Rev. 06-11-2018

NARROW GROOVE SLIDING PENSTOCK "BUREAU"

DESCRIPTION

- Narrow groove sliding penstock for high speed fluids.
- Mechanically welded body, comprising two screwed parts, with internal guides for smooth movement of the penstock during operation.
- Penstock design carried out in accordance with **"U.S. BUREAU OF RECLAMATION"**.
- Passage of the rectangular section penstock, although-there is also the possibility of the inlet and outlethaving a circular section.
- Various construction materials available.
- Face to face distance in accordance with **CMO Valves** standard.

APLICATIONS GENERAL

This narrow groove sliding penstock is designed to work with fluids at high speeds. Its main application is in water deposit run offs.

Design for this applications:

- Dams
- Hidrológical Projects
- Chemical Plants.
- Bumping
- Water Treatment

SIZES

The construction sizes for this type of penstocks are adapted to the needs of each particular project.

WORKING PRESSURE (ΔP)

As is the case with the dimensions of the penstock, the working **ΔP** is also adapted in accordance with the specific needs of each project.

The indicated working pressures will be valid only following the direction of the arrow marked on the valve. Due to the design of the valve with support slides for the gate, it is permissible to apply 30% of this working pressure in the opposite direction to the arrow without causing any damage. In these circumstances the valve doesn´t have a 100% tightness. In order to achieve it under these conditions, it is necessary to incorporate additional supports.

SERIE - CB

DRILLING OF FLANGES

The drilling of the flange is perform according to the standard of **CMO Valves** or also can adapt to needs client in each project specific.

GATE

The gate passage has a rectangular section. Although there is also the possibility that the valve´s entrance and exit might have a circular section through a ***transition from rectangular to circular shape.***

DIRECTIVES

- Pressure equipment. **(PED) ART.3 /CAT.1.**
- Of explosive atmospheres. **(ATEX) CAT.3 ZONE 2 y 22 GD.**

** For information on categories and zones, contact the technical-commercial department of **CMO VALVES.***

DOSSIER DE CALIDAD

All valves are hydrostatically tested with water at CMO and material certificates (in accordance with Standard EN 10204 3.1.) and test certificates (in accordance with Standards ISO 5208 and EN 12266) are supplied.

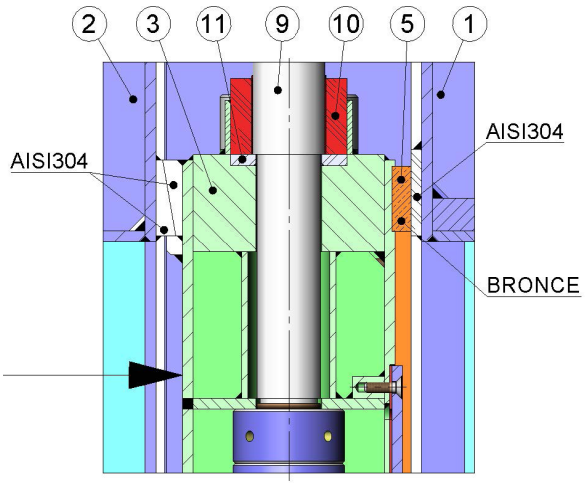
- Body test = working pressure x 1.5.
- Seal test = working pressure x 1.1.

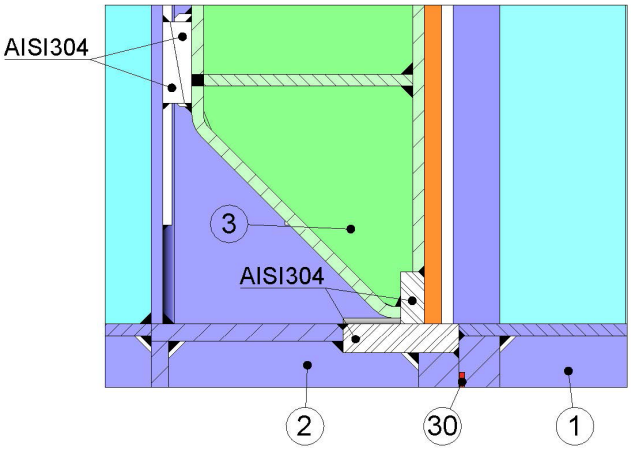
ADVANTAGES

The main characteristic of this penstock is the body design. This is a body formed by two screwed half bodies, with exterior reinforcements and a machined interior which provides the penstock with great capacity to work with high-speed fluids whilst guaranteeing that high working pressures can be withstood.

