Canadian Stream Valve

FIXED CONE VALVE

(JET HOLLOW VALVE)

SERIES 10 FIXED CONE VALVE

FIXED CONE VALVE

The Fixed cone Valve is typically operated by a manual, electric or hydraulic actuator mounted above the bevel gear. The bevel gear transmits torque to the drive shafts on either side, which operate through the actuator on each side, turning the operating screw which slide the cylinder gate forward to restrict or shut-off flow, and backward to open the valve for full flow. In the open or partially open position, flow is directed radially outward around the deflector head. The resulting spray pattern effectively dissipates hydraulic energy and allows a free flow discharge without erosion damage to the surrounding area.

Valves are proven performers in applications requiring control of water under free discharge (into the atmosphere). The radial discharge capacity of the valve eliminates the need to overcome hydrostatic forces common to most valves, and has made the fixed cone valve the leader among balanced free-discharge valves. The Fixed cone valve is also lower in cost than any other type of balanced free-discharge valve. The low-maintenance valve provides efficient free-discharge operation for high and low heads, and operates through the entire stroke range without vibration or pitting. The valve's high coefficient of discharge allows the use of smaller than line-size valves, reducing construction costs. The cylinder gate that seats against the fixed cone requires little effort to operate, and is the only moving part of the assembly in contact with water flow.

FEATURE

- Large flow rate compared with other control valves, the discharge coefficient Cd can reach 0.66-0.84;
- Simple structure and light mass, the entire transmission device is set out of the valve body so that easy to maintenance;
- The operation is smooth with small opening force and closing force. The valve is suitable for small and medium irrigation engineering without power supply; also it can be driven by manual, electric, pneumatic, and hydraulic to achieve remote control easily or unattended operation;
- When use the valve for discharging, the shape of the jets is like a horn, if the condition permission, adopt the aerification when the jet diffusion in the air. Otherwise adopt the submerge jet, it also can get the good result of energy dissipation;
- The valve body made by the advantage anti-corrosion material, so the valve can be submerged in the liquid permanently;
- The flow is guided by the inner vanes, in order to decrease the vortex and the vibration;
- The valve seat is made by the high strength ally, which possess both the effect of the metal-metal sealing and the metal-rubber soft sealing;

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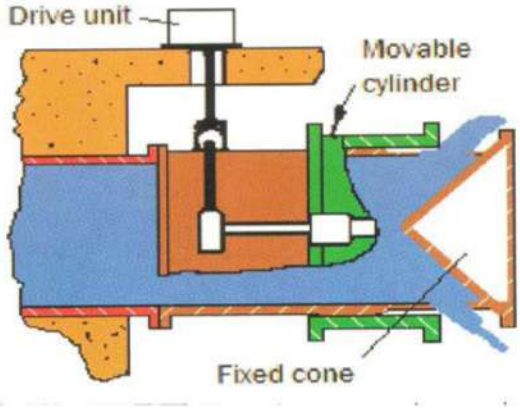
STRUCTURE AND PRINCIPLE

Since it includes a back ward cone, so the valve called fixed cone valve, also named cone valve briefly. It is consisted of the valve body, guiding vane, fixed cone, transmission mechanism and the controlling sleeve. The guide rails are assembled on the valve body or alternatively, a layer of wear-resistant material weld overlaying on valve body. The controlling sleeve is moved by drive unit, in order to change the area of the flow passage. The regulation characteristic is near linear.

Fixed cone valve 3D chart



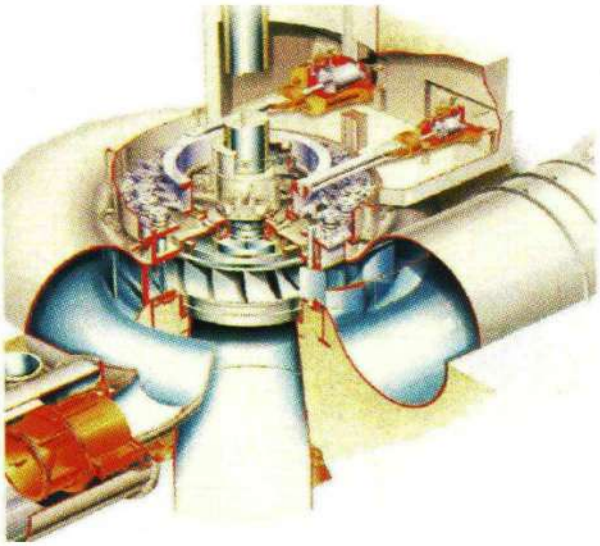
Fixed cone valve schematic diagram

APPLICATION

- Power
- Flood control
- Irrigation
- Storm water
- Turbine bypass
- Water aeration
- Treatment plant discharge

