturating cylinder. Rugged design (dimensionally stable).
- Piston sealing with enclosed design. No damages to sealing rings, independently of torques.
- Long guide of the obturating cylinder. No drawer effect.
- Short face-to-face dimension. Stable shape insensitive to vibrations.

TECHNICAL DATA

- **Sizes**
  DN 300 to 2000 PN 10 -25
  Higher pressures
  available on request
- **Flange drilling**
  PN 10 to PN 25 acc. to
  EN 1092-2
  ANSI available on request
- **Medium temperature**
  -10 °C to 60 °C
- **Coating**
  Epoxy 250 µm GSK or up to 500 µm
  EPC for abrasive or sea water

USES

- **Dams and hydropower:**
  Cone outlet valves for hydropower plants, irrigation dams, compensating reservoirs or detention reservoirs are used for environment friendly discharge of water downstream or into a tailwater pool.

  The water is simultaneously enriched with oxygen in this process. This is an end-of-line valve, discharging to atmosphere and not used for regulating with both upstream and downstream piping.
- **Dam discharge:**
  - Bottom or medium outlet.
  - The discharge valve facilitates cavitation- and vibration- free energy dissipation at the end of the line, handling huge volumes of water.

ADVANTAGES

- **Efficiency:**
  Optimised flow behaviour and sophisticated flow control for lowest pressure losses at full opening.
- **Precision:**
  Control range up to 96% and push-crank gear with precisely matched characteristic curve. Push crank gears allow slow closing, which reduces the risk of pressure surges.
- **Prevention of cavitation damage:**
  The high quality structure facilitates cavitation- and vibration- free energy dissipation, which is important for end-of-line valves.
- **Customisation:**
  All our cone outlet valves are customized to the specific plant conditions, sometimes especially designed to meet customer demands.

OPERATION

The obturating cylinder actuated by external drive elements is moved across the body (consisting of connecting flange, body pipe, ribs, and jet guiding cone). By means of a resilient rubber seal, the cylinder is sealed against the jet guiding cone and the body pipe. In the open position of the valve, the inrushing water jet impinges on the cone and is sprayed, forming a very broad, umbrella-like hollow jet. This brings about intensive contact with the external air, causing high friction and turbulence and thus considerable energy conversion.

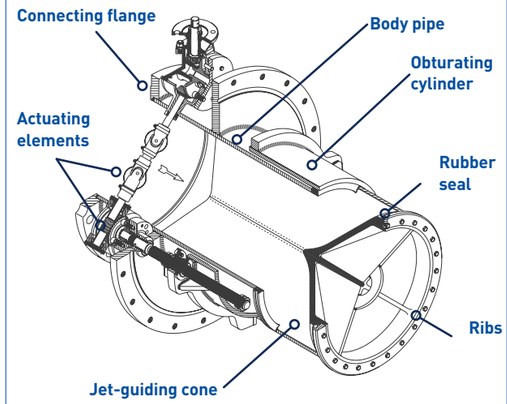
The flow is regulated by moving the obturating cylinder, changing the discharge cross section.

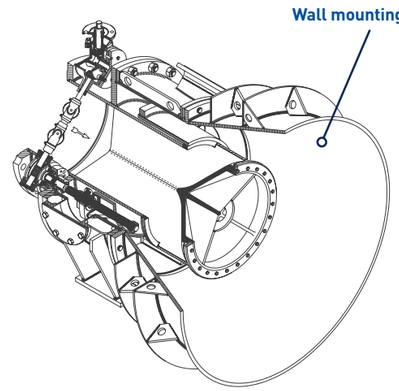
Two different types of ERHARD Fixed Cone Discharge Valves are available, i.e. valve types for:

- Chamber installation
- End of line service

It is preferable to discharge to the atmosphere, but there are installations where it cannot be avoided or where it is desirable to discharge underwater to dampen the effect of the outflow stream.

In order to protect the valve from cavitation when discharging in submerged conditions, an aeration system is installed.





Chamber installation with gearbox for electric actuator

WELDED AIR VALVES

Vacuum breakers are safety valves designed to open fully and allow air to enter the pipeline to prevent collapse during critical vacuum conditions.

They can be caused by rapid draining of the piping system, as it can occur when pipes burst.

This valve in welded design is customised according to operating conditions.

CHARACTERISTICS

- High ventilation performances for a safe pipe operation during emptying and draining process or in case of emergency.
- Non-slam device on the valve disc for a soft operation thanks to an air buffer and pressure compensator system.
- Anti-corrosion stainless steel parts for a long-lasting product.
- Large cross section for a maximum air inlet to protect the installation.
- Wide proposal of solutions to adapt to the on-site operating conditions.
- Tested as per EN 12266 and EN 1074
- Equipped with one up to three TWINAIR air valves for optional air outlet function.
- Optional resilient seated gate valve as inspection valve for the TWIN-AIR.
- Made in Germany.

TECHNICAL DATA

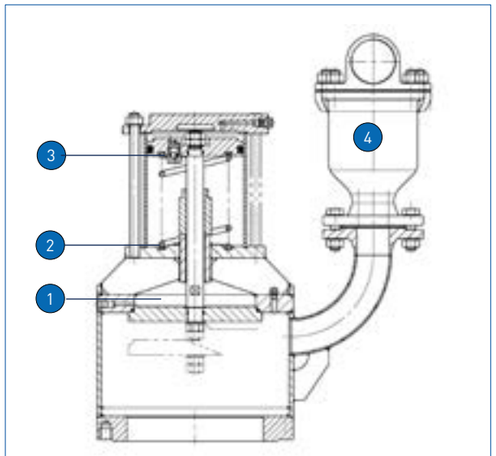
- **Sizes:**
  DN 200 to 900 PN 10 - 40
  DN 50 to 150 PN 10 - 63
- **Temperature:**
  0 °C to 60 °C
- **Connection type:**
  Welded outlet
- **Coating:**
  Epoxy 250 µm
- **Air flow velocity:**
  Recommended
  80 - 100 m/s

USES

- The vacuum breaker is mounted at critical high pipeline points, and allows for rapid air intake to avoid vacuum conditions a in piping systems.
- **Transmission pipelines:**
  - Vacuum breaker downstream of emergency shutt-off valve.
- **Penstock and transmission pipelines:**
  - Vacuum breaker downstream of pipe burst protection.
- **Dam discharge:**
  - Vacuum breaker and air control at the dam discharge.

