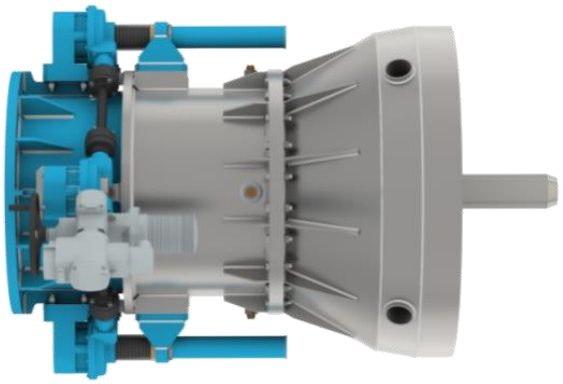
# FIXED CONE VALVES

## DN200-2400 PN (8” to 96”)
## up to PN40 (ANSI Class 300)



CAMU lenzi HYDROELECTRICS
www.camulenzi.com

# COMPANY PRESENTATION

## 00 HISTORY

Since 1968, the year of its foundation in Arco (Trento), CAMU is a leading manufacturer of machines and systems for water regulation and hydroelectric plants.In 1995, with the acquisition of Officine Meccaniche LENZI, historical and leading industry in Trento founded in 1860 and operating in the field of flood control, CAMU has implemented its technical, production and sales potential.

The company began its activities in the engineering industry with processing capacity in steel structures of various kinds and over time CAMU has increased its expertise in the environmental, civil, hydraulic and hydroelectric field.

CAMU is particularly active in customized solutions, and can offer products and services for innovative and tailor-made hydroelectric plants, thanks to the deep competence on engineering and hydraulics development applied to Pelton, Kaplan, Francis, Archimedean Screws and Turbines .

## 01 OFFICES

**TECHNICAL SALES OFFICE**

The sales managers analyze the Client's request and specifications to pre-design equipment and quoting. Our team is able to offer the best solutions.

**DESIGN AND R&D OFFICE**

After a first look to the specifications and job order, our engineers design and create construction drawings according to the regulations, using the latest 3D software such as SolidWorks and AutoCAD.

**JOB ORDERS MANAGEMENT OFFICE**

Our engineers lay down a project schedule based on the drawings after they've been revised and approved by the Customer. The purchasing of materials, welding, machining and the assembly process are defined to reach the quality.

and delivery time requested by the Client. If the Customer has any queries after the order, our project management team will take care of any request

## 02 PRODUCTION & ERECTION ON SITE

**WELDING DEPARTMENT**

Our welding team is composed by certified welders up to a maximum of 200 mm of thickness of various materials (such as steel, stainless steel, aluminum, duplex, hardox). We have different kind of welding machines available (wire welding, TIG, MIG and electrode) everything moved with a crane with a maximum weight load of 60 Tons.

**MECHANICAL MACHINE TOOLING DEPARTMENT**

Thanks to the extensive mechanical knowledge acquired, our machine tooling team is capable of handling materials with high precision. Combining this with the wide range of sluice gates that we produce with our machines, we can offer a complete solution to our Customer.

**ASSEMBLY**

The experience of our assembly team ensures high quality finished products.

## 03 CERTIFICATION

CAMU is provided with the certification **ISO 9001:2008.**

The guideline quality policy is to provide customer satisfaction through constant actions implemented to prevent any cause of dissatisfaction. For this purpose, UNI EN ISO 9001:2008 is an accurate guide for the operation and allows a precise measurement of all factors that can affect the quality of products offered to our customers.

**CAMU has completed the UNI EN 1090-1:2012 Class: Exc 2 certification for marking the structural civil component in steel.**

# FIXED CONE VALVES

## 04 APPLICATION

The primary use of the fixed cone valves is for energy dissipation at the end of penstocks under high heads. Their main feature is the high discharge capacity associated with a simple design.

Although the valve is designed for free discharge into the atmosphere, it can be used also for submerged-discharge operation. Unless spray is objectionable, free discharge into the atmosphere poses no particular problems.

Providing correct and sufficient aeration, ducted discharge and discharge with horizontal dissipating chamber are allowed.

