WORKMAN SHIP 60 MONTHS WARRANTY

Submerged Tubular Column Pumpsets

...ATBP, ATBN & ATBM

Portable & Versatile...

Simple & Space Savings Pumping Stations

Energy Saving...

Ultra Low Maintenance...

AQuA®©

Design

3 Unique Hydraulics...

...cover a wide spectrum of Heads & Liquids.

CADesigned, CFD optimized; Hydraulics ensure Superb Efficiency

Pump Casing is of **Bowl** type & Impeller *(either **Propeller** or **Non-Clog** or **Mix Flow**)* is mounted **directly** on to the **Common Shaft** *(of the motor)* hence **eliminating alignment** & **vibration** problems.

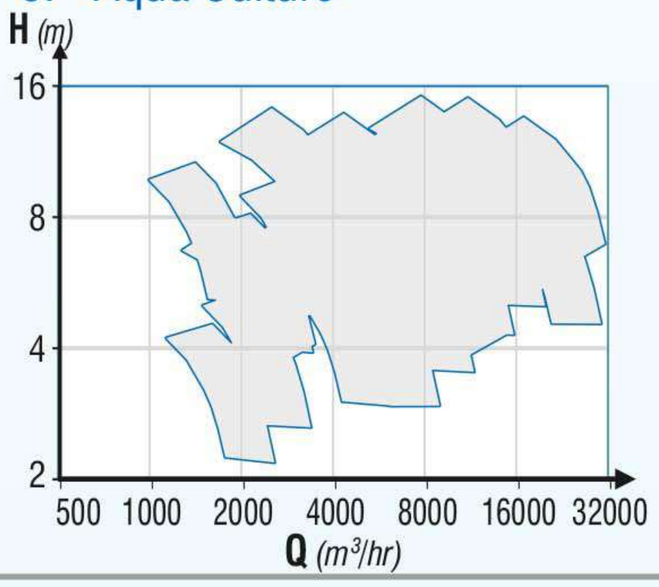
ATBP

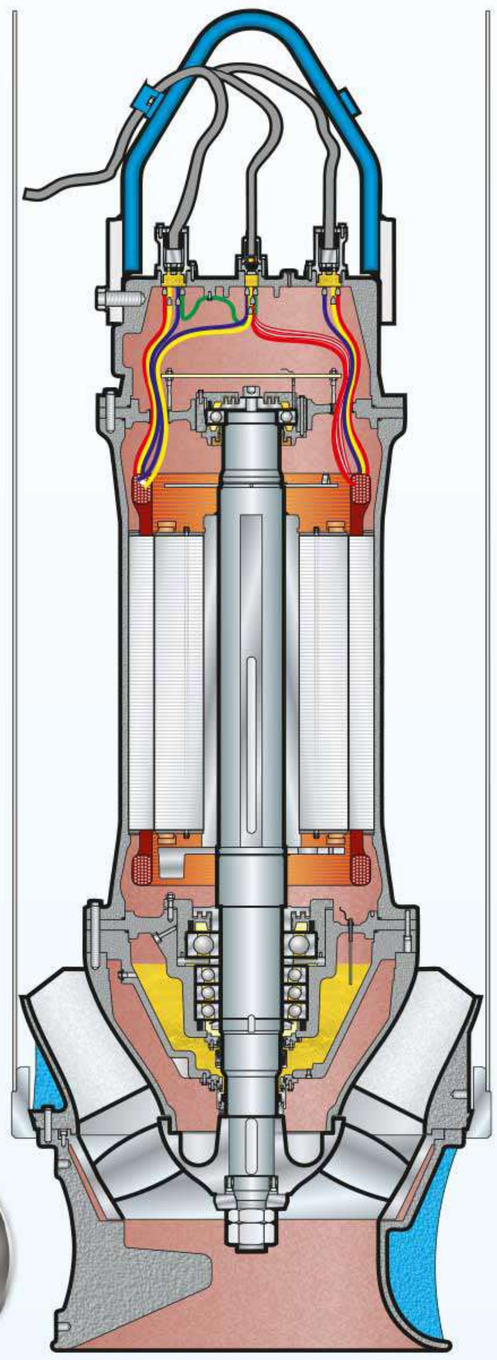
Axial Flow; Propeller type Hydraulics...

