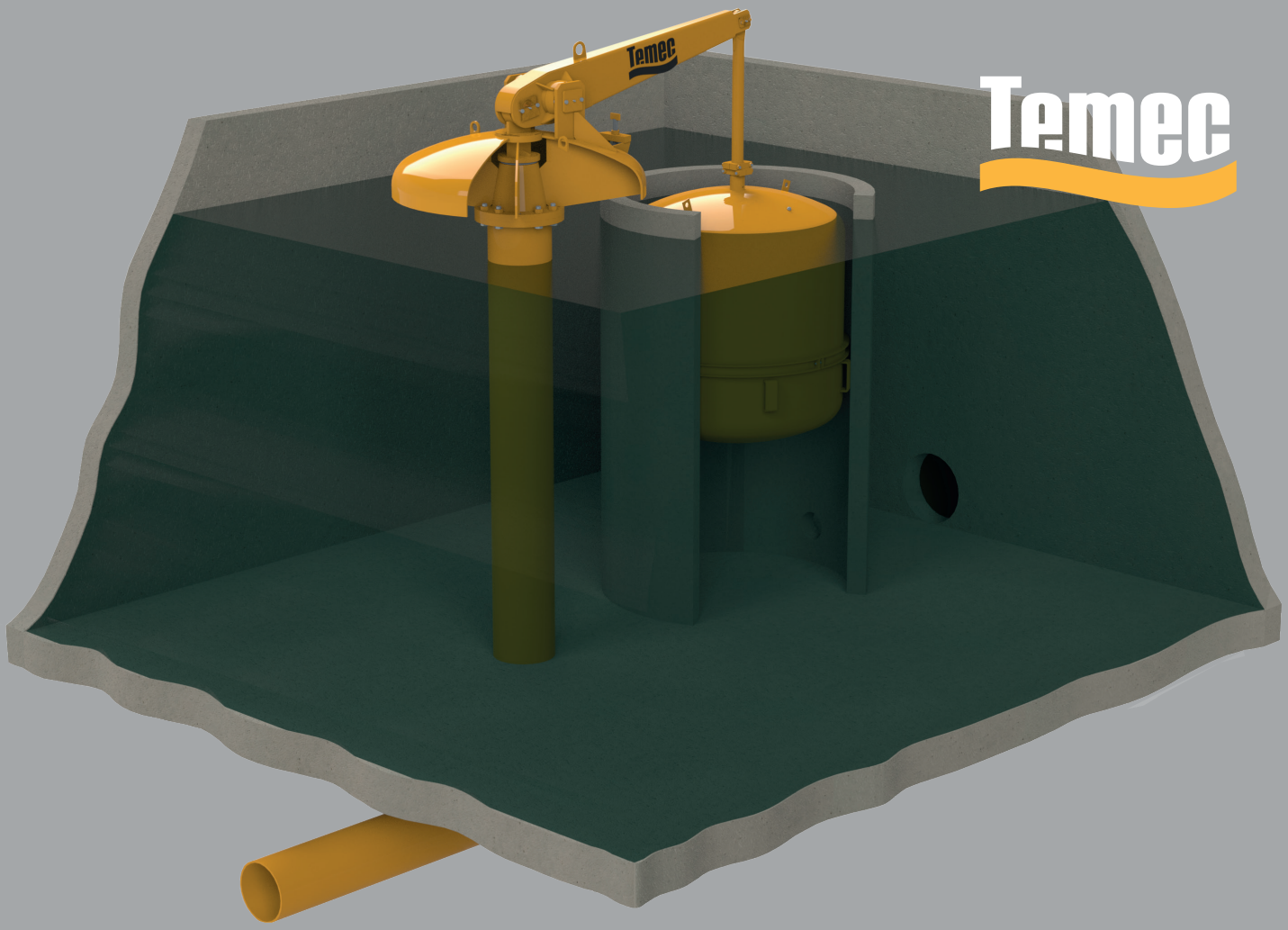


Temec

SELF-CENTERING DISC VALVE

Regulation on demand from a pressurized pipe (up to 250 mwc)

- Accurate
- Reliable
- Automatic
- Simply
- No water-hammer
- Free of cavitation

FUNCTION

These valves installed at the end of a pressurized pipeline, keep the water level in an energy dissipation pool, regardless of the circulating flow or upstream pressure.