CAMU can provide also valves incorporating an integral steel hood that concentrates the discharge spray into a “jet”. These hoods reduce the spray while also providing satisfactory dissipation of energy.

## 05 OPERATION

A cylindrical shutter, hydraulically or electrical actuator operated, slides on the body, adjusting the discharge openings. The 45° cone pointed upstream ensures an expanding discharge pattern, with a good aeration and a big dispersion of the energy.

The shutter is non subjected to unbalanced pressure and therefore its operation does not require big forces, resulting in economic size of hydraulic cylinders.

## 06 PRODUTION RANGE

Nominal diameter: from 200 to 2400 mm ( 8” – 96”)

Nominal pressure: up to 40 bar (580 PSI)

# COMPONENTS AND TECHNICAL SPECIFICATION

## 07 BODY

The body is a carbon steel cylinder, whose inside diameter is the same as of the upstream pipe or conduit to which is attached by a bolted flanged connection.

Inside the cylinder, radial ribs extending downstream support the concentric 45° cone. On the external edge of each radial rib, a stainless steel guide provides support for the shutter bronze shoes.

The apex of the cone is pointed upstream. On the periphery of the cone downstream end there is a stainless steel seat ring. holding a rubber seal. This seat mates with the sealing surface on the shutter. The rubber seal is replaceable.

Depending on valve arrangement, the upstream seal can be made with with a rubber seal working in the closed position against a stainless steel seat ring on valve body, alternatively a dynamic sliding seal can be made with a u-cup ring.

## 08 SHUTTER / GATE

The shutter is a carbon steel cylinder, acting as a cylindrical gate. Two hooks on the external surface are for connection with the hydraulic cylinder rods. A third smaller hook is for connecting the position indicator rod.

The upstream end of the shutter is provided with a rubber seal which slides and seals on the stainless steel ring of the body. The rubber seal is replaceable by loosing the retaining ring.

The downstream end of the shutter is provided with a stainless steel seat which gets in contact with the rubber seal of the body. Again the rubber seal is replaceable at job site by disassembling retaining ring.

Brass pins, in the number of two for each body rib, act as shutter shoes sliding on the body stainless steel guides. The pins have a threaded portion for adjusting the contact during the valve life, or even replaceable at job site.

## 09 CORROSION PROTECTION

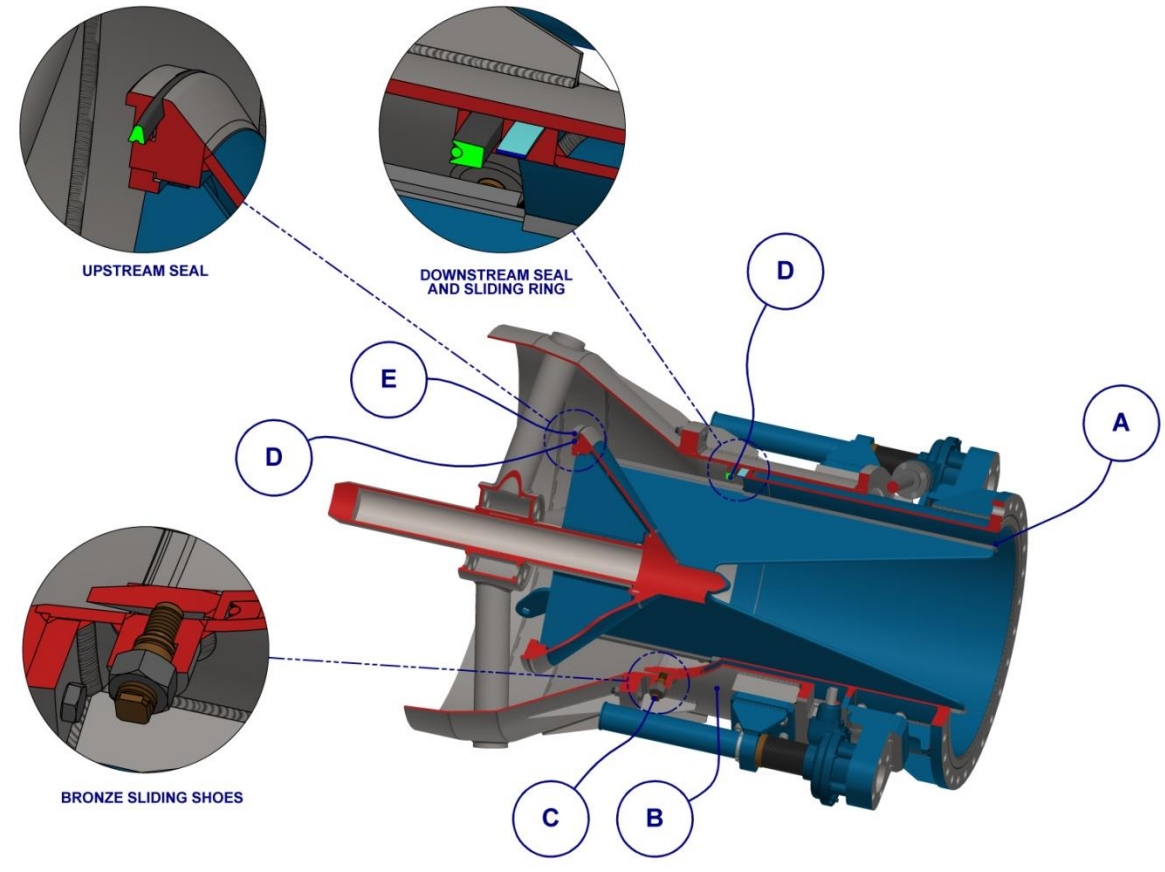
The standard painting cycle for all surfaces in contact with the water is as follows:
- grind blasting grade SA 2 ½.
- two coats of epoxy coal even suitable for drinking water.