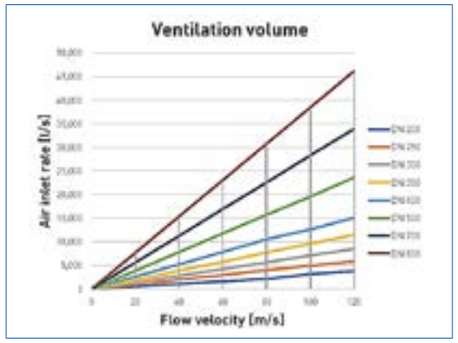
OPERATION

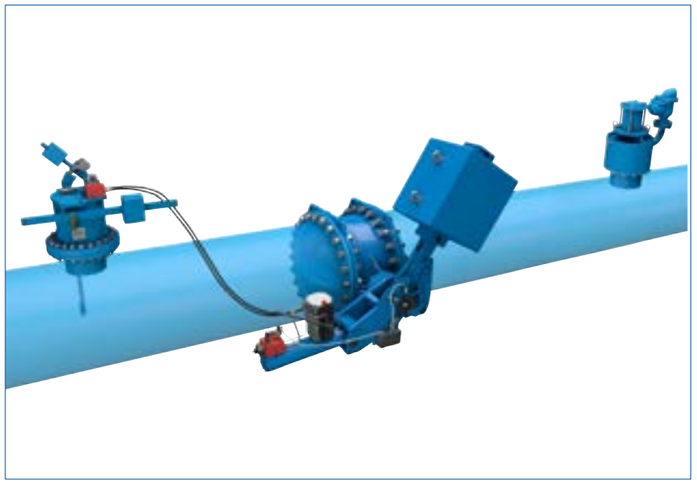
The closing element is the valve disc (1). This is held in the closed position by a pre-loaded spring (2).
When the opening force generated by the vacuum in the pipeline becomes greater than the closing force by the spring, the valve disc opens to let air in.
As a standard, the valve opens at a negative pressure of 0,1 bar and is fully open at 0,2 bar.
The spring-loaded piston is equipped with a damping device (3) to prevent it from operating too quickly.
For an additional air outlet function, 1-3 TWIN-AIR air valves (4) can be equipped.



ADVANTAGES

- **Tailor-made solution:**
  Opening pressure, connection size and specific materials can be chosen according to on site conditions. Optional air outlet function can be included.
- **High performance:**
  Optimised for large pipelines allowing air inlet of up to 40.000 l/s.
- **Safety damping device:**
  The valve is equipped with a damping device avoiding abrupt slamming of the valve disc.tion.





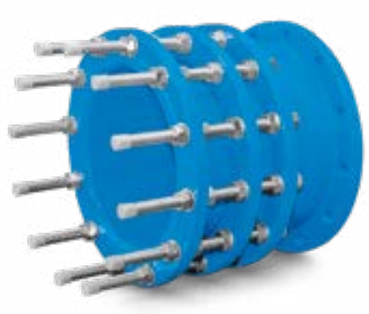
GOOD TO KNOW

For pipe burst applications (see page 12), we recommend the combination of a paddle trip mechanism to detect overspeed, a butterfly valve with weight-loaded actuator and a vacuum breaker with additional air outlet.

MBR_TALIS_211119_DAMS_AND_HYDROPOWER_EN

PAS DISMANTLING JOINTS

Dismantling joints play an important role in the design and layout of pipelines and valves. They are an essential aid for the installation and removal of pipe sections and valves. Without a dismantling joint offering longitudinal adjustment, it is almost impossible to insert a valve exactly into a pipe section. The adjustability offerred by the dismantling joint, enables greater versatility during installation and removal, thus contributing to increased efficiency and reducing site operations and downtime. PAS Dismantling Joints are highly customisable to meet your specific project needs.



CHARACTERISTICS

- Manufactured and designed in accordance with AWWA-C219 guaranteeing an absolutely leakproof product.
- Welding in accordance with AD2000 guidelines.
- Made from WRAS, ACS & KTW W270 / UBA approved materials.
- Standard +/- 25mm longitudinal adjustment to compensate for unexpected variations in lengths of pipeline components.
- Many options, including different face-to-face lengths, greater adjustability, greater DN / PN, special steelgrades & coatings available on request.
- Versatile design for use in many applications.
- PAS10, PAS20 & PAS30 dismantling joints are used in many applications and prestigous projects wordwide.
- Designed and made in Europe.

TECHNICAL DATA

- **Standard Sizes**
  DN 50 - DN 1600 +
- **Standard Flange Drilling**
  PN10 to PN 40
  acc. to EN 1092-2
- **Standard Body material**
  EN GJS 500-7 and/or
  S235 EN 10025 and/or
  S275 EN 10025
- **Standard Coating**
  Epoxy 250 µm GSK
- **Standard Tie Bars**
  Mild steel Zinc-Electroplated or Hot Dip Galvanized or Stainless Steel AISI 316-A4
- **Standard Gasket:**
  EPDM [EN 681] or NBR

ADVANTAGES

- **Longitudinal adjustment:**
  As standard +/- 25mm adjustment to facilitate easy installation and removal of flanged equipment.
- **Economical:**
  Offers great efficiency, from the planning stage, to the installation stage and during maintenance works.
- **Maximum safety:**
  The continous tie-bars ensure a fully restrained secure connection and a leak-free operation.
- **High quality materials:**
  Selected for strength and adaptability.
- **Highly customisable:**
  To meet your specific project requirements.
- **Proven design:**
  Used in many prestigious and challenging projects worldwide.