FIXED CONE VALVE

TYPICAL APPLICATION



Bypass of turbine

Dam discharge

Equipped with hood to prevent diffusion

Lined steel in concrete culvert to prevent diffusion

The oblique installation for energy dissipation

Free discharge at termination

FIXED CONE VALVE

TECHNICAL DATA

Technical Parameter

DN (mm)	PN (MPa)	Test Pressure		Temperature	Medium
		Shell Test (MPa)	Closure Test (MPa)		
300～3000	0.6～2.5	1.5×PN	1.1×PN	0～80℃	Water, Water included silt, etc.

Standard

Test and Inspection	Flange Dimension	
GB/T 13927	Steel Flange	GB/T 90015
ISO 5208/EN 12266 (DIN 3230 Parts)	Steel Flange	BS EN 1092-2
Note: If other standards are chosen, please mark out in the contract or technical agreement.		

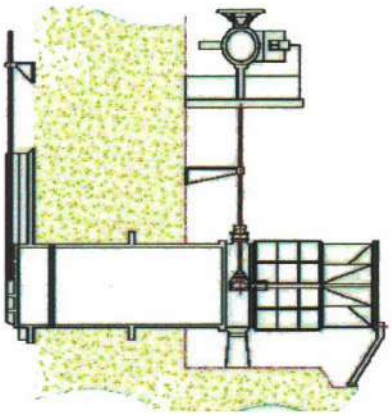
Part list and Material

No.	Item	Material
1	Body	Carbon steel / Cast steel / Stainless steel
2	Sleeve	Carbon steel / Stainless steel
3	Fixed Cone	Carbon steel / Cast steel
4	Seal	EPDM+Metal
5	Gear case、Worm-gear case	Carbon steel / Ductile Iron

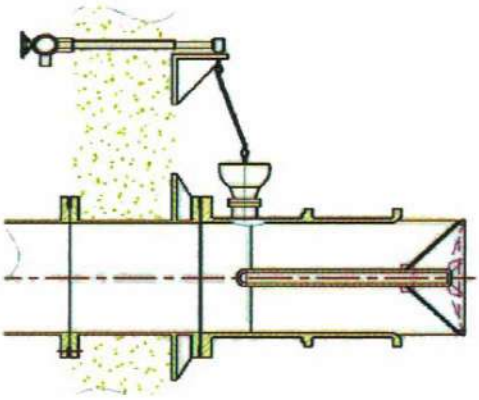
FIXED CONE VALVE

INSTALLATION TYPE

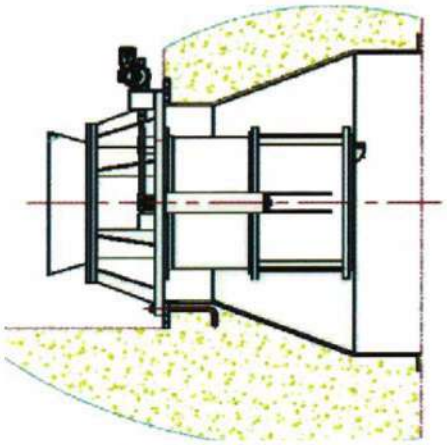
The fixed cone valve has two fundamental installation types which are discharge to atmosphere and submergence. It can be mounted with horizon, vertical or incline. Some typical installation types are listed as follow:



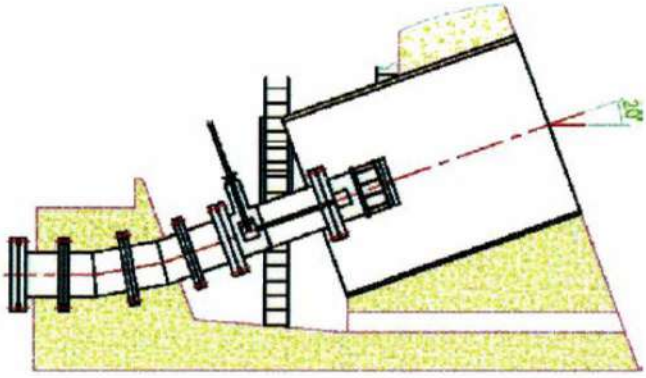
Two points support



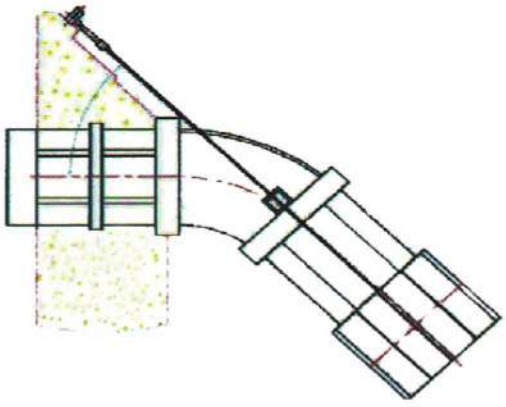
Mounting with hoisting and cross wall



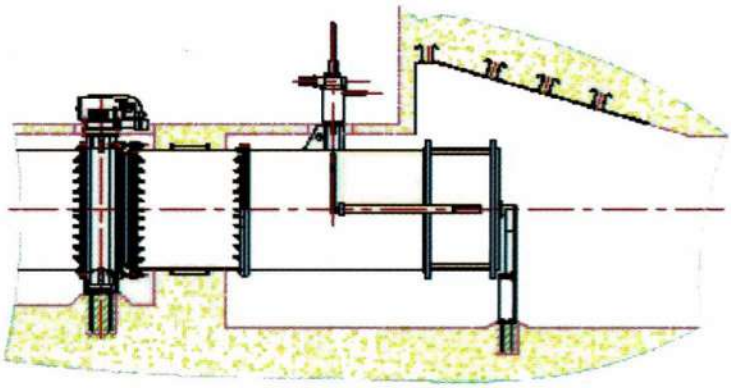
Submerged mount



Up tilt mounting



Down tilt mounting



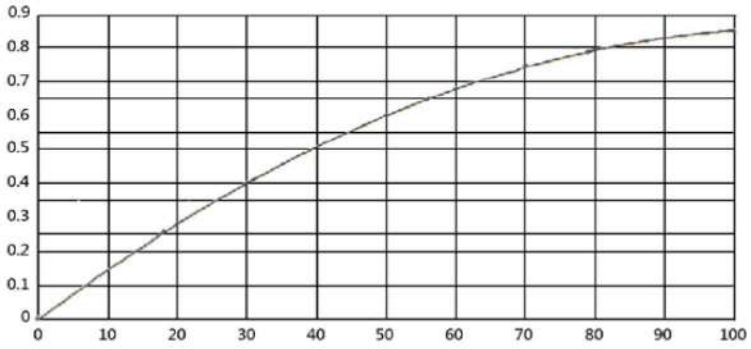
Install in tunnel with flange and support

FIXED CONE VALVE

INHERENT CHARACTERISITICS

Discharge coefficient

The discharge coefficient Cd is the inherent characteristics of valve, which represent the flow capacity and regulation characteristics. It is a dimensionless number and can be converted from flow resistance coefficient. The conversion formulas are different under the condition of atmosphere or submerge. The regulation characteristic is similar to linearity such as upper chart. Each working condition has different discharge coefficients listed as follow:

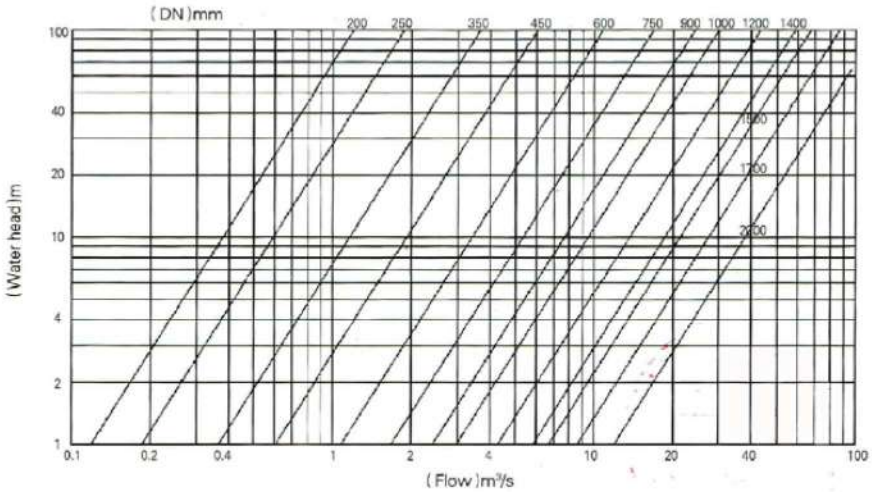


Discharge coefficient for each working condition

Working Condition	Atmosphere without hood	Atmosphere with hood	Submerge without hood	Submerge with hood
Cd (Discharge coefficient)	0.84	0.67	0.82	0.66

Flow

According to discharge coefficient, the flow ability of the fixed cone valve in atmosphere without hood is referred to below chart.



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SIZING INFORMATION

Application medium;

Working temperature;

Maximum working pressure;

Minimum pressure difference @ max flow

Selection by flow

Based on below formula, only need know the maximum required flow rate and the pressure, the DN of the valve can be calculated.

$$Q=C_d A\sqrt{2gH}$$

Q- Flow rate, m3/s;

g- Gravity acceleration, here is 9.81m2/s;

A- The area of the valve intake, A= π D2/4， D from the DN of the valve, the unit is m.

H- The pressure difference. The valve inlet total pressure should be minus the outlet static pressure which takes the valve centerline elevation as the baseline.

Cavitation Check

The allowable cavitation coefficient σ of fixed cone valve is 0.4. If exceed the value, the air supply or multiple level energy dissipation should be adopted. The cavitation would be occurring with higher possibility if valve with hood.

$$\sigma=\frac{\frac{P-P_V}{\rho g}}{\frac{V^2}{2g}}$$

P- Absolute pressure of outlet, Pa;

PV- Saturated vapor pressure at working temperature, 2338.8 Pa at 20 ℃;

ρ - Density, water is 1000Kg/m3;

g- Gravity acceleration, here is 9.81m2/s

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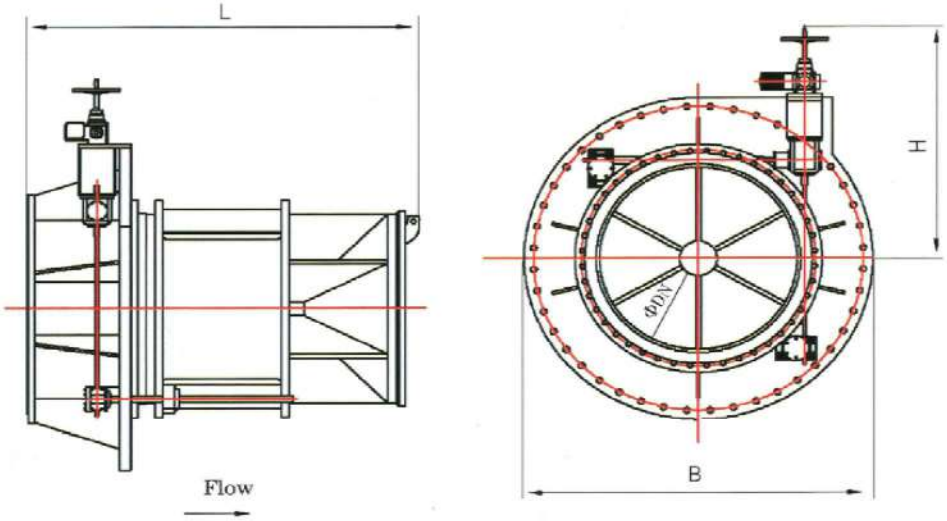
DIMENSION



DN	L (mm)	B (mm)	H (mm)	Estimated Weight (kg)
200	613	463	460	1000
300	762	669	500	1800
350	1380	1020	650	2700
400	1054	1200	800	3400
500	1250	1300	920	4800
600	1300	1400	950	7000
800	1730	1630	1200	9500
900	1772	1683	1300	10200
1000	1900	1949	1400	11300
1200	2400	2205	1500	12000
1400	2600	2470	1600	13500
1500	2800	2580	1660	14500
1800	3250	3010	1900	17000
2000	3400	3504	1950	18700
2200	3620	3700	2000	22500

*More dimension specifications are available on request.