These types of penstocks require very little maintenance. To keep maintenance to a minimum, the penstock sealing system is metal/metal. For the purpose of the front seal the board has a machined bronze frame screwed to it; this makes the seal against a series of machined stainless steel strips located in the body. A wedge system is used to push the board against the seal. These wedges are entrusted with ensuring sealing with little depth of water. The body sealing strips are in the downwater part of the body, thus guaranteeing greater sealtightness at greater water depths.

The valve spindle is made of AISI 304 stainless steel. This is another added advantage because some manufacturers supply it with 13% chromium and it oxidizes quickly. The steering wheel is manufactured in STEEL CARBON. Other manufacturers supply it in cast iron which can cause its breakage in case of a very high maneuvering torque or an unexpected blow.





Since these penstocks are designed for use in water deposit run offs, the lower part of the penstock passage is completely smooth, thus preventing the build up of residue on the lower seal and ensuring there is no turbulence or cavitation.

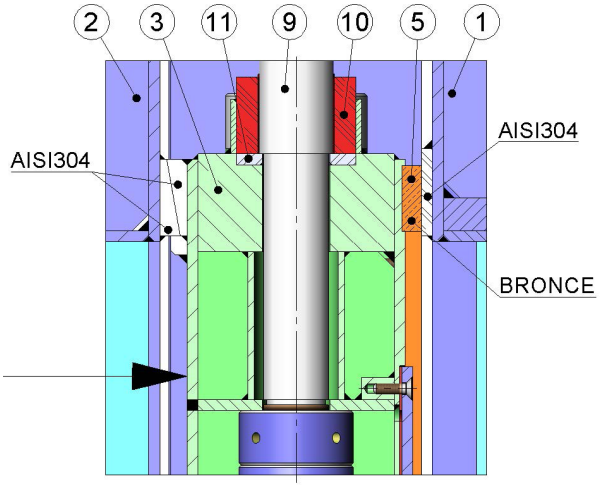
This lower seal is achieved when the machined stainless steel strip in the lower part of the board tightens against the machined stainless steel strip in the lower part of the body.

Sufficient pressure to achieve sealtightness can be achieved by exercising force through the hydraulic cylinder.

The only regular maintenance required for these penstocks is to hange the gasket to carry out this task in the most straightforward way possible,

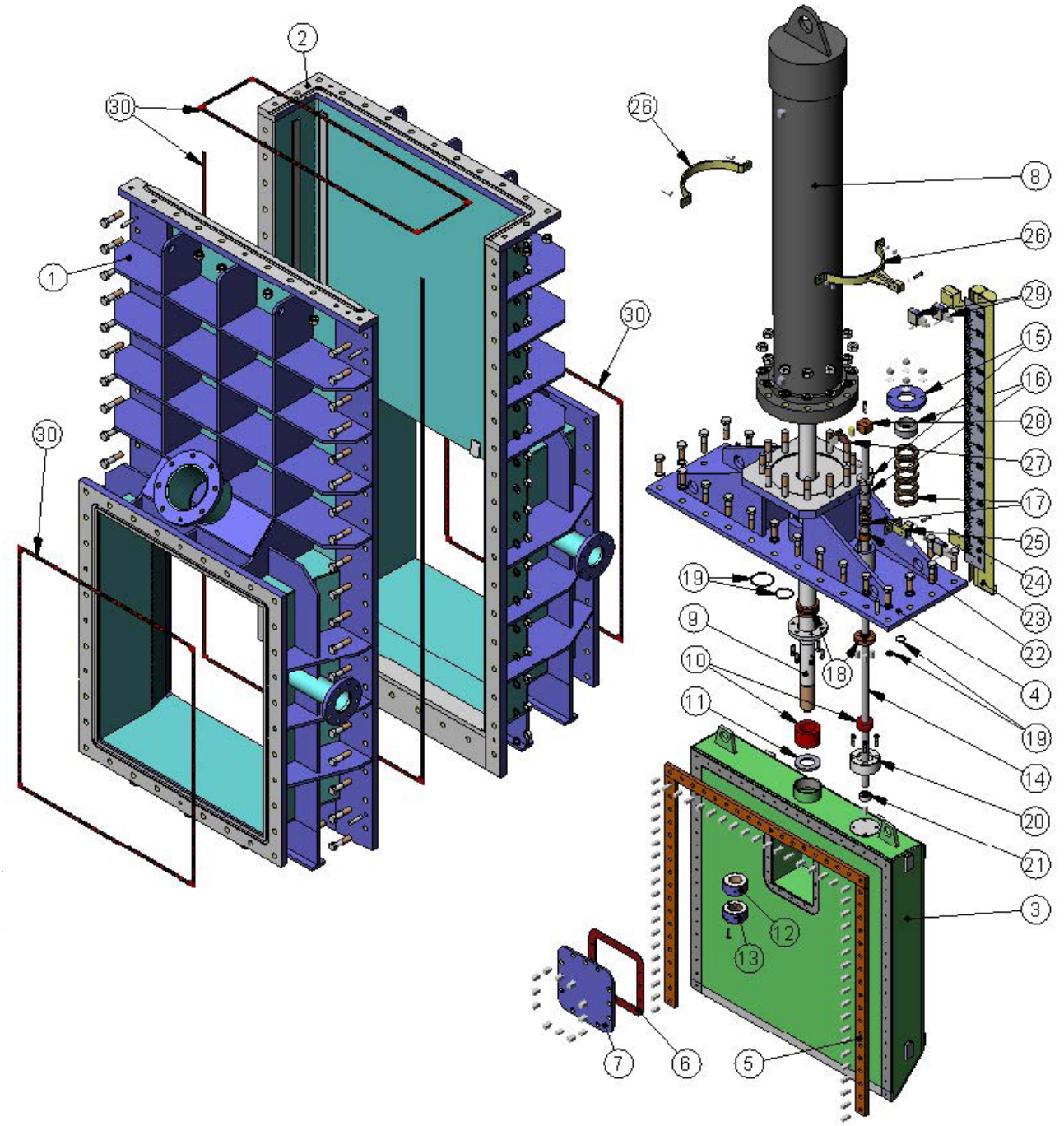
CMO penstocks have a system which brings in the cylinder spindle whilst the elastomer seals in the upper part of the board make the seal against the bronze scrapers in the cover, meaning the old gasket can be removed and replaced with new strips whilst the penstock is under pressure.