PAS 10

- Independent system for optimal gasket control
- Designed for fast & efficient installation
- Highly economical

PAS 20

- Classic & sturdy design
- Design can be used for extra large DN & PN
- For various applications

PAS 30

- Extra large face-to-face length
- Tie-bars can slide completely between end flanges
- Ideal for small spaces or fixed positions

LARGER, LARGER, LARGEST...UNIJOINT DISMANTLING JOINTS CAN BE TAILORED TO SPECIFIC CUSTOMER NEEDS. AMONG THE ENDLESS POSSIBILITES ARE SUPER LARGE DIAMETERS UP TO DN 4000 AND BEYOND!

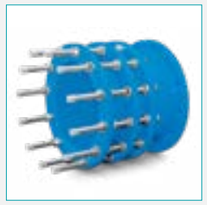
OUR DISMANTLING JOINTS CAN BE DESIGNED TO MEET WORKING PRESSURES OF 100 BAR AND BEYOND. AS A COST-EFFECTIVE ALTERNATIVE TO DUPLEX STAINLESS STEEL FOR SALT / BRACKISH WATER INTAKE LINES, UNIJOINT DISMANTLING JOINTS CAN BE DELIVERED WITH INTERNAL RUBBER LINING ON REQUEST.

AUXILIARY CIRCUITS

Besides the special dam and turbine valves, there are many less exotic valve types found in the inner workings of any hydroelectric power plant. The turbine feed lines often have parallel connections to other turbines in case a turbine must be fed from another source. There are also utility lines that allow water to be diverted to different inputs or outlets as the need arises.

Additionally, like any large plant, there are many other water utility lines, e.g. for cooling or fire protection. TALIS holds a large portfolio of valves and accessories for these auxiliary circuits.operating conditions.

CONNECTION & REPAIR



DISMANTLING JOINTS

TECHNICAL DETAILS
DN 50 - 1600
PN 10 - 100

UNIVERSAL COUPLINGS & FLANGE ADAPTORS

TECHNICAL DETAILS
DN 50 - 300
PN 10 / 16

LARGE DIAMETER COUPLINGS & FLANGE ADAPTORS

TECHNICAL DETAILS
DN 50 - 1600
PN 10 - 100

PIPE FITTINGS

TECHNICAL DETAILS
DN 50 -1200
PN 10 - 40

CONTROL VALVES

NEEDLE VALVES

TECHNICAL DETAILS
DN 100 - 2000
PN 10 - 160

AUTOMATIC CONTROL VALVES

TECHNICAL DETAILS
DN 50 - 1000
PN: 10 - 25

FLOW CONTROL VALVE

TECHNICAL DETAILS
DN 50 - 150
PN 10 - 40

SMART SOLUTIONS

SMART SOLUTONS

Smart cellular Data Loggers, Hydrometers and other solutions

ISOLATION VALVES

RESILIENT SEATED GATE VALVES

TECHNICAL DETAILS
DN 20 - 1200
PN 10 - 16

BALL VALVES

TECHNICAL DETAILS
DN 80 - 1200
PN 10 - 160

COMBI-CROSS GATE VALVES

TECHNICAL DETAILS
DN 50 - 300
PN 10 -16

CENTRIC BUTTERFLY VALVES

TECHNICAL DETAILS
DN 32 - 1800
PN 10 -16

DOUBLE ECCENTRIC BUTTERFLY VALVES

TECHNICAL DETAILS
DN 80 - 3600
PN 10 - 40

PENSTOCKS

TECHNICAL DETAILS
DN 150 - 3000

NETWORK PROTECTION

FOOT VALVES

TECHNICAL DETAILS
DN 50 - 200
PN 16

AIR VALVES

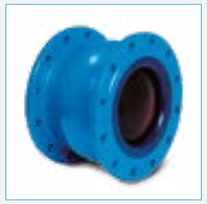
TECHNICAL DETAILS
DN 50 - 200
PN 16 - 40

HIGH PRESSURE DUAL PLATE CHECK VALVES

TECHNICAL DETAILS
DN 40 - 1200
ANSI 600 / PN 100

STRAINER BOXES

TECHNICAL DETAILS
DN 50 - 900
PN 10 - 25



NOZZLE CHECK VALVES

TECHNICAL DETAILS
DN 80 - 600
PN 10 - 40

TILTING DISC CHECK VALVES

TECHNICAL DETAILS
DN 150 - 1400
PN 10 - 40

ACTUATORS

RELIABLE ACTUATION

The choice of actuating device is decisive for the proper functioning of the valve. A top-quality valve is of no use if it cannot be operated properly to perform its function. In this chapter, there is a description of the most commonly supplied actuation types most commonly supplied in the dams & hydropower applications from TALIS.

1. Gearboxes for manual & electric actuation
2. Electric actuators
3. Hydraulic actuators
4. Weight-loaded actuators

1. GEARBOXES FOR MANUAL & ELECTRIC ACTUATION

The easiest way to operate the valves is manually, which is also interesting if no auxiliary power is available. For manual operation, the valves are fitted with a gearbox acting on the shaft, which is operated by a handwheel. For butterfly, ball and needle valves, the required movement on the shaft is 90° (1/4 turn). The gearbox converts a certain number of input turns at the handwheel with a low torque into a 90° movement with the output torque required to actuate the valve.

1/4 TURN SLIDER CRANK GEARBOX

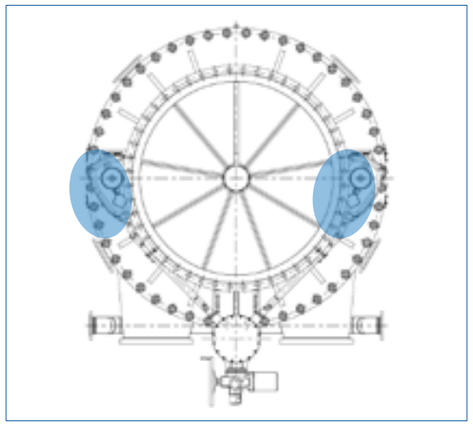
The SKG slider crank gearbox is designed and manufactured at ERHARD in Heidenheim. It is adapted to the torque curve of the valve and has consistently low torques. Its 2-step closing behaviour protects against water hammer damages.