# COMPONENTS AND TECHNICAL SPECIFICATION

## 10 STANDARD MATERIALS

A. BODY carbon steel for cylinder. ribs. cone; stainless steel for seat rings and for guides
B. SHUTTER carbon steel with stainless steel seat ring
C. BRONZE SHOES G-Cu-Sn12
D. UPSTREAM/DOWNSTREAM SEALS neoprene 60- 70 shore
E. SCREWS FOR SEAT RINGS stainless steel OTHER SCREWS zinc coated

**NOTE : OTHER MATERIALS ON REQUEST**



# COMPONENTS AND TECHNICAL SPECIFICATION

## 11 VALVE ACTUATOR

Fixed cone valves can be actuated either with twin-screw electric actuator and dual hydraulic cylinders.

***ELECTRIC ACTUATOR***

The mechanical screw stem actuating system will consist of two screw stem actuators mounted diametrically opposite and connected to a miter gearbox. Inter-connecting shafting is connected by flexible couplings.

Actuators are designed for valve operation for modulating, intermittent duty with up to 1.200 starts per hour. Motors are totally enclosed IP67 type. Valve actuators are equipped with thermoswitches, limit switches, torque switches, and handwheel for manual operation. On request actuator can be equipped with 04 – 20 mA electronic position transmitter.

***HYDRAULIC ACTUATOR***

Cylinders work in parallel and are flanged to the body flange, upstream on the sides of the pipe.

The shutter position is indicated by a simple index/ruler system. The cylinder and indicator rods are chrome plated. Adjustable packing ensure perfect sealing.

