HYDROCORE LIMITED

The smart solutions for your business

Hydrocore™ Non-Slam Check Valve

APPLICATION

The Hydrocore™ non-slam check valve prevents back flow while minimizing the water hammer effect during the valve's closure.

PRINCIPLE OF OPERATION

- The Hydrocore™ non-slam check valve gradually opens when the pump starts running.
- Gradually closes at a speed controlled by the valve's speed control orifice.
- Gradually reduces the flow through the valve while closing.
- Utilizes a spring to ensure a valve closed position.
- Can be installed in a horizontal or vertical position.

LONG LIFE & LOW MAINTENANCE

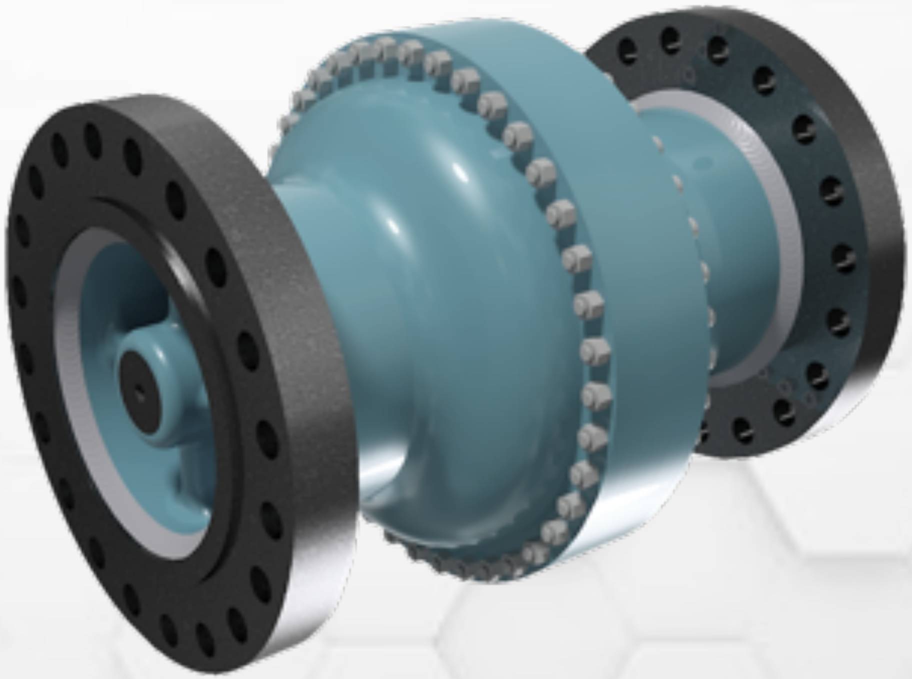
All moving parts and surfaces of the Hydrocore™ non-slam check valve are made from stainless steel in order to minimize corrosion and prevent scale buildup. The valve's shuttle is suspended by bronze bushes.

SPRING LOADED SHUTTLE

The Hydrocore™ non-slam check valve's spring maintains a closed valve position when the valve's upstream is empty. The spring also assists the closing function on reverse flow conditions.

CLOSING SPEED

The Hydrocore™ non-slam check valve speed is determined by the speed control orifice. Decreasing the orifice size slows down the closing speed and vice versa.



MEDIA

Liquid and gas with low content of suspended solids.

PIPE SIZES

1"(25NB) to 24"(600NB)

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.

