



Chemical  
& Pharma



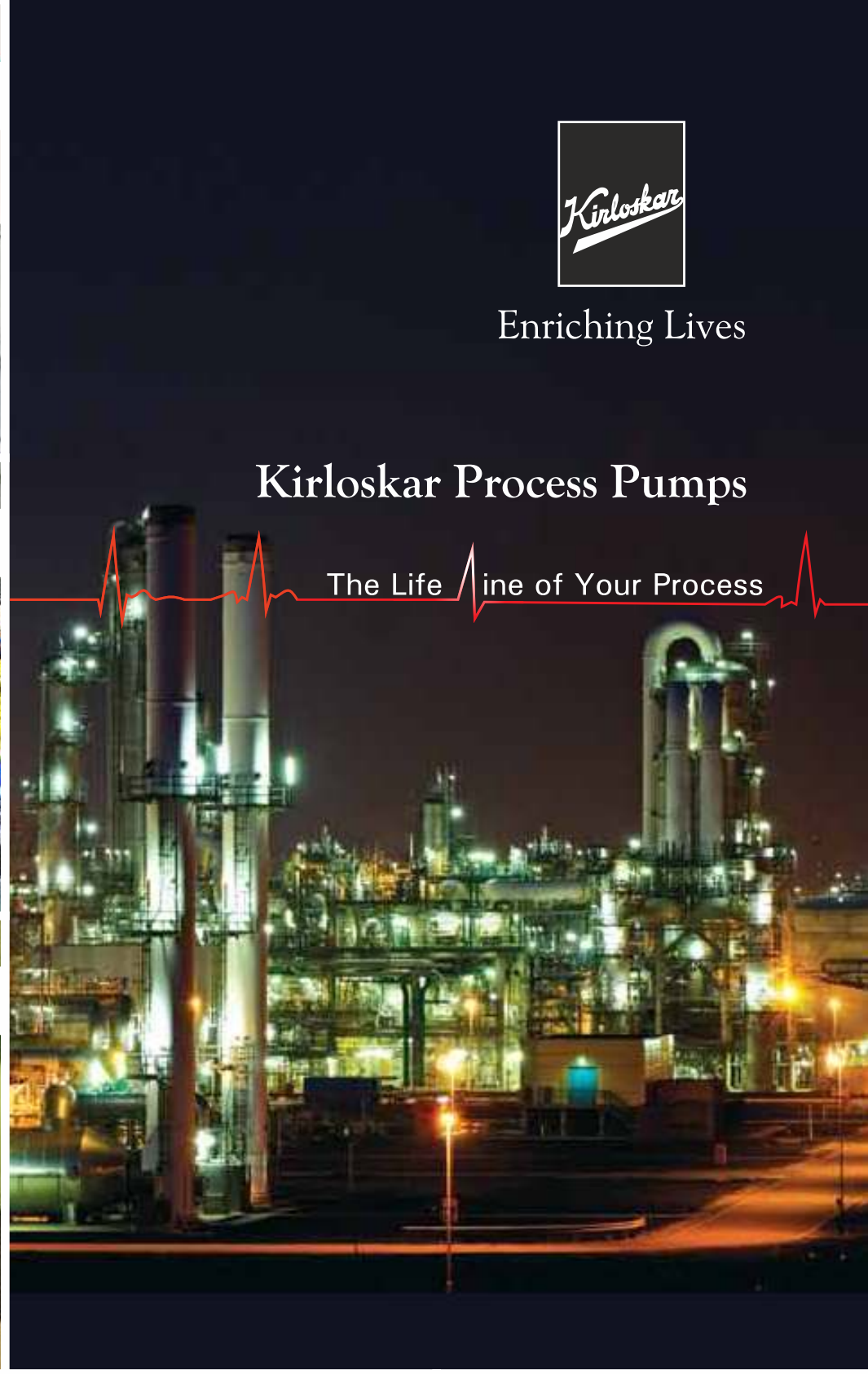
Food &  
Beverage



Sugar



Steel

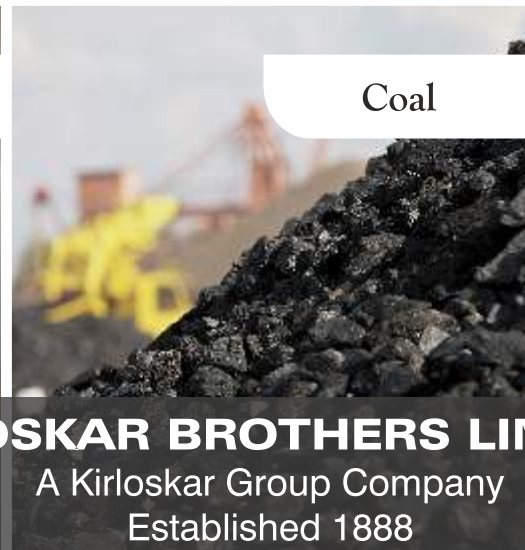


# Kirloskar Process Pumps

The Life  ine of Your Process



Enriching Lives



Coal



Cement

**KIRLOSKAR BROTHERS LIMITED**

A Kirloskar Group Company  
Established 1888



Global Headquarter: "Yamuna", Baner, Pune, India.

## Why Kirloskar?

Optimised pumping solutions across market segments from concepts to commissioning

Largest manufacturer and exporter of centrifugal pumps from India

Provider of energy efficient pumping solutions to core sectors

State-of-the art integrated manufacturing facilities

Manufacturer of the largest pumps by size and horsepower in India

Commands the highest market presence amongst pump manufacturers in India

Pioneer manufacturer of centrifugal pumps in India

**Kirloskar Brothers Limited (KBL) is a world-class pump manufacturing company with expertise in engineering and manufacture of systems for fluid management.**

Kirloskar Brothers Limited (KBL) is a world class pump manufacturing company with expertise in engineering and manufacture of systems for fluid management. Established in 1888 and incorporated in 1920, KBL is the flagship company of the \$ 2.1 billion Kirloskar Group. KBL, a market leader, provides complete fluid management solutions in the areas of water supply, building & construction, power plants, industry, irrigation, oil & gas and marine & defence. We engineer and manufacture industrial, agriculture domestic pumps, valves and hydro turbines.

In 2003, KBL acquired SPP Pumps, UK and established SPP INC, Atlanta, USA, as a wholly owned subsidiary of SPP, UK, to expand its international presence. In 2007, Kirloskar Brothers International B.V., The Netherlands and Kirloskar Brothers (Thailand) Ltd., a wholly owned subsidiary in Thailand, were incorporated. In 2008, KBL incorporated Kirloskar Brothers Europe B.V. (Kirloskar Pompen B.V. since June 2014), a joint venture between Kirloskar International B.V. and Industrial Pump Group, The Netherlands. In 2010, KBL further consolidated its global position by acquiring Braybar Pumps, South Africa. SPP MENA was established in Egypt in 2012. In 2014, KBL acquired SyncroFlo Inc., the largest independent fabricator of commercial and municipal domestic water booster pumps to further strengthen its global position, in 2015, Kirloskar Pompen B.V. acquired Rodelta Pumps International, The Netherlands.

KBL has joint venture cooperation with Ebara corporation, Japan since 1988 for the manufacture of API 610 standard pumps & multistage pumps. Kirloskar Corrocoat Private Limited is a joint venture between KBL and Corrocoat, UK since 2006. KBL acquired The Kolhapur Steel Limited in 2007 and Hematic Motors in 2010.