1/4 TURN WORM GEARBOX

The worm gearbox is the most common type on the market and is available from several suppliers. TALIS works with renowned suppliers and complies with technical requirements as well as the customers' preferences.

CENTRAL PLANETARY GEAR

For the cone outlet valve, actuation is not performed by a ¼ turn gearbox. Instead, it consists of a central planetary gear (designed and manufactured at ERHARD) which transmits the rotary motion to two bevel gears which rotate the lateral threaded rods. The rods, in their rotary motion, pull the sealing cylinder. The operating handwheel is installed on this planetary gear.



2. ELECTRIC ACTUATORS

When regular operation of the valve is required, manual operation is not an option. Electric actuators are very commonly used in all applications, since electric power is relatively inexpensive, easy to manage, and normally available for most industrial sites. All necessary control functions are integral to electric actuators, reducing capital costs.

The electric actuators are installed on the gearboxes mentioned above, replacing the handwheel and exertion by the operator.

The actuators shall therefore be multi-turn and have a turn control system with limit switches to stop the motor once the valve reaches its fully open or fully closed position. It is convenient and common for electric actuators to also have torque switches, which stop the motor in case the valve is blocked by an object, as well as a thermostat.

ELECTRIC MULTI-TURN ACTUATOR

ELECTRIC MULTI-TURN ACTUATOR WITH CONTROL UNIT

The number of options is enormous and actuators can be equipped with electronic position indicators, local control units, heaters, communication protocols with remote control systems, etc.

Electric actuators have an emergency handwheel to operate the valve in the event of a power failure.

They are also available with different degrees of environmental protection (I67, IP68, ATEX, submerged conditions) as well as for different voltages and in alternating or direct current.

EXAMPLES OF TALIS VALVES WITH ELECTRIC ACTUATORS

MBR_TALIS_211119_DAMS_AND_HYDROPOWER_EN

ACTUATORS

3. HYDRAULIC ACTUATORS

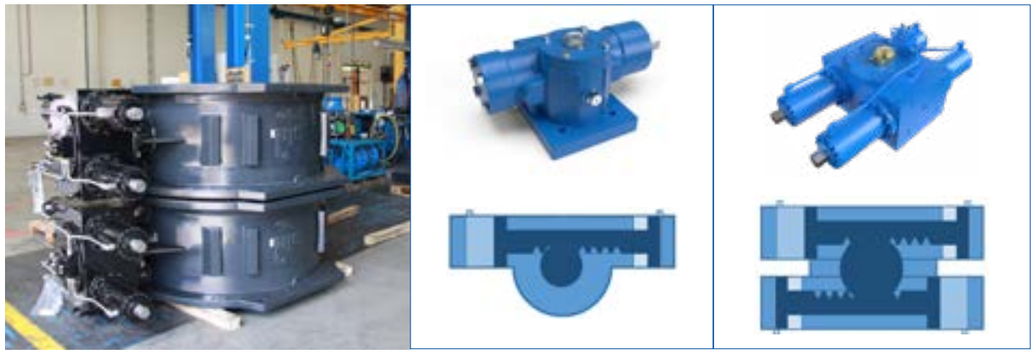
There can be several reasons for preferring a hydraulic over an electric actuator:

- Electricity is not accepted or not available in the specific installation location.
- Fail-safe option for safety valves.
- Closing or opening speed must be very high.
- Required torque is very high.

With its proven design, this type of actuator is reliable and can be used for long periods. In general, the hydraulic actuator consists of a housing and a piston which is driven by hydraulic pressure. Depending on the type of actuator, linear or rotary displacement is common.

DOUBLE-ACTING HYDRAULIC CYLINDER

In a double-acting cylinder, the working fluid acts alternately on both sides of the piston. For torques up to approx. 50.000 Nm, one piston can be used. For torques up to approx. 130.000 Nm, a double-acting hydraulic actuator is required.



Double-acting hydraulic cylinder with 1 piston [up to 50.00 Nm]

Double-acting hydraulic cylinder with 2 pistons [up to 130.00 Nm]

SINGLE-ACTING HYDRAULIC CYLINDER

Single-acting cylinders work where either a push or a pull force is required, so the hydraulic fluid only acts on one side of the piston rod. Another force operates the cylinder in the other direction. This can be a spring for torques up to approx. 50.000 Nm..

ENERGY ACCUMULATORS FOR QUICK ACTION & FAIL-SAFE OPERATION

Alternatively to the spring design, for the purpose of a fail-safe feature, a double-acting actuator can be equipped with an energy accumulator, such as a bladder or a weight.

A fail-safe feature is required for safety valves providing the required position upon loss of power or a trip condition.

Accumulator fail-safe equipment is usually:

- A raised weight, which is explained in detail on the next page.
- Springs, as mentioned for the single-acting hydraulic actuator.
- Bladders: The bladder accumulator consists of an oil section and a gas section. The oil around the bladder compresses the gas, when the pressure increases. When the pressure drops, the gas expands and forces the stored oil into the circuit.

COMPACT ELECTRO-HYDRAULIC ACTUATORS

In conventional hydraulic systems, the power unit with its main items tank, pump and motor is positioned separately and connected to the actuator by piping or hoses.

It can be convenient to have a compact system, including the hydraulic power unit.

Electro-hydraulic actuators are a combination of a hydraulic actuator and a power unit.

In electro-hydraulic actuators, both systems (power unit and actuator) are directly connected to each other, combining the benefits of a smart control, like a motorised actuator, and the high torque and operation speed of hydraulic actuators.

Only an electrical power supply and control signals are needed to operate this system. The interface to the above control system can be configured in a wide range, from discrete signals to any kind of bus systems.