The inside of the body has machined stainless steel strips which act as a guide for the stainless steel slides found on all faces of the board.



Note: The numbers of the images refer to the list of components in the list of components.

SLIDING PENSTOCK LIST COMPONENTS



STANDARD COMPONENTS LIST					
1	BODY	11	THRUST WASHER	21	INDICATOR STOPPER
2	COUNTERBODY	12	CYLINDER NUT	22	GUIDE BUSHING
3	BOARD	13	CYLINDER COUNTERNUT	23	RULE SUPPORT
4	COVER	14	INDICATOR SPINDLE	24	INDICATION RULE
5	CIERRE	15	GLAND FLANGE	25	LOWER SUPPORT
6	BOARD COVER SEAL	16	GLAND BUSHING	26	UPPER SUPPORT
7	BOARD COVER	17	GASKET	27	INDICATOR ARROW
8	HYDRAULIC CYLINDER	18	SCRAPER GUIDE	28	SLIDE
9	CYLINDER SPINDLE	19	O-RING SEAL	29	LIMIT SWITCH
10	GASKET CHANGE SEAL	20	RING	30	SEAL

DESIGN CHARACTERISTICS

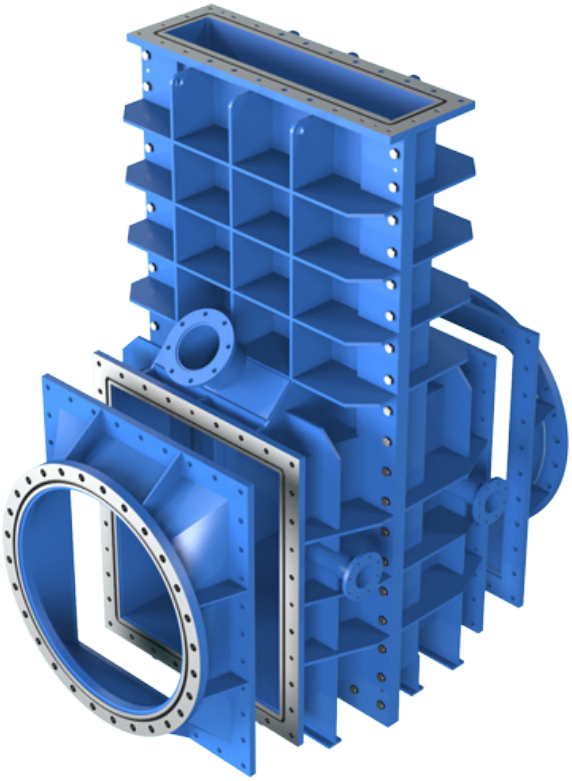
1. BODY

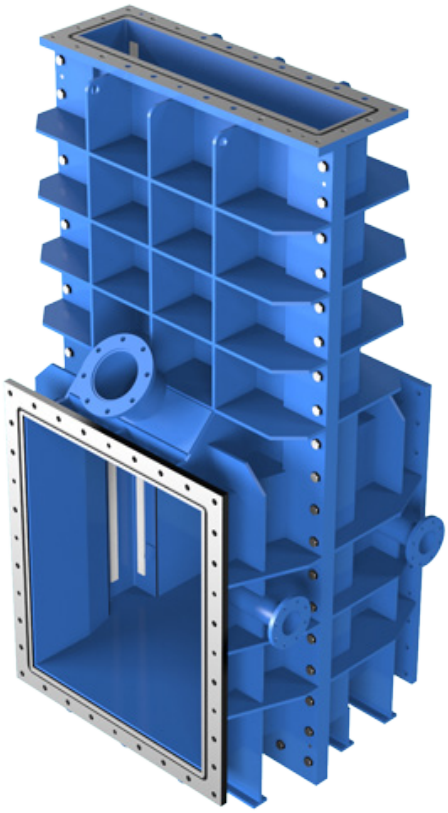
Body formed by two half-bodies, body and counter-body. These half-bodies are screwed to each other to create a solid, robust body. There is an elastomer seal between the two half-bodies in order to ensure there are no leaks in this joint.

The body is mechanically welded with outer reinforcements to withstand the work pressure. The inside of the body has machined stainless steel strips, namely the sealing strips and the guide strips.

The sealing strips are positioned on the downwater half body, whilst the guide strips and the wedges are located on the upwater half body, thus allowing the fluid pressure to help the penstock sealing system.

The penstock is designed with total passage in order to provide large flows with small losses of load. The body's internal design prevents any build-up of solids in the seat area.





The clamping flanges of the penstock are usually rectangular, although circular ones can be produced to order. In any case, these flanges have a built-in elastomer seal, with the benefit of not requiring any additional seal between the conduct and the penstock.

The standard manufacturing materials are AISI304 stainless steel and S275JR carbon steel, although other materials such as AISI316 stainless steel are available to order.

As standard, carbon steel penstocks are painted with an anti-corrosive protection of 250 microns of EPOXY (colour RAL 5015). Other types of anti-corrosive protections are available to order.

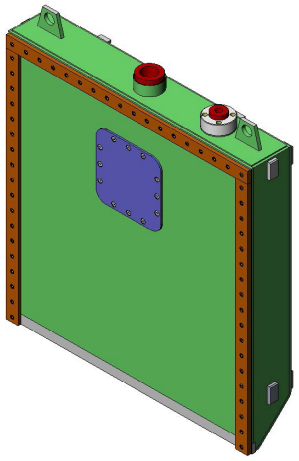
GATE

The gate passage has a rectangular section. Although there is also the possibility that the valve´s entrance and exit might have a circular section through a ***transition from rectangular to circular shape.***

2. BOARD

The standard manufacturing materials for the board are AISI304 stainless steel and S275JR carbon steel. Other materials or combinations can be supplied to order. The board is fitted with a screwed machined bronze frame which is used to carry out the front seal, whilst the lower seal is carried out using a machined stainless steel strip. The side opposite the seal has stainless steel wedges in order to press the board against the body's sealing frame when the penstock is shut off. Both this face and the sides have stainless steel slides to ensure the board is guided at all times.

The board has a gap inside where the nuts which secure the hydraulic cylinder spindle are located. This gap has a cover. To release the actuator, remove the cover and release the nuts, leaving the spindle free to be removed upwards in a vertical direction.
The upper part of the board contains the elastomer seals, which are compressed against the cover and carry out the sealing when the spindle is brought in, thus allowing the gasket to be changed when the penstock is under pressure.



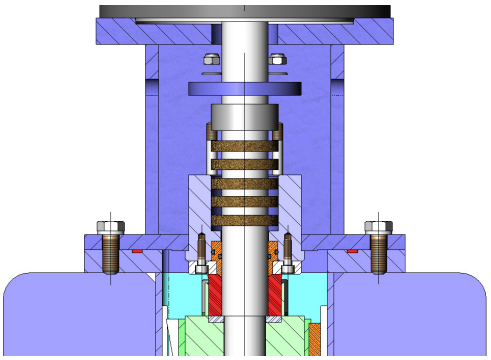
3. SEAT

In this type of penstocks, sealing is carried out by way of machined bronze strips against stainless steel ones, in order to keep maintenance work to a minimum. As previously stated, the board has a screwed bronze frame which is pressed against the body's stainless steel strips by way of the wedges and the fluid pressure, thus carrying out frontal sealing. In order to carry out the lower sealing, the board has a stainless steel strip in the lower section which, by way of the force exerted by the hydraulic cylinder, is pressed against the body's stainless steel strip, thus achieving sealtightness in the lower section. The lower part of the body passage is completely smooth without any protrusions, thus helping to prevent the accumulation of waste in the seal area.

4. GASKET

These penstocks have a gasket in two parts of the cover: one for the hydraulic cylinder spindle and another for the indication arrow spindle. The Standard CMO gasket comprises several lines of synthetic +PTFE gasket which provide sealtightness between the spindle and the cover, avoiding any type of leakage.

It is situated in a very accessible place and can be easily replaced. The hydraulic cylinder spindle is drawn in, allowing the board's elastomer seals to carry out the sealing against the cover's bronze scrapers and therefore prevent leakages, at which point the gasket can be changed; this operation can be carried out when the penstock is under pressure. As mentioned previously, CMO standard gasket is synthetic + PTFE, although there are other types of gasket available to customers.



SINTÉTICO + PTFE

This gasket is composed of braided synthetic fibres soaked in PTFE both inside and out. It is for general use in hydraulic applications in both pumps and valves and in all types of fluids, especially corrosive ones, including concentrated and oxidising oils. It is also used in liquids with solid particles in suspension.

5. SPINDLE

The hydraulic cylinder spindle is usually AISI420 stainless steel with a chrome coating of 50 microns; these characteristics provide the spindle with extremely high resistance and excellent properties in preventing corrosion. The indicator spindle is stainless steel AISI 304. This has excellent properties against corrosion and its purpose is to run the limit switches and support the indicator arrow.

6. PACKING GLAND

The packing flange, through the gland bushing, allows uniform force and pressure to be applied to the gasket in order to guarantee sealtightness between the spindles and the cover. As standard, valves with carbon steel body include carbon steel packing glands, whilst penstocks with stainless steel body have stainless steel packing glands. In both cases the gland bushing is common stainless steel. These penstocks have two packing glands, one for each spindle, i.e. one for the hydraulic cylinder spindle and one for the indicator spindle.

7. ACTUATORS

The drive system of these penstocks is usually a hydraulic cylinder. When it is envisaged that any penstock is to remain open for long periods, there is the possibility of supplying the hydraulic cylinder with interlocking. The interlocking system we supply is usually mechanical, and works by way of springs on the outside of the cylinder. However, there is also the option of hydraulic interlocking, which consists of a smaller hydraulic cylinder coupled to the hydraulic drive cylinder.
drive cylinder

ACCESSORIES AND OPTIONS

There are different accessories and options to adjust the penstock to the customer's needs in each project, such as:

INDICATOR RULE

Since these penstocks are completely shut off and the actuator is usually a hydraulic cylinder, a spindle is installed parallel to the hydraulic cylinder spindle in order to know the degree of opening of the penstock; this has an indication arrow on the end with a ruler to show the degree of opening of the penstock at each moment.

POSITIONERS

When the position of the penstock is to be known remotely, positioner is installed to indicate the position of the penstock continuously.

AIREATION

There is also the option of supplying the penstock with an aeration system. These aeration systems commonly include a bifunctional or trifunctional air vent with valve. The aeration system has two purposes. Firstly, when the internal pressure drops, a vacuum is generated and this depression may seriously harm both the penstock and the conduct; for this reason the air vent will allow incoming air, thus interrupting the vacuum and limiting pressure to within admitted values. Secondly, when the internal pressure is positive but pockets of air have been formed, this air vent will discharge the pockets of air whilst preventing any discharge of liquid. This air vent is often accompanied by a valve in order to shut it off and carry out air vent maintenance tasks without any problem, even when the penstock is under pressure.

BY-PASS

This type of penstock is designed to work at the maximum differential pressure; in order to extend the working life of the upwater penstock seals, it is recommended to carry out the open/close operation with the pressures balanced, to which end a bypass system is used.
This system is used to equal the downwater and upwater chamber pressures. This bypass system has two valves, usually working with the downwater valve; the upwater valve is only used to carry out maintenance tasks.

MECHANICAL LIMIT SWITCHES

Mechanical limit switches are installed in the indication rule, indicating the specific position of the penstock. These limit switches are actuated by the same indication arrow.

CYLINDER INTERLOCKING

As mentioned previously, whenever it is envisaged that the penstock is to remain open for long periods of time, there is the possibility of supplying the hydraulic cylinder with interlocking. This interlocking can be mechanical or hydraulic. Normally this interlocking is positioned upwater in the penstock, and allows the penstock to remain open without the help of the actuator.

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