PROCESS PUMPS (I) Pvt Ltd

PUMPING SOLUTION - REDEFINED

About Us

- Company that specializes in the design, manufacture and supply of industrial centrifugal pumps since 1984

- Pump offered in a wide range of metallic and non metallic materials to cater to the entire spectrum hazardous and corrosive liquids handled in various chemical and process industries.

Our Strength

- Company is manned by a team of highly qualified professionals in the field of hydraulics, mechanical engineering, materials & corrosion sciences and chemical engineering

- An ISO 9001 certified company since 1998 endorsing our well established and mature quality system and focus on delivering a world class product.

- Based on our various supplies and renewed & persistent R&D efforts, we have been accorded the status as an approved R& D center by the Dept. of Science & Technology, Govt. of India.

Design Philosophy

We commit to offer products that have:

- Sustainable performance and efficiency
- Good corrosion resistance and adequate mechanical properties, which will be accomplished by selecting the appropriate materials based on the application
- Low Life Cycle Cost (LCC) and high Mean Time Between Failure (MTBF)
- Critical components with a 450% safety factor in mechanical design
- A minimum of 4 mm corrosion allowance on all wetted parts

Design

Our key strength is designing the pumps.

We have expertise in designing single stage centrifugal pump covering various specific speeds (from radial to axial flow).

As you see from our product range, we manufacture pumps both in the horizontal and vertical configurations.

Most of our designs are derived from the first principles and validated by software analysis as well as verified by actual performance.

Design

Our design capabilities fall into three areas

- Mechanical design
- Hydraulic Design
- Metallurgical Aspects

Mechanical Design

We design the shaft either for vertical, horizontal or vertical cantilever pumps taking into consideration of deflection, vibration and critical speed.

Normally in our design, we aim at maximum deflection at impeller end of 30microns. The vibration is limited to max of 2.1mm/s for 1440RPM and 4.1mm/s for 2900pumps.

Apart from this, while designing a shaft we also take care of torque, fatigue and bending moments.

There will be minimum 450% safety factor in terms of torque and mechanical values.

While designing of bearing housing we consider very high MTBF and low vibrations.

We are aware of shock loading characteristics required by naval pump and we have expertise in a different shock loading design

We are very well aware Seismic Qualification and have deliver pumps to NPCIL in conformance to ASME Section V

Hydraulic Design

Over the years we have developed and standardised a robust design procedure for hydraulic elements viz; impeller, diffuser and volute casing.

We have also developed many self-priming pumps. Our design methodology takes care of efficiency and cavitation issues.

While designing hydraulic elements we also take care of high corrosion allowance on wetting components as our pumps are used for handling corrosive fluids.

Most of the hydraulic designs are validated by actual performance and some of them are verified by using CFD tools.

Metallurgical Aspects

We have a strong metallurgy team and we understand corrosion science and selection of materials very clearly.

Own a foundry where we manufacture castings right from Magnesium to super alloys.

Established good foundry practices to meet castings adhering to ASME codes.

Quite experienced in NDT techniques and radiography as and wherever applicable.

Matured quality assurance program including UT, DP, mechanical values and radiography of relevant standards.

Our design takes care of various factors of reliability including fatigue and residual stress.

Experts available in our team in the respective areas who are qualified and backed by rich experience

Further we derive technical support from various departments of Institute of sciences which help us in updating our knowledge and processes.

Material Selection

- Selection of the right material to ensure required corrosion resistance in the given environment
- Following input data is required from customers for better material selection
  - Primary Corrosive element
  - Nature of the liquid (viscosity, slurry/solid content)
  - Operating temperature and pressure
  - Oxidising/ Reducing or Unstable nature of liquid
  - Process data

Material Spectrum
Metallic

- Stainless Steel in conformation to various International(ASTM)Standards
- Alloy 20 (CN7M)
- CD4MCu & other Duplex Steels(CD6Mn, CD3Mn)
- R 55
- Hastelloy B & C
- Acid corrosion resistant bronzes
- Monel
- Nickel (CZ-100) , Inconel & Super alloys
- Titanium (Fabricated)

These alloys are cast in the in-house foundry to ensure that the alloy exhibits the desired exacting properties

Material Spectrum
Non -Metallic

- Ultra High Molecular Weight Poly Ethylene ***(UHMWPE)***
- Poly Vinylidene Fluoride ***(PVDF)-Lined***
- Fluorinated ethylene propylene***(FEP) – Lined***
- Perfluoroalkoxy alkane***(PFA) – Lined***

The components are molded in an in-house facility from virgin material

Salient Features of Fluorocarbon Lined Pumps

Pumps offered with cast steel liner thus ensuring higher mechanical property. This avoids breakage/ damage due to higher operating pressure or higher pipe line loading compared to CI liner.

Our manufacturing practice is Insitu moulding on cast steel body .Thus deriving following benefits.

- Generally lined pumps are provided with a loose fluorocarbon lining just put in the casing. In this case the fluorocarbon lining collapses if the system is operated in vacuum which is avoided in our design.
- In Insitu moulding, there is no gap between fluorocarbon lining and the liner, thus ensuring good heat transfer. This offers a higher mechanical stability under high temperature or vacuum conditions. This would also ensure no air lock or seepage of the process liquid between the lining and the liner
- We offer a minimum lining thickness 4m.
- These pumps will give longer life and are dependable than the loose liner pumps.

Manufacturing Facility

- An in-house foundry to manufacture castings, to ensure that different alloys exhibit the desired exacting properties
- An in house molding facility adopting special moulding techniques for specialty plastics, namely UHMWPE ,PVDF, PFA & FEP
- Manufacturing activity carried out with an in-house facility augmented by an extended arm of subcontractors

Quality Control

- Clear Identification and inspection of incoming Raw Material & Semi finished / fully finished components.
- Chemical (Spectrovac & PMI) & Mechanical Testing at NABL approved laboratories for Castings & Incoming Bar Stock. We can provide 3.1 certification
- Ultrasonic test on every bar stock by qualified third party NDT agency.
- Dye Penetration test on components where-ever required by qualified third party NDT agency.
- IGC test for special application where ever required

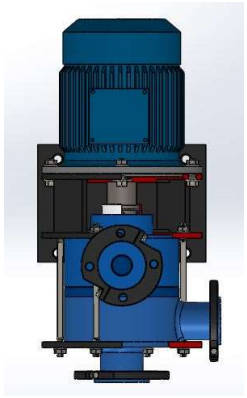
Quality Control

- Radiography of castings where-ever required by approved third party agency
- In-Process inspection of the components are carried out during the machining process with required calibrated instruments.
- Hydro-pressure test of every impeller casing as prescribed by IS-5120 / HIS ,As well as by API 610. For high alloys, air pressure test & elevated temperature hydro-pressure test is also carried out.
- Metallic impellers are balanced as per IS-1940 Gr. 6.3 however if the customer requires balancing as per IS-1940 Gr. 2.5, the balancing is carried out at a third party agency.

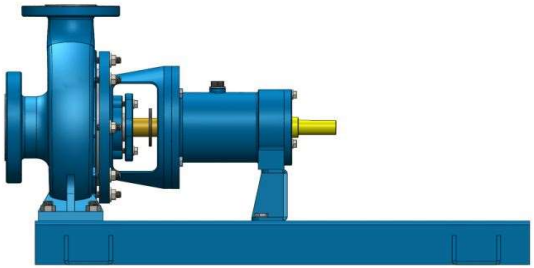
Performance Test

- Every pump is performance tested for its guaranteed value
- The test is carried out in conformance to IS-5120 / API 610 /ISO-9906/ HIS/PTC
- The pump is tested in a for Head, Capacity, Power Consumption, Efficiency, Bearing Temperature, Noise & Vibration.

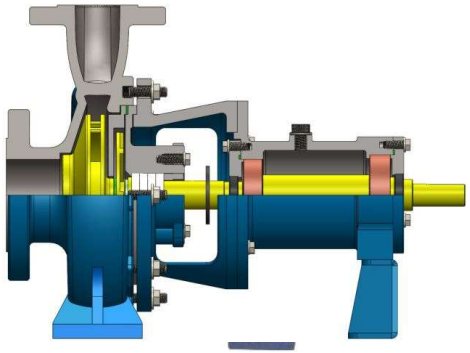
Range of Products



Vertical Glandless Pumps

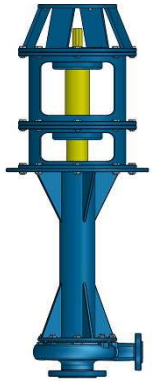


Horizontal Pumps



Hydrodynamic Seal pumps

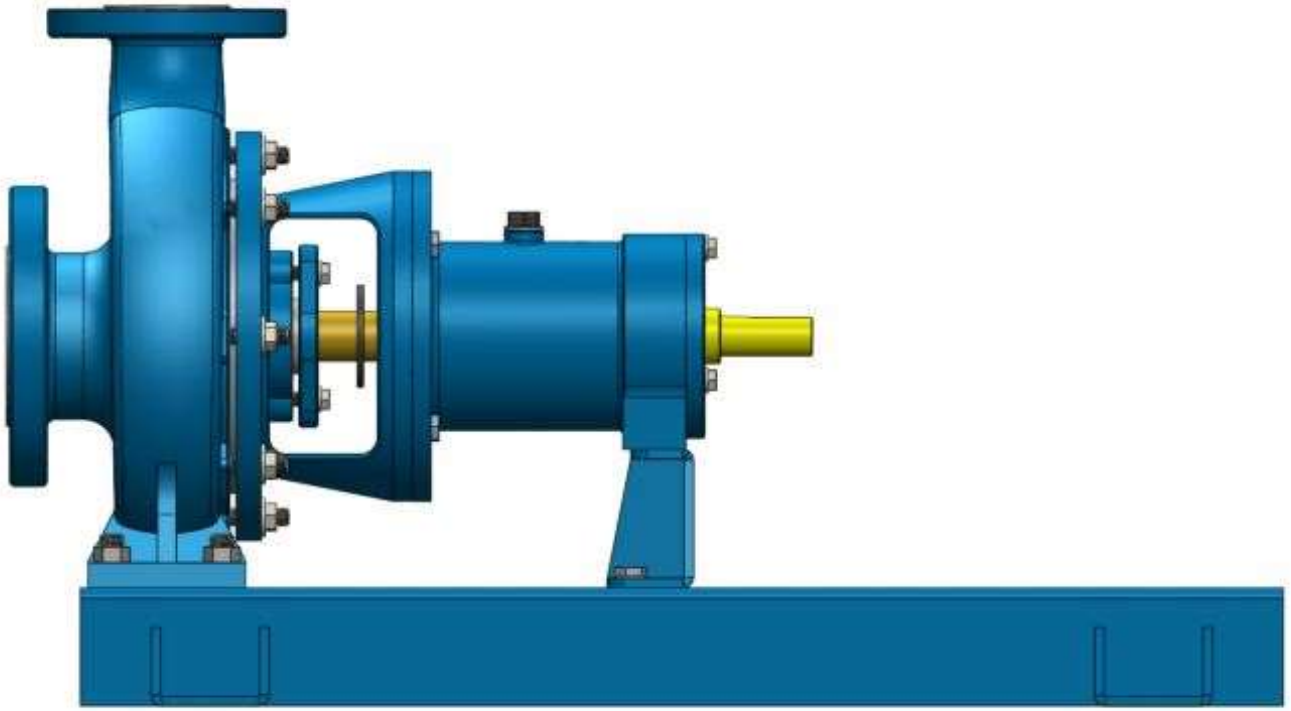
Vertical Sump Pumps



Vertical Cantilever Shaft pumps

Horizontal Pump

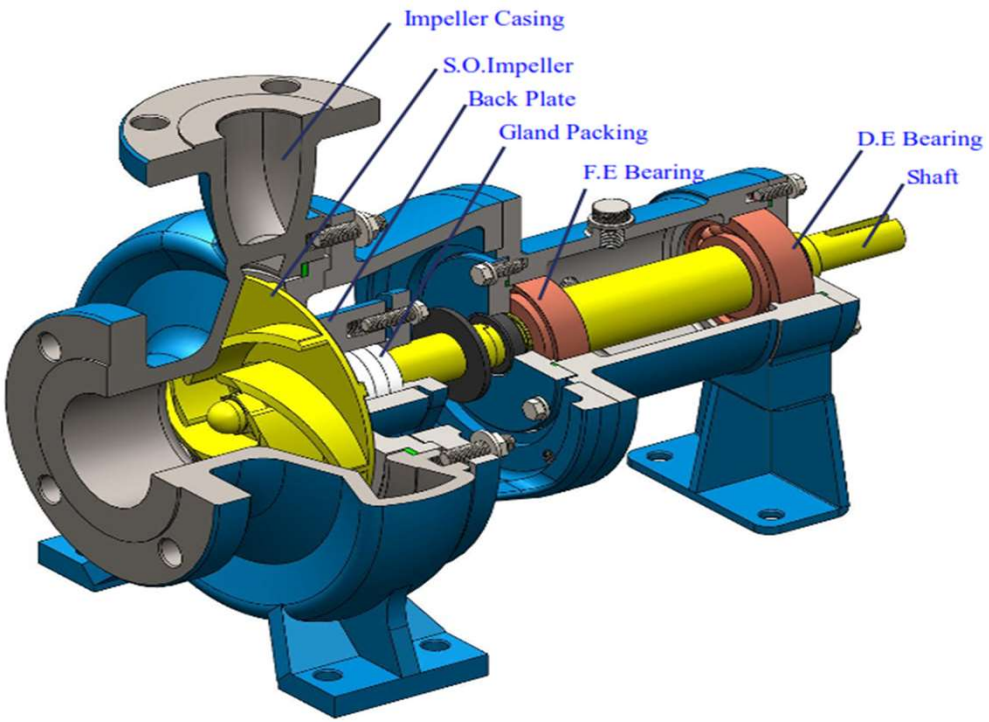
DESIGNED TO PERFORM



Horizontal Pump

Metallic Series

Horizontal Metallic Pump



Horizontal Pump – Cut Section

METALLIC SERIES

Horizontal pumps
Outline

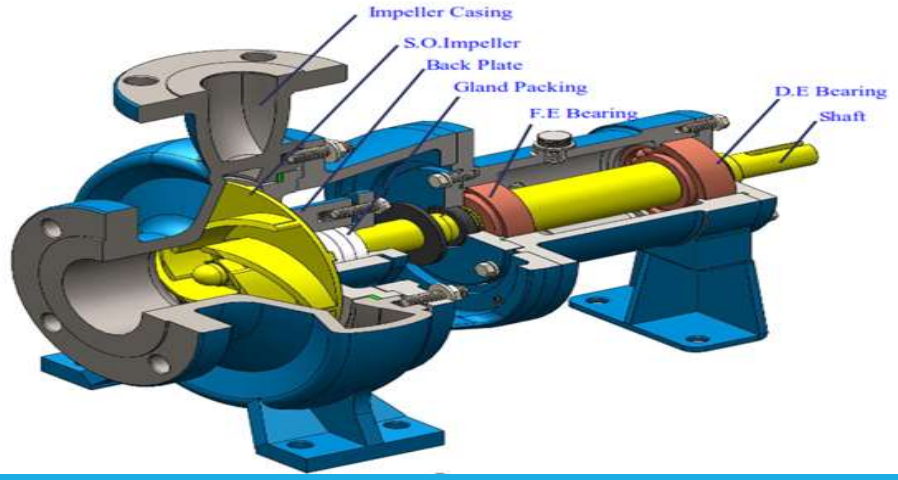
- The most common pumps used in the Chemical & Petrochemical industries
- A back pull out design for ease of operation and maintenance
- Offered in a metallic and non metallic materials of constructions