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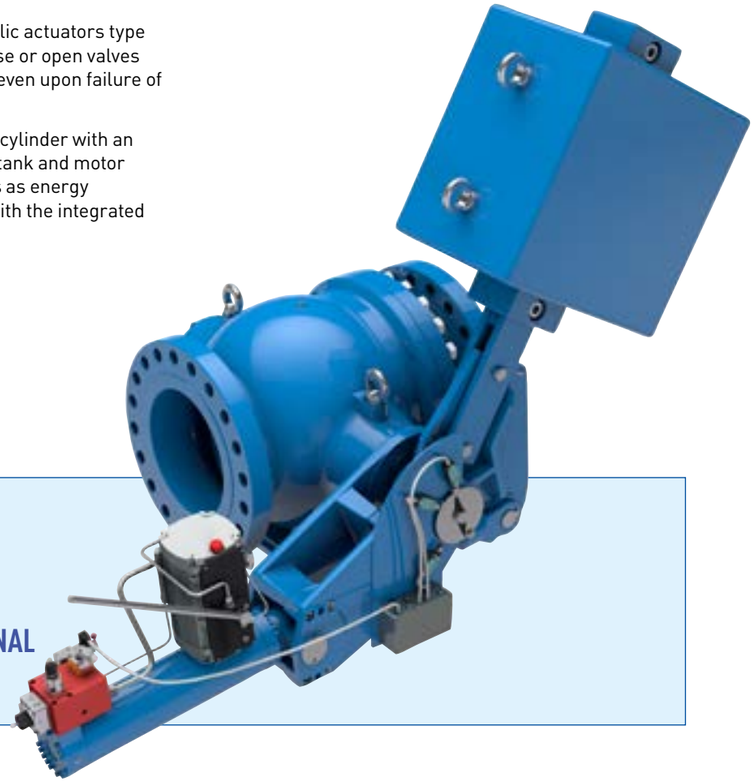
ACTUATORS

4. WEIGHT-LOADED HYDRAULIC ACTUATORS KFA

ERHARD weight-loaded compact hydraulic actuators type KFa are used for ¼ turn valves. They close or open valves reliably at crucial points in the network, even upon failure of the external operating energy.

The KFa actuators consist of a hydraulic cylinder with an integrated hydraulic circuit including oil tank and motor pump. A counterweight on a lever serves as energy accumulator. The weight is lifted again with the integrated hydraulic pump.



- SYSTEM SAFETY
- COMPACT DESIGN
- INDEPENDENT OF EXTERNAL ENERGY SOURCES

CHARACTERISTICS

- Provides the energy required for operation when it falls.
- Control by means of solenoid valve.
- Two phase closing action.
- Flow control valves regulating sinking phases and speed operate independently of the pressure in the main pipelines.
- Torque range 250 - 300.000 Nm (9 actuator sizes).
- 1/4 turn valve types:
  - Double eccentric butterfly valves
  - Ball valves
  - Needle valves
- Coating epoxy 250 µm GSK.

USES

KFA actuators are used in safety valves applications:

- **Turbine safety valves:**
  - Main inlet valve, ball valve recommended
  - Inlet valve by-pass, ball valve recommended
  - Turbine by-pass, quick opening function, needle valve recommended
- **Penstock & transmission pipelines:**
  - Safety valve for emergency shut-off for pipe burst protection, butterfly valves recommended.
- **Pumping station:**
  - Discharge valve as a combined start-up and check valve, ball valve recommended
- **Dam discharge:**
  - Safety valve for emergency shut-off in case of failure of the discharge valve or a burst pipeline, ball valve recommended.

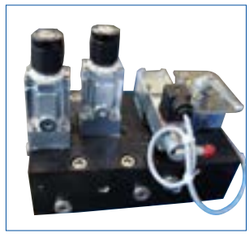
ADVANTAGES

Compact design:

- Hydraulic power unit with integrated oil tank & electric pump built into the actuator.
- Hydraulic forces are absorbed & supported within the valve, no transmission onto the structure.
- Control unit is directly mounted on the cylinder block design with little tubing.

Adjustable closing phases:

- Each of the 2 closing phases (0-70% & 70-100%) can be adjusted separately.
- High-quality flow control valves operating independently of the pressure in the pipeline.
- Precise adaptation to the operating conditions.



Limit switches:

- 3 limit switches: OPEN, CLOSED, 90% OPEN.
- Unintentional sinking of the weight is registered by the additional limit switch (90% open) Automatically switches on the motor pump and resets the system to the OPEN position.
  This way, an internal leakage can be compensated.

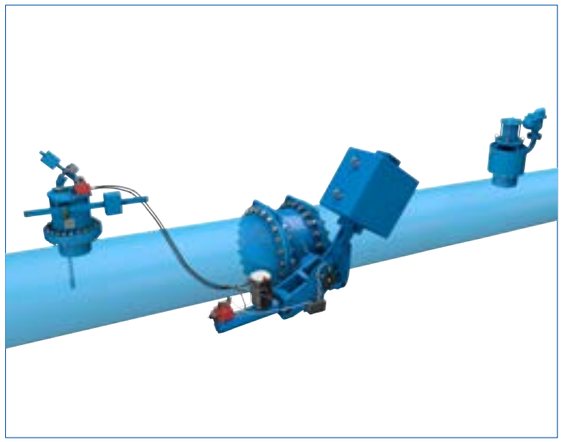
GOOD TO KNOW

Fail-safe elements:

- Leakage monitoring by third limit switch
- Manual pump in case of power failure
- Pressure relief valve in the HPU
- Oil level indicator
- Manual switch for triggering the actuator
- 3-way ball valve for manual operation
- Locking keys on flow control valves
- Temperature monitoring
- Optional blocking device to prevent accidental movement of the actuator

PIPE BURST PROTECTION WITH PADDLE TRIP MECHANISM

A burst pipe is detected by an excessive flow rate. The signal of the excessive flow rate is then used to trigger the drop of the weight, closing the valve and stopping the flow in emergency mode.



TALIS can integrate any type of flowmeter, pressure sensor or level indicator into the control unit. The signal - mechanical, hydraulic or electrical - is used to trigger the weight drop.

When it comes to uncompromising safety and reliability in case of a burst pipe, the ERHARD paddle trip mechanism is a reliable detection and trigger method.

It consists of a paddle with a lever, which sticks out into the water. When the flow velocity within the pipeline reaches the tripping point, the paddle is pushed in the flow direction and triggers the hydraulic circuit within the cylinder of the weight loaded actuator and causes the weight to drop.

