HYDROCORE LIMITED

The smart solutions for your business

Hydrocore™ Angular Pressure Control Valve

PRESSURE CONTROL VALVE

The Hydrocore™ Pressure Control Valve (**PCV**) maintains a constant downstream pressure 'Pd' irrespective of changes to the down stream pressure. The pressure control valve setting can be changed multiple times as conditions change and changes are required.

PRINCIPLES OF OPERATION

The PCV reduces the upstream pressure 'Pu' by a fixed ratio 'R' to a required downstream pressure 'Pd', irrespective of the valve's flow rate. The valve's piston is in equilibrium state when the required pressure reduction ratio exists.

FEATURES AND BENEFITS

- Accurate, stable & smooth control of pressure and flow regulation
- Can suit all valve sizes and pressure ratings
- Suitable for low flow (high velocity)
- Reduces noise and vibration
- Improved anti-cavitation on valve seat area
- Increased longevity of valve lifespan

ALTERNATIVE CONTROL & ACTUATION

Various types of actuators, could be applied for the purpose of controlling flow or pressure.

MINIMAL MAINTENANCE

The 'Hydrocore™ PCV requires minimal maintenance, consisting of an annual cleaning and greasing of the sealing surfaces inside the valve's bore.

RECOMMENDED RATIOS

PRESSURE	MAXIMUM
0 - 20 bar	5:1
20 - 40 bar	4:1
40 - 60 bar	3:1
60 - 80 bar	2.5:1
80 - 100 bar	2:1
100 - 120 bar	1.5:1

MEDIA

Liquid and gas with low content of suspended solids.

PIPE SIZES

2"(50NB) to 16"(400NB)

FLANGES

SABS 1123, BS4504, BS10,
ASME B16.34, ANSI B16.5

COUPLINGS

Tapered shoulders and other pipe couplings

PRESSURE

Up to 3750 psi (25MPa) pressure rating.

TEMPERATURE RATINGS

Up to 85°C with standard seals.

PH LEVELS & CHLORIDES

Parts of the valve are made from stainless steel and can withstand a low level of chlorides.

INSTALLATION POSITION

The valve can be installed in any position.

SEATING

Seat Leakage - B16.104 class III, IV, V or VI, depends on valve type and application.

For more information please visit our website www.hydrocore.tech

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ADVANTAGES OF THE HYDROCORE™ VALVE OVER BALL VALVES

Crippled gearboxes, cavitation from high differential pressures and longer lead times are three serious flaws of ball valves that the Hydrocore™ valves are spared from.

GEARBOX MALFUNCTIONING

A common frailty of ball valves occurs in chilled water sections, where condensation enters the gearbox, and removes the grease within. This in turn causes the gearbox internal parts to corrode and prevents the ball valve from isolating. In contrast, the Hydrocore™ and NGD™ isolating valves have fewer working parts than ball valves, are hydrostatically balanced and do not require a gearbox. They, therefore have no such flaw, even when these valves have been inactive for a long period of time. This was evident when an audit of the cooling coils was conducted on the VCR below 120 Project. Every single NGD™ and Hydrocore™ isolating valve seated completely, even after many years of standing idle in the system. Some NGD™ isolating valves with broken spindles had to be isolated by means of a vice grip, and even under these conditions, the valves could be isolated.

BALL VALVE ILLUSTRATION

HIGH DIFFERENTIAL PRESSURES

When the ball valve is in a closed position and there is a high differential pressure between the upstream and downstream, and the valve is initially opened, the seat of the ball valve cavitates tremendously. Within a few operations the ball valve has to be decommissioned and the body and ball seat need to be repaired or replaced.

In contrast, both the NGD™ and Hydrocore™ isolating valves have a natural anti-cavitation area above the seat preventing this from happening. Furthermore, the moving parts of Hydrocore™ and NGD™ valves are manufactured from stainless steel. Their body seat is also made from stainless steel thus increasing the valves durability and longevity.

Furthermore, in the audit, it was proven that the NGD valve did not cause excessive flow loss and after some simple maintenance on the cooling coils was completed, all the cooling coils operated at the correct flow.

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HOW MUCH DOES IT COST?