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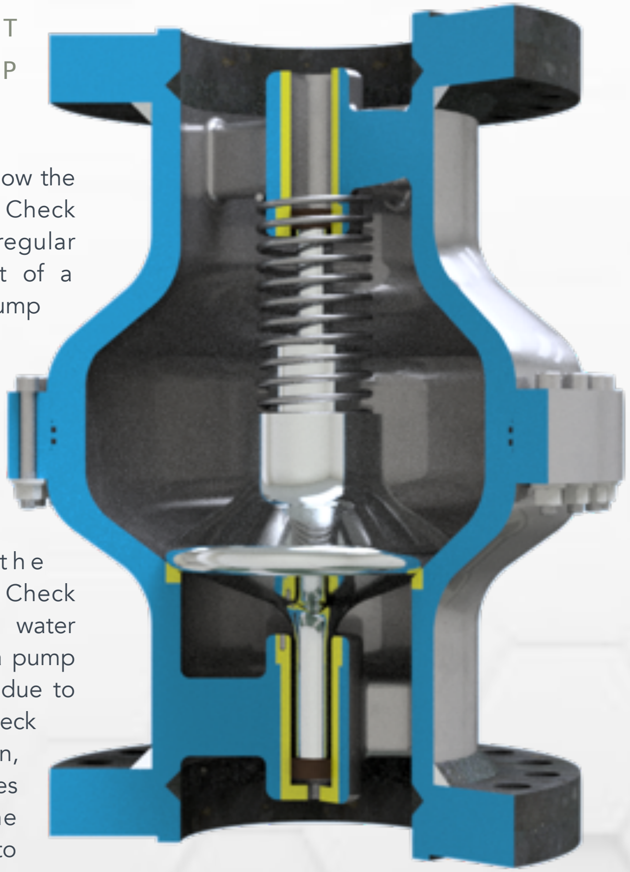
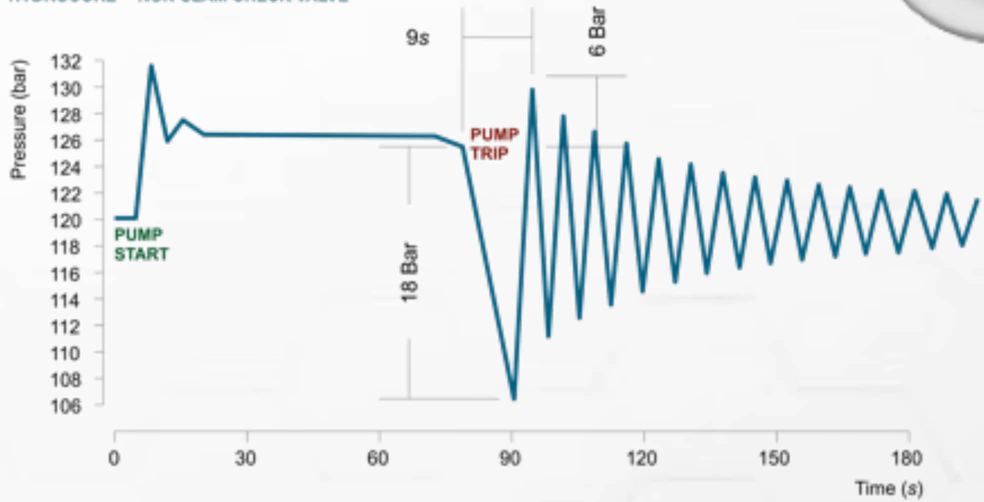
PRESSURE TRANSIENT FOLLOWING A PUMP TRIP

The graphs demonstrate how the Hydrocore™ Non-Slam Check Valve compares to a regular check valve in the event of a pump trip. When the pump trips it creates a water hammer in the system which can cause havoc if the shock is not minimized.

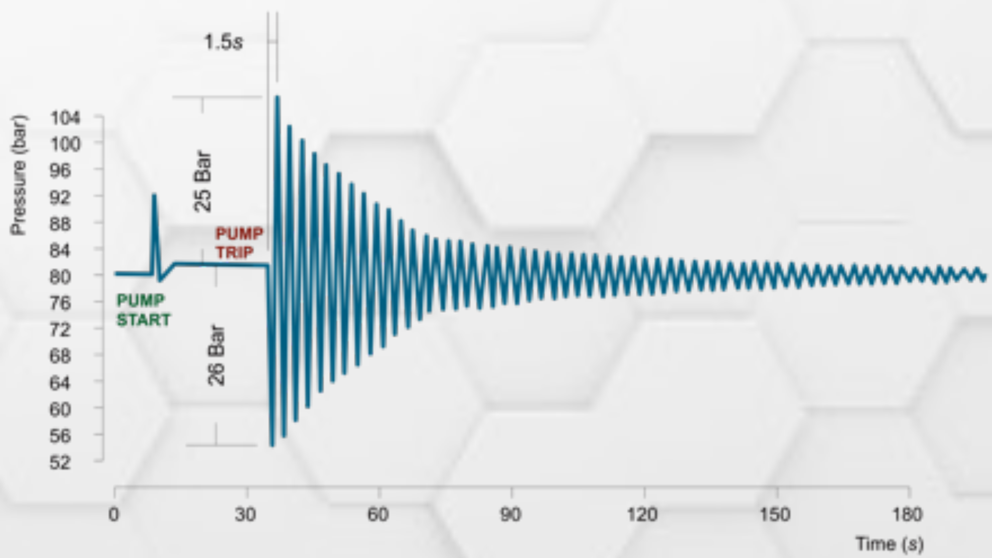
With the use of a speed control orifice in the Hydrocore™ Non-Slam Check Valve, the shock of the water hammer (in the event of a pump trip) is minimized greatly, due to the speed in which the check valve closes. In comparison, a regular check valve does nothing to alleviate the shock in the system due to the fact that the valve closes instantaneously.



HYDROCORE™ NON-SLAM CHECK VALVE



REGULAR CHECK VALVE



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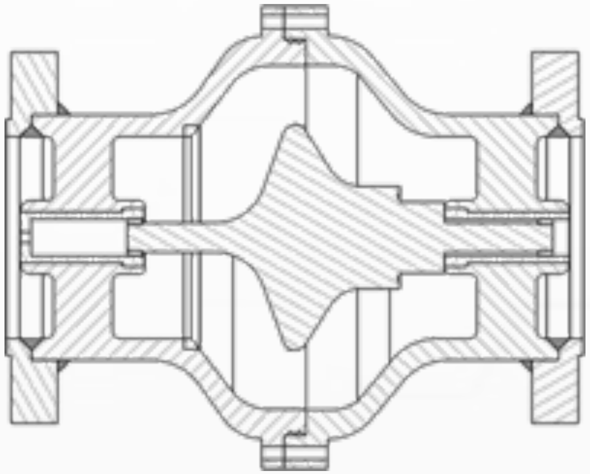
VALVE FLOW CV

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.

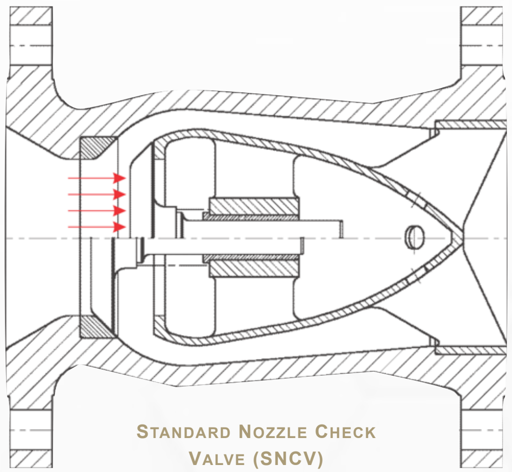
We have modelled a Standard Nozzle Check Valve (SNCV) to determine its Cv (see figures below).

The table on the right shows the power penalty cost of a Hydrocore non-slam check valve versus a SNCV.

As is evident, the cost savings using a Hydrocore non-slam check valve versus a SNCV 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.



HYDROCORE NON-RETURN VALVE (NRV)



STANDARD NOZZLE CHECK VALVE (SNCV)

A TYPICAL 250NB (12”) CHECK VALVE USED IN A PUMP STATION

PARAMETERS	UNIT	HYDROCORE	SNCV
Nominal Working Pressure	Bar	120	120
Flow Rate	Lit/Sec	270	270
Flow Coefficient	**Cv**	**2867**	**768**
Cost of penalty per hour	R/kWh	1.06	1.06
Cost of penalty per hour	$/kWh	0.07	0.07
Pump efficiency (%)	%	75%	75%
RESULTS	UNIT	HYDROCORE	SNCV
Differential Pressure Losses	Bar	0.155	2.160
Valve Power Losses (per hour)	kW	2.430	33.861
Annual Penalty (operating 16 hours per day)	**Rand**	**15,041**	**209,615**
	USD	**954**	**13,289**
ANNUAL SAVINGS USING THE HYDROCORE NON-SLAM CHECK VALVE			
	Rand	**194,574**	-
	USD	**12,336**	-