Metallic Series - Features

- Offered in 75 different models
- Designed as per ISO 2858
- Conforming to API 610, 11 edition up to a capacity of 750 m^3/hr and a temperature of 450^oC
- Offered in Open, Semi open, closed or ***reverse vane*** impellers

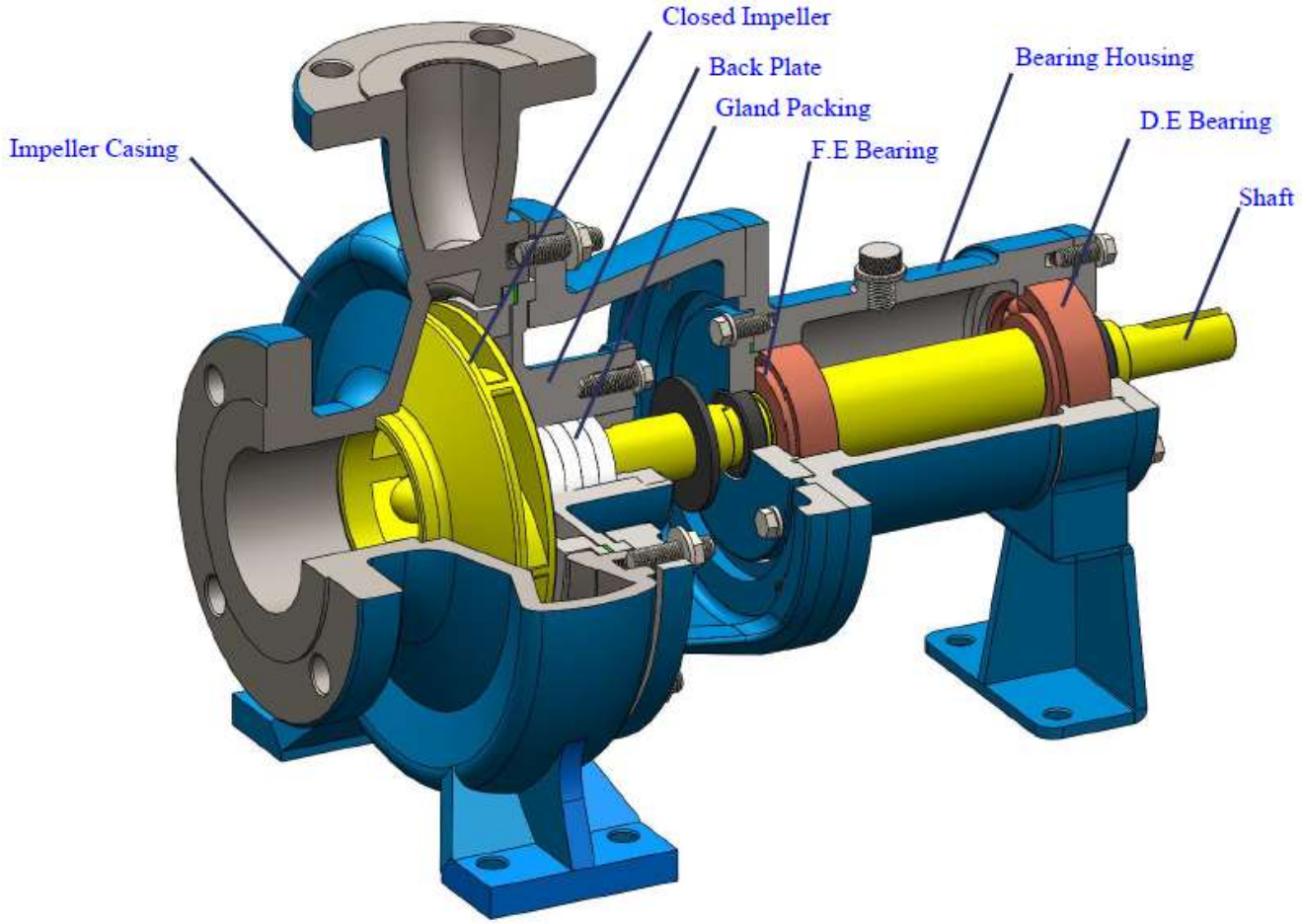
Semi open impeller

Semi open impeller are offered to handle slurries with various Percentage of solid content and particle size.



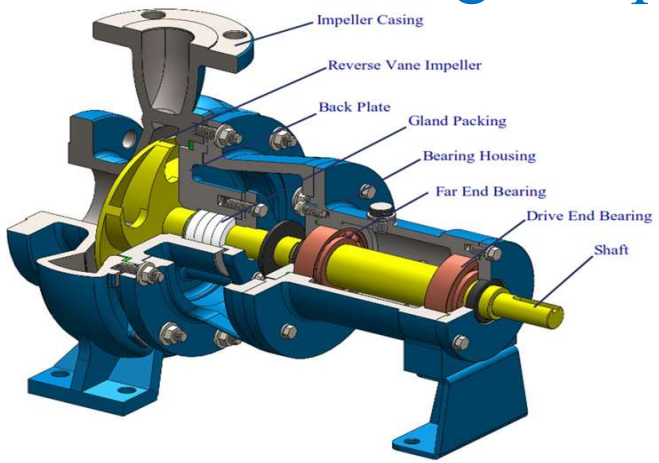
closed impeller

Pumps with closed impeller are offered for handling clear Liquids or liquids with low percentage of solid content that too with the small particle size. The large size pumps can handle higher particle size depending upon the size of flow path in the impeller.

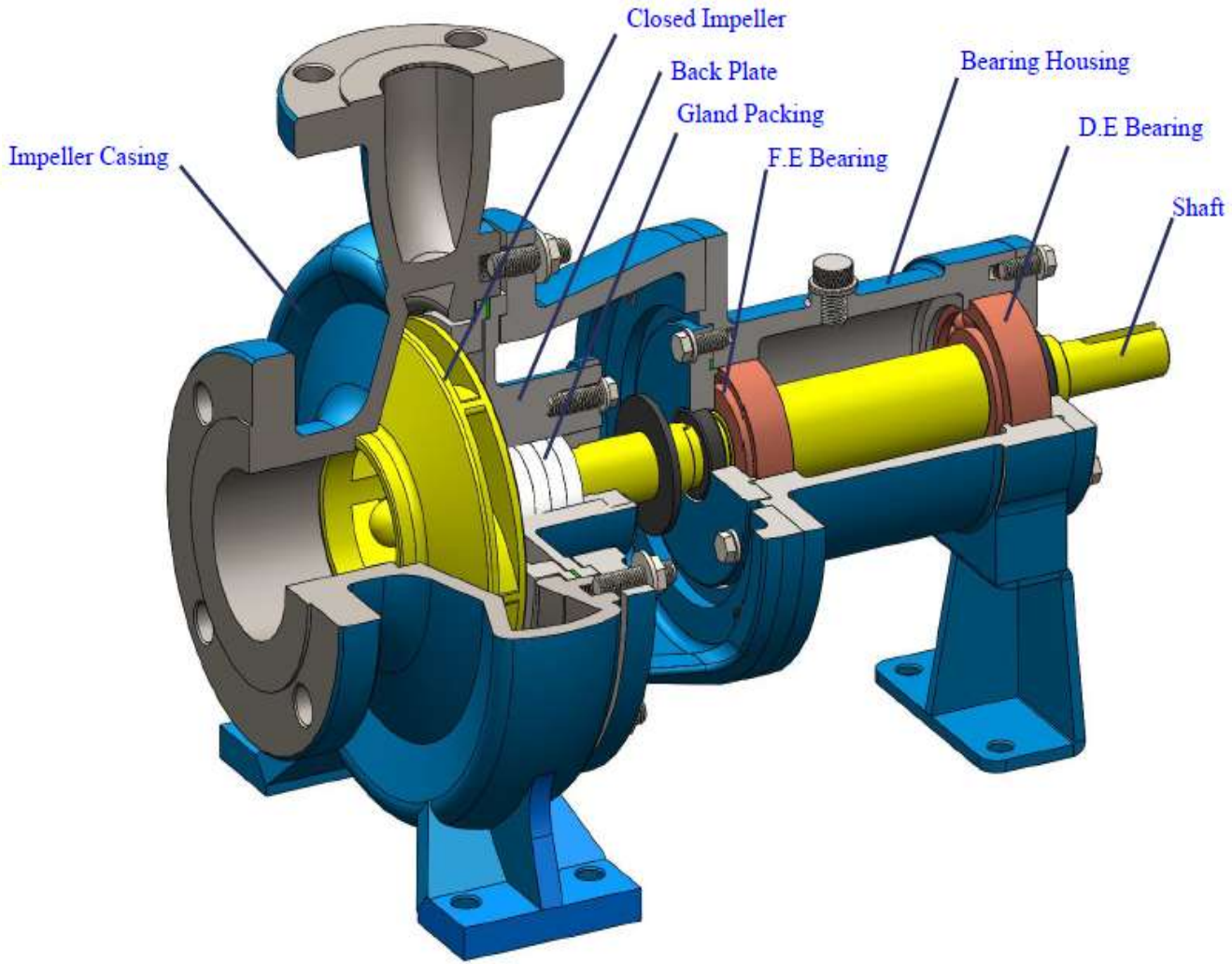

Closed Impeller
Back Plate
Gland Packing
Bearing Housing
D.E Bearing
F.E Bearing
Shaft
Impeller Casing

reverse vane impeller

Reverse vane impeller are offered to handle slurries with the advantage of lesser wear on the impeller casing and low axial load as well as low stuffing box pressure.

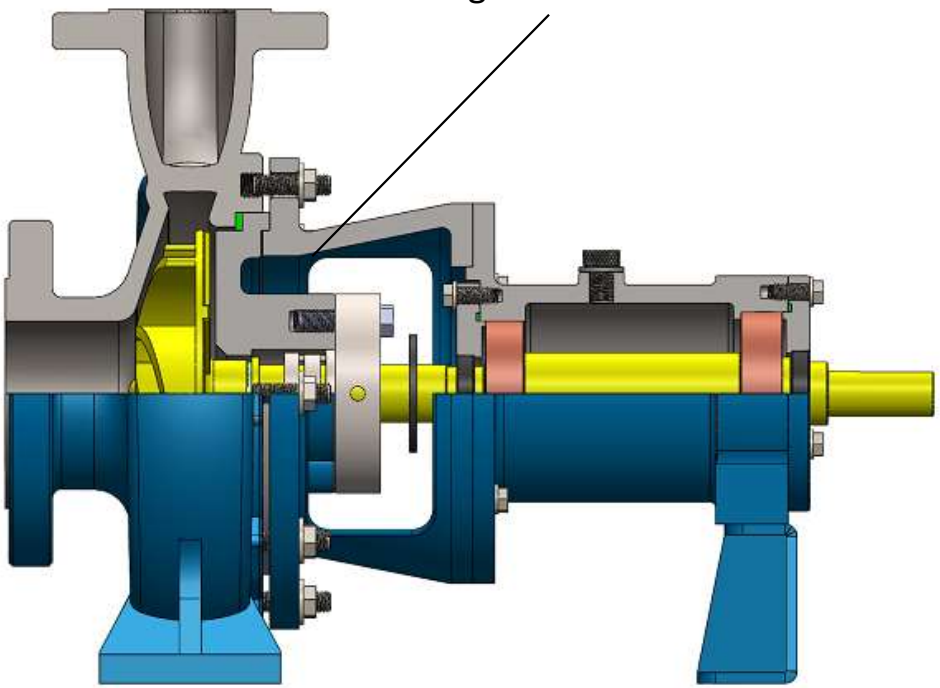


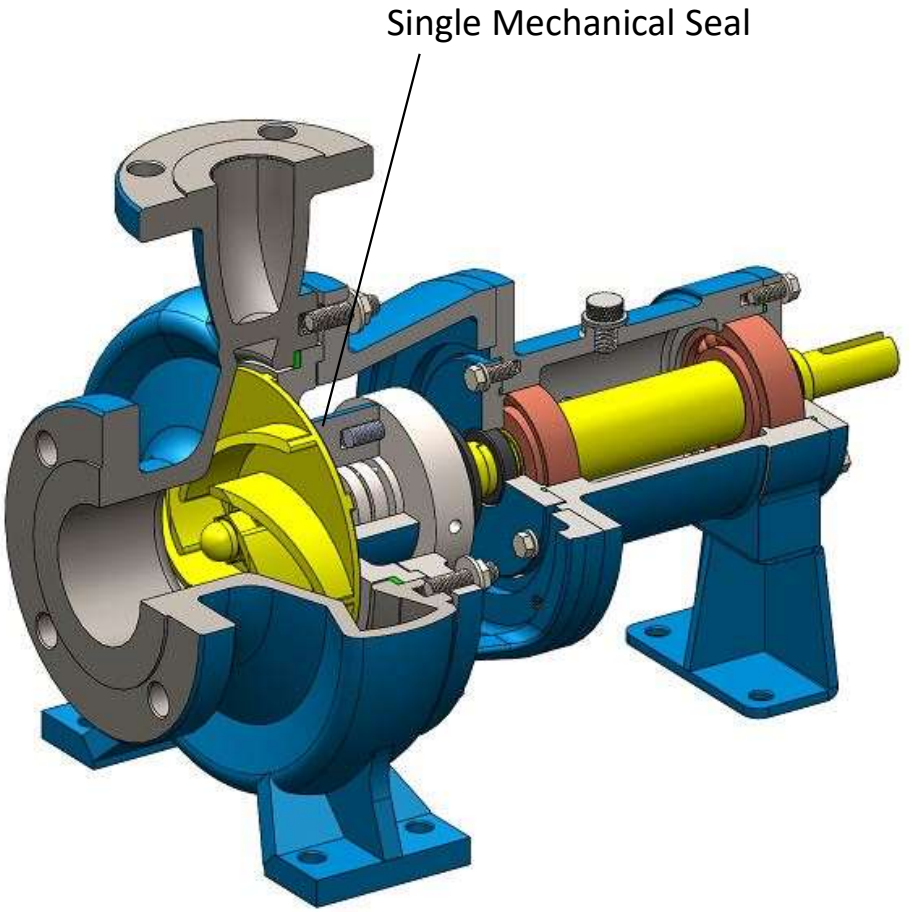
The pumps are offered either with gland packing or the mechanical seal with appropriate flushing or quenching arrangement