KBL has eight manufacturing facilities in India, viz Kirloskarvadi, Dewas, Kondhapuri, Shirwal, Sanand, Kaniyur, Kolhapur and Karad. In addition, KBL has global manufacturing and packaging facilities in Egypt, South Africa, Thailand, The Netherlands, United Arab Emirates, United Kingdom and United States of America. KBL has 12,700 channel partners in India and 80 overseas and is supported by best-in-class network of authorised service centres and authorised refurbishment centres across the country.

All the manufacturing facilities of KBL are certified for ISO 9001, ISO 14001, ISO 50001, BS OHSAS 18001 and SA8000. In addition, the Kirloskarvadi plant is also certified for N & NPT Stamp. KBL's corporate office in Pune is certified for ISO 9001 & SA8000.

The factories deploy total quality management tools using European Foundation for Quality Management (EFQM) model. The Kirloskarvadi plant of KBL is a state-of-the-art integrated manufacturing facility having Asia's largest hydraulic research centre with testing facility up to 5000 kW and 50,000 m<sup>3</sup>/hr.

KBL is the ninth pump manufacturing company in the world to be accredited with the N and NPT certification by American Society of Mechanical Engineers (ASME), for supply of pump & pump components for nuclear installation.

# Our Strengths

Comprises one of Asia's largest Hydraulic Research Centers with state-of-the-art testing facilities

Manufacturer of large split case pumps

Manufacturer of large vertical turbine pumps

Manufacturer of concrete volute pumps

Manufacturer of large size valves

Sump model testing and actual scaled down model

Executing large turnkey projects from concept to commissioning

Service network - 24x7

## Innovation, Research Engineering and Development - a constant process at KBL

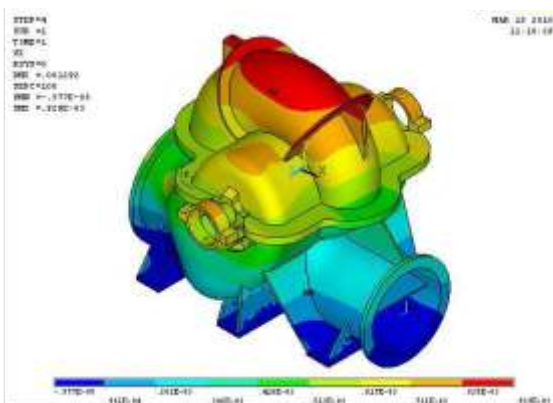
Our products and solutions are conceptualised after exhaustive research and undergo a manufacturing process which is world class. We have been awarded 17 patents for innovative solutions including 2 from the United States.

### Well-equipped R&D Center

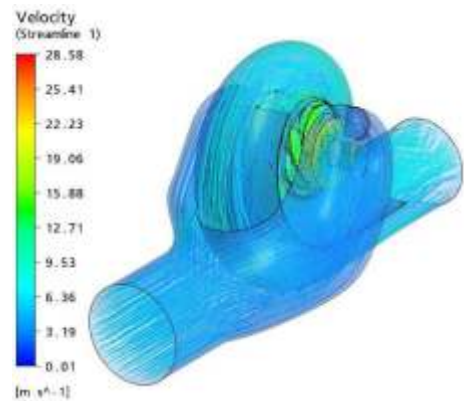
KBL's R&D facility is recognised by the Department of Science and Industrial Research (DSIR). The applied research work conducted in KBL has resulted in appropriate technology for development of many new series of pumps like horizontal split case, multistage, small end suction, large end suction, mixed flow pumps and many more to come. KBL has introduced India's first efficient pump to the more recent Solar motor pumps, Concrete volute pumps, metallic volute pumps, sodium pumps and magnetic drive pumps.

### Design and Engineering Analysis Software at KBL

- Pro-E Wildfire for Solid modeling
- Pro-Mechanica (for preliminary structural analysis)
- ANSYS Mechanical and Hyper works for structural analysis
- ANSYS CFX and Fluent STARCCM for CFD analysis
- Surge analysis package (SAP)
- Turbo design-1 (for inverse design)
- JMAG software for electromagnetic analysis for electric motor design



Stress Analysis of Split Case Pump



CFD analysis of split case pump

### Technical analysis performed at KBL

- Torsional analysis
- CFD analysis
- Surge analysis
- Sump model studies
- Structural analysis
- Cavitation studies
- Thermal analysis
- Transient analysis

# Manufacturing Excellence



01

It is our constant endeavour to upgrade and implement the latest and most advanced technology for smooth functioning of our facilities for uninterrupted production and seamless services.



02

01 Non - Ferrous Foundry

02 Assembly Shop

03 Foundry - Pattern



03



04



05



06

04 Radiography  
 05 Process Pump Machine Shop  
 06 Assembly Line



All the manufacturing facilities at KBL are certified for ISO 9001, ISO 14001, ISO 50001, BS OHSAS 18001 and SA8000. In addition, the Kirloskarvadi plant is also certified for N & NPT Stamp.

# Testing Capabilities

Dye penetration test

Ultrasonic test

Magnetic particle test

Inhouse radiography

Non destructive testing facilities

National Accreditation Board for testing and Calibration Laboratories (NABL) Accredited



One of Asia's Largest Hydraulic Research Centres ( HRCs) for testing pumps at duty conditions up to 5000 kW motor and with discharge up to 50,000 m<sup>3</sup>/hr

## Infrastructure

- One of Asia's largest Hydraulic Research Centres (HRC) for testing pumps at duty conditions up to 5000 kW (motors of 3.3/6.6/11 kV) and discharge up to 50,000 m<sup>3</sup>/hr.
- Closed circuit NPSH testing capabilities
- Computerized data acquisition system
- Sump model study system
- Conceptualized and built under the guidance and supervision of British Hydraulic Research Association
- Non-destructive testing facilities comprising dye penetrate testing, magnetic particle testing, ultrasonic testing and radiography capabilities
- Material testing laboratory for conducting transverse compression and shear hardness test and impact tests, spectrometer for chemical analysis of materials

## Foundry

The Kirloskarvadi foundry is equipped with a centralised pattern shop, mechanised sand processing system, automatic moulding machines and metal pouring system. There are independent units for cast iron, alloy steel and non-ferrous metals. The cast iron foundry is capable of producing a single casting weighing up to 8,000 kg and the steel foundry unit can produce castings of special alloy steels with acid pickling capability tailored to international standards. Total production capacity of foundries is 1,400 tons per month.





## Paper & Pulp

## Kirloskar Pumps in Process Industry

KBL is a global fluid management company, which thrives on need assessment, innovation and manufacturing excellence. This is the thought, common to each of our manufacturing facilities in India and abroad.

KBL is a driving force in the global industrial marketplace for API and non-API pumps, both for utility and various process applications. Our products and solutions are conceptualised after an exhaustive research and manufactured under standards and benchmarks accepted across the globe. Generations have witnessed the fine balance of engineering & thought in KBL's manufacturing ideology.

Once manufactured, the products undergo a stringent quality control process complying to various international standards. These tests are performed across the value chain in manufacturing pumps. All this is done to ensure that only the best fits into your processes to give you results which exceed expectations. High versatility, durability and reliability of process pumps makes them suitable for majority of the operating conditions and liquids.