These safety valves must be equipped downstream with an adequate air valve to enter once the valve closes, thus preventing the pipe from collapsing.

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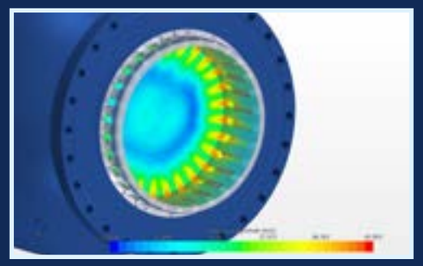
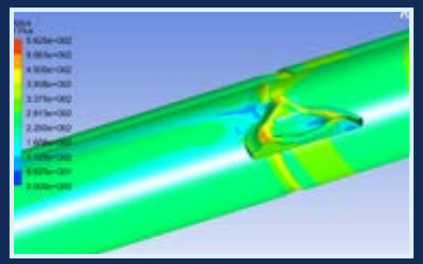
WHY TALIS?

ENGINEERING
TESTING
PROJECT MANAGEMENT





ENGINEERING

Our valves are developed, designed, manufactured and tested in our factories. During the product development process, we consider fluid mechanics and structural mechanics as well as the connection of these two, in particular the consideration of the resulting torque.

The aim of the fluid mechanics considerations is to determine the flow-relevant parameters; the flow resistance (KV value) is the main result. The calculations are made for several operating conditions, from which the corresponding KV curves and pressure loss curves can be derived. In addition to the KV values, we base the design and shape of core valve elements (e.g. disc of butterfly valves, cylinder of needle or cone outlet valves) on iterations of flow and structural mechanical calculations. This way, we optimise the flow and turbulence, minimising risk of cavitation and vibrations.

All TALIS valve designs are also verified for structural mechanics by stress and strain calculations. The basis for these calculations is the numerical stress calculation (FEA), which is compared with structural and mechanical guidelines and norms such as FKM, various DIN or ISO standards and AD 2000.

TESTING CAPACITIES

We have been carrying out tests on fluid mechanics in our own research and test laboratory for decades. This way, we validate our simulations and calculations for new developments as well as customised products, which ensures the safety and reliability of our products.

Test scope in our facilities:

FLUIDIC RESEARCH:

- Determination of head loss coefficients, control characteristics and defined performance data of valves up DN 1200.
- Investigation of the cavitation behaviour of valves.
- Scaled models to predict flow behaviour of the full-size product.

MECHANICAL RESEARCH:

- Cycle tests for wear behaviour of mechanically- and hydraulically-loaded components.
- Gearbox efficiency with load torques of up to 65000 Nm.
- Burst tests with pressures of up to 500 bar, the strength of safety-relevant valves can be verified.
- Force and torque measurements.

Differential pressure, flow rate, stroke, opening degree, torque and force are recorded with electronic transducers, digitally processed and evaluated.

70+ YEARS
HYDROPOWER
EXPERIENCE

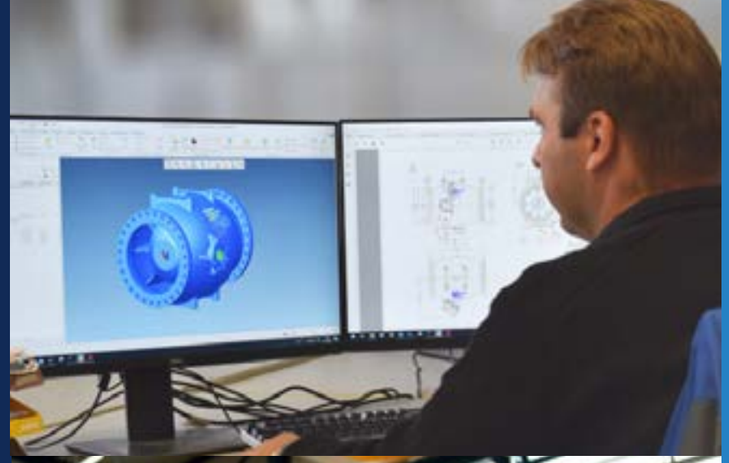
PROJECT MANAGEMENT

Our full-time, experienced project management team at TALIS provides project support from start to end, tracking engineering, supply chain, delivery time and quality factors, all with close contact to

our customers. We are experienced in factory and site acceptance tests, which are also coordinated by the project manager.

Experts in
SAFETY VALVES

Member of
iha
international hydropower association



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WHY TALIS?

SERVICE
REPAIR
GENERAL OVERHAUL

SERVICE

OUR SCOPE OF SERVICES

Our service team offers on-site services such as installation, commissioning, maintenance, minor repairs and operators.

Major repairs and overhauls are done at our factory. We take care of the disassembly and transport of the valves to our facilities. After finishing the overhaul process, our service technicians mount the valves on -site and put them into operation.

REPAIR AND GENERAL OVERHAUL AT THE FACTORY

At our factory in Heidenheim, we carry out around 290 repairs a year and guarantee the use of the original design documents, material pairings and spare parts.

Our modern machinery is available to you for valve repairs. Take advantage of the following services:

- Blasting, coating and mechanical finishing of the components.
- Exchange of original spare and wear parts.
- Repair of electric actuators and gearboxes.
- Hydrostatic, mechanical and electrical function and quality tests.
- Creation of welded structures.
- Crack testing.

PN
≥160 BAR

290 repairs
YEARLY

WORLDWIDE
EXPERIENCE

BEFORE

Our valves can be refurbished several times.
Hence, the normal life expectancy of decades is multiplied.

AFTER

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REFERENCES

DAMS AND HYDROPOWER

We have been part of projects for dams and hydropower all over the world.

Let us show you some of our reference installations.

MIDDLE EAST

Khoda Afarin Dam (2018)

The purpose of the Khoda Afarin dam is hydroelectric power generation and irrigation.
The cone outlet valve for its bottom outlet was developed and designed for this specific application and is highly customised.

KEY FACTS:

Capacity: 102 MW

Designed to irrigate 75.000 hectares.