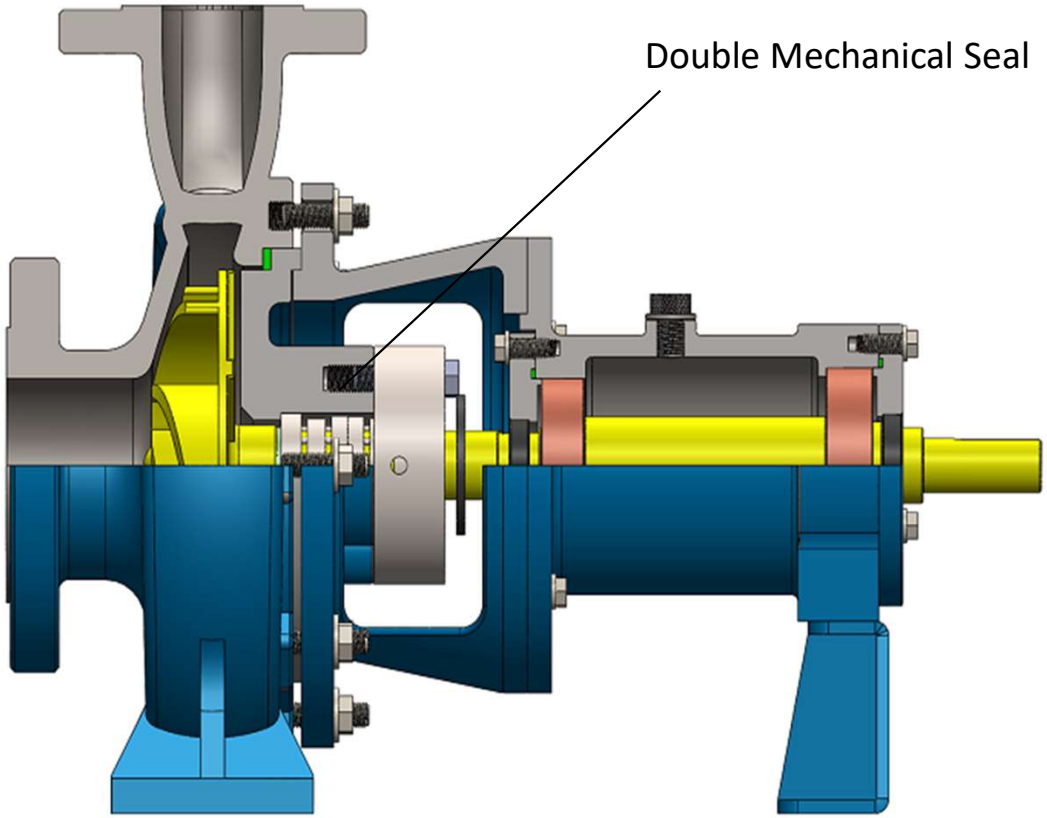
USE THIS IMAGE FOR CHEM
ICAL PROCESS PUMP
METALLIC

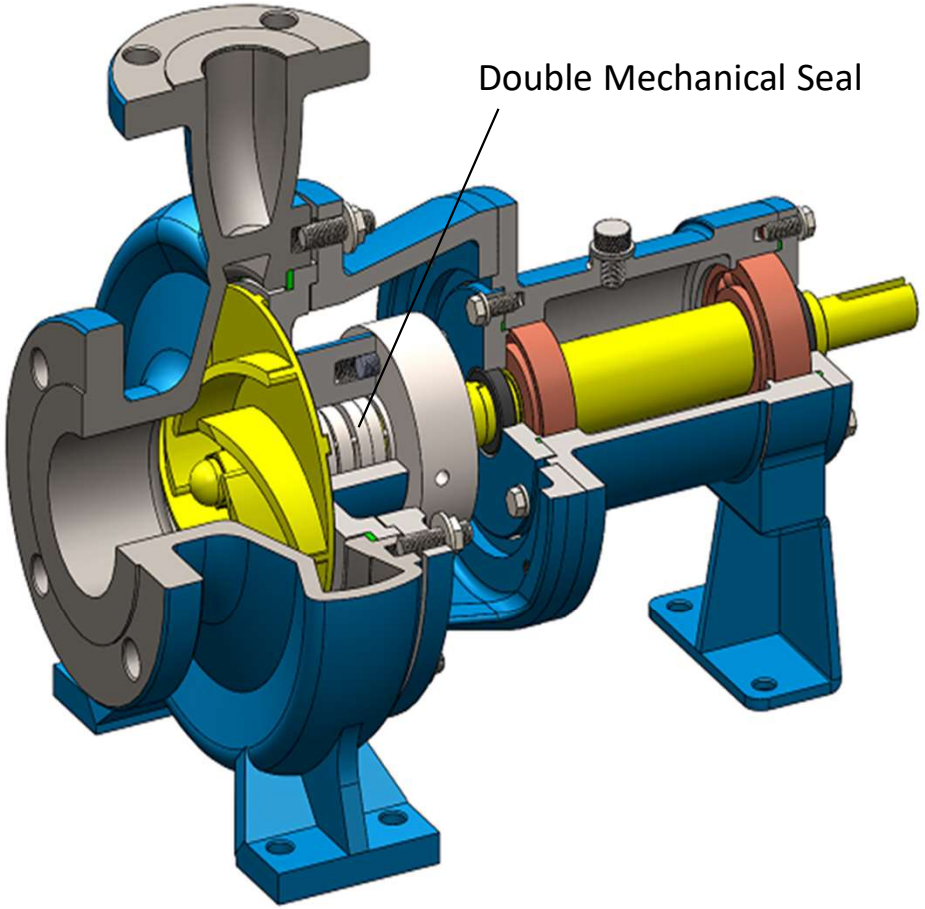
Horizontal Gland Packing Pump (Metallic Series)





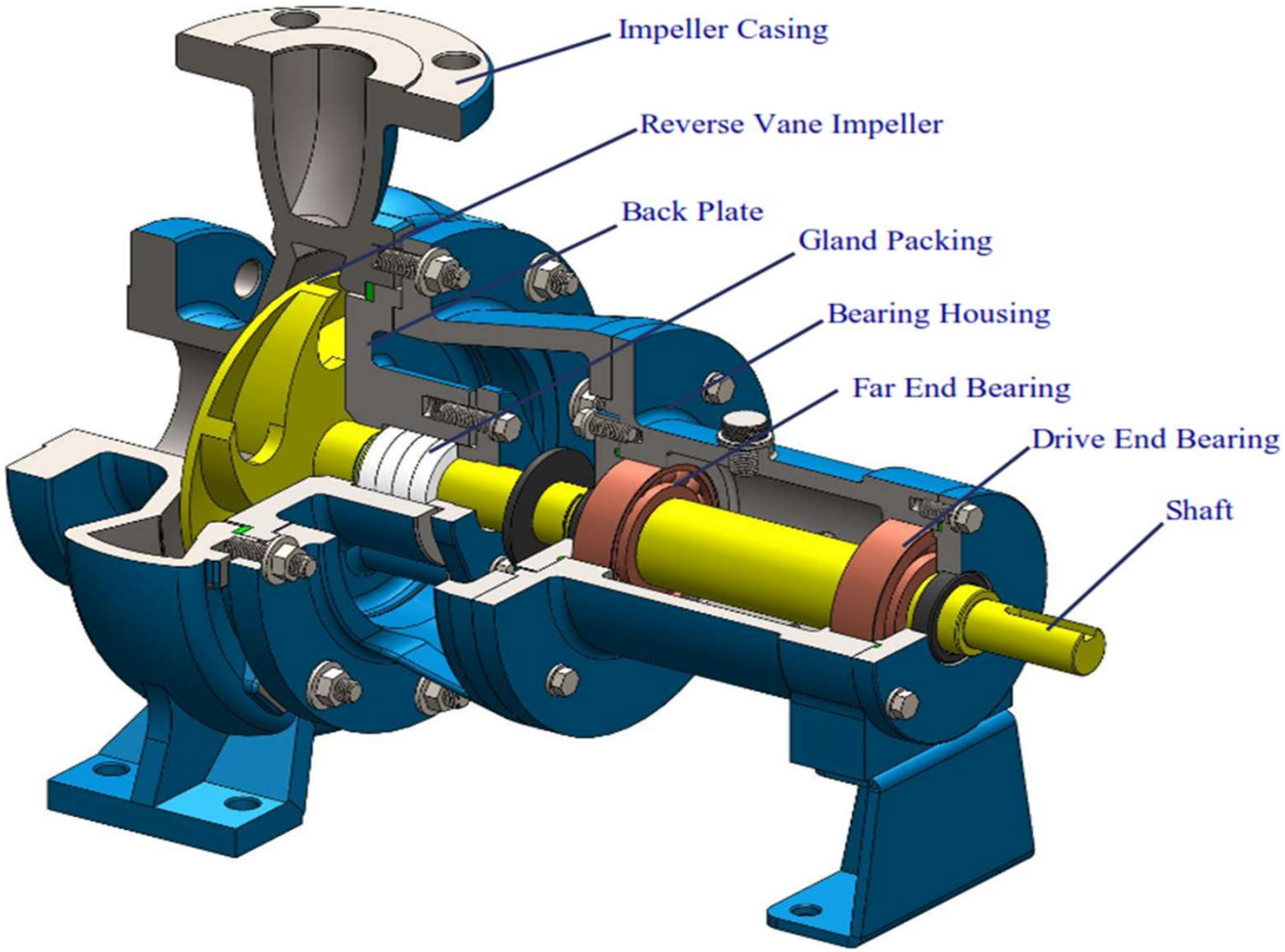
Horizontal Single Mechanical Seal Pump(Metallic)





Horizontal Double Mechanical Seal Pump(Metallic)

HBPO Reverse Vane Impeller Pump

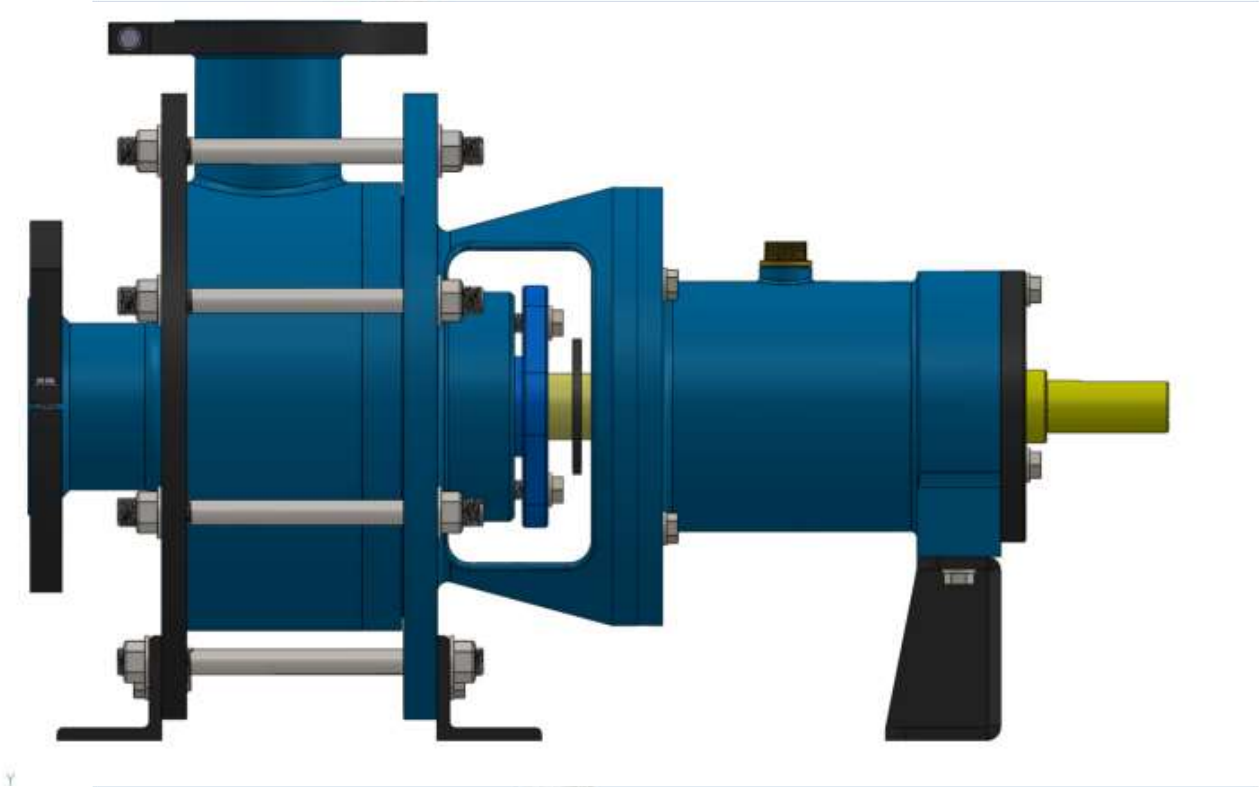


Highlights of Pumps with Reverse Vane Impeller

- Reverse vane impeller are ideally desirable to handle slurries.
- In the reverse vane design, the solid particles accumulating near stuffing box (mechanical seal) will be greatly reduced
- The pump will experience low axial load hence will have greater bearing life /Mechanical seal life.
- The high wear on the impeller casing is avoided thus reducing the maintenance cost.
- Highly user friendly and low-down time due to maintenance.

Metallic Series – Tech Spec

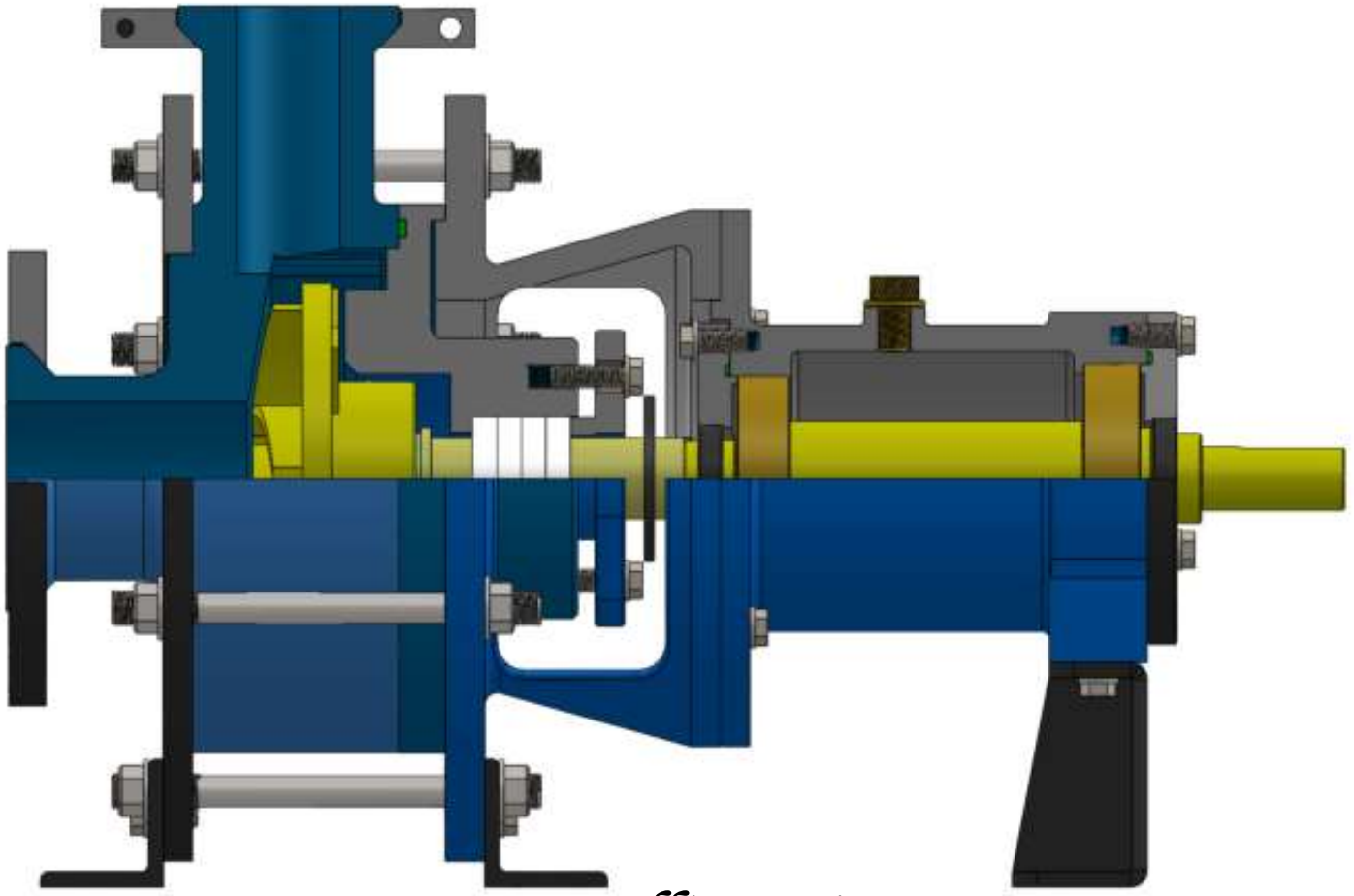
- Head up to 150MLC
- Capacity from 1.5m^3/hr to 750m^3/hr
- Temperature range from- 70 to 450°C
- Casings designed to withstand a pressure of 60 bar at 200°C
- Supplied with Gland packing or Mechanical seal as per customer's requirement.