Depending on the customer requirement, our pumps can be specially coated with anti-corrosion, anti resilience and hydrophobic coat, making them hydraulically efficient.

## Our Innovative Process Pumps

- Canned motor pump - iCM
- Magnetic drive pump - ROMAK
- Process pump - GK(P)
- Air cooled thermic fluid pump - AT



## Refrigeration Plant



## Soap & Detergent



## Acid Plant



## Automobile Paint Shop



## Chemical & Process

## Coal:

- Underground mine dewatering pump
- Open cast mine dewatering pump
- Phase dewatering pump
- High head high discharge mine dewatering pump
- Coal washery pump
- Dumper cleaning pump



Innovative & Reliable Pumping Solutions  
- for Wide Range of Industrial Applications

## Tyre:

- Stock preparation pump extruder pump
- Curing area pump
- HSD pump
- Naphtha pump
- Circulating water pump
- Booster pump



## Paper:

- Stock pump
- Fan pump
- Green liquor pump
- Black liquor pump
- Cooking liquor pump
- Blow tank discharge pump
- White liquor-sulphate process pump
- Chlorine water pump
- Hot water/boiler feed pump



## Cement:

- Cooling water pump
- GCT spray pump
- Pump for WTP /STP plants
- Limestone mine dewatering pump
- Make-up water pump
- Recirculating pump







### Steel:

- High pressure ammonical liquor pump
- Descaling pump
- Booster pump
- Scale-pit pump
- Quenching pump
- Dedusting pump
- Tuyere pump
- Furnace oil pump
- Acid pickling pump
- Filter water pump



### Chemical & Pharma:

- Organic and inorganic chemical handling pump
- Acid handling pump
- Air-cooled thermic fluid pump
- Solvent transfer pump
- Sealless canned motor pump
- Magnetic drive pump
- Special application vertical sump pump

### Food & Beverages:

- Sealless pump for refrigeration
- Hot oil pump
- Solvent extraction pump
- Oil extraction pump
- Liquor handling pump



### Sugar :

- Unstrained/Strained juice pump
- Weighed juice pump
- Sulphited juice pump
- Injection pump
- Caustic soda & filtrate pump
- Re-circulation juice
- Syrup extraction
- Hot & cold water



## Case Studies

### Pumping of salt water with different densities

#### APPLICATION:

Earlier, the customers had been using imported sump pump to pump salt water with specific gravity of 1.25 at ambient temperatures. When these pumps were not in operation for eight hours or more, the salt water would crystallise, thus leading to deposition of solids on the pump surface. These crystallites could not be washed or removed from the pump surface when the pumps were restarted. Hence, the pumps had to be opened completely for washing. The only way to remove the deposits was by using pumps with high pressure clean water (5kg/sq cm). To restore them, the customer had to remove the pumps from installation site and take them to a location 2 km away from the pump house, where low-density clean water was available. Due to the unavailability of adequate clean water, the process of removing the pumps and cleaning them with fresh water used to take 2 to 3 days. This not only delayed the operation but also resulted in wastage of time and money.

#### SOLUTION:

Considering the property of salt water, KBL recommended end suction pumps with mixed flow impeller design with anti-corrocoat on the impeller and a casing with special Fluiglode coating. This led to improved efficiency and enhance life of coated pump components. The material of the casing and the impeller was 2% NiCl & CF8M recommended, respectively, with Fluiglode coating. This helped in reducing the maintenance time, since no dismantling /transportation of pump was required for cleaning purpose. The MOC (Material of Construction) suggested was 2.5% NiCl casing with CF8M internal and corrocoating. In this way, KBL's application engineering knowledge duly benefitted the customer.

### Pumps with defined metallurgy for spin bath application

#### APPLICATION:

The spin bath in textile industries is very corrosive. The liquid contains sulphuric acid, zinc sulphate, sodium sulphate and water. This combination of different chemicals leads to rapid material erosion, thereby leading to shorter life span of pumps.

#### SOLUTION:

KBL's latest technology and in-house foundry capabilities have enabled it to create benchmarks in offering special application process pumps with precise metallurgical composition, which suits all kinds of special and customised requirement of various customer. This includes materials like R55, Super Duplex, Alloy 20/CN7M, Hastalloy C, CD4MCu, etc. KBL successfully maintains the metallurgical composition within the specified range and supplies pumps having combination of R55 and K-Monel metallurgy for many of its premium customers in textile industries.

# Product Range

## End suction process pump - KPD/KPDQF/KPDJ EN 22858 (DIN 24256) and ISO 2858



### Features

- Horizontal, single stage and end suction
- Top centre line delivery
- Back pull out design
- Oil lubricated bearings
- Gland packing or with mechanical seal
- API flushing plan

### Applications

- Process Industries, Petro-chemical, Refinery, Fertilizer, Paper, Sugar, etc.
- Pumps suitable for handling Acids, Alkalies, Salt solutions, Caustic, Hydro carbons, Edible oil, Thermic fluids, Solvent, Monomers, LPG, Condensates, Viscous liquids, etc.

### Material of Construction

- CI, Cast steel, CF8, CF8M, Alloy 20, R55, CN7MS, MONEL, CD4MCu, Hastalloy C, etc.

## End Suction Process Pump KPD

### Features

- Back pull out design
- Oil lubricated bearing
- Top centre line delivery

### Operating Range

Delivery size	up to 350 mm
Capacity	up to 1550 m <sup>3</sup> /hr
Head	up to 225 metres
Working pressure	16 - 25 bar
Temperature	(-) 50°C to 180°C

## End Suction Process Pump KPDQF

### Features

- Semi-open impeller
- Suitable for liquid with solid particles
- Stuffing box cooling (optional)
- Steam jacket (optional)

### Operating Range

Capacity	up to 580 m <sup>3</sup> /hr
Head	up to 200 metres
Working pressure	16 - 25 bar
Temperature	(-) 50°C to + 300°C

## End Suction Jacketed Pump KPDJ

### Features

- Suitable for handling congealing liquids, fatty acids and viscous liquids
- MS/SS 316 heating jacket

### Operating Range

Capacity	up to 1550 m <sup>3</sup> /hr
Head	up to 225 metres
Working pressure	16 - 25 bar
Temperature	(-) 50°C to + 300°C

## Water cooled thermic fluid pump - KPDT EN 22858 (DIN 24256) and ISO 2858



### Features

- Back pull out design
- Centre line mounted
- Stuffing box cooling
- Bearing and pad cooling

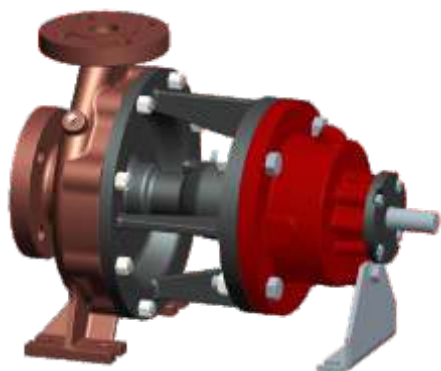
### Applications

- KPDT pumps are designed for handling thermic fluids, synthetic oil, hot oil, etc.