- They work as energy dissipators at the outlet of the pipeline
- Adjust the upstream pipeline flow with the downstream demanded flow rate

APLICATIONS

- Regulation of flow rates at dam outlets, reservoirs, pipelines... to adjust them to demand
- Energy dissipation with venting to atmosphere in strong sloping pipelines
- Pressure drop for controlled emptying or by-pass of penstocks in hydroelectric power plants

WORKING PRINCIPLE

The principle of operation is due to the fact that, by having a disc attached to a connecting rod articulated by its upper end on the water jet that comes out from a vertical nozzle, it is self-centered on the jet, resulting in a radial dispersion of the jet.

The balance is perfectly stable, because when it is separated from this position, the disc is subjected to an opposite force that increases with separation and pressure.

The opening between the disc and the nozzle for operation can be commanded by a float or by a manual or electric actuator.

In float operated valves, this is located in a vessel, connected to the energy dissipation basin by a calibrated orifice, obtaining a damping function that ensures progressive operation.

In devices with manual or motorized actuator, the progressiveness of the valve depends on the operating speed.

Figure N°1

SUBMERGED DISC VALVE

The nozzle and the disc are located beneath the water level to be controlled. The orifice is a specially profiled nozzle and the self-centering obturation disc is attached to a long connecting rod that connects it to a rocker arm located above the water.
The other end of the rocker is where the float is articulated. The ball bearing of the rocker arm is fixed to a beam (concrete or steel) which is transverse to the energy dissipation basin, supporting the combined thrust of the float and the obturation disc.
Maximum Head is 60 meters of water column.

HOODED DISC VALVE

The nozzle and the disc are located above the water level to be controlled.The orifice is a specially profiled nozzle and the self-centering obturation disc is approached or moved away from the nozzle by a lever arm and rocker arm, operated by the float.The water that flows radially between the nozzle and the disc, impacts a hood (dished head), bolted to a mounting flange.

The volume required for the energy dissipation basin is 3 times less than for the submerged disc valve.

MANUFACTURING

Self-centering disc valves are manufactured in normalized carbon steel plates, tubes and beams, assembled under strict quality controls, which guarantee their operation. On request, they can be made in stainless steel.

The protection against corrosion is made on the basis of a painting scheme that includes a zinc-rich base on just shot-blasted metal, with a two-coat epoxy paint finish.

Bolts are in stainless steel.

The active part of the equipment is built basically by a mobile system articulated around a bearing and a rocker arm. This system is made up of two parts:

I) .A disc that seals the outlet nozzle, moving away or towards it to adjust the flow of water that comes out radially

II) A float that moves according to the water level of the tank where it is installed, communicated with the dissipation basin through an orifice calibrated to generate damping

III) In case of choosing a manual or electric actuator, it acts directly on the obturator disc

ADVANTAGESS

- Float operated units do not require external power
- No friction, which means progressive operation and no water hammer
- Without cavitation, whatever the degree of opening and the energy to be dissipated
- High abrasion resistance
- Perfectly watertight in its metal-to-metal (submerged) or metal-to-rubber (under hood) closure
- Wide range of flows and loads to be dissipated (up to 60 mwc and Ø1000 mm in submerged and 250 mwc and Ø500 mm in under hood)

CONDITIONS AND TIPS FOR INSTALLATION

Self-centering disc valves are an alternative to the use of annular, globe, Howell-Bunger valves since they have a better performance against cavitation