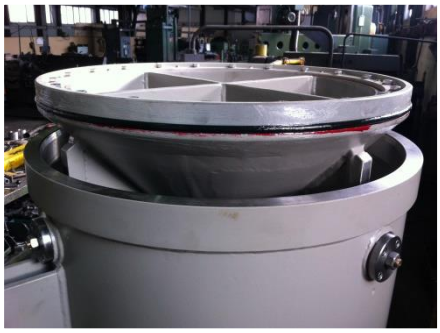
## 12 AUTOMATIC DISCHARGE CONTROL

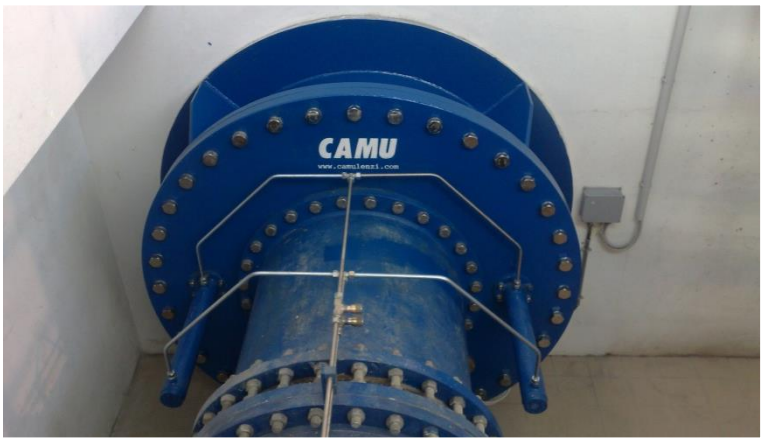
Upon request, an integrated automatic control can be installed for fine discharge regulation.

The system is made of:

- discharge meter. either ultrasonic sensor or Pitot type
- transducer of shutter position
- end-of-travel proximity switches
- hydraulic power pack
- electric cabinet, PLC technology

The electric signals from discharge meter and from position transducer are compared in the cabinet against a set point. Commands are sent to the hydraulic cylinders through the power pack to accordingly adjust the shutter position.