### Operating Range

Delivery size	up to 200 mm
Capacity	up to 900 m <sup>3</sup> /hr
Head	up to 200 metres
Working pressure	16 - 25 bar
Temperature	Up to +350°C

## Air cooled thermic fluid pump - AT EN 22858 (DIN 24256)



### Features

- The pump is integral foot mounted for a given temperature range
- More reliable for thermal isolation of volute casing
- Maintenance free mechanical seal
- No additional cooling required (air cooled)
- Pump with grafoil packing at stuffing box cavity and Sintered Silicon Carbide or Carbon Bearings

### Applications

- Thermic fluid
- Synthetic oil
- Hot oil

### Operating Range

Delivery size	32 to 80 mm
Capacity	up to 250 m <sup>3</sup> /hr
Head	up to 100 metres
Working pressure	16 bar
Temperature	Up to +350°C

## Process pump - GK(P) ISO 2858 / DIN EN 22858 / ISO 5199



### Features

- End suction centrifugal process pump
- Back pull out design
- Top centerline discharge with foot mounted as well as centerline volute casing
- Availability of cooling jackets to cool stuffing box for liquids having temperature more than 105°C
- Conical stuffing box

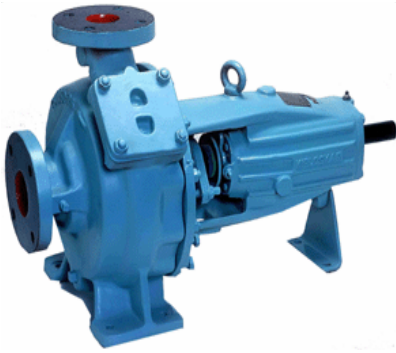
### Applications

- Acids / Alkalies
- Hydrocarbons, oils
- Process fluids

### Operating Range

Delivery size	Up to 150 mm
Capacity	up to 500 m <sup>3</sup> /h
Head	up to 150 metres
Working pressure	16 - 25 bar
Temperature	Up to 180°C

## Solid handling pump - SHM IS 5600



### Features

- Back pull-out design
- Gland packed / Mechanical seal
- Available in vertical execution

### Applications

- Sludge & Paper pulp
- Sewage & Waste water
- Viscous liquids / Fibrous material
- Contaminated process liquids
- Strained/Unstrained juice

### Operating Range

Delivery size	200 mm
Capacity	up to 800 m <sup>3</sup> /hr
Head	up to 90 metres
Working pressure	16 bar
Temperature	(-) 10 °C to 140 °C

## Solid handling sump pump - SHS



### Features

- Vertical submerged, single stage, single suction pump
- Vertical shaft arrangement
- Side discharge pump with space saving installations

### Applications

- Liquids with solids in suspension
- Sludge & pulpy material
- Industrial waste handling
- Liquid containing fibrous & powdered material
- Coal tar

### Operating Range

Delivery size	up to 300 mm
Capacity	up to 1500 m <sup>3</sup> /hr
Head	up to 90 metres
Working pressure	16 bar
Temperature	(-) 10 °C to 90 °C

## Sump pump - KPDS



### Features

- Vertical submerged, single stage, single suction pump
- Vertical shaft arrangement
- Side discharge pump with space saving installations

### Applications

- Petrochemicals, refinery, fertilizer and power industries
- Transfer and circulation of acids, alkalis, solvent oil, etc.
- Highly alkaline and highly acidic liquids (with enclosed impeller)
- Water, D.M. water, waste water and food processing units
- Liquids containing light soft solids
- Molten Sulphur

### Operating Range

Delivery size	20 mm to 150 mm
Capacity	0.5 to 560 m <sup>3</sup> /hr.
Head	up to 150 metres
Working pressure	16 - 25 bar
Temperature	Up to 90° C

## Condensate extraction pump - RKB-CV / BHRC



### Features

- Vertical can (barrel) - type ring-section pump
- Suction / stage impellers are of radial flow type design
- Pump can be single or multistage
- Pump can either be with single or with double suction to have lower NPSHR

### Applications

- Handling steam condensate in Industries / Power plant

### Operating Range

Delivery size	up to 500 mm
Capacity	up to 2200 m <sup>3</sup> /hr
Head	up to 350 meters
Temperature	up to 120 °C

## Mixed flow pump - MF



### Features

- Pump casing: Horizontal/vertical end suction high efficiency volute type with top/side/45 degrees orientations. Delivery flange and supporting feet are cast integral with the casing.
- Impeller: Non clog - semi open / enclosed type
- Bearing: Deep groove ball bearing and thrust bearing. Standard lubrication - oil (except MF 200 pump with grease lubrication)

### Applications

- Circulation of hot or cold water, in air-conditioning plants, Power stations, Textile mills and for sewage handling
- Fan pump application in the paper industry
- Spin bath application and in acid/alkalies

### Operating Range

Delivery size	650 mm
Capacity	up to 7000 m <sup>3</sup> /hr.
Head	up to 30 metres
Working pressure	16 bar
Temperature	(-) 10°C to 140°C

## Multi stage pump - RKB-Horizontal Multistage



### Features

- Ring section diffuser casings
- Stuffing box cooling for high temperature application
- Available in vertical configuration
- Available with double suction impeller for first stage
- Optional orientation available for suction branch
- Hydraulic balancing by balancing holes
- Multi-outlet feature enables usage of the pump for various delivery pressure

### Applications

- Mine dewatering
- Descaling
- High pressure ammonia liquor aspiration system
- Condensate extraction
- Boiler feed

### Operating Range

Delivery size	250 mm
Capacity	up to 850 m <sup>3</sup> /hr
Head	up to 850 meters
Working pressure	40-64 bar
Temperature	(-) 30°C to 140°C

## Canned Motor Pump - i-CM



### Features

- i-CM pump is end suction type sealless and emission-free canned motor pump, having integral motor design due to which it is compact in construction and light in weight.
- Integrated motor design

### Applications

- Liquefied gases (e.g. ammonia, freons), amines, etc.

### Operating Range

Delivery size	32 to 50 mm
Capacity	4 to 80 m <sup>3</sup> /hr.
Head	up to 60 metres
Working pressure	16 bar
Temperature	Up to 90°C

## Magnetic drive pump - ROMA K ISO 2858 / DIN EN 22858 / ISO 5199



### Features

- Sealless
- End suction pump comprises permanent magnet

### Applications

- Chemicals - Paints, solvents, intermediaries, resin, polymers, other Acidic and basic chemicals
- Pharmaceuticals
- Petrochemicals
- Suitable for various process industries for clean/clear liquids without any suspended particles

### Operating Range

Delivery size	Up to 100 mm
Capacity	Up to 300 m <sup>3</sup> /hr.
Head	up to 150 meters
Working pressure	16 bar
Temperature	(-) 50°C to 180°C

## Process pump - i-CP ISO 2858



### Features

- Pump without mechanical seal & without gland packing arrangement
- Selfventing design
- Pump with back pull out design
- Shaft is fully protected from liquid
- Widely interchangeable components

### Applications

- Light chemicals like caustic soda, weak acids, etc.
- Food & beverage industries (sugar, vegetable oils, etc.)
- Hot water, brine, DM water, lime water, etc.

### Operating Range

Capacity	up to 180 m <sup>3</sup> /hr
Head	up to 55 metres
Temperature	Up to 95°C

## Side channel flow pump - CF



### Features

- CF pumps are self priming type owing to their regenerative type impellers design.
- CF pumps are capable of handling liquid and gas mixture.
- Low NPSHR values permit high suction lift or operation close to evaporation temperature.