Horizontal Pump

Non-metallic Series
Pump In UHMWPE

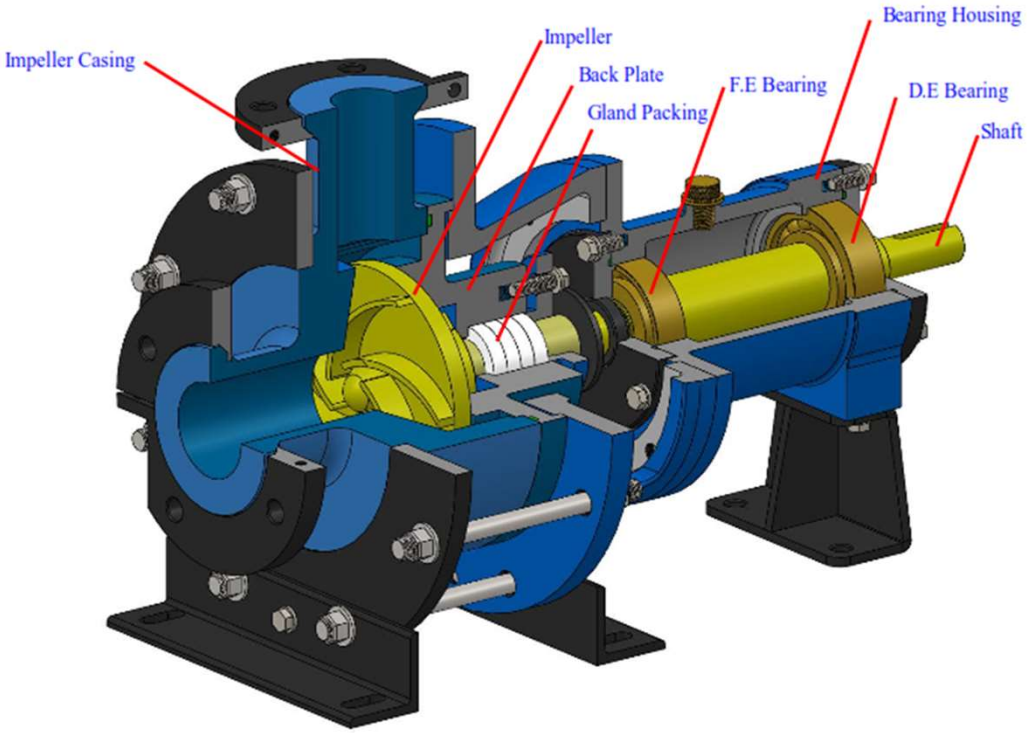
Horizontal Pump (Non - Metallic)



Non-metallic Series

Pump In UHMWPE

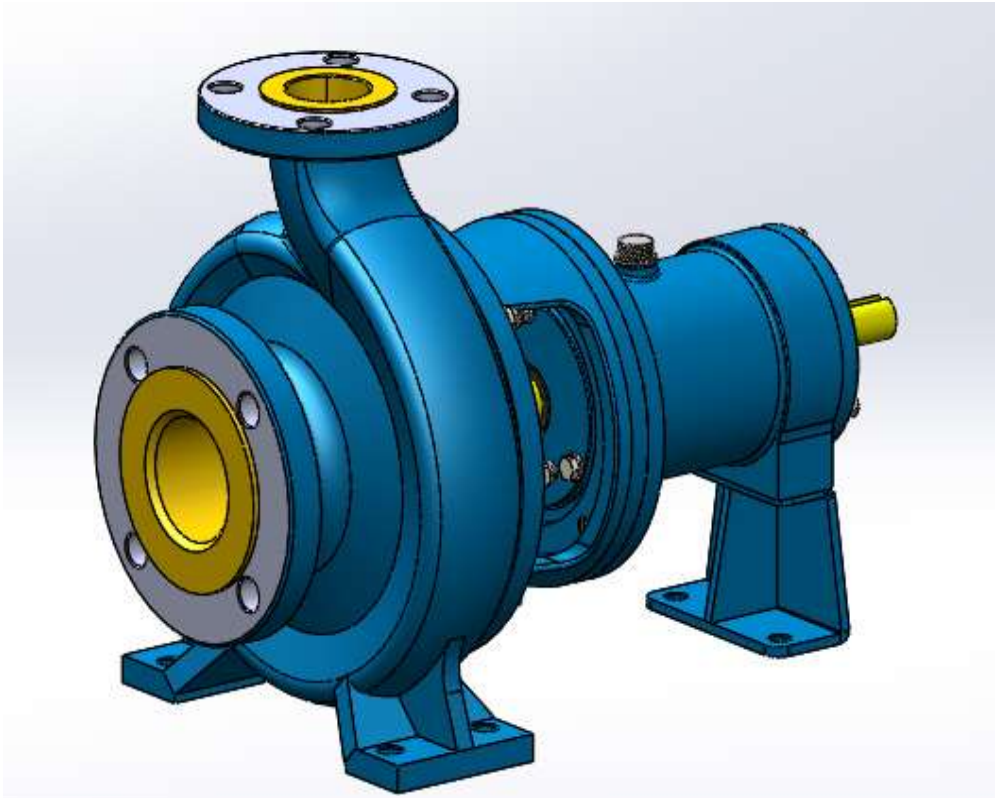
HBPO Non Metallic Pump



Chemical process pump
for Non mettalic Images

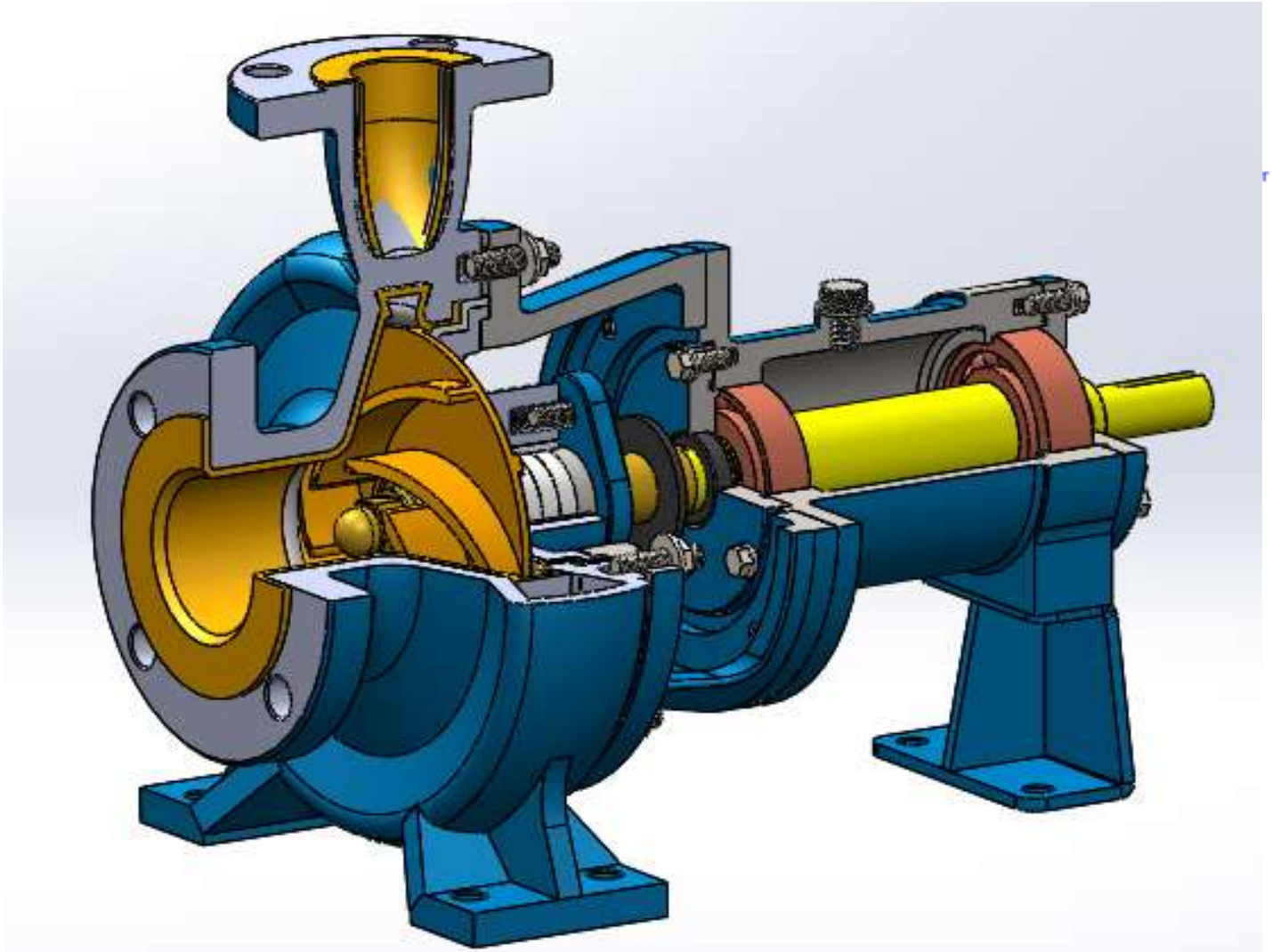
Horizontal Pump

Non-metallic Series
Pump In UHMWPE



Horizontal Pump

Non- Metallic Lined Series
Pump in Fluro Plastics



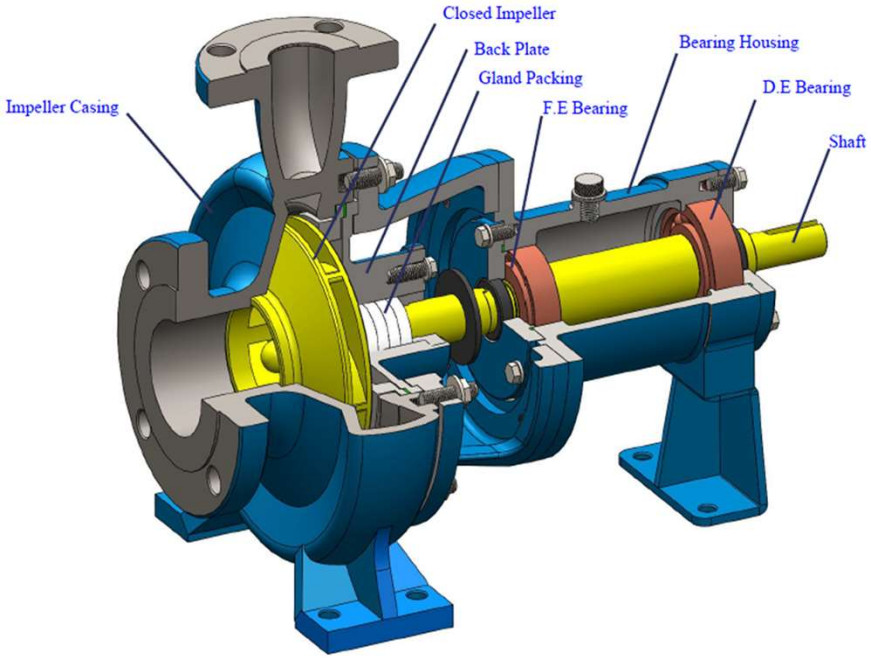
Horizontal PVDF Lined Pump

Non-Metallic Series – Tech Spec

- Head of upto 60 MLC
- Capacity from 3m^3/hr to 400 m^3/hr
- Temperature range from – 20 to 95^{O}C for UHMWPE or 140^{O}C for PVDF, 180^{O}C FEP & 200°C for PFA
- Casings designed to withstand a pressure of 16 bar pressure
- Supplied with a gland packing or mechanical seal as per the customer's requirement.

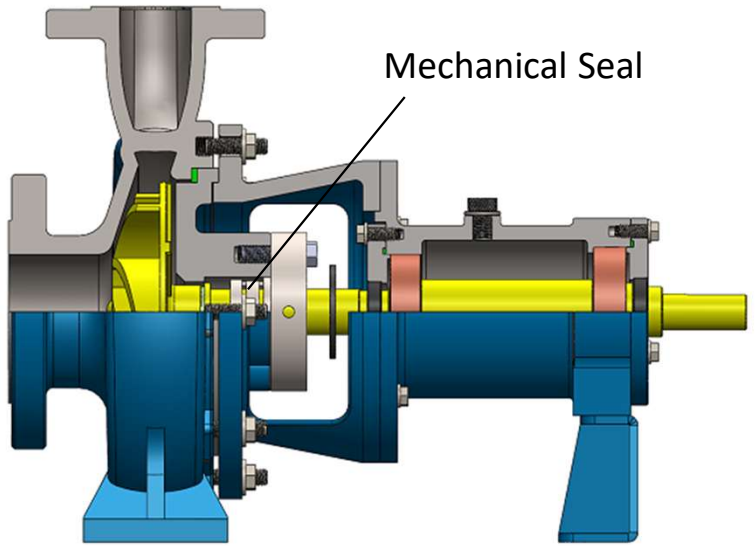
Points to note for pump with Gland Packing

- Leakage can never be stopped
- Leakage can only be controlled by loosening or tightening the gland studs
- Power loss due to friction increases rapidly with tightening
- Shaft sleeve wears out faster with increase tightening
- Limited gland life



Points to note for pump with Mechanical Seal

- Different seals have to be selected for different service conditions
- Maintenance of the appropriate pressure and quantity of barrier fluid or quenching liquid is very important
- Pump running dry even in short time will result in the failure of mechanical seal
- Maintenance required skilled manpower
- Replacement of parts is quite expensive
- Seal failure result in higher down time



Types of Mechanical seal used

- Teflon bellow (External Mounted) - GFT/Cer, Cer/SiC
- Internal Mounted Seal (Single Seal) - C/SiC, SiC/SiC
- External Mounted Seal (Single Seal) - C/SiC, SiC/SiC
- Metal Bellow Seal - C/SiC , SiC/SiC
- Double Seal - SiC/SiC//C/SiC