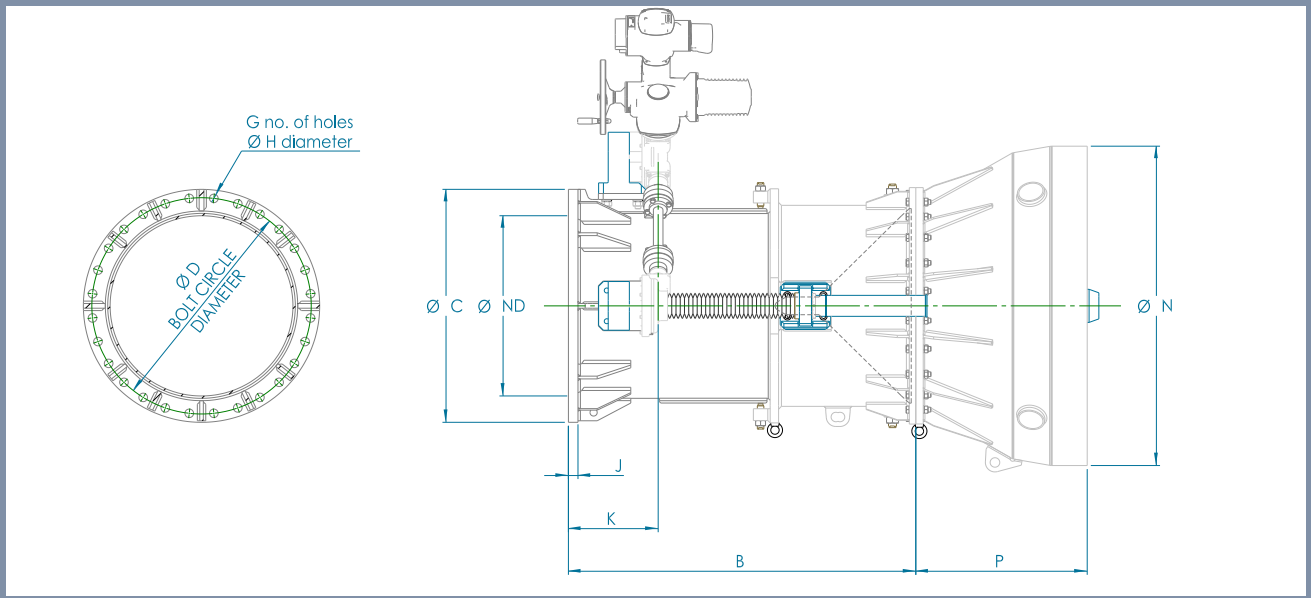




# COMPONENTS AND TECHNICAL SPECIFICATIONS

## 13 FIXED CONE VALVE DIMENSION

| ND | STROKE | B | K | C* | D* | G* | H* | J* | Approx. weight | *RING JET VALVE* N | P |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *[in]* | *[in]* | *[in]* | *[in]* | *[in]* | *[in]* | *[in]* | *[in]* | *[in]* | *[kg]* | *[in]* | *[in]* |
| 8 | 5 | 28 | 8,5 | 13,5 | 11,75 | 8 | 0,87 | 0,69 | 120 | 14 | 7,5 |
| 10 | 6,3 | 31 | 8,5 | 16 | 14,25 | 12 | 1 | 0,69 | 170 | 17,5 | 9,4 |
| 12 | 7,6 | 36 | 10,5 | 19 | 17 | 12 | 1 | 0,69 | 220 | 21 | 11,3 |
| 14 | 8,8 | 39 | 10,5 | 21 | 18,75 | 12 | 1,12 | 0,82 | 280 | 24,5 | 13,1 |
| 16 | 9,5 | 40 | 10,5 | 23,5 | 21,25 | 16 | 1,12 | 1 | 380 | 28 | 15 |
| 18 | 10,5 | 45 | 13 | 25 | 22,75 | 16 | 1,25 | 1,06 | 500 | 31,5 | 16,9 |
| 20 | 12 | 49 | 13 | 27,5 | 25 | 20 | 1,25 | 1,12 | 595 | 35 | 18,8 |
| 24 | 14 | 53 | 13 | 32 | 29,5 | 2 | 1,37 | 1,25 | 860 | 42 | 22,5 |
| 30 | 15 | 58 | 15 | 38,75 | 36 | 28 | 1,37 | 1,5 | 1.270 | 52,5 | 28,1 |
| 36 | 18 | 65 | 15 | 46 | 42,75 | 32 | 1,62 | 1,62 | 1840 | 63 | 33,8 |
| 42 | 21 | 71 | 15 | 53 | 49,5 | 36 | 1,62 | 1,75 | 2.570 | 73,5 | 39,4 |
| 48 | 24 | 80 | 17 | 59,5 | 56 | 44 | 1,62 | 1,75 | 3880 | 84 | 45 |
| 54 | 27 | 86 | 17 | 66,25 | 62,75 | 44 | 1,87 | 2,12 | 5.150 | 94,5 | 50,7 |
| 60 | 30 | 94 | 19 | 73 | 69,25 | 52 | 1,87 | 2,25 | 7150 | 105 | 56,3 |
| 66 | 33 | 101 | 19 | 80 | 76 | 52 | 1,87 | 2,5 | 8.450 | 115,5 | 61,9 |
| 72 | 36 | 109 | 21 | 86,5 | 82 | 60 | 1,87 | 2,62 | 9700 | *Separate hood advised* | |
| 78 | 39 | 118 | 23,5 | 93 | 89 | 64 | 2,12 | 2,75 | 11.050 | | |
| 84 | 42 | 125 | 23,5 | 99,72 | 95 | 64 | 2,12 | 2,75 | 13500 | | |
| 90 | 45 | 131 | 23,5 | 106,5 | 102 | 68 | 2,37 | 3 | 15.000 | | |
| 96 | 48 | 140 | 25,5 | 113,25 | 108,5 | 68 | 2,37 | 3 | 18000 | | |
| * C207 CLASS D (175 psi) | | | | | | | | | | | |



## 14 SIZING

The size of the valve is determined by the minimum available net head at the valve inlet and the maximum discharge flow required. Net head is the distance between the head water elevation and the centerline of the valve (or if the valve is submerged – the tail water elevation) less the inlet, conduit, bend or other friction losses. The graph below shows the maximum calculated discharge for valve sizes 8 inch to 108 inches, based on net heads up to 500 feet.

This graph is based on an average coefficient of 0.85 under free discharge, although some field tests shows a slightly higher value for the large size valves. For ring-jet valves coefficient of discharge shall be reduced to 0.78. Maximum discharge values for other heads can be determined from the formula:

$$Q = C_d \cdot A \cdot (2gH)^{0.5}$$

where

Q = Cubic feet per second (cfs)

Cd = coefficient of discharge with valve full open = 0.85

g = acceleration due to gravity = 32.2 feet/sec^2

H = net head in feet.