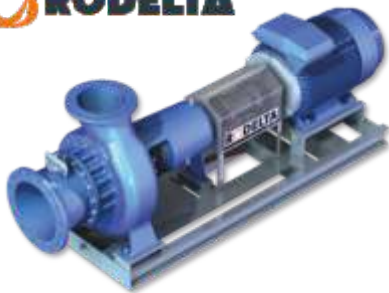
### Applications

- Chemical and process industry
- Booster service
- Air conditioning and refrigeration installations
- Boiler feed duties
- LPG and other petroleum products

### Operating Range

Delivery size	up to 50 mm
Capacity	up to 20 m <sup>3</sup> /hr
Head	up to 315 metres
Working pressure	40 bar
Temperature	-40°C to 90°C, 90°C to 120°C (with Stuffing Box Cooling)

## Medium Consistency Pump – ES Series (Rodelta Pumps International B.V)



### Features

- High efficiency generally in excess of 80%
- Dry state and air indications up to 6%
- Special open impeller for solid densities of up to 10%
- Consistency up to 8% in the paper and pulp industry

### Applications

- Viscous and fibrous fluids in pulp and paper
- Light/Medium slurries
- Light/Medium Hydrocarbons
- Fibres and solids in suspensions
- Pre Treatment & Electro Coat paint
- Primary & Secondary sludge
- Starch industry

### Operating Range

Delivery size	80 to 300 mm
Capacity	up to 2500 m <sup>3</sup> /hr
Head	up to 80 meters
Working pressure	10 bar
Temperature	Up to 100°C

## Vortex Pump – FN series (Rodelta Pumps International B.V)



### Features

- Single stage with a vortex impeller
- Gentle pumping action (less than 20% of pumped liquid in contact with impeller)
- Practically no change to the products contained in liquid
- Fully recessed impeller
- Impeller mounted in centre of casing (circular casing), therefore, radial loads are very low at all operating points on the performance curve
- Back pull out
- Low attrition to solids

### Applications

- Fibrous, textile, leather & rubber shreds
- Light/medium hydrocarbons/low shear applications
- Waste paper pulp, juices, starch.
- Sand, gravel coal & cement slurries

### Operating Range

Delivery size	50 to 125 mm
Capacity	up to 450 m <sup>3</sup> /hr
Head	up to 70 meters
Temperature	(-) 20°C to 170°C



## TAZN TYPE PUMP- VS4 Pump (Rodelta Pumps International B.V)



### Features

- Fully complying with API 610 11th Edition VS 4 design.
- Pump can be supplied to lengths up to approx. 8m depending upon pump size
- Utilises HZC hydraulics

### Applications

- Steel mills
- Chemical & petrochemical plants
- Oil & gas
- Paper mills
- Power plants

### Operating Range

Capacity	up to 300 m <sup>3</sup> /hr
Head	up to 250 metres
Working pressure	16 bar
Temperature	up to 250°C

## TC series API-VS-5 (Rodelta Pumps International B.V)



### Features

- Vertically suspended (VS 5)
- Cantilever with no shaft support below cover plate
- Dry running capability

### Applications

- All kinds of sump duties
- Refineries
- Petrochemical plants
- Chemical plants
- Silicon wafer cutting

### Operating Range

Capacity	up to 800 m <sup>3</sup> /hr
Head	up to 80 meters
Working pressure	10 bar
Temperature	Up to 200°C

## TA series Non-API VS-4 (Rodelta Pumps International B.V)



### Features

- Vertically-suspended single casing volute line shaft driven pumps
- Impeller: Closed/open/vortex
- Double/ single radial spiral casing

### Applications

- Steel mills
- Chemical & petrochemical plants
- Oil & gas
- Paper mills
- Power plants
- All kinds of sump duties

### Operating Range

Capacity	up to 2500 m <sup>3</sup> /hr
Head	up to 120 meters
Working pressure	10 bar
Temperature	Up to 200°C

## Boiler Feed Pumps - MSS / MSSH

**KEPL**



### Features

- Design and manufacture as per company standard
- Multistage pump with ring section diffuser casing design, with foot mounted casing suitable for low pressure requirements
- Easy inspection and repair maintenance of bearings and mechanical seal after removal of coupling spacer only

### Applications

#### MSS

- Low pressure boiler feed applications
- Low pressure applications in light chemical plants

#### MSSH

- Medium pressure boiler feed applications
- Medium pressure applications in light chemical plants

### Operating Range

Capacity	Up to 270 m <sup>3</sup> /hr - MSS Up to 550 m <sup>3</sup> /hr - MSSH
Head	Up to 550 m - MSS Up to 850 m - MSSH
Working pressure	Up to 11 bar
Temperature	(-) 5 to 165°C
Nozzle orientation	TOP/TDP & side-TOP
Flange rating	Cl. 150/600

## Boiler Feed Pumps - SS/SSD

**KEPL**



### Features

- Design and manufacture as per company standard, however, can meet API 610 requirements
- Multistage pump with ring section diffuser casing design with centerline support to meet high temperature and high pressure application especially in BFW application
- First stage impeller with double suction is provided in SSD models to improve NPSHR performance

### Applications

- High pressure boiler feed water applications.
- High pressure mine drainage applications
- High pressure applications in water treatment plant

### Operating Range

Capacity	Up to 650 m <sup>3</sup> /hr
Head	Up to 2500 m
Working pressure	Up to 17 bar
Temperature	(-) 5 to 200°C
Nozzle orientation	Top-Top & Side-Top
Flange rating	Cl. 300/600/ 900/1500/2500

## Pressure Boosting (HYPN) System



The pressure boosting (HYPN) system keeps desired pressure in the pipeline at par with the demand from multiple loads. These kind of systems are useful in case of varying water requirements. The total water requirement is divided by multiple pumps, which run in parallel with variable speed drives. As per demand, number of pumps as well as speed will vary for facilitating optimisation of energy.

### Applications

- Textile - Providing water (Cold & Hot) to dyeing & washing machines
- Bottling or liquid filling plants - Filling of vessels, vessel cleaning
- Process & pharma plants - Reactor cooling, Eye washer & Body Shower
- Steel plants - Cooling circuits
- Leather industry - Washing application
- Sugar industries - Water injection pumps
- PVC industries - Machine cooling / Mould cooling

# Remote condition monitoring - Intelligent pumping solutions

Condition monitoring enables a person to view process parameters through internet. The key features of remote condition monitoring of pumpsets include:

- Monitoring of operational behaviour of the pump or pumping system
- Monitoring and analysis of faults
- Suggestions for tentative actions to be taken in case of faults
- SMS alerts and e-mails in case of faults with daily reports through e-mails for record and analysis

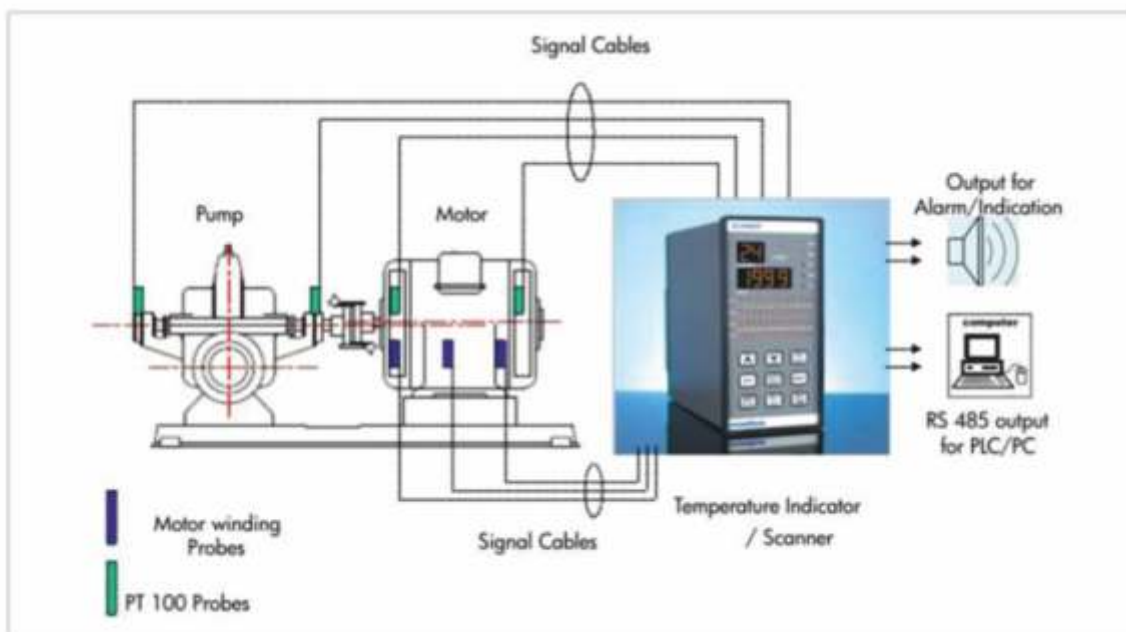
The condition monitoring system is very useful in cases where pumps or pumping systems are catering to critical processes or applications. This is done by capturing data from pressure transmitter, flow meter, vibration sensors, bearing RTD and energy meters.

**Web based monitoring can be carried out for the following parameters:**

- Flow
- Pressure
- Vibration
- Bearing temperature
- Voltage
- Current
- Energy consumption

**Benefits of the system**

- Monitoring is possible at anytime by anyone and anywhere
- Alerts via SMS and e-mails can trigger early attention and rectification and result in lesser down time
- Weekly reports enable the user and KBL to analyse the overall health of the pumpsets and, does preventive maintenance can be planned accordingly
- Planning of spares requirement is possible based on these parameters
- Involves onetime investment, which reduces operational costs
- Provides immediate knowledge of system performance
- Increases equipment life and does reduces cost of repairs
- Improved process and plant reliability
- Reduces man-hours (labour costs) required for troubleshooting
- Includes web-based user configurable dashboard for live and trend data
- Facilitates integration with existing PLC and automation system



# Energy Audit

An energy audit is an inspection, survey and analysis done to facilitate energy conservation in order to reduce the amount of energy input into the system without negatively affecting output(s). Industrial energy audits monitor consumption and locate the source(s) of wastage, so that they can be plugged. Even as the industry today strives for more energy there is serious need to reduce energy consumption as it leads to rise in cost of the product as well as pollution. However, this has a larger impact on contribution of organisation and curtailing both can have a make or break impact on any organisation.

## KBL's Audit Approach

Kirloskar Brothers Limited has set up an Energy Audit Cell, a conservation cell, wherein our team of BEE certified energy managers and auditors undertake and evaluates actual performance measurement of pumps and motors. The results are compared against the designed performance level or the industry best practices. The difference between observed performance and "best practice" is the potential for energy and cost savings. Specifically, the audit helps to identify actions for improving energy performance.

Recommendation for suitable pumps & motors and bringing improvements in the pump piping layout are suggested based on the findings. Energy audit also helps to decide on how to budget energy use, plan and practice feasible energy conservation methods that will enhance their energy efficiency, minimise energy wastage and thereby reduce energy costs.



# Customer Service & Spares

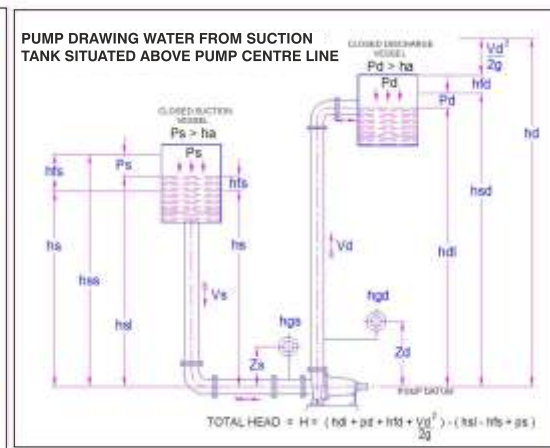
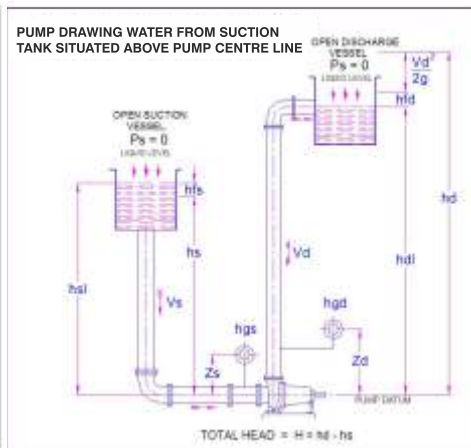
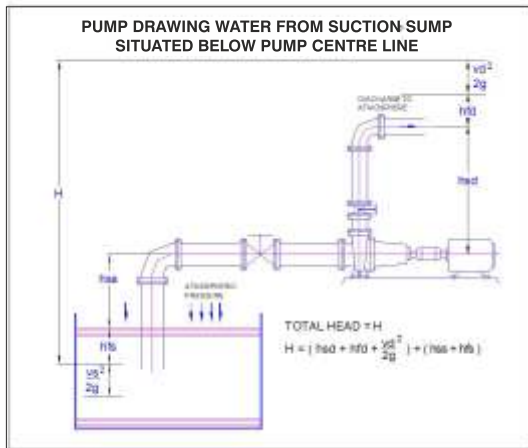
Our various service offerings enable ease of access, which ensures quicker turnaround time and helps in faster resolution of issues.

- Service capabilities: More than 30 technically competent KBL service engineers and 64 authorised service dealers operate across India for delivering 24x7 reliable services.
- SAP CRM 7.1 : CRM 7.1 is a simple and powerful web-based tool, seamlessly integrated with SAP ECC. CRM 7.1 provides a single interface for all our services, right from submitting quotations, issuing orders and quicker delivery of spares to complaint registration for providing faster service. It also provides our customers with regular updates on special offers for spares, service camps, training schedules and other relevant information.
- Our customers help-desk is always prepared to help resolve all customer issues.



# Basic Guidelines for Pump Performance

## Total Head Calculation Methods



### Pump Performance Vs Impeller Diameter

- The performance of a centrifugal pump can be varied by changing the impeller diameter.
- Common rules of affinity apply between the diameter and flow, head and power:

$$Q \propto D \quad Q = \text{flow}$$

$$H \propto D^2 \quad H = \text{head}$$

$$P \propto D^3 \quad P = \text{absorbed power}$$

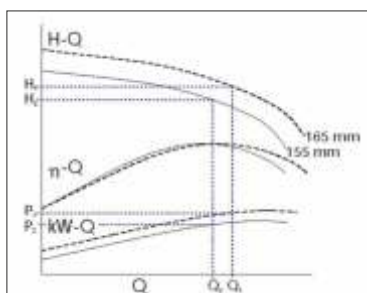
D = impeller dia. in mm.