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90,000 gold and platinum jobs at risk as Eskom hikes loom

EXCERPT TAKEN FROM AN ARTICLE PUBLISHED IN ENGINEERING NEWS BY TERENCE CREAMER
25TH OF MARCH 2019

*The Minerals Council South Africa is ringing alarm bells over the threat posed to employment and production in the gold and platinum sectors as a result of recently approved electricity tariff increases, including the **13.8% hike** to be implemented from April 1.*

In addition, the council is warning that the hikes will accelerate the State-owned utility's own downward spiral as mines and smelters, which currently consume 30% of Eskom's yearly production, respond by closing unprofitable operations.

The body's revised estimates point to **90 000 gold and platinum jobs being at risk** as a result of the increases, approved by the National Energy Regulator of South Africa (Nersa) on March 7. The figure represents a modest improvement on the 150 000 job losses forecast ahead of the regulator's fourth multiyear price determination (MYPD4) decision.

Some 464 000 people were employed across the mining industry in 2017 and the council estimated earlier this year that about 18 300 of the 53 500 jobs shed in the industry since 2006, when South Africa's power crisis emerged, could be directly attributed to electricity tariff increases.

Nevertheless, the outlook for the gold-mining sector remained especially dire, with the council indicating that only two mines were likely to remain viable at the end of the three-year period. Previously, only one mine, with a yearly output of 20 t, was expected to remain viable. In 2018, the industry is likely to have produced about 132 t of gold.

Nersa has granted Eskom increases of 9.4% for 2019/20, 8.1% for 2020/2021 and 5.2% for 2021/22, following an adjudication of the MYPD4, in which **Eskom requested hikes of 17.1%, 15.4% and 15.5% respectively.** The State-owned utility would increase tariffs on April 1 by 13.8%, however, given that the regulator had already approved a further 4.41% hike, in line with an earlier adjudication of three regulatory clearing account applications.

Minerals Council South Africa CEO Roger Baxter said on Monday that the "front-loaded" nature of the hikes would hurt all miners as well as smelting operations.
Deep-level gold and platinum miners would be particularly hard hit, however, given that many mines were already unprofitable or marginal, as well as the fact that **electricity made up about 25% and 17% respectively of a gold and platinum mine's cash production costs.**

Chief economist Henk Langenhoven said total industry production costs would rise by 29% over the three-year period, which was 12% lower than would have been the case should Nersa not have disallowed R102-billion of revenue sought by Eskom in the MYPD4.
Nevertheless, the outcome was "inconsequential" for the gold sector, potentially only saving about 8 000 jobs. For platinum, the impact was larger, potentially saving 22 800 jobs.

The hikes would further erode the competitiveness of the South African mining industry relative to global peers, which were enjoying lower tariffs and were also less affected by supply interruptions.

At R1.06/kWh from April 1, Eskom's Megaflex industrial tariff was higher than average industrial tariffs of about R1/kWh in the US and well above those of around 66c/kWh available in Quebec, Canada.

"Our **electricity prices in South Africa have gone up by 538% over the last ten years**, which has obviously had a huge impact particularly on our deep-level gold and platinum mines," Baxter noted.

South Africa had also experienced a sustained period of rotational power cuts in mid-March, with Stage 4 load-shedding, equating to cuts of 4 000 MW, declared by Eskom on several days. During those periods, mines were required to reduce their load by 20%.

KEY POINTS
- Electricity prices have risen by 538% in the last 10 years.
- Eskom prices rose by 13.8% on the April 1, 2019.
- A further 17.1%, 15.4% and 15.5% price hikes are expected in 2020, 2021 and 2022.
- 90,000 jobs in the gold and platinum fields are at risk.
- Electric costs constitute 25% of the gold mines' expenses, and 17% of the platinum mines expenses.
- As of 1st of April, Eskom's Megaflex industrial tariff is R1.06/kWh.