(for High Efficiency, Low Head pumping of Clear, Raw or Sea Water &/or Solid laden liquids)

Applications:

1. Irrigation Pumping Stations.
2. Drainage & Storm Water Pumping Stations.
3. Sea Water Intake for Desalination Plants.
4. Raw & Clean Water Pumps in Waterworks, Industry & Power
5. Waste Water Treatment Plants.
6. Aqua Culture

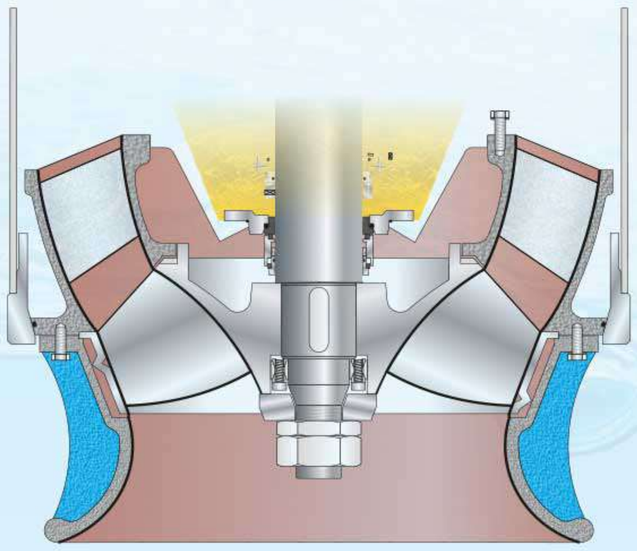




ATBN

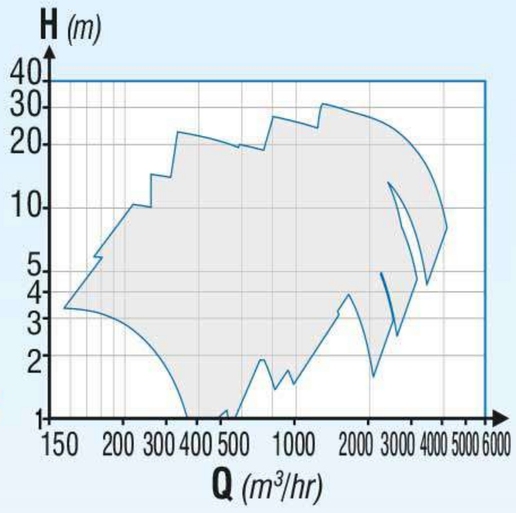
Non Clog; Semi Open type Hydraulics...

(for Medium Heads & Solid laden Liquids)



Applications:

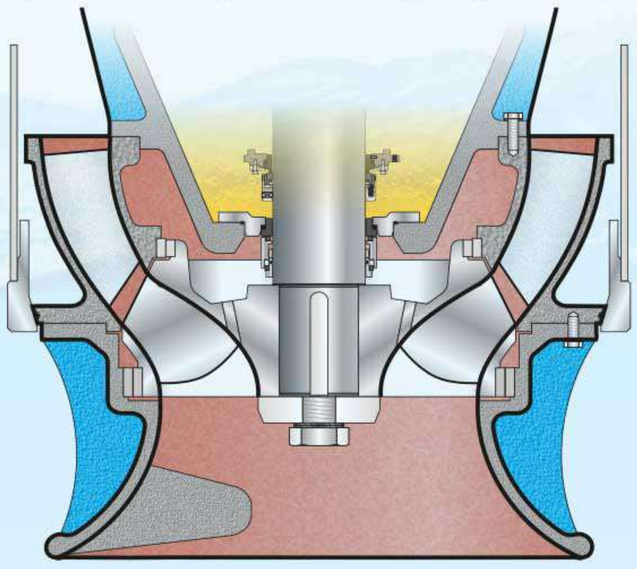
1. Waste Water, Mixed Water, Sewage & Activated Sludge pumping in WWTP
2. Storm Water Pumping Stations
3. Industrial Effluent Water
4. Combined Sewage & Storm Water Pumping Stations



ATBM

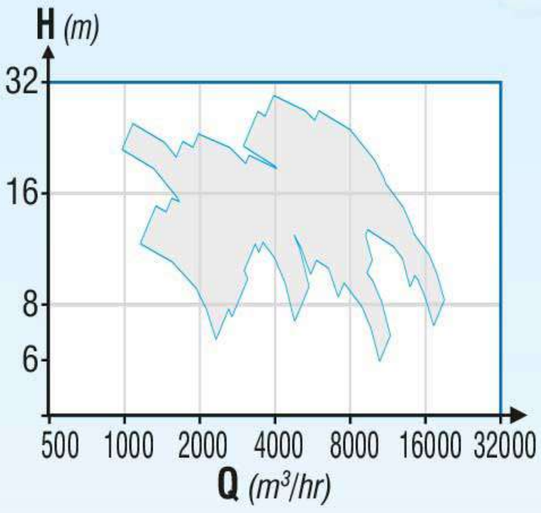
Mixed Flow, Enclosed type Hydraulics...

(For Ultra High Efficiency, High Head; Clear, Raw or Sea Water)



Applications:

