

- ✓ **High A-class penstock design**
based on DIN 19569-4 / BS 7775 / AWWA C 560
- ✓ **Fast and economic wall fixing**
pipe flange- and grouted fixing also possible
- ✓ **Simple civil construction - no cutouts**
therefore no concrete forming required
- ✓ **Metal to metal sealing faces of corrosion resistant bronze**
double seal design, i.e. sealing face on frame and door
- ✓ **Sealing faces in bolted design**
therefore exchangeable
- ✓ **Adjustable wedges provide a maximum of tightness**
at on-seating and off-seating heads
- ✓ **Standard head 6 m for on-seating and off-seating**
higher head on demand
- ✓ **Door guided by rollers - beginning with size DN 500**
provides easy opening, even in case of high operating head
- ✓ **All steel components of stainless steel grade 316**
provides maximum resistance against corrosion

TESACO-Penstocks are designed for decades of operation even under the most extreme conditions. This is among others ensured through the exchangeable metal to metal seals made of bronze. Another special feature of the **TESACO**-Penstocks are the resilient wall seal. It ensures fast and easy installation even with uneven concrete walls. In combination with the exchangeable block seals this sophisticated penstock design is considered as a high quality and economic penstock solution.

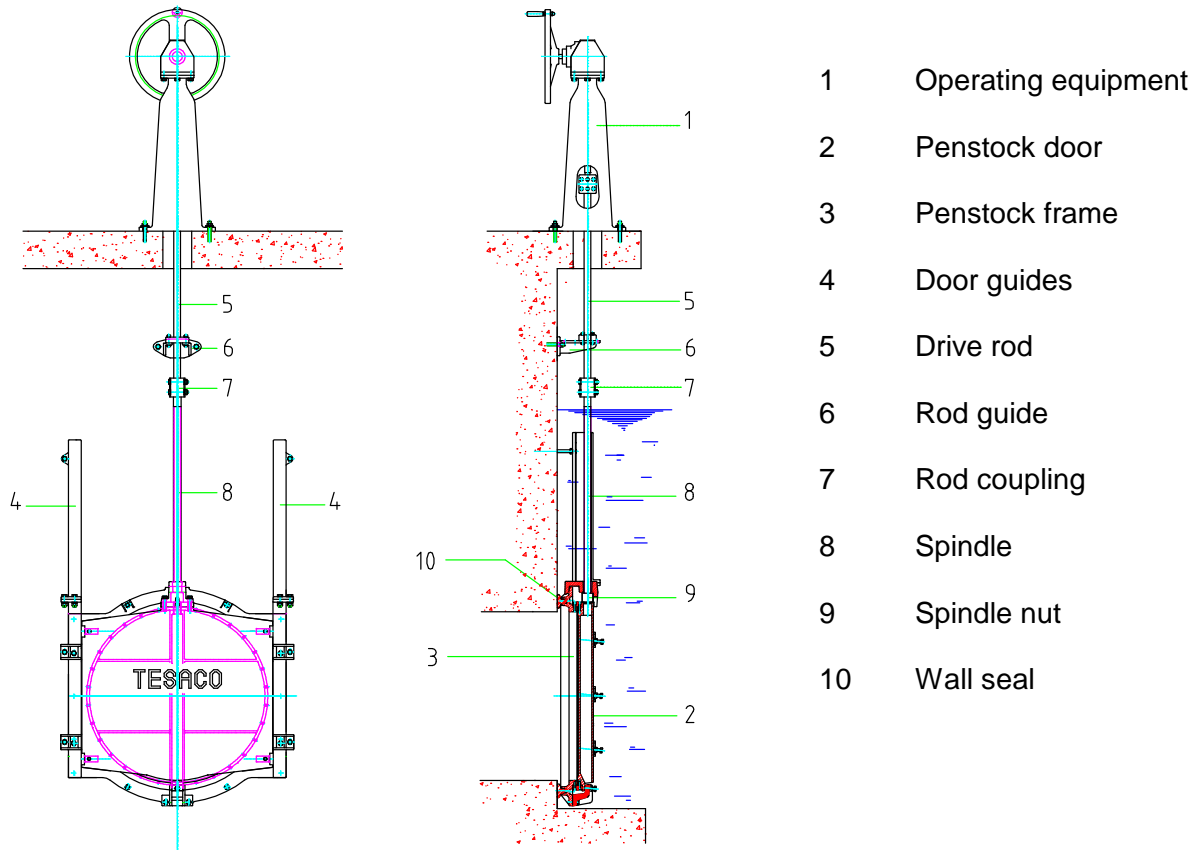
The operation could be carried out manually or electrically by electric actuators. These electric actuators could be equipped with various features and remote control units. In addition there are pneumatic and hydraulic lifting devices for the penstocks available.

The **TESACO**-Penstocks consists of the following main components:

- Penstock frame: Wall fixing, pipe flange fixing or grouted fixing
MATERIAL: cast iron, DIN EN 1561 EN-GJL-250 (GG-25); OPTIONAL: any special alloyed cast iron
- Penstock door: Sliding or rolling (depending from the nominal size)
MATERIAL: cast iron, DIN EN 1561 EN-GJL-250 (GG-25); OPTIONAL: any special alloyed cast iron
- Door guides: With adjustable wedging for maximum of seal-effect
MATERIAL: cast iron, DIN EN 1561 EN-GJL-250 (GG-25); OPTIONAL: any special alloyed cast iron
- Block seals: On frame and door, exchangeable
MATERIAL: Bronze CuSn12-C acc. DIN EN 1982
- Spindle: Rolled thread in trapezoidal form, rising or non-rising
MATERIAL: S.S. 316 acc. DIN EN 10088-3
- Spindle nut: Located at the penstock door or above coping level
MATERIAL: Bronze CuSn12-C acc. DIN EN 1982
- Wall seal: Easy installation and optimal sealing at uneven concrete walls
MATERIAL: Wastewater resistant Neoprene (CR)
- Operating equipment: Manual, electric or pneumatic/hydraulic
MATERIAL and DESIGN: acc. to specification and manufactures advices
- Anchor bolts: Chemical anchor V, including capsule V-P
MATERIAL: S.S. 316

TESACO-Penstocks represent a heavy and reliable design combined with max. resistance against corrosion. Therefore they are optimal for installation in municipal and industrial wastewater treatment plants, sewers systems, pumping stations, retention reservoirs. There are different designs available for the application under conditions of highly aggressive industrial waste water. In case of marine water we have a special edition with components made of high quality marine water resistant stainless steel and plastic.

Penstock design



- 1 Operating equipment
- 2 Penstock door
- 3 Penstock frame
- 4 Door guides
- 5 Drive rod
- 6 Rod guide
- 7 Rod coupling
- 8 Spindle
- 9 Spindle nut
- 10 Wall seal

Fig. 1 - typical penstock configuration

Fixing types

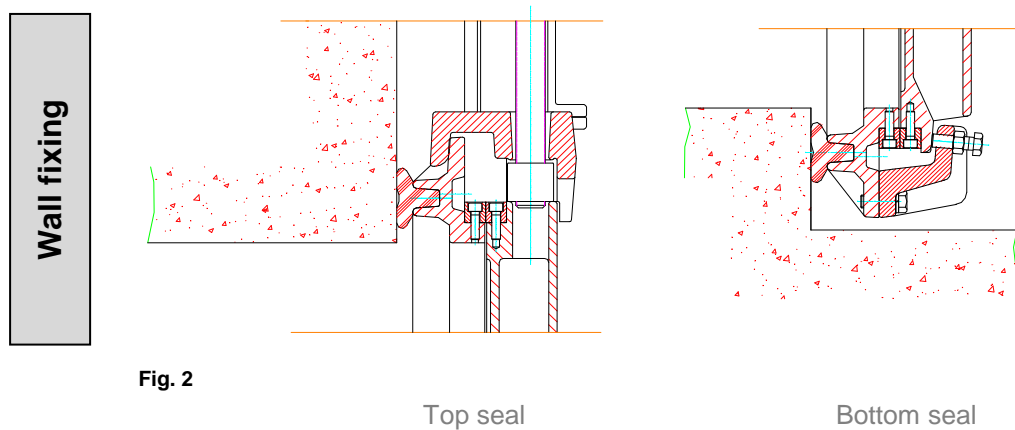


Fig. 2

Pipe flange fixing

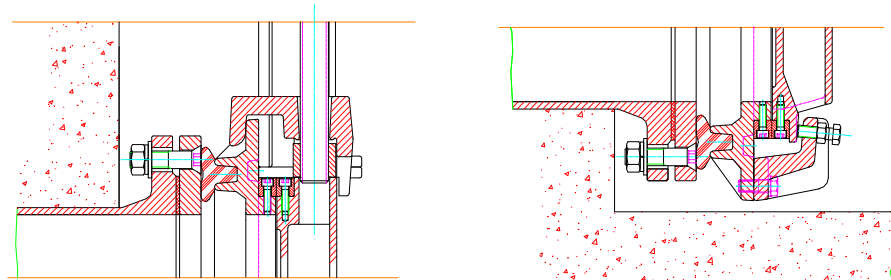


Fig. 3

Top seal

Bottom seal

Grouted fixing

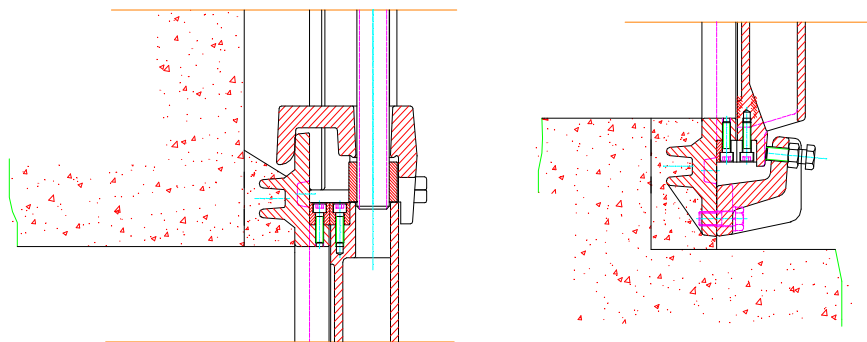


Fig. 4

Top seal

Bottom seal

Design details

Penstock frame:

The frame is a self containing system. It could be easily fixed to a concrete wall due to its very effective butterfly seal. The exchangeable block seals are bolted to the frame and are made from corrosion resistant zinc free bronze or synthetic material. The plastic version is for installations under highly aggressive waste water conditions. In this case the fastener's material is high quality stainless steel or Monel.

Penstock door:

The door is casted in one piece and manufactured under DIN / ISO Standard 9001 standards. Our standard designs are reinforced by ribs and are up to maximum pressure of 10 m water column. We also provide special designs for installations up to a maximum pressure of 20 m water column. Both, frame and door, have the same exchangeable block seals. Because of their plane surface we can guarantee a very high tightness of the penstock

Function of rollers and wedges:

All penstocks are equipped with an adjustable wedging system. Beginning with size 500 mm, all penstock's doors have a roller system additionally. Therefore the operation is very easy. The guide's design enables a lifting of the door to reduce the frictional resistance. So it is less power for the opening required. You can vary the closing pressure of the door by means of the continuously adjustable system of wedges. That is why you are able to adjust the penstock to off-seating pressure without any problems.

Roller system

- 1 Penstock door
- 2 Penstock frame
- 3 Blok seals
- 4 Door guides
- 5 Wall seal
- 6 Door roller

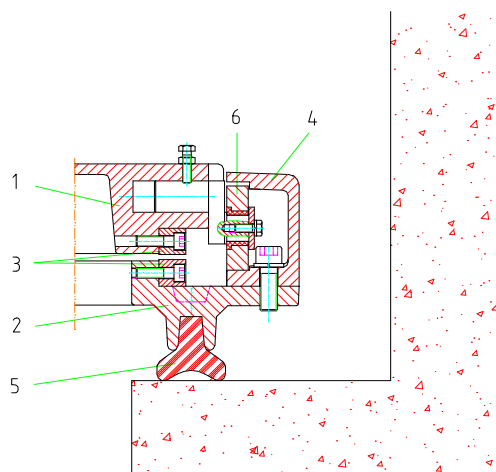


Fig. 5 - Roller system

Wedging system

- 1 Penstock door
- 2 Penstock frame
- 3 Blok seals
- 4 Door guides
- 5 Wall seal
- 6 Wedge adjusting bolt
- 7 Anchor bolt

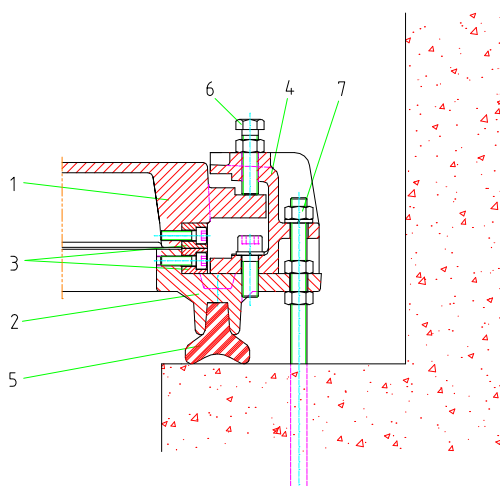


Fig. 6 - Wedging system

Door guides:

The guides are made of cast iron, alike the frame and door. The door guides are bolted to the frame. They are removable separately without loosening the frame. Their length enables a full opening of the door.

The wedge adjusting bolts ensure a higher tightness due to the regulation of the closing pressure. This variable and adjustable wedging system is a positive advantage in case of off-seating pressure.

Spindle nut:

Each door is operated via a spindle nut made of zinc free bronze. Its wastewater resistant trapezoidal thread provides an easy operation even under a high concentration of sludge and trash.

Spindle and drive rod:

The spindles are made of stainless steel AISI 316. They have a trapezoidal thread conforming with the spindle nut.

Guides are required in relation to the extension length. They prevent a bending of the spindles or rods. The guides are equipped with adjustable range spacers to compensate irregularities of the wall.

Corrosion protection:

Shot blasting acc. DIN ISO 55928, SA 2 1/2 with 400 µm Polyurethane or Epoxy coating.

Static and Operating heads for penstocks:

Standard:	10 m/WC*	Static head
	6 m/WC*	Operating head
Special design:	15 m/WC*	Static head (max. 20 m/WC)
	10 m/WC*	Operating head (max. 20 m WC)

* m / WC = Head in meter water column on-and off seating

Operating equipment:

Depending from the requirements there are various types of different penstock drives available. Generally the operating equipment is located either above floor level or under floor level. Additionally the penstock could be operated manually or by power operation (electric or pneumatic/hydraulic).

Please refer to our catalogue part "D".