High lights of the Pump with Mechanical Seal

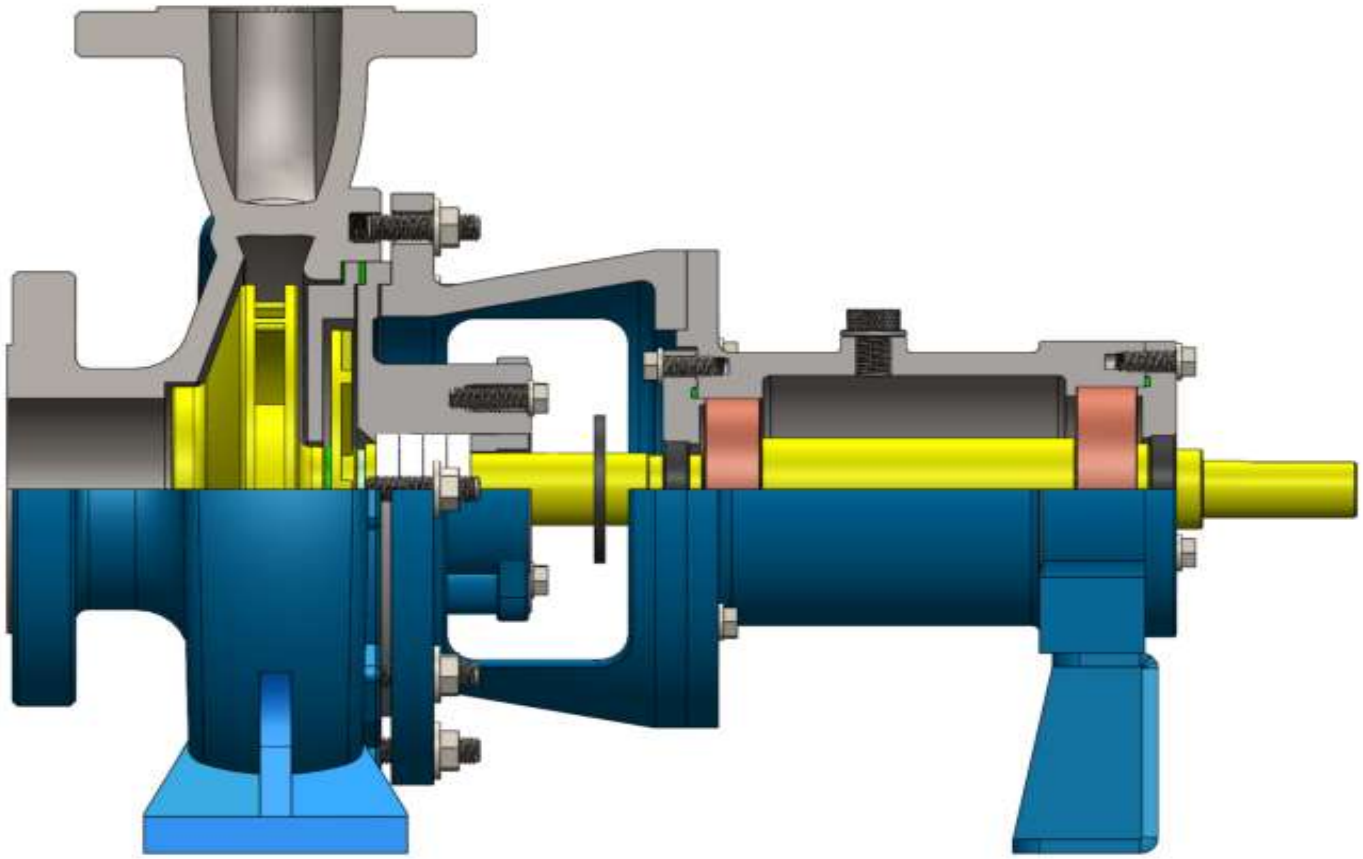
- No leakage during operation
- Can handle high temperature liquid at low system pressure (vacuum) or high system pressure
- Based on the liquid we choose the faces and hardware of the mechanical seal for the effective functioning

Limitations of Mechanical Seal Pump

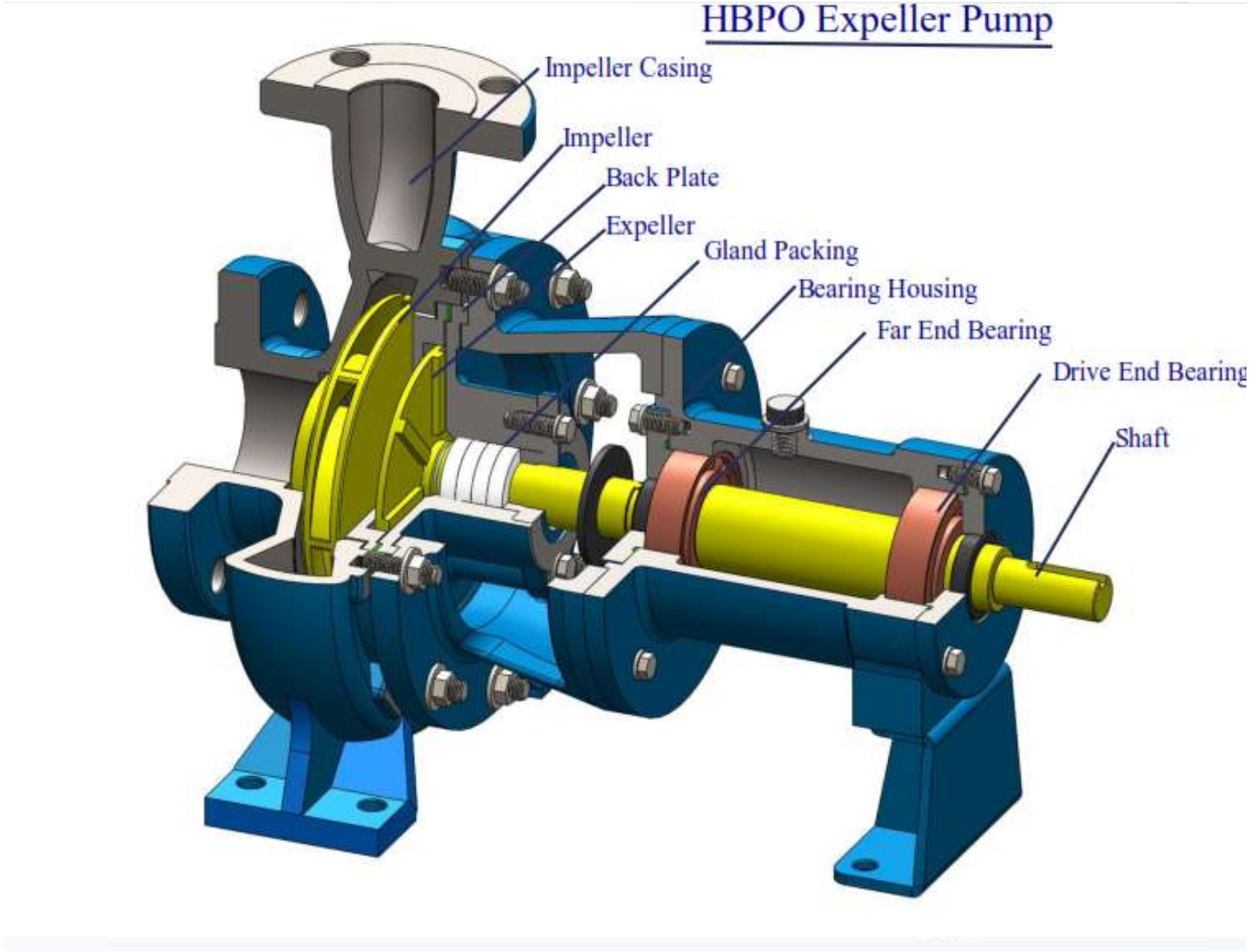
- Pump running dry even for a short while would lead to a mechanical seal failure
- Unspecified solids getting into seal area when the pump is meant to handle clear liquid / settling of the solid during the non-operating time
- Choking of the flushing line /Inadequate pressure of flushing liquid and flushing liquid quality
- Fretting of the secondary packing
- Clogging of the mechanical seal hardware (particularly spring) or its corrosion

Horizontal Hydrodynamic Seal Pump

MAINTENANCE ENGINEER'S DELIGHT



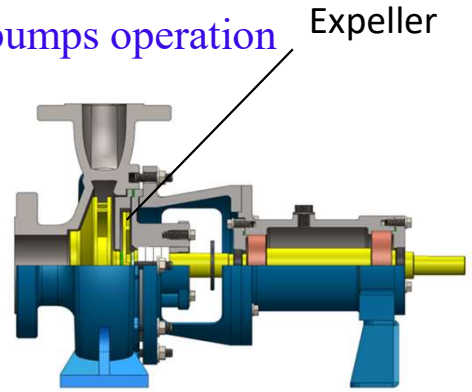
Horizontal Hydrodynamic Seal Pump



Horizontal Hydrodynamic Seal Pump

Highlights of Hydrodynamic Seal Pump

- Critically engineered expeller design ensures no leakage during the pumps operation
- Pump running dry will not damage seal
- Can be operated in flooded as well as negative suction condition
- Can handle clear liquids and slurries
- During non operative condition, pump behaves like a conventional gland packing pump
- The hydrodynamic sealing will be effective for a suction head of upto 3m and negative suction lift less than 3m.



Limitation of pump with Hydrodynamic seal

- The hydrodynamic sealing will be effective for a suction head less than 3m (both positive or negative).
- These pumps are not suitable for transferring Highly flammable liquids and highly hazardous liquids.

Tech Spec

- Head of upto 60 MLC
- Capacity from 1.5m^3/hr to 250m^3/hr
- Offered in Metallic and Non Metallic Series
- For a Non metallic series, expeller is provide in a metallic material based on the liquid handled

Vertical Glandless Pump

EXPERIENCE GLAND FREE PUMPING

Understanding

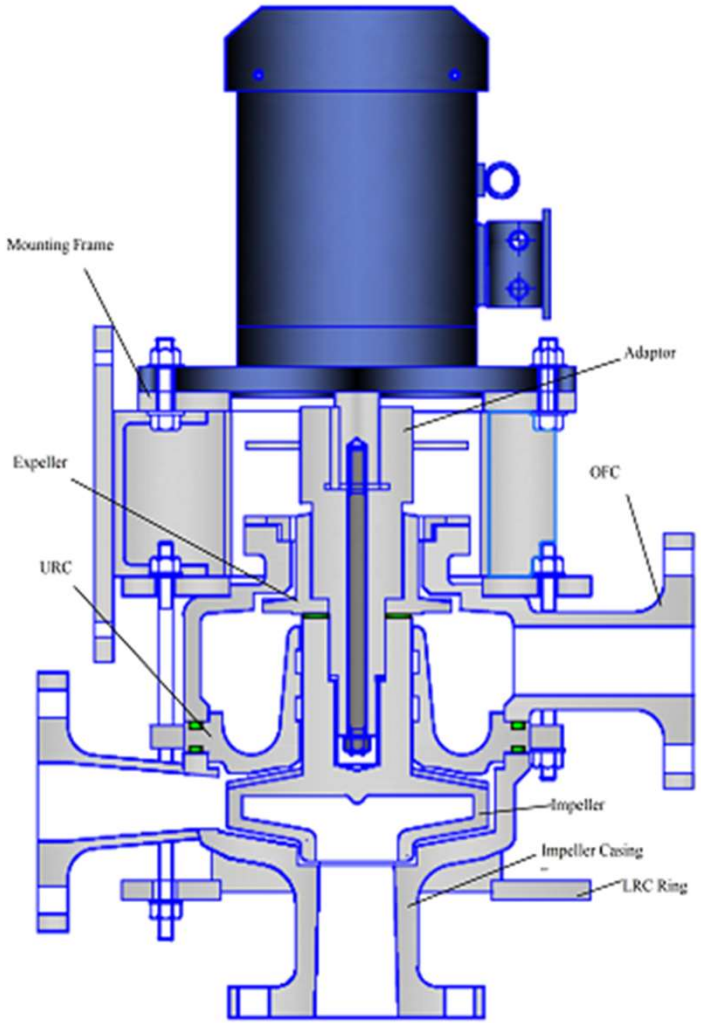
- No Gland or mechanical seal
- No problem associated with alignment of the pump with motor
- Self draining
- Suitable for clear liquid and slurries
- Zero safe minimum flow, pump can run dry indefinitely
- Ideally suited for continuous operation
- Saves valuable floor space

Points to be noted for the use of a Vertical Glandless Pumps

Vertical Glandless pump can be used where:

- There is a negative suction or the suction can be made negative
- Priming is possible and for water based chemicals
- The overflow line can be put back to the suction tank
- Suction lift is not more than 4 meters
- Not recommended for High temperature or flammable liquids

VERTICAL *GLANDLESS PUMP (METALLIC)*

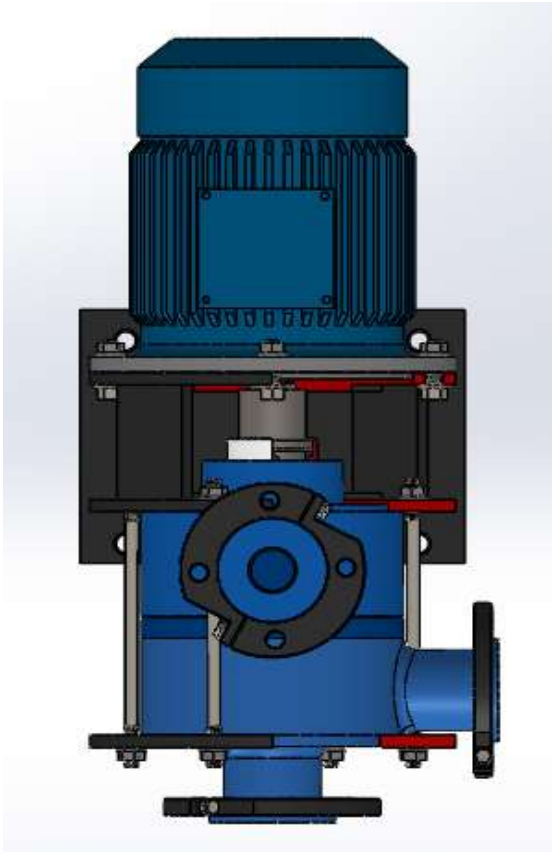


High Efficiency Vertical Glandless Pump

Metallic Series

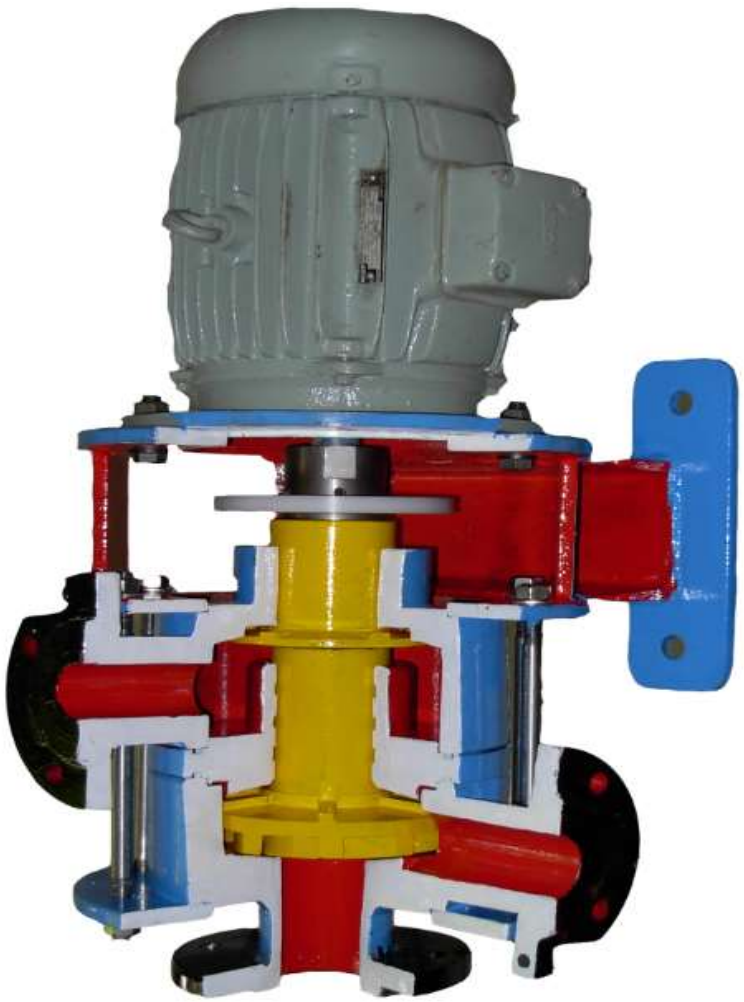
Metallic Series – Tech Spec

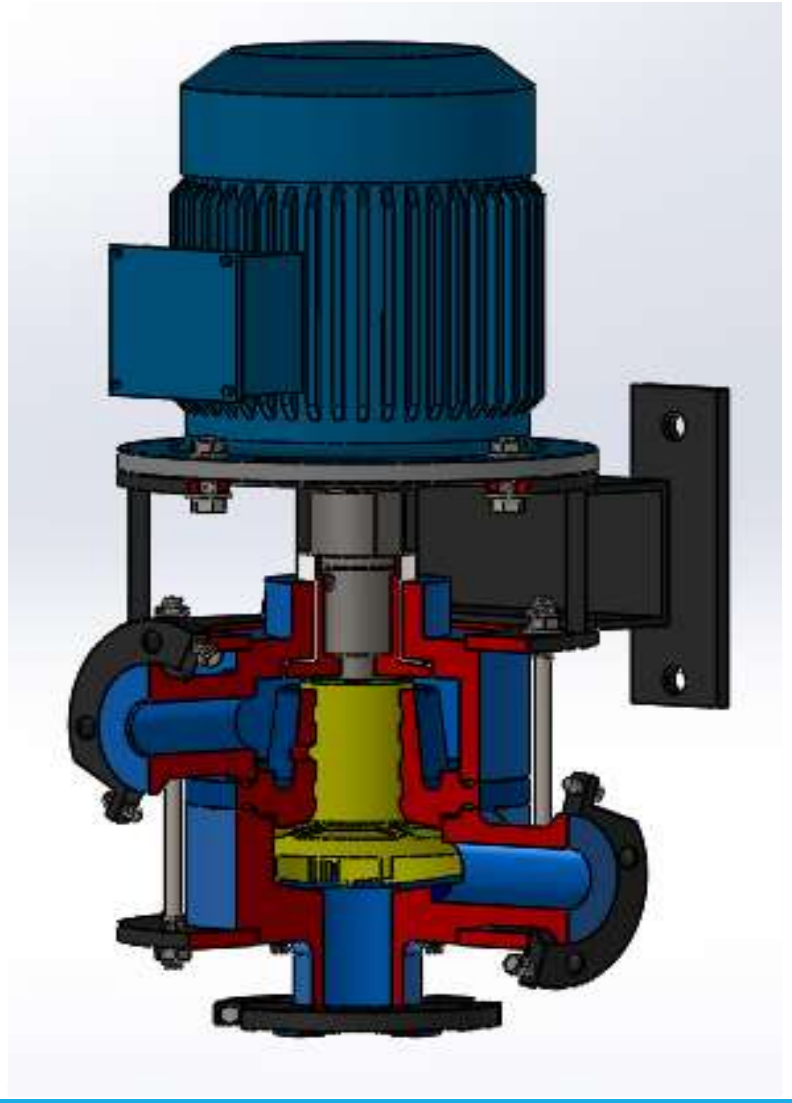
- Head of upto 120 MLC
- Capacity from 1.5m^3/hr to 500 m^3/hr
- Offered in Closed or Semi open impellers



Vertical Glandless Pump

Non-metallic Series
Pump In UHMWPE

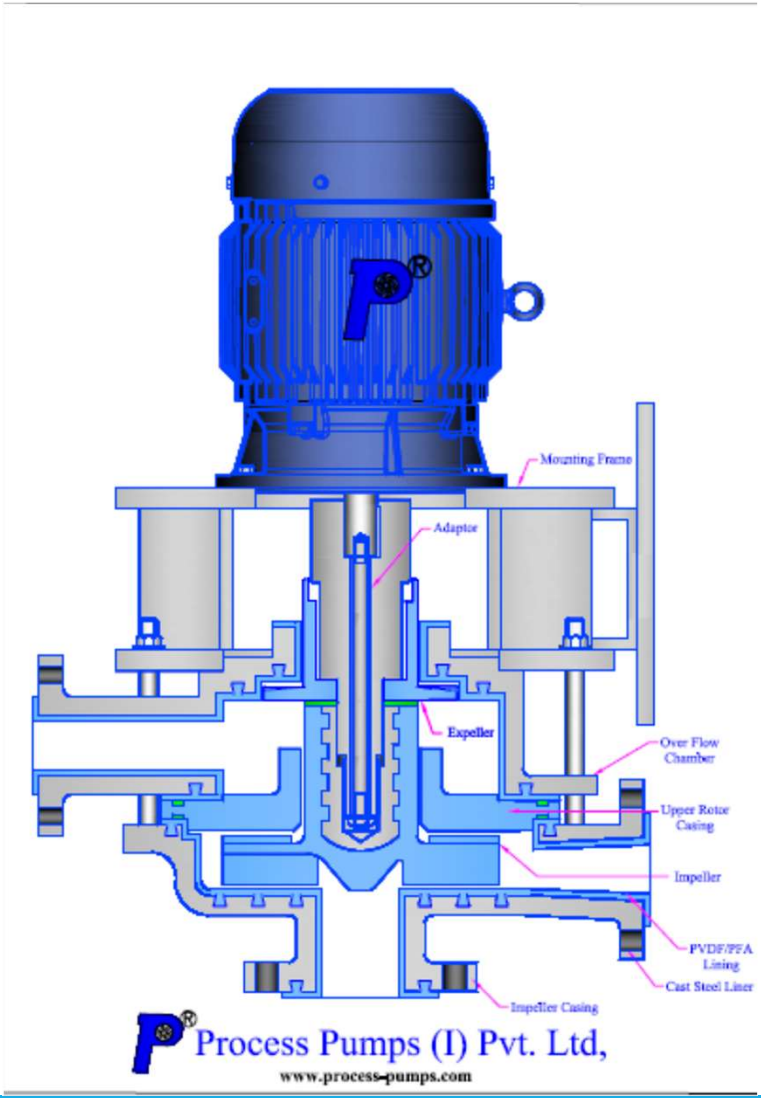




Vertical Glandless Pump(Non Metallic)

Vertical Glandless Pump

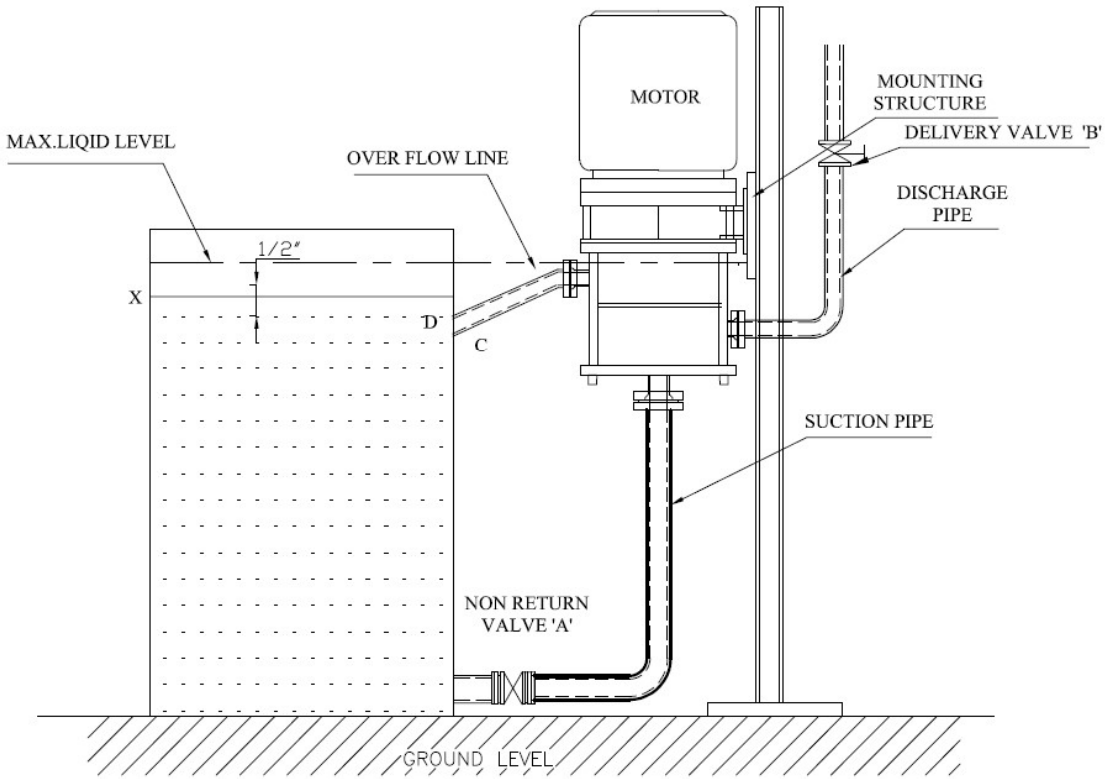
Non-metallic Series
Pump In Lined Pumps


Mounting Frame
Adaptor
Expeller
Over Flow Chamber
Upper Rotor Casing
Impeller
PVDF/PFA Lining
Cast Steel Liner
Impeller Casing
Process Pumps (I) Pvt. Ltd,
www.process-pumps.com

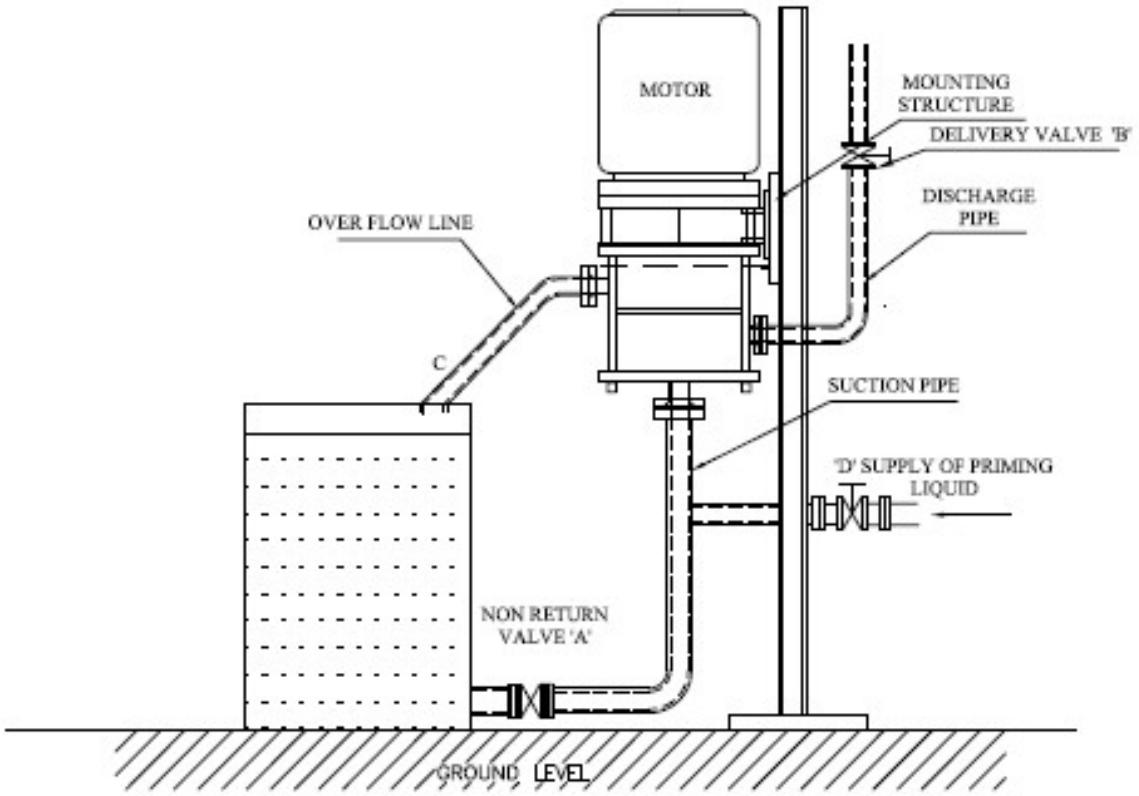
Non-Metallic Series – Tech Spec

- Head of up to 60 MLC
- Capacity from 1.5m^3/hr to 350m^3/hr
- Offered in Semi open impeller only

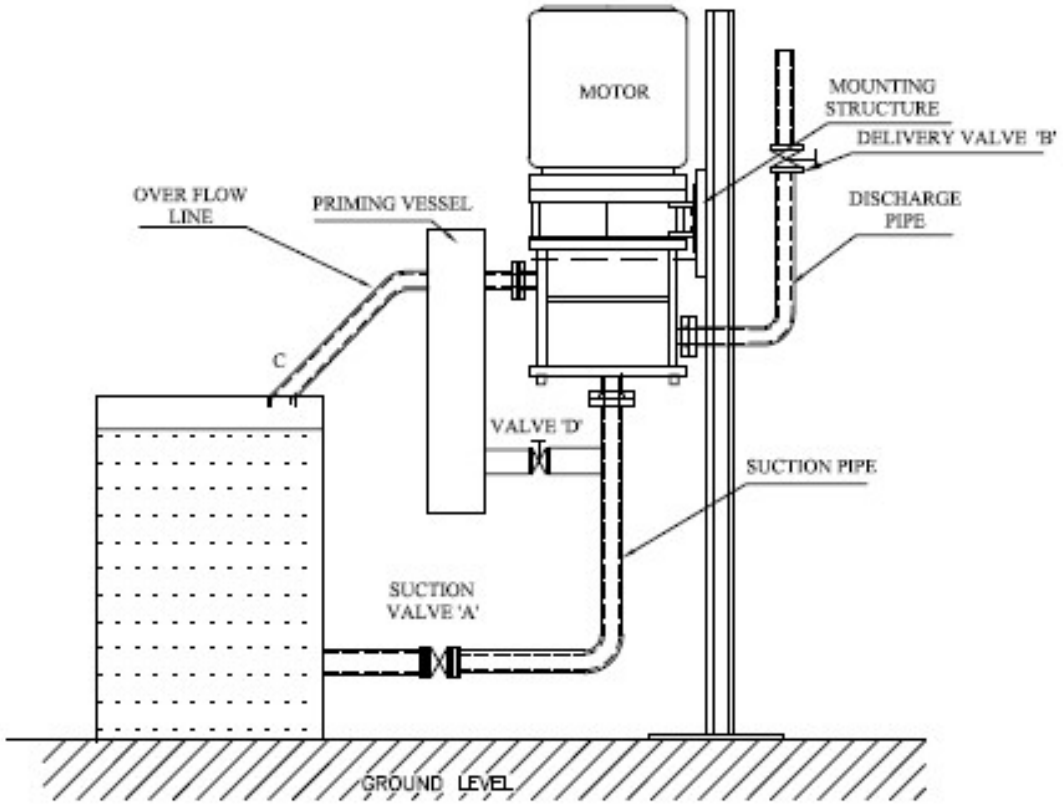
VERTICAL GLAND LESS PUMP
INSTALLATION SCHEME-1