PRODUCT LIST

- 2x Cone Outlet Valves DN 2000 PN 10, for submerged conditions.
- Safety valve in turbine by-pass.
- These valves were developed and designed specifically for this application.

GERMANY

Biggetal Dam (2001)

The Biggetal lake serves primarily to store water for the Ruhr area and for flood control.
The first Erhard valves were installed 2001.
In 2021, the valves were completely refurbished.
They are coated inside with EPC (epoxy polymer ceramic) which is highly resistant against abrasive raw water as it is found in the Ruhr river.

KEY FACTS:

Capacity: 17,6 MW, 3x Francis turbines

PRODUCT LIST

- Needle Valves DN 2200 / 1800 with air admission unit at dam discharge.
- Double Eccentric Butterfly Valves DN 1800.
- Both valve types refurbished in 2021.

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AUSTRALIA

Warragamba Dam (2004-2020)

Located 65 kilometres west of Sydney, Warragamba Dam is one of the largest domestic water supply dams in the world.

27 km of twin parallel pipelines deliver water from Warragamba Dam for treatment, supplying up to 80% of Sydney's water. Water NSW undertook a project to upgrade critical valves along this supply main to ensure the safety and security of this asset.

KEY FACTS:

Supplies water to more than 5 million people

Lake area: 75 km²

Total operating capacity: 2027 million m³

PRODUCT LIST

- Double eccentric butterfly valves DN 900-2100 PN 16 with electric actuators as isolation valve for maintenance
- Double eccentric butterfly valves DN 2100-2400 PN 10 and PN 16 with weight-loaded actuator for burst pipe protection

TURKEY

Otluca II (2020)
Hydropower Plant

Otluca-1 & 2 HEPP is a hydroelectric power plant located on Dragon Creek in the province of Mersin in Turkey. Commissioning took place 2011. In 2020, Erhard replaced critical safety valves from another supplier.

KEY FACTS:

Capacity: 3 Francis turbines, 6 MW in total

Water head 28 meters, discharge 8 m³/s

PRODUCT LIST

- Double Eccentric Butterfly Valves DN 1600 PN 10 with weight loaded actuator KFa for turbine inlet.
- Ball Valves and Needle Valves DN 200 PN 10 for by-pass.
- Resilient Seated Gate Valves DN 125 PN 16.
- Twin-Air Air valves DN 150 PN 16
- Dismantling Joints DN 150-1600.

MADEIRA ISLAND

Calheta III (2020)
Pumped Storage Plant

Construction of a new dam at 1345 m of elevation, with a capacity of 1,000,000 m³, as well as a buffer reservoir with a capacity of 70,000 m³ at 654 m of elevation. Calheta III covers 20% of Madeira's electricity demand.

Excess wind energy produced during periods of lower demand supplies energy to the pumping station in order to pump the water back to the dam with 3 pumps (5 MW each).

KEY FACTS:

Capacity: 2 Pelton turbines, 15 MW each.

3,6 km of 70 bar high pressure pipeline

PRODUCT LIST

- Ball Valves DN 500 PN 100 with weight-loaded actuator used as pump start-up
- Ball Valves DN 600 PN 16 with electric actuator used as isolation valves

GERMANY

Wendefurth Dam (2009)

The Wendefurth Dam is used for flood control and energy generation.
The needle valve with a nominal diameter of two meters and a weight of 40 tons was sent by heavy transport on the two-day journey to Heidenheim. In addition to the repair work, the overall design was optimised. After the overhaul was completed, the valve was transported back and put into operation by the Erhard service team.

KEY FACTS:

Capacity: 1 Kaplan turbine, 870 kW.

PRODUCT LIST

- Refurbishment of Needle Valve for discharge DN 2000 PN 10, originally installed in 1967.

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NORWAY

Oksebotn (2020)
Hydropower Plant

Oksebotn power plant was completed in 1988, in the Voss municipality in Vestland county/ Norway.
The power plant is supplied through a 1.6 km long tunnel from the regulation reservoir in Stora Volavatnet. Reservoir capacity is 56.6 million m³, and the water is dammed by a 180,000 m³ rockfill dam.

KEY FACTS:

Capacity: 1 Francis turbine, 11 MW.

Head: 125 m

Power to approx. 3000 households

PRODUCT LIST

- Ball Valve DN 1200 PN 16 with weight-loaded actuator used as turbine inlet valve
- Replacement of valve installed in 1988.

LIECHTENSTEIN

Samina (2014)
Pumped Storage Plan

The original Samina storage power plant first went into operation in 1949. In 2014, it was converted into a pumped storage power plant. When energy consumption is low and supply by wind turbines is high, the water is pumped back into the reservoir pier.

KEY FACTS:

Capacity: 2 Pelton turbines, 7.3 MW each, 2 pumps 5 MW each.

2,1 km of high pressure pipeline with an operating pressure of 83 bar

PRODUCT LIST

- Ball Valves DN 300 PN 10.
- Ball Valves DN 400 PN 100.
- Refurbishment of 3 valves DN 300 PN 100 (22 years old).
- 2x Needle valves RKVP DN 200 PN 25 with aeration unit in pump by-pass.

SPAIN

Minicentral Valmayor (2017)

The mini-hydroelectric plant allows the energy use of the entire flow derived from the Valmayor reservoir to the drinking water treatment plant located next to it.

KEY FACTS:

Capacity: 1 turbine, 800 kW.

Power to approx. 7500 inhabitants

PRODUCT LIST

- Needle Valves DN 800 PN 16 with aeration unit in dam discharge position.

GERMANY

Kinzigtal Dam (2021)

The Kinzigtal Dam is used for flood protection, low water elevation and power generation. The Kinzigtal Dam holds up to 7.2 million cubic meters of water. A needle valve DN 400 ensures that the minimum discharge of the dam required by the regional government is maintained in the event of a turbine failure, so that the Kinzig does not run dry.
If the turbine fails, the valve opens; the requirement currently specifies 0.5-1m³/sec.

KEY FACTS:

Purpose: water level control.