Submerged disc valve

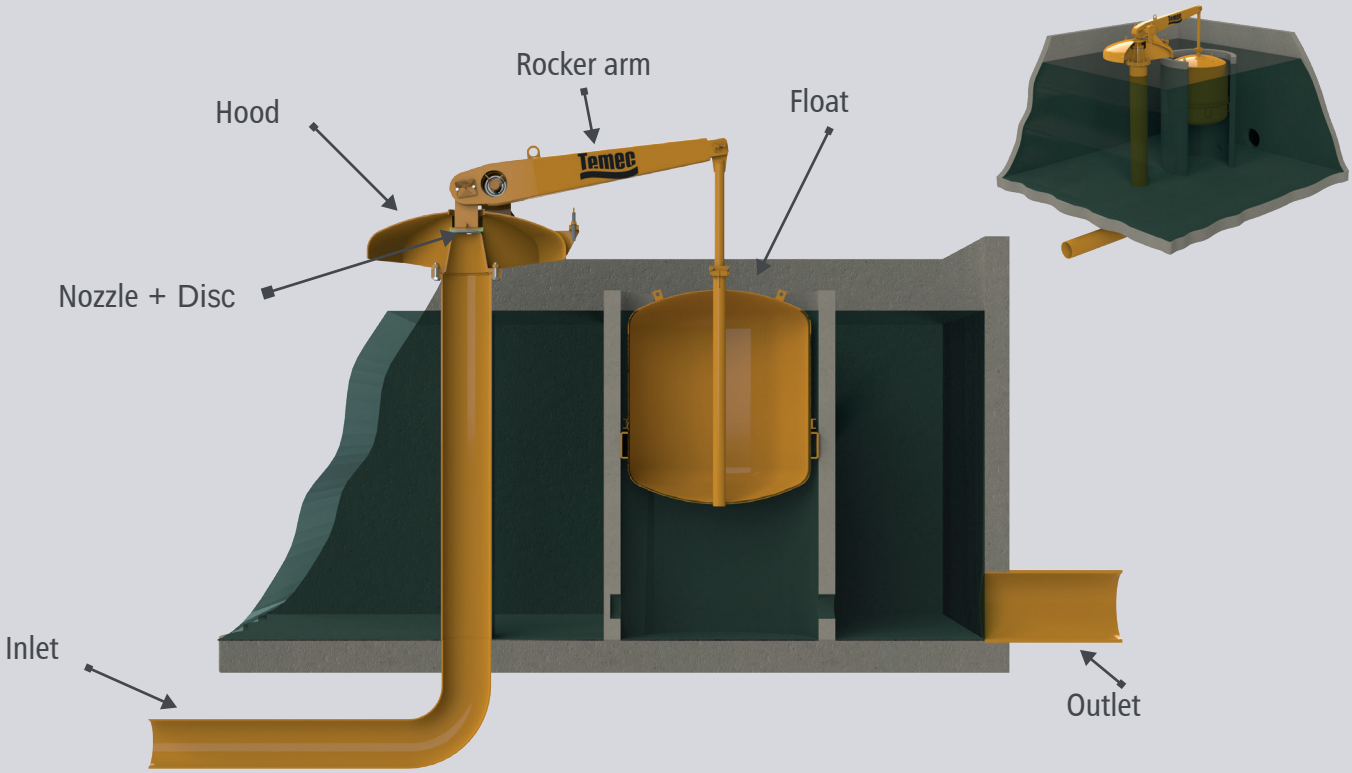
- Permissible load up to 60 mwa
- Higher Kv than under hood shutters
- Quiet operation

Under hood disc valve

- Permissible load up to 250 mca
- Smaller energy dissipation basin for same flow and load than submerged shutters
- Indicated for the optimization of the number of devices to lose energy in a long and steeply sloped pipeline

ODCF - Hooded self-centering disc valve

Downstream regulation from a presurized pipeline



SELECTION OF THE UNIT

For sizing a hooded self-centering disc valve it is necessary to know:

- Qmax: Maximum flow rate to be controlled
- Hr: Residual load or the minimum available load for the regulation of the maximum flow (due to losses along the pipe)
- Hs: The maximum static load at zero flow

DECREMENT

The decrement in the float-operated valves is the level variation in the dissipation basin, between:

- The lowest level, corresponding to the lowest position of the float: i.e. at maximum opening of the disc, and therefore the maximum flow rate under the lowest load
- The highest level, corresponding to the highest position of the float, i.e. the complete closure of the valve disc and therefore the maximum hydrostatic pressure

PREDIMENSIONING

Before entering the graph presented on the next page, it is recommended to estimate a nozzle diameter using the following formula

$$\emptyset \geq 22\sqrt{\frac{Qmax}{\sqrt{Hr}}}$$

Q in l/s, Ø in mm and Hr in m

To estimate the volume of the pool required for energy dissipation, 7.3 kW per m³ of pool is accepted

For a final dimensioning of the pool, the technical department of TEMEC S.A. should be contacted.

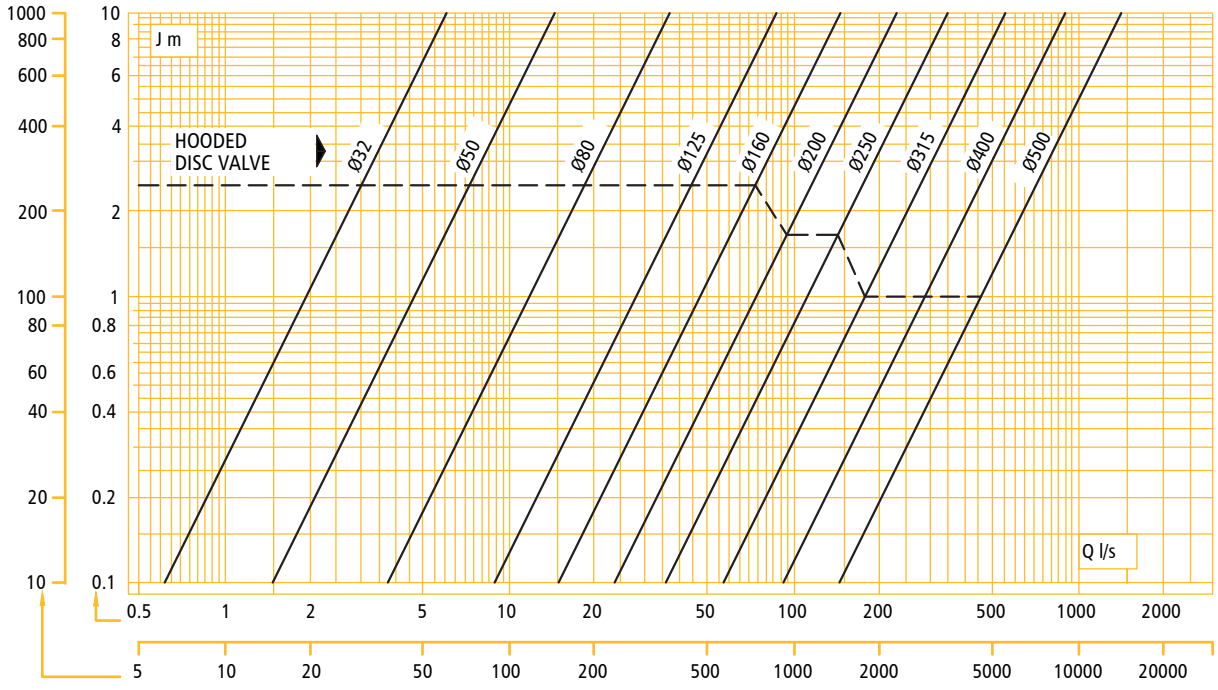
MAIN CHARACTERISTICS OF THE STANDARD VALVES