This question is probably the only question posed to any marketing personnel when a high pressure valve is being inquired. However, there are several more questions that should be asked when considering a high pressure valve in a mining setting:

- Valve Flow Co-efficient (Cv)
- Simplicity of Design
- Maintenance and Servicing
- Valve Longevity

Below is a comparison of these points between the Hydrocore™ Isolating Valve versus a Standard Isolating Globe Valve (**SIGV**)

VALVE FLOW CV

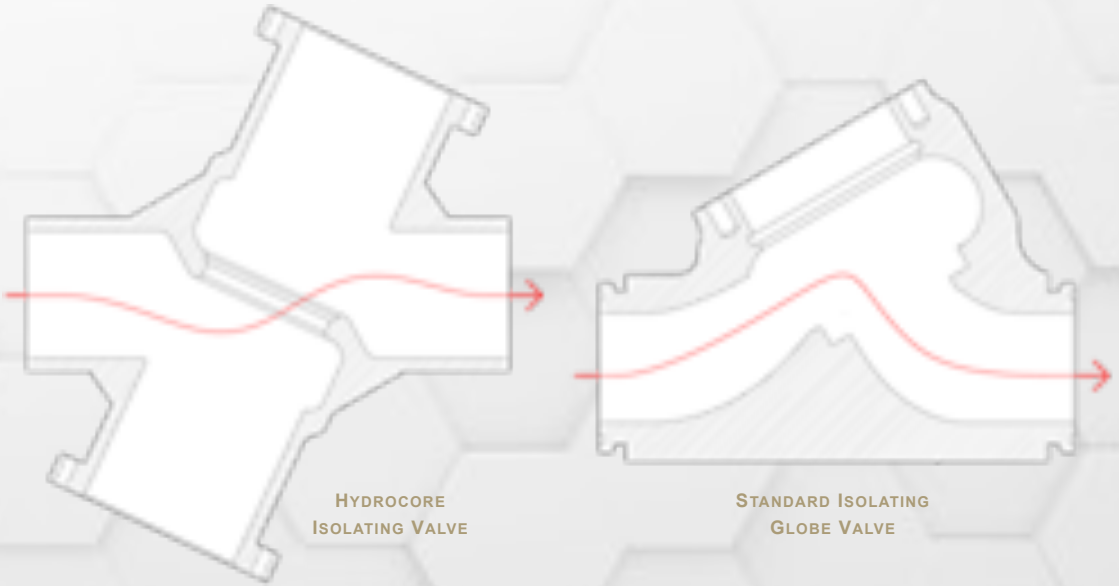
One of the primary costs after the initial capital outlay is running costs, especially in a pump station. A valve's Cv determines the pressure drop between the inlet and outlet ports of the valve. The lower the pressure drop the higher the Cv, which in turn results in lower power consumption of the pump.

We have modelled a SIGV to determine its Cv (see figures below).

The table below shows the power penalty cost of a Hydrocore Isolating Valve versus a SIGV.

As is evident, the cost savings using a Hydrocore Isolating Valve versus a SIGV are astronomical even within the first couple of years. Assuming that the price of electricity is not going to go down in the future, those cost savings will only increase.

PARAMETERS	UNIT	HYDROCORE	SIGV
Nominal Working Pressure	Bar	100	100
Flow Rate	Lit/Sec	106	106
Flow Coefficient	**Cv**	**1086**	**360**
Cost of penalty per hour	R/kWh	0.82	0.82
Cost of penalty per hour	$/kWh	0.06	0.06
Pump efficiency (%)	%	84%	84%
RESULTS	**UNIT**	**HYDROCORE**	**SIGV**
Differential Pressure Losses	Bar	0.166	1.515
Valve Power Losses	kW	1.942	17.673
Annual Penalty (operating 24 hours per day)	**Rand**	**13,950**	**126,947**
	USD	**996**	**9,068**



HYDROCORE ISOLATING VALVE

STANDARD ISOLATING GLOBE VALVE

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SIMPLICITY OF DESIGN

A complicated valve is a valve that invariably will have issues once the valve is commissioned. The simpler the design the better. This should also be taken into account when considering a Hydrocore Isolating Valve versus a standard globe valve.