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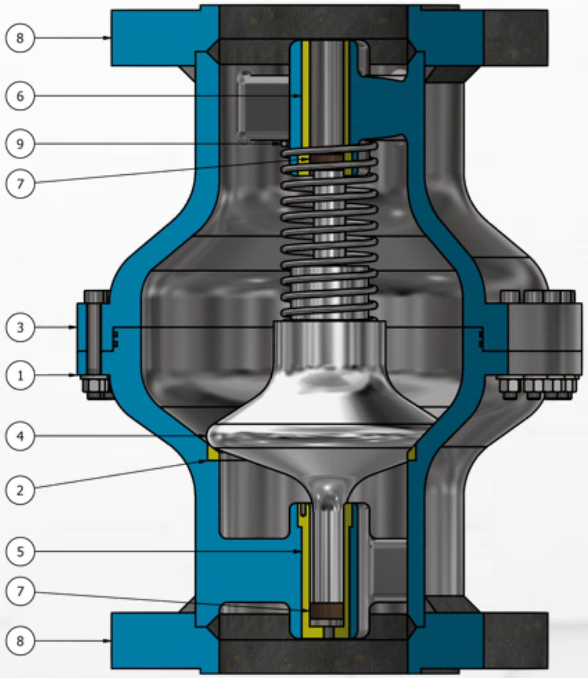
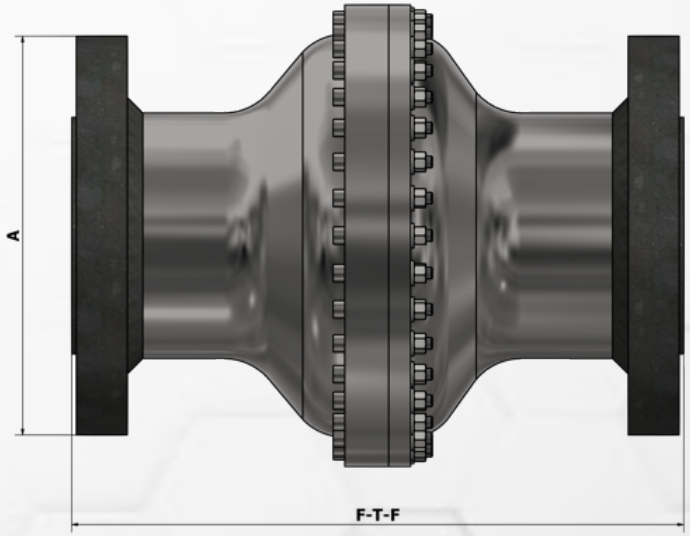
PARTS LIST

PART	DESCRIPTION	MATERIAL
1	Inlet	Mild Steel
2	Body Seat	309SS
3	Outlet	Mild Steel
4	Shuttle	304SS / 316SS
5	Inlet Sleeve	304SS / 316SS
6	Outlet Sleeve	304SS / 316SS
7	Shuttle Bush	Bronze
8	Flange	
9	Spring	Spring Steel

Seal Material - Nitrile, Viton, EPDM, Polyurethane





VALVE DIMENSIONS (FACE-TO-FACE DIMENSIONS IN ACCORDANCE WITH ANSI B16)

NB	MAX PRESSURE	MAX FLOW	CV VALUE	A (MM)	ANSI C-600	ANSI C-900	ANSI C-1500
150	160 bar	120 ℓ/sec	802	360 mm	559 mm / 147kg	610 mm / 169kg	705 mm / TBD
200	160 bar	180 ℓ/sec	1583	440 mm	660 mm / 230kg	737 mm / 289kg	832 mm / TBD
250	160 bar	300 ℓ/sec	2867	632 mm	787 mm / 516kg	838 mm / 559kg	991 mm / TBD
300	160 bar	380 ℓ/sec	2978	670 mm	838 mm / 551kg	965 mm / 654kg	1130 mm / TBD