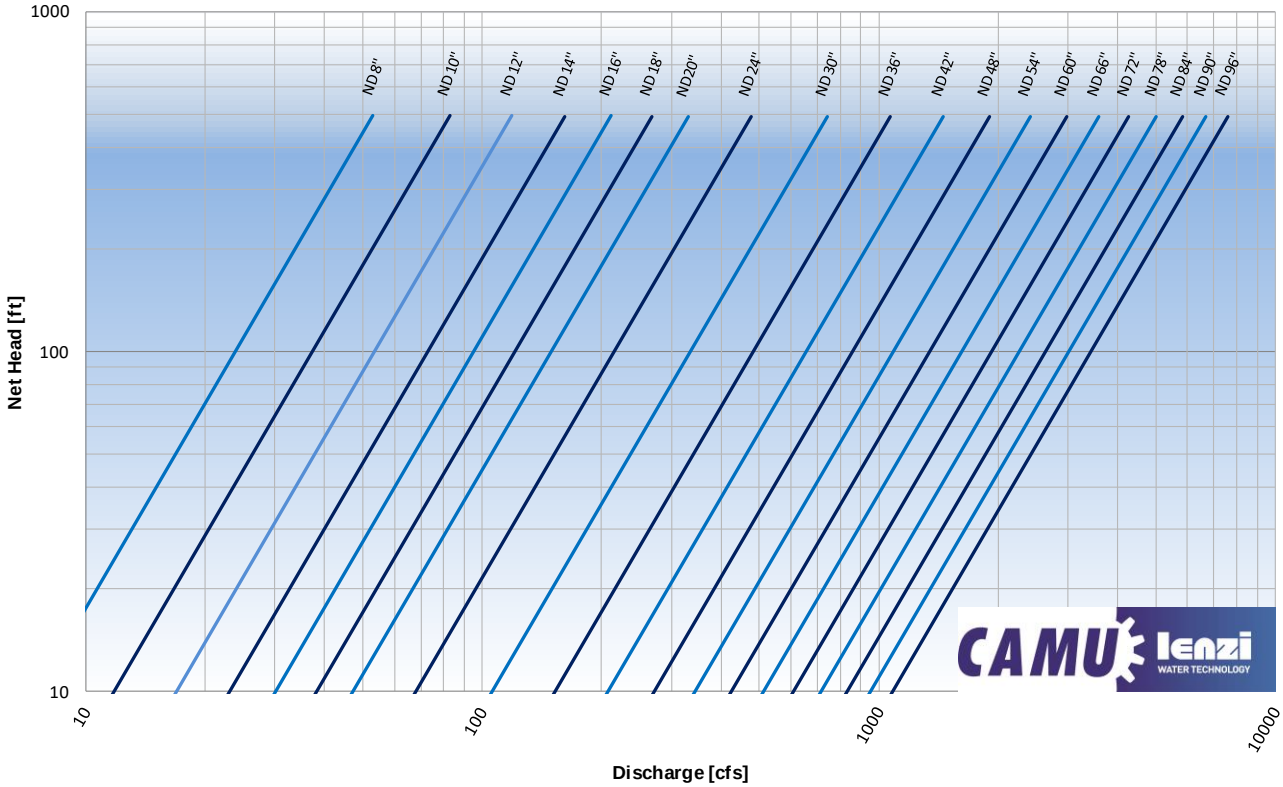
A = area of valve in square feet (based on nominal inside diameter).

Using a coefficient of discharge of 0.85, this formula can also be expressed as:

$$Q = 0.85 \cdot \pi \cdot D^2 \cdot (2gH)^{0.5} = 5.345 \cdot D^2 \cdot H^{0.5}$$

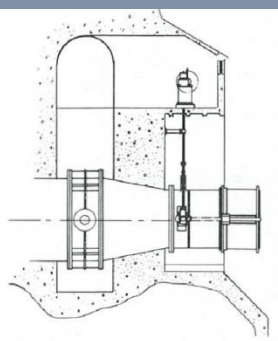
Where D is the diameter of the valve in feet