The different models are defined by the diameter of their nozzle (outlet) as well as by the maximum static load they can support and by the head loss they generate for the maximum flow, which must be lower than the available residual load

Nozzle diameter (mm):
32-50-80-125-160-200-250-31-400-500
Maximum static load:
250 m.w.a. for diameters from 32 to 160 mm
160 m.w.a. for diameters from 200 to 250 mm
100 m.w.a. for diameters from 315 to 500 mm

LOAD LOSS CHART

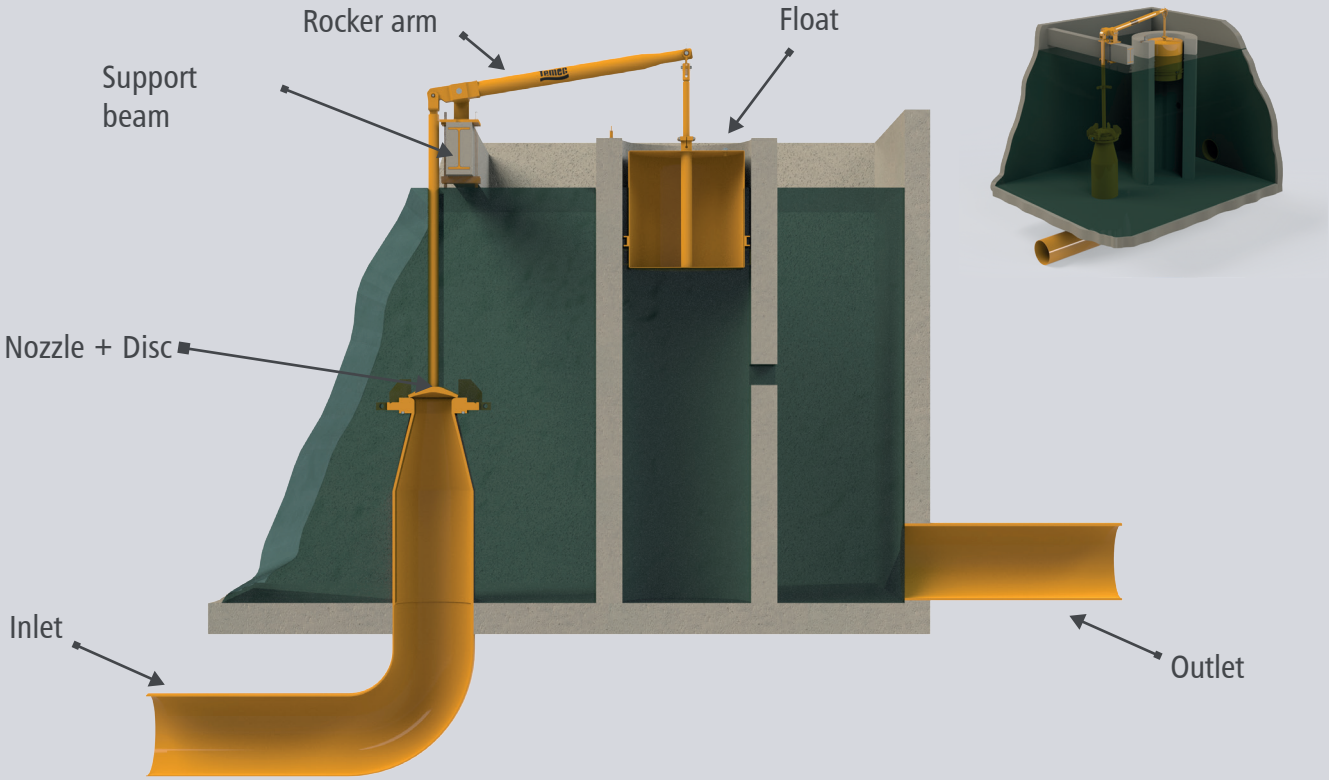
Hooded Self-centering disc valve



For the final sizing of the unit, the technical department of TEMEC S.A. should be contacted