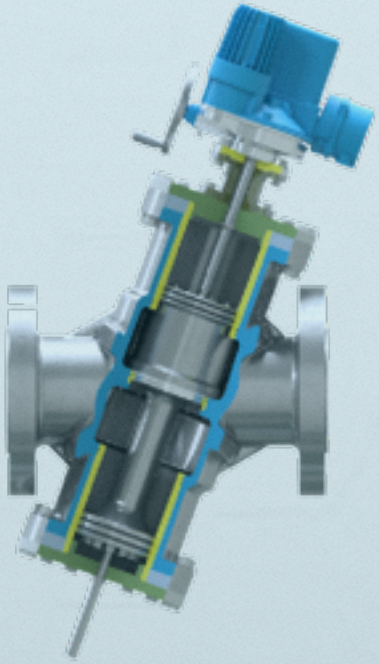
MAINTENANCE AND SERVICING

The more moving parts in any valve design the more prone the valve will be to constant maintenance and servicing. This is even more of a concern in a mining setting where conditions are not optimal for smooth valve functioning. The Hydrocore Isolating Valve is simple to maintain and service compared with a SIGV.

VALVE LONGEVITY

This point is built on the previous two points. If a valve keeps on breaking down and requires constant servicing and maintenance, then the valve is no more an asset. In fact, it is now an obstacle to the smooth running of a mine. Inevitably, the valve gets replaced by another brand. The Hydrocore Isolating Valve, if maintained on a regular basis, will be keep on functioning indefinitely.

ILLUSTRATION OF THE HYDROCORE VALVE WITH ONLY ONE MOVEABLE PART



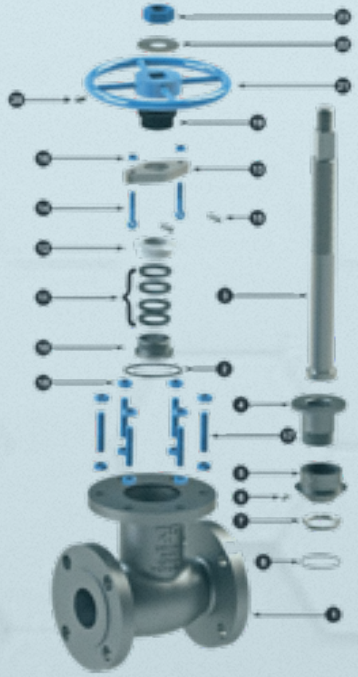
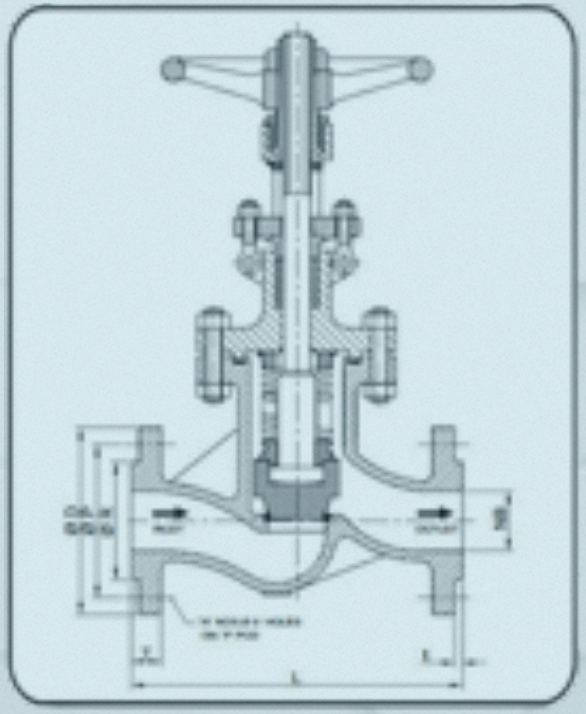
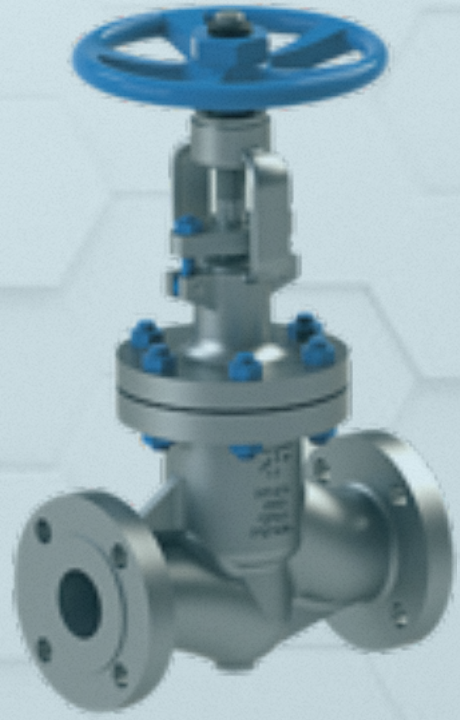