### Changes in Impeller Diameter

$$\frac{Q_2}{Q_1} = \frac{D_2}{D_1} \quad \text{therefore} \quad Q_2 = Q_1 \times \left(\frac{D_2}{D_1}\right)$$

$$\frac{H_2}{H_1} = \left(\frac{D_2}{D_1}\right)^2 \quad \text{therefore} \quad H_2 = H_1 \times \left(\frac{D_2}{D_1}\right)^2$$

$$\frac{P_2}{P_1} = \left(\frac{D_2}{D_1}\right)^3 \quad \text{therefore} \quad P_2 = P_1 \times \left(\frac{D_2}{D_1}\right)^3$$



### Pump Performance Vs Speed

- The performance of a centrifugal pump can be varied by changing the speed.
- Common rules of affinity apply between the speed and flow, head and power:

$$Q \propto N \quad Q = \text{flow}$$

$$H \propto N^2 \quad H = \text{head}$$

$$P \propto N^3 \quad P = \text{absorbed power}$$

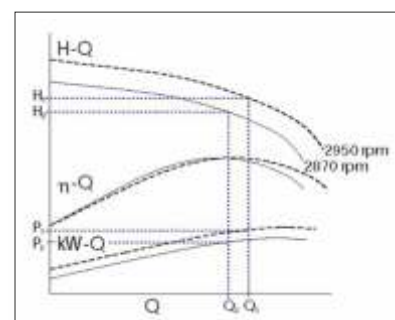
N = speed rpm

### Changes in Pump Speed

$$\frac{Q_2}{Q_1} = \frac{N_2}{N_1} \quad \text{therefore} \quad Q_2 = Q_1 \times \left(\frac{N_2}{N_1}\right)$$

$$\frac{H_2}{H_1} = \left(\frac{N_2}{N_1}\right)^2 \quad \text{therefore} \quad H_2 = H_1 \times \left(\frac{N_2}{N_1}\right)^2$$

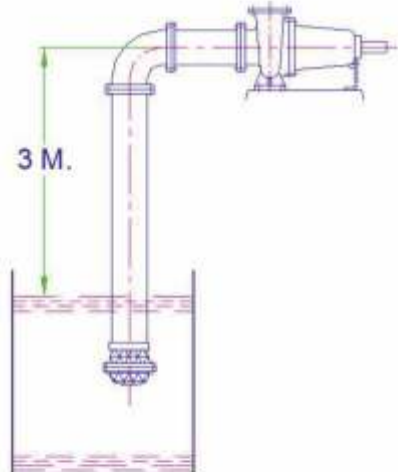
$$\frac{P_2}{P_1} = \left(\frac{N_2}{N_1}\right)^3 \quad \text{therefore} \quad P_2 = P_1 \times \left(\frac{N_2}{N_1}\right)^3$$



# Basic Guidelines for Pump Performance

## NPSH calculation for various piping layouts

**NPSHA CALCULATIONS**  
 1) CASE No. 1: PUMP DRAWING LIQUID FROM A SUMP OPEN TO ATMOSPHERE



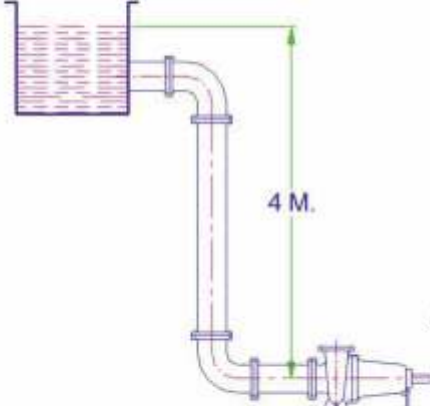
**DATA :**

- a) SUCTION LIFT = 3 meters
- b) FRICTION LOSSES IN SUCTION PIPE LINE, FOOT VALVE, STRAINER } = 1 meter
- c) TEMPERATURE OF WATER = 21° C
- d) VAPOUR PRESSURE = 0.25 meters
- e) ATMOSPHERIC PRESSURE = 10.00 meters

TOTAL SUCTION LIFT =  $h_s = h_{ss} - h_{fs}$   
 $= -3 - 1$   
 $= -4$  meters

NPSHA =  $h_a \pm h_s - h_{vp}$   
 $= 10 - 4 - 0.25$   
 $= 5.75$  meters

**NPSHA CALCULATIONS**  
 1) CASE No. 2: PUMP DRAWING WATER FROM TANK, LOCATED ABOVE PUMP CENTRE AND OPEN TO ATMOSPHERE.



**DATA :**

- 1) HEIGHT OF WATER LEVEL IN SUCTION TANK, ABOVE THE CENTRELINE OF THE PUMP = 4 meters
- 2) FRICTION LOSSES IN SUCTION PIPE SYSTEM ( PIPE LINE VALVE & FITTINGS ) = 1.2 meters
- 3) TEMPERATURE OF LIQUID : = 21° C
- 4) VAPOUR PRESSURE OF THE LIQUID : = 0.25 meters
- 5) ATMOSPHERIC PRESSURE : = 9.00 meters

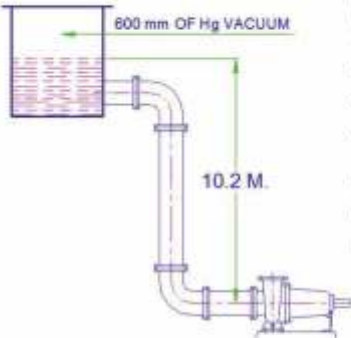
**METHOD :**

SUCTION HEAD,  $h_s = h_{ss} - h_{fs}$   
 $= +4 - 1.2$  meters  
 $= 2.8$  meters OF WATER (SUCTION HEAD)

NPSHA =  $h_a \pm h_s - h_{vp}$   
 $= 9.00 + 2.8 - 0.25$   
 $= 11.55$  meters

# Basic Guidelines for Pump Performance

**NPSHA CALCULATIONS**  
 1) CASE No. 3 : PUMP DRAWING WATER FROM A CLOSED VESSEL UNDER VACUUM



**DATA :**

- VACUUM IN VESSEL = 600 mm of mercury
- LIQUID TEMPERATURE = 40° C
- LIQUID LEVEL ABOVE PUMP CENTRE = 10.2 meters
- FRICITION LOSSES IN SUCTION PIPE ILINE SYSTEM = 1 meter
- VAPOUR PRESSURE = 0.49 kg / cm<sup>2</sup>
- SP. GRAVITY OF LIQUID = 0.72

**METHOD :**

$$h_a = \frac{10 \times 1}{0.72} = 13.89 \text{ meters of liquid}$$

$$h_{vp} = \frac{10 \times 0.49}{0.72} = 6.81 \text{ meters of liquid}$$

$$P_s = 600 \text{ mm of Hg}$$

$$= \frac{600}{1000} \times \frac{13.6}{0.72} = 11.33 \text{ meters of liquid}$$

(∵ 13.6 is specific gravity of mercury )