ODSF - Suberged self-centering disc valve

Downstream regulation from a presurized pipeline



SELECTION OF THE UNIT

For sizing a submerged self-centering disc valve it is necessary to know:

- Qmax: Maximum flow rate to be controlled
- Hr: Residual load or the minimum available load for the regulation of the maximum flow (due to losses along the pipe)
- Hs: The maximum static load at zero flow. (Hs < 60m)

DECREMENT

The decrement in the float-operated valves is the level variation in the dissipation basin, between:

- The lowest level, corresponding to the lowest position of the float: i.e. at maximum opening of the disc, and therefore the maximum flow rate under the lowest load
- The highest level, corresponding to the highest position of the float, i.e. the complete closure of the valve disc and therefore the maximum hydrostatic pressure

PREDIMENSIONINIG

Before entering the graph presented on the next page, it is recommended to estimate a nozzle diameter using the following formula

$$\emptyset \geq 19\sqrt{\frac{Qmax}{\sqrt{Hr}}}$$

Q in l/s, Ø in mm and Hr in m.w.c.

To estimate the volume of the pool required for energy dissipation, 2.2 kW per m³ of pool is accepted.

For a final dimensioning of the pool, the technical department of TEMEC S.A. should be contacted.

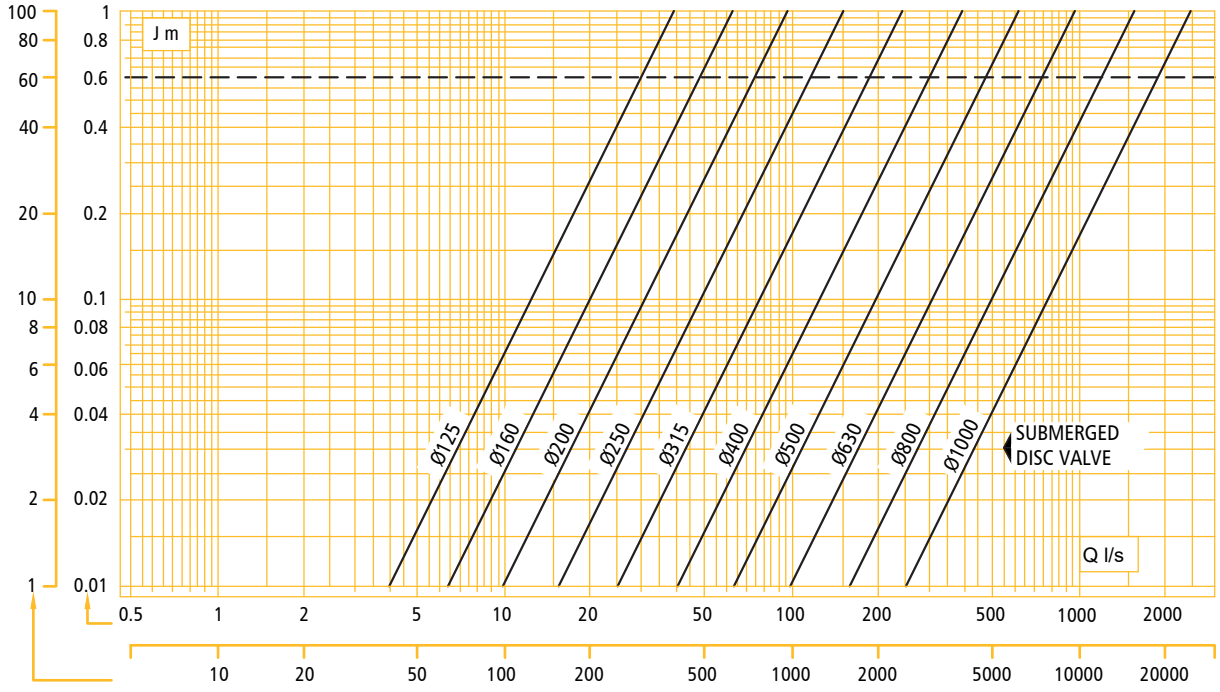
MAIN CHARACTERISTICS OF THE STANDARD VALVES

The different models are defined by the diameter of their nozzle (outlet) as well as by the maximum static load they can support and by the head loss they generate for the maximum flow, which must be lower than the available residual load.