PRODUCT LIST

- Refurbished Needle Valve DN 400 PN 10, originally delivered in 1982. Valve is used for environmental flow management.

MBR_TALIS_211119_DAMS_AND_HYDROPOWER_EN

REFERENCE LIST - DAMS & HYDROPOWER

PROJECT	COUNTRY	YEAR	KEY PRODUCTS DELIVERED
Canning Dam	Australia	2021	Double eccentric butterfly valves
Wungong Dam	Australia	2021	Double eccentric butterfly valves
Waimea Dam	New Zealand	2021	Double eccentric butterfly valves, Dismantling joints
Wahnbachtalsperre	Germany	2021	Needle valve (plus maintenance contract)
Grane Talsperre	Germany	2021	Double eccentric butterfly valves, Air valves,Gate valves
Warragamba Dam II	Australia	2020	Double Eccentric Butterfly Valves & Centric Butterfly Valves
Horstseetalsperre	Germany	2019	Needle Valves & Gate Valves
Oksebotn Hydropower Plant	Norway	2019	Ball Valves
Deer Creek Dam	USA	2018	Needle Valves
SDCWA Rancho Hydro	USA	2018	Needle Valves
Steinbachtalsperre	Germany	2017	Ball Valves, Butterfly Valves, Air Valves & Needle Valves
Normandia Hydropower Plant	Ecuador	2017	Butterfly Valves, Dismantling Joints & Needle Valves
Jackson Dam	USA	2017	Ball Valves & Needle Valves
Khoda-Afarin Dam	Middle East	2017	Cone Outlet Valves
Calheta III Pumped Storage Plant	Madeira Island	2017	Ball Valves
Warragamba Dam	Australia	2017	Butterfly Valves
Hydropower Plant Las Cruces	Spain	2014	Double Eccentric Butterfly Valves
Samina pumped storage Plant	Liechtenstein	2014	Ball Valves & Needle Valves
Dulhasti Hydropower Plant	India	2014	Needle Valves & Air Valves
Baglihar Hydropower Plant I & II	India	2014	Ball Valves & Air Valves
Piedilago Hydropower Plant	Italy	2012	Double Eccentric Butterfly Valves
Kopswerke	Austria	2011	Needle Valves
Dasque Creek	Canada	2011	Needle valve with Air Admission
Gondomar (Pego negro)	Portugsl	2010	Cone Outlet Valves
Peuffeyre Hydropower Plant	Switzerland	2010	Ball Valves
Hieflau Hydropower Plant	Austria	2009	Cone Outlet Valves
Talsperre Bautzen	Germany	2009	Needle Valves with Air Admission
Shannon Creek Dam	Australia	2008	Cone Outlet Valves
Papadia Dam	Greece	2008	Cone Outlet Valves
Avon Dam	Australia	2007	Cone Outlet Valves
Talsperre Neunzehnhain	Germany	2007	Needle Valves, Butterfly Valves, Air Valves, Dismantling Joints, Gate Valves
Zeta Dam	Middle East	2007	Needle Valves, Butterfly Valves, Air Valves, Dismantling Joints, Gate Valves
Bradon Dam	Middle East	2006	Cone Outlet Valves

REFERENCE LIST - DAMS & HYDROPOWER

PROJECT	COUNTRY	YEAR	KEY PRODUCTS DELIVERED
Stausee Ahausen	Germany	2006	Cone Outlet Valves & Gate Valves
Saidenbach Talsperre	Germany	2005	Needle Valves with Air Admission, Butterfly Valves, Air Valves, Gate Valves
Nagoldtalsperre	Germany	2004	Cone Outlet Valves
Warragamba Dam	Australia	2004	Double Eccentric Butterfly Valves
17th April Dam	Middle East	2001	Double Eccentric Butterfly Valves
Sösetalsperre	Germany	2000	Needle Valves (bottom-outlet with air admission) & Dismantling Joints
Poza Honda Dam	Ecuador	1999	Cone Outlet Valves
Gemenchem Dam	Malaysia	1999	Cone Outlet Valves
Möhnetalsperre	Germany	1999	Needle Valves (bottom-outlet with air admission) & Dismantling Joints
Okertalsperre	Germany	1999	Needle Valves (bottom-outlet with air admission)
Goldisthal Pumped Storage Plant	Germany	1998	Cone Outlet Valves
Lingesetalsperre	Germany	1998	Needle Valves (bottom-outlet with air admission)
Oderstalsperre	Germany	1998	Needle Valves (bottom-outlet with air admission)
Wahnbachtalsperre	Germany	1998	Needle Valves (bottom-outlet with air admission)
Bevertalsperre	Germany	1997	Needle Valves (bottom-outlet with air admission)
Hana Dam	Middle East	1996	Cone Outlet Valves
Shahid Rajaee Dam	Middle East	1996	Cone Outlet Valves
Tapada Hydropower Plant	Portugal	1995	Cone Outlet Valves
Urfftalsperre	Germany	1993	Needle Valves (bottom-outlet with air admission)
Evretou Dam	Cyprus	1985	Cone Outlet Valves
Eidisverkid Hydropower Plant	Faroe Islands	1985	Cone Outlet Valves
Wegscheid Hydropower Plant	Austria	1984	Cone Outlet Valves
Rio Yacambu Dam	Venzuela	1981	Cone Outlet Valves
Bodendorf Hydropower Plant	Netherlands	1980	Cone Outlet Valves
Kleine Kinzig Dam	Germany	1979	Cone Outlet Valves
Prim dam, Nonnweiler	Germany	1979	Cone Outlet Valves
Wehebach Dam	Germany	1979	Cone Outlet Valves
Sima Hydropower Plant	Norway	1979	Cone Outlet Valves
Schlichem Dam	Germany	1978	Cone Outlet Valves
Oderstalsperre	Germany	1974	Needle Valves (bottom-outlet with air admission)
Twiste Dam	Germany	1973	Cone Outlet Valves
Poza Honda Dam	Ecuador	1972	Cone Outlet Valves
Okertalsperre	Germany	1954	Needle Valves (bottom-outlet with air admission)

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