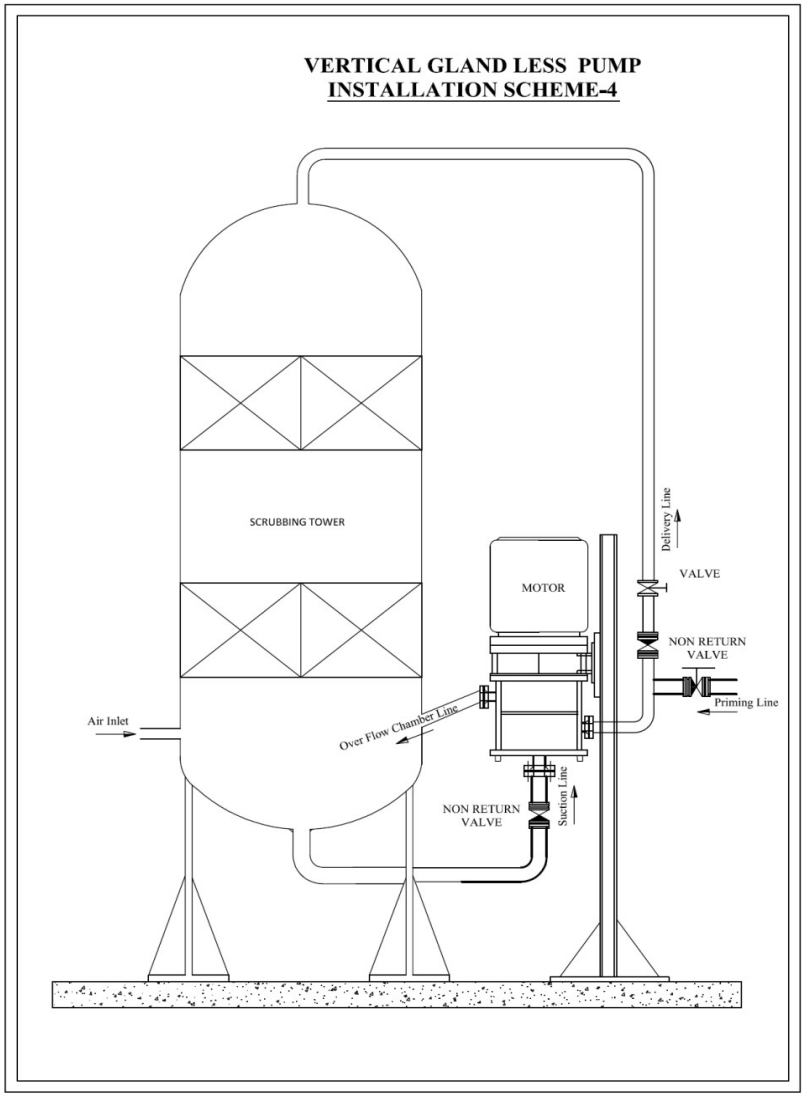
VERTICAL GLAND LESS PUMP
INSTALLATION SCHEME–2



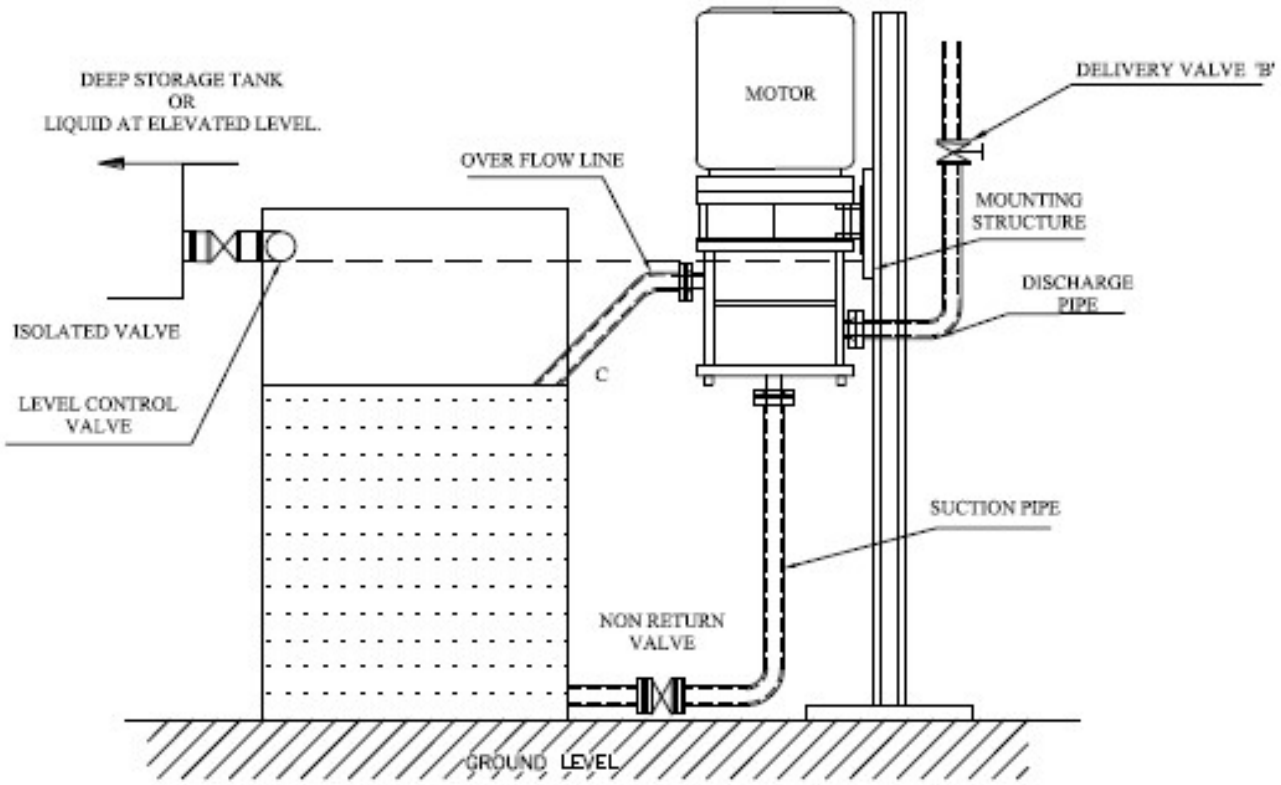
VERTICAL GLAND LESS PUMP INSTALLATION SCHEME–3



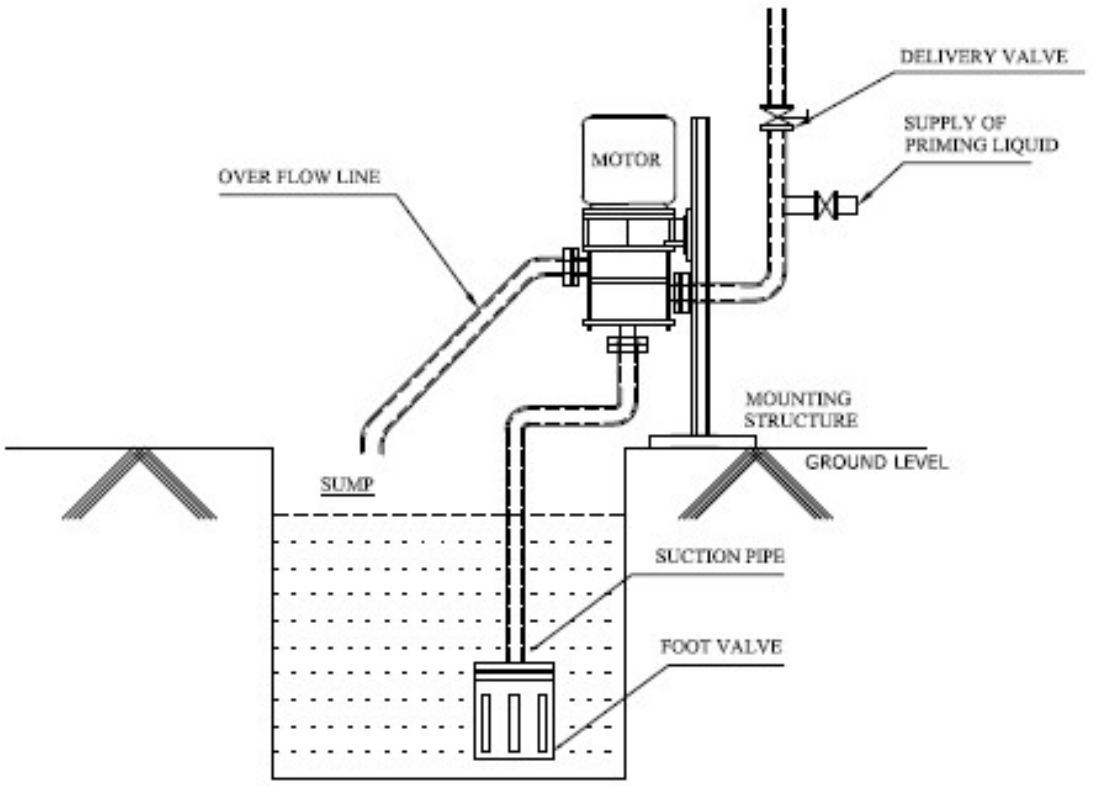
VERTICAL GLAND LESS PUMP
INSTALLATION SCHEME-4



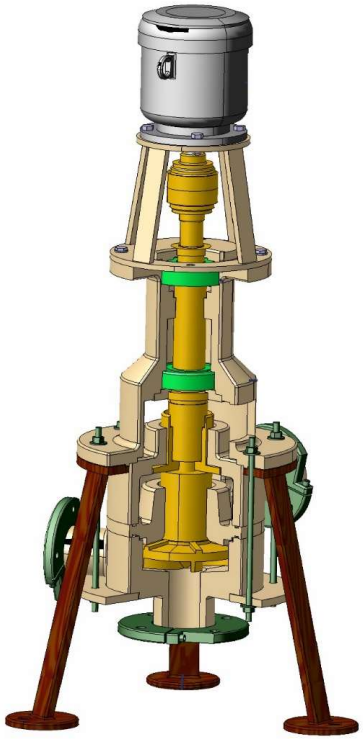
VERTICAL GLAND LESS PUMP
INSTALLATION SCHEME-5



VERTICAL GLAND LESS PUMP
INSTALLATION SCHEME-6

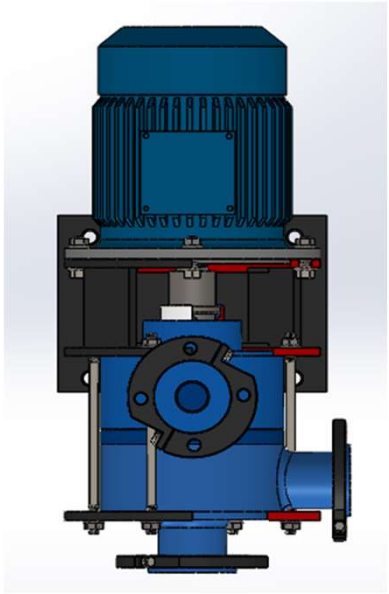


Vertical Glandless Pump with Intermediate Bearing Housing



Highlights of Vertical Glandless pump

- No packing or mechanical seal. Hence the problem associated with them does not exist.
- Truly glandless in nature.
- Zero safe minimum flow.
- Pump can run dry indefinitely.
- Self-draining.
- Suitable for clear liquid and slurry.

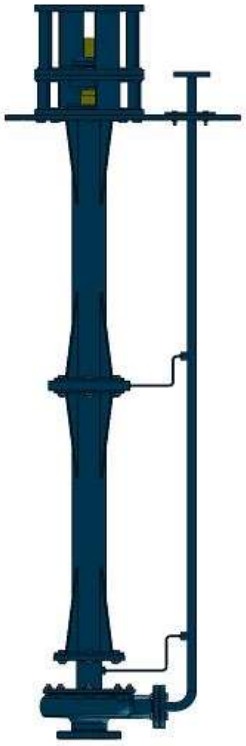


Limitations of Vertical Glandless Pump

- Can operate only wherever negative suction exists.
- The suction lifts pose a limitation in the installation.
- Can be suitable for only those liquids where external priming is feasible
- Not recommended for high temperature application or inflammable organic liquids.

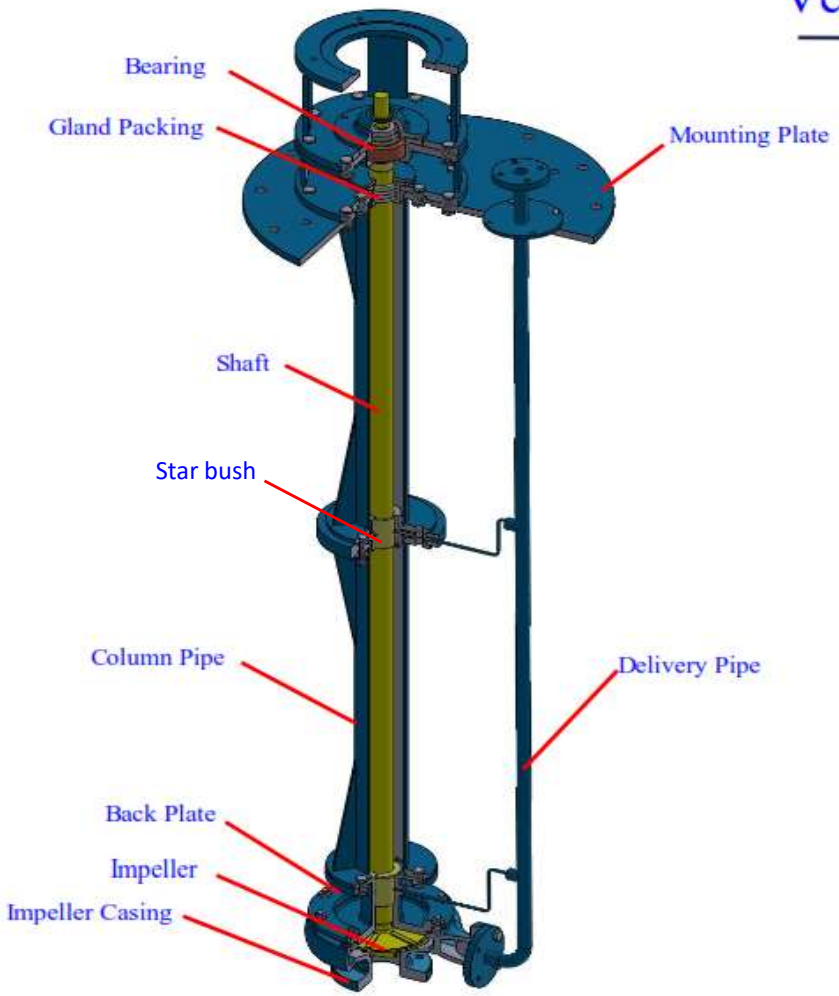
Vertical Sump Pump

DEEP PUMPING SOLUTION



Vertical Sump Pump

Vertical Sump Pump



Salient Features

- The pump conforms to VS4 as per API 610 requirement.
- We can offer the pump for a temperature range of -70 to +170°C
- Pump is provided with a single shaft to ensure very low vibration, reliability and longer life.
- Intermediate bush bearings are provided as a steady - the number of intermediate bearing depends upon the depth of immersion.
- The above construction ensures a maximum deflection of 50 micron irrespective of depth
- Recommended for pump of liquids with low vapor pressure from a sump
- The lubrication of intermediate bearing (hydraulic cushioning) is done by the pumping liquid itself, the pumping liquid delivered from the delivery pipe to bearing area.