Nozzle diameter (mm):
125-160-200-250-315-400-500-630-800-1000
Maximum static load:
60 m.w.c. in all models

LOAD LOSS CHART

Submerged Self-centering disc valve



For the final sizing of the unit, the technical department of TEMEC S.A. should be contacted

ELECTRIC/MANUAL SELF-CENTERING DISC VALVE

The float level control system can be replaced by an electric actuator or a manual drive.

Like the float valve, it is placed at the outlet of a pressurized pipeline, in a storage tank, pond or reservoir with the difference that the level downstream can be adjusted as required.

The opening of the valve is regulated with total precision, regardless of the load it is subjected to, so that both parameters are known and the flow rate supplied by the equipment can be regulated.

El actuador deberá tener un grado de protección mínimo de IP67 y mando remoto. Se recomienda la instalación de una pasarela por mantenimiento.

This element allows:

- Downstrem Level control
- Flow control
- Upstream pressure control

The energy dissipation characteristics are the same as float self-centering valves, submerged or hooded. However, as there is no float to eliminate the danger of water hammer in upstream operation, a sufficiently slow closing speed must be sought in the actuator.

The range of equipment is identical to that of the float valve, both under the hood (Figure 4) and submerged (Figure 5).

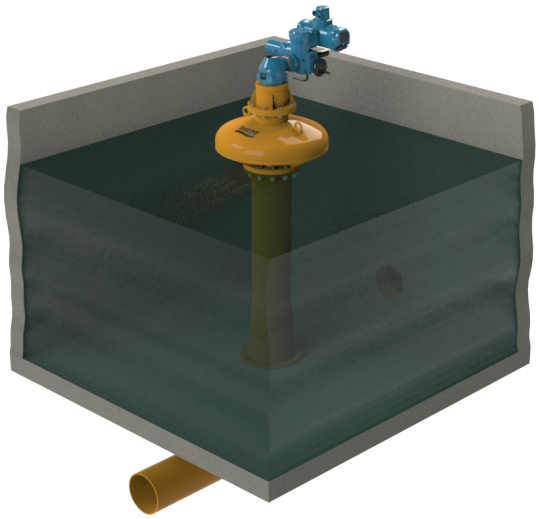


Figure N°2

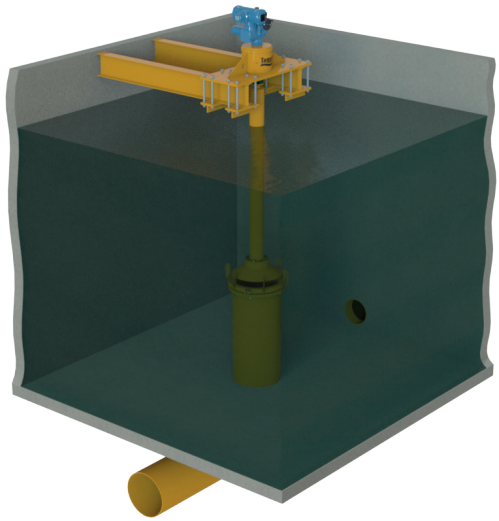


Figure N°3

CONCLUSION

These devices, inspired by a simple hydraulic conception, are totally autonomous, do not require any external energy source, are robust and without any mechanical complication, which allows them to adapt to the most severe working conditions.

The TEMEC Self-Centering Disc Valves are a useful, effective and precise way to automatically regulate the flow rates on demand and break high pressures in the pipes to the atmosphere with a minimum of civil works and without cavitation problems.