ILLUSTRATION OF A STANDARD GLOBE VALVES WITH THEIR MANY MOVEABLE PARTS





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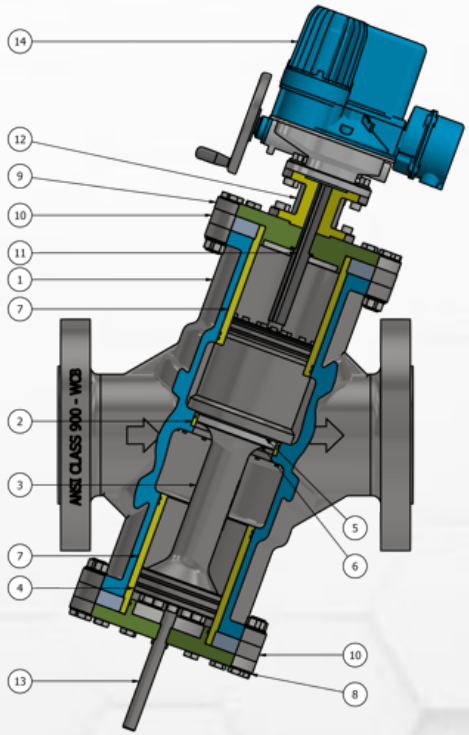
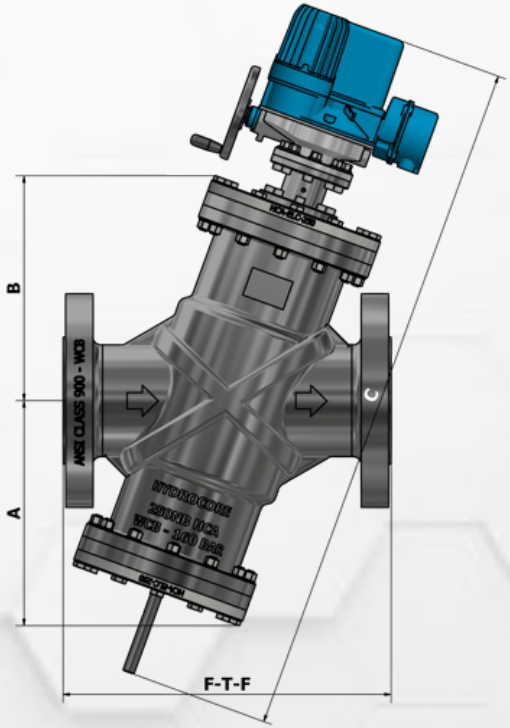
PARTS LIST

PART	DESCRIPTION	MATERIAL
1	Body	Mild Steel
2	Body Seat	Stainless Steel
3	Shuttle	Mild Steel
4	Shuttle Bottom	Stainless Steel
5	Shuttle Seat	Devlon / Polyurethar
6	Shuttle Seat Holder	Stainless Steel
7	Body Sleeve	Stainless Steel
8	Bottom Cover	Mild Steel
9	Top Cover	Mild Steel
10	Sleeve Cover	Mild Steel
11	Spindle	Stainless Steel
12	Adapter	Mild Steel
13	Limit Rod	Stainless Steel
14	Electrical Actuator	N/A

** Seal Material - Nitrile, Viton, EPDM, Polyurethane*





DIMENSIONS & WEIGHTS									FLOW COEFFICIENTS		PRESSURE & FLOW RATES	
NB	A	B	C	#150 F-T-F	#300 F-T-F	#600 F-T-F	#900 F-T-F	#1500 F-T-F	CV	ΔP (PSI)	MAX PRESSURE	MAX FLOW
150	381 mm	381 mm	1236 - 1363 mm	559mm / 229kg	559mm / 245kg	559mm / 270kg	610mm / 297kg	705mm / TBD	525	12.5	160 bar	117 ℓ/sec
200	494 mm	494 mm	1430 - 1590 mm	660mm / 405kg	660mm / 429kg	660mm / 460kg	737mm / 509kg	832mm / TBD	1086	1.4	160 bar	152 ℓ/sec
250	573 mm	573 mm	1570 - 1753 mm	787mm / 744kg	787mm / 778kg	787mm / 840kg	838mm / 891kg	991mm / TBD	1433	6.7	160 bar	233 ℓ/sec
300	652 mm	652 mm	1678 - 1885 mm	838mm / 1052kg	838mm / 1098kg	838mm / 1164kg	965mm / 1277kg	1130mm / TBD	1936	7.9	160 bar	337 ℓ/sec