Tech Spec

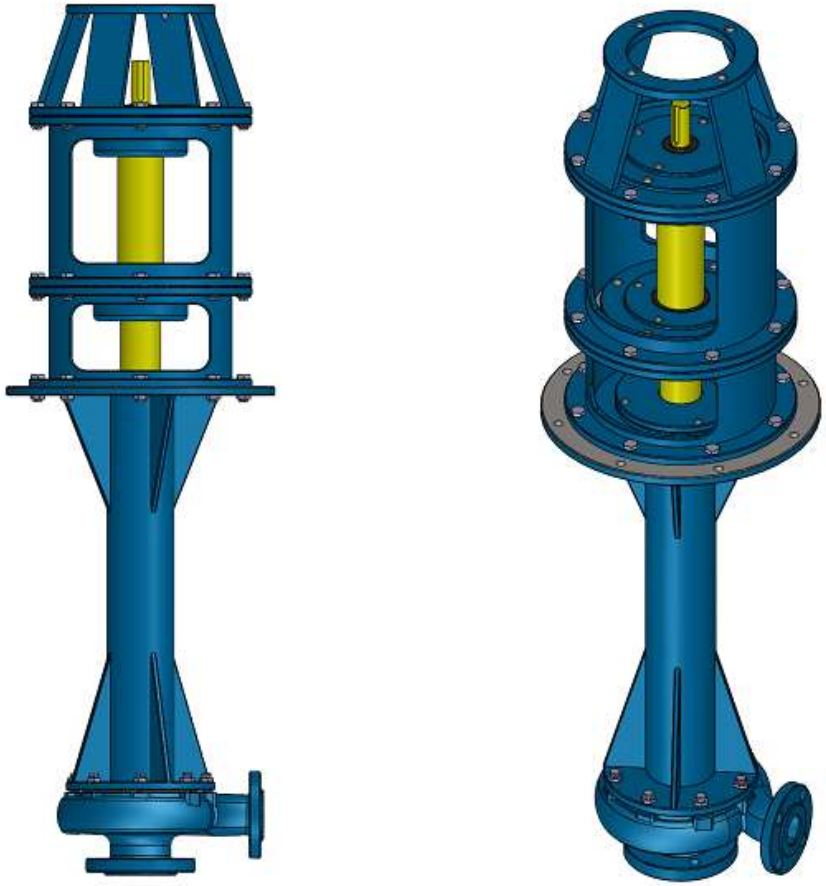
- Head of upto 120 MLC
- Capacity ranging from 3 m^3/hr to 300 m^3/hr
- We can offer in 2900 or 1440 RPM

Advantages of Vertical Sump Pump

- Ideally suitable for pumping liquid from underground tank - closed or open tank.
- Automatic switch ON and OFF is possible without necessitating priming
- The use of mechanical seal is avoided. Hence the downtime and maintenance of seal is eliminated
- We can offer pump for 4m depth of immersion
- Offer in an RPM to suite your duty point in metallic construction only
- We have offered a single stage pump for 120m head.
- Ideally suited for solvents and hazardous liquids.

Vertical Cantilever Shaft Pump

MAINTENANCE FREE DEEP PUMPING



Vertical Cantilever Shaft Pump

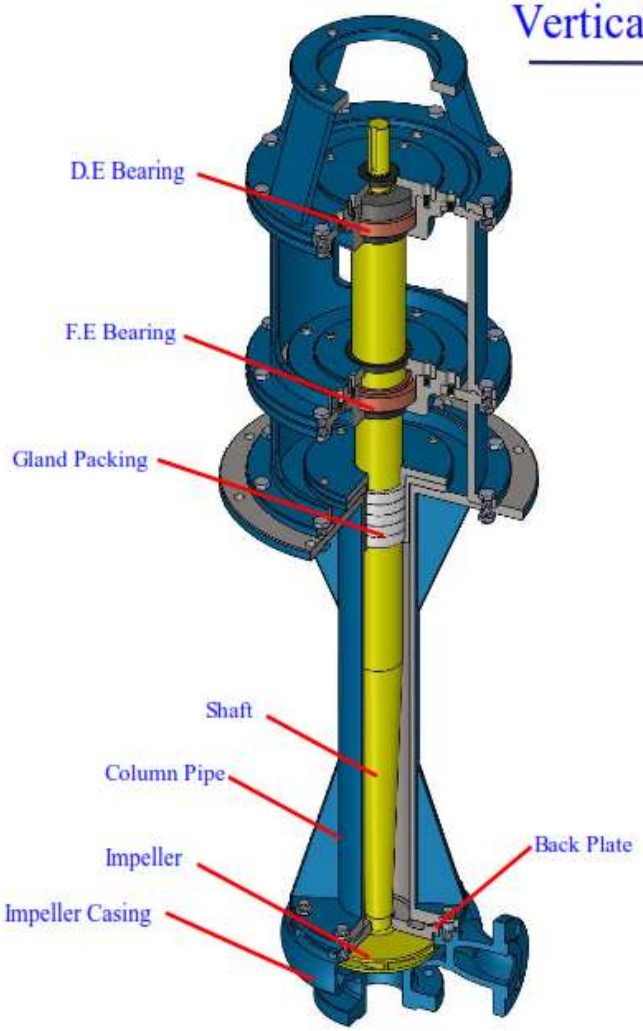
Salient Features

- Shaft deflection at the pump side is less than 30 Microns
- No Bearing on the pump side
- High reliability, rugged construction and low maintenance
- Automatic switching possible
- Low noise and vibration levels
- For sumps of higher depths suitable tail pipes are provided
- Used in critical applications where routine maintenance is not possible

Vertical Cantilever Shaft Pump

Metallic Series

Vertical Cantilever Shaft Pump

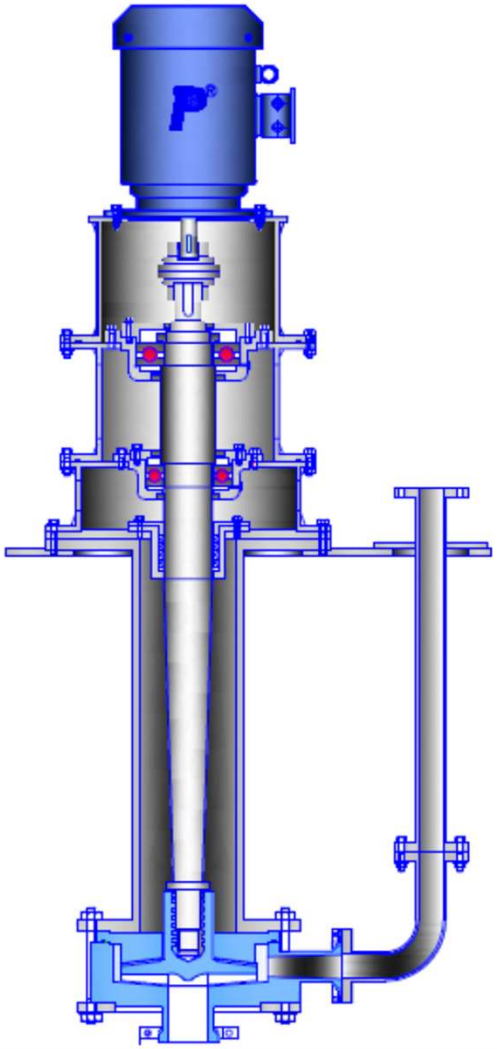


Vertical Cantilever Shaft Pump (Metallic)

Vertical Cantilever Shaft Pump

Non-Metallic Series

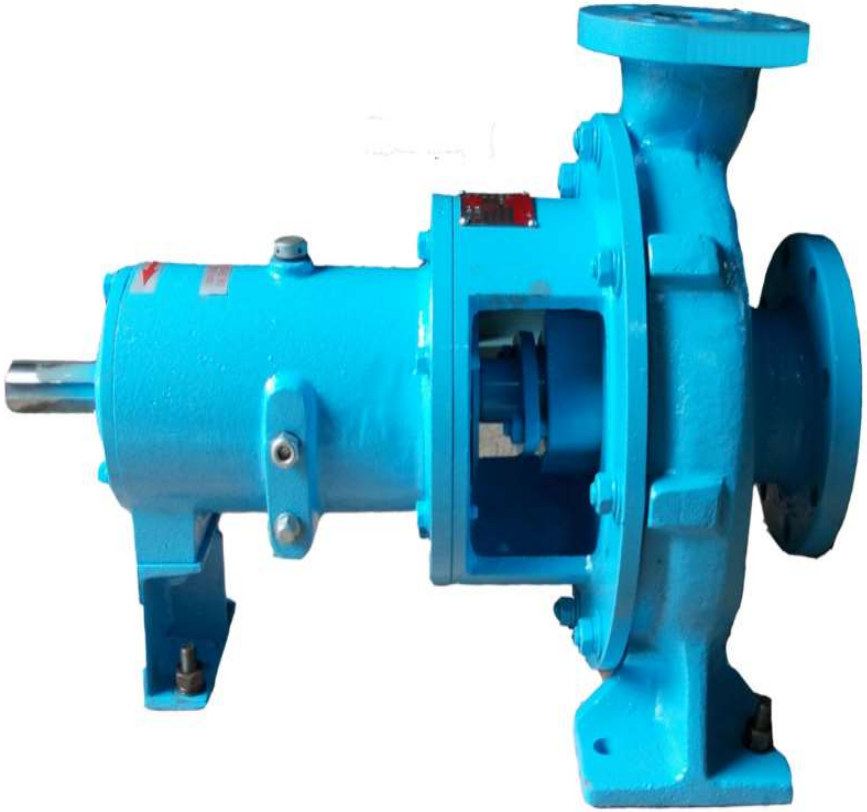
Vertical Cantilever Shaft Pump (Non-Metallic)



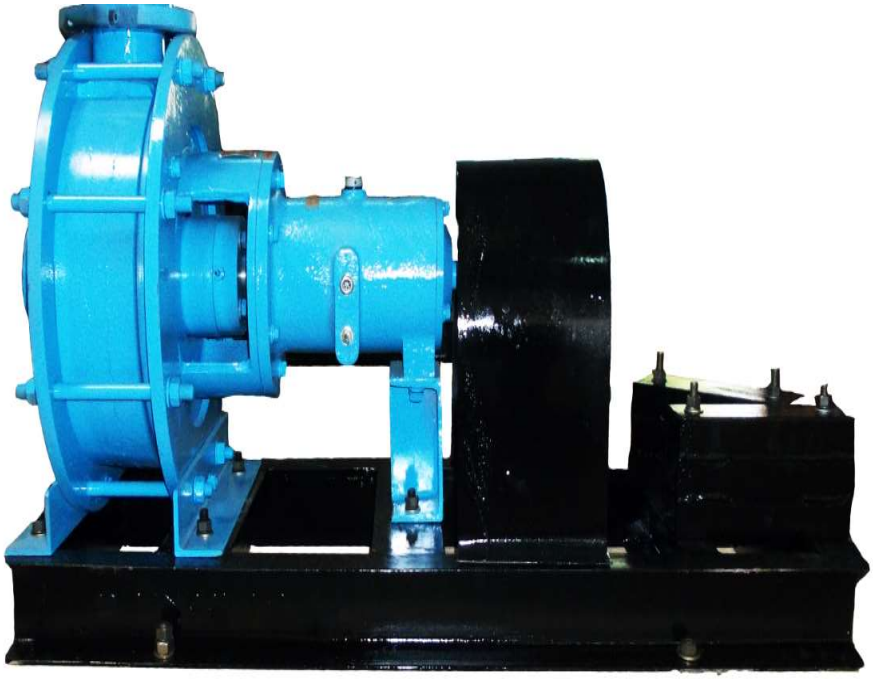
Tech Spec

- Head of upto 60 MLC
- Capacity ranging from 3 m^3/hr to 450 m^3/hr
- Offered in both metallic and non metallic construction
- Operating temperature based on the material

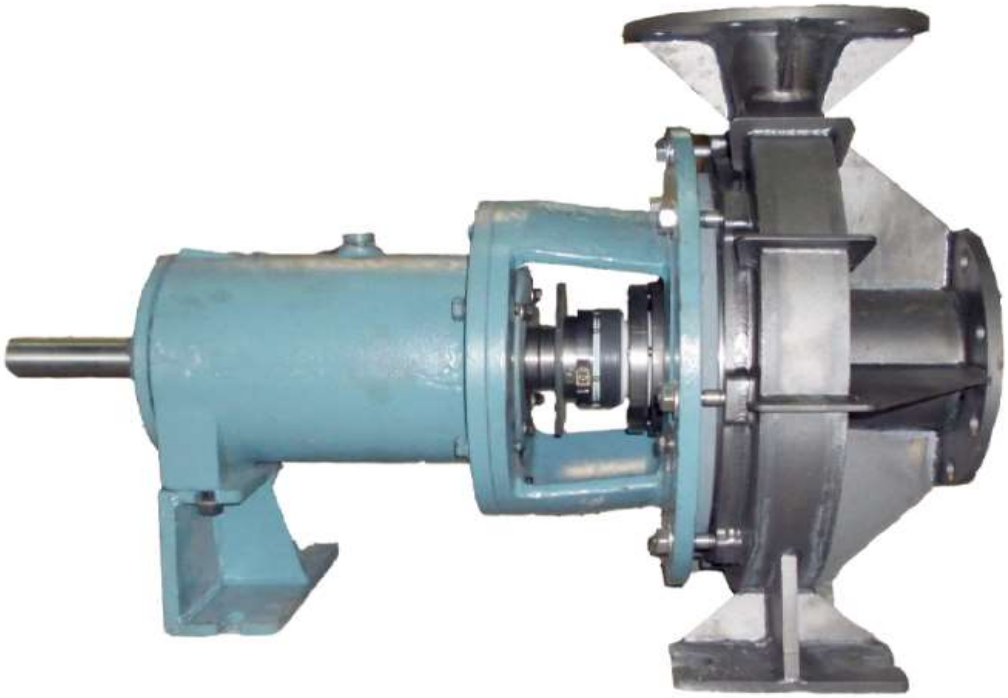
Thank You



Horizontal Metallic pump



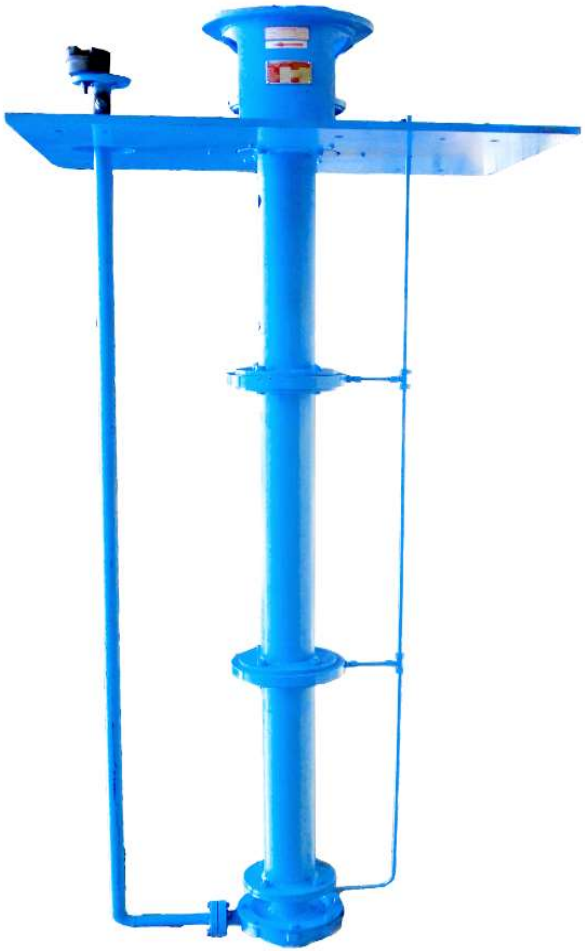
Horizontal Non-Metallic pump



HBPO-Titanium Pump

Vertical Glandless Pump(Metallic)

Vertical Glandless Pump(Non Metallic)



Vertical Sump Pump

Vertical Cantilever Shaft Pump(Metallic)

Vertical Cantilever Shaft Pump(Non-Metallic)