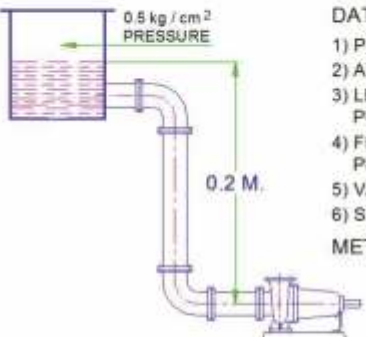
$$h_s = h_{sl} - P_s - h_{fs}$$

$$= 10.2 - 11.33 - 1$$

$$= - 2.13 \text{ meters of liquid ( suction lift exists )}$$

$$\text{NPSHA} = h_a \pm h_s - h_{vp} = 13.89 - 2.13 - 6.81 = 4.95 \text{ meters}$$

**NPSHA CALCULATIONS**  
 1) CASE No. 4 : PUMP DRAWING LIQUID UNDER PRESSURE FROM A CLOSED TANK.



**DATA :**

- PRESSURE IN CLOSED VESSEL = 0.5 kg / cm<sup>2</sup>
- ATMOSPHERIC PRESSURE AT INSTALLATION = 0.9 kg / cm<sup>2</sup>
- LIQUID LEVEL IN A VESSEL ABOVE THE PUMP CENTRE LINE = 0.2 meters
- FRICITION LOSSES IN SUCTION PIPE ILINE SYSTEM = 1.5 meters
- VAPOUR PRESSURE OF LIQUID = 0.45 kg / cm<sup>2</sup>
- SP. GRAVITY OF LIQUID = 0.8

**METHOD :**

$$h_a = \frac{10 \times 0.9}{0.8} = 11.25 \text{ meters of liquid}$$

$$h_{vp} = \frac{10 \times 0.45}{0.8} = 5.625 \text{ meters of liquid}$$

$$P_s = \frac{10 \times 0.5}{0.8} = 6.25 \text{ meters of liquid}$$

**NOW**

$$h_s = h_{sl} + P_s - h_{fs}$$

$$= 0.2 + 6.25 - 1.5$$

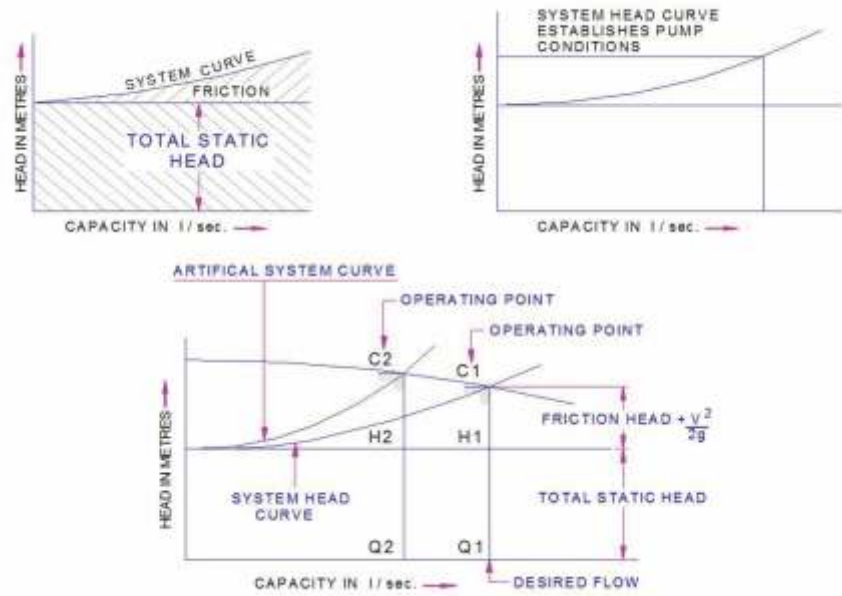
$$= 4.95 \text{ meters of liquid ( suction head exists )}$$

$$\text{NPSHA} = h_a \pm h_s - h_{vp}$$

$$= 11.25 + 4.95 - 5.625$$

$$= 10.575 \text{ meters}$$

**SYSTEM HEAD CURVE**



**SYSTEM HEAD CURVE**

HEAD IN METRES

FRICITION

TOTAL STATIC HEAD

CAPACITY IN l / sec.

SYSTEM HEAD CURVE ESTABLISHES PUMP CONDITIONS

HEAD IN METRES

CAPACITY IN l / sec.

**ARTIFICIAL SYSTEM CURVE**

OPERATING POINT

OPERATING POINT

FRICITION HEAD +  $\frac{v^2}{2g}$

TOTAL STATIC HEAD

SYSTEM HEAD CURVE

HEAD IN METRES

CAPACITY IN l / sec.

DESIRED FLOW

Q2

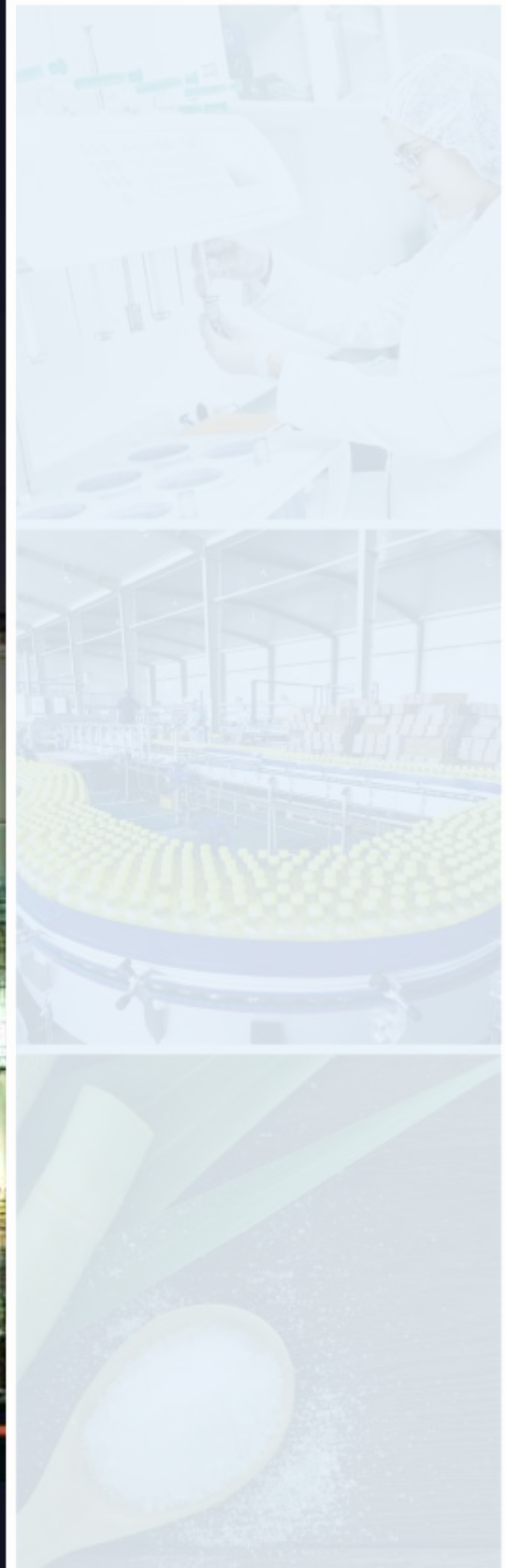
Q1

H2

H1

C2

C1



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