### VALVE SELECTION CHART

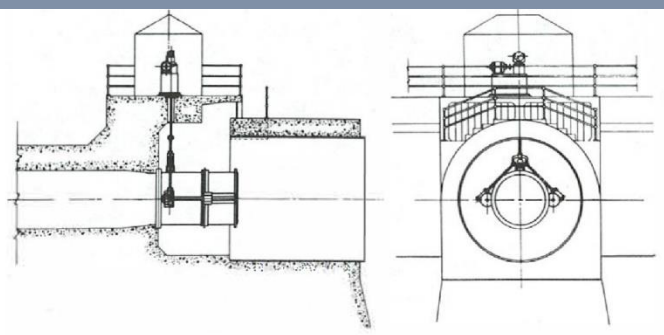


# 15 INSTALLATION

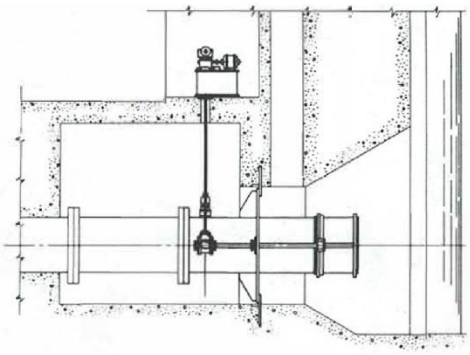
In cases where it is desirable to confine the normal expansion of the discharge jet, the valve is located in the chamber or stationary hood. It is also maybe installed for discharge directly into a tunnel. The application sketch below shows some of the arrangement generally used.



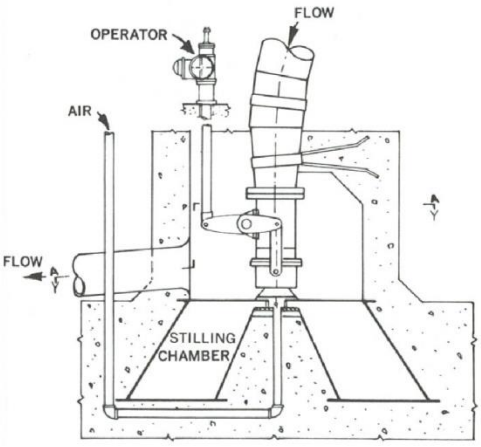
Free Discharge



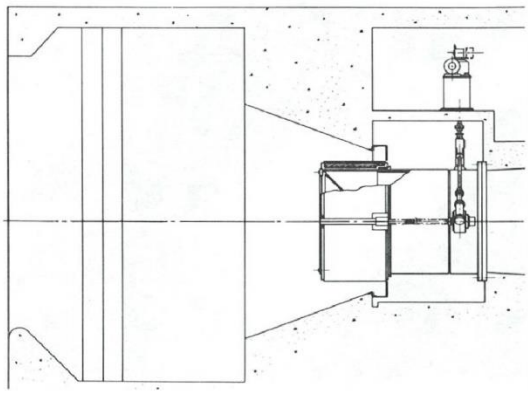
Ducted Discharged



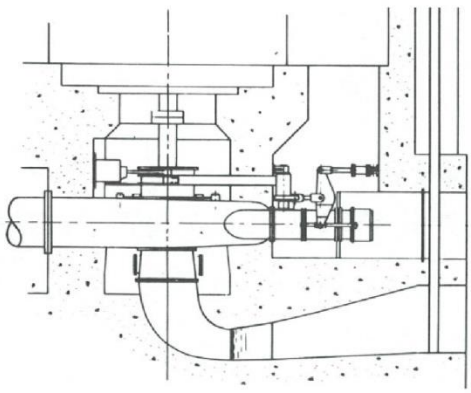
Horizontal Submerged Discharge




Vertical Submerged Discharge



Subfreezing temperatures installation



Turbine Relief installation


GERMANY
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SWITZERLAND
INNSBRUCK
ITALY
BOLZANO
ARCO
TRENTO
GARDA LAKE
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BOLOGNA
GENOVA
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**VALVES – GATE & PENSTOK - TRASH SCREEN MACHINE - METALWORK**

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