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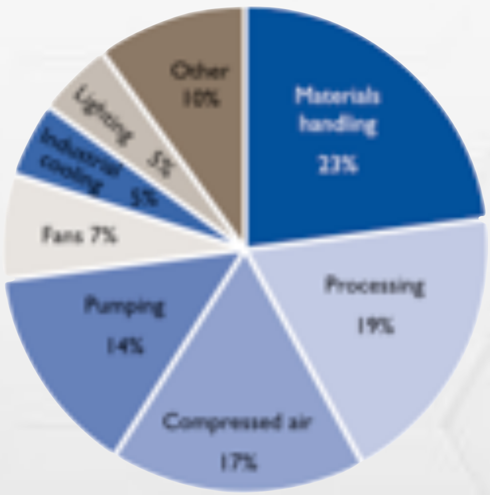
Opportunity to save electric costs by utilising less throttling valves used in the pump stations

FACTS EXTRACTED FROM ESKOM'S "THE ENERGY EFFICIENT SERIES: TOWARDS AN ENERGY EFFICIENT MINING SECTOR" ARTICLE

- The mining industry consumes 15% of Eskom's annual output (does not include smelting).
- The pumping needs constitute 14% of a mines electric use.
- Motors account for some 60% of electricity consumption in industry. Over its life, a motor can cost 100 times more to run than it did to buy.
- Of the total electricity consumed by the industrial sector, about 60% is used to drive motor systems, such as pumps, ventilation fans, compressed air systems, conveyor belts, etc., with pumping being the most dominant load.

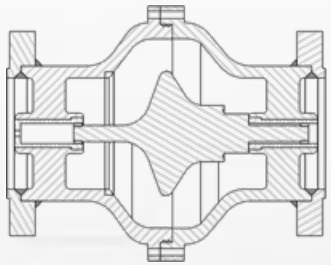


SAVING BY USING MORE EFFICIENT VALVES

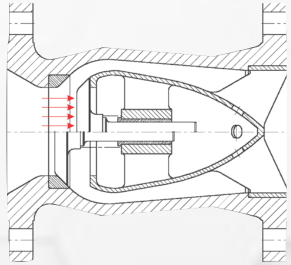
Several suggestions and guidelines are recommended to increase the efficiency of the pumping stations in order to decrease the electrical costs incurred. One of these factors is using better flow efficient valves that reduce the resistance experienced by the pumps.

A valve's Cv (flow efficiency) 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.

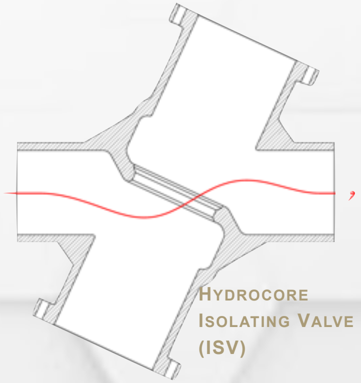
We at Hydrocore have modelled a standard globe valve (SGV) and a standard nozzle check valve (SNCV) to determine their Cv (see figures below). The table shows the power penalty cost of a Hydrocore Isolating Valve (ISV) and Non-return Valve (NRV) versus a SGV and SNV. As is evident, the cost savings using the Hydrocore valves versus their counterparts 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.



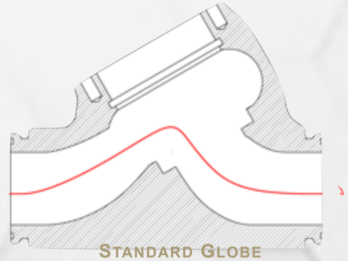
HYDROCORE NON-RETURN



STANDARD NOZZLE CHECK



HYDROCORE ISOLATING VALVE (ISV)



STANDARD GLOBE VALVE (SGV)

Valve Models	Nominal Working Pressure	Flow Rate	Flow Coefficient (Autodesk)	Cost per kWH	Pump Efficiency	Differential Pressure Losses	Valve Power Losses	Hourly Penalty	Monthly Penalty (16 hr day)
Unit	Bar	ℓ/sec	Cv	R/kW	%	Bar	kW	Rand	Rand
200NB Hydrocore ISV	120	152	1086	1.06	75%	0.342	5.367	R 5.69	R 2,769
200NB Standard SGV	120	152	359	1.06	75%	3.132	49.113	R 52.06	R 25,336
200NB Hydrocore NRV	120	180	1583	1.06	75%	0.226	3.542	R 3.75	R 1,827
200NB Standard SNCV	120	180	527	1.06	75%	2.038	31.961	R 33.88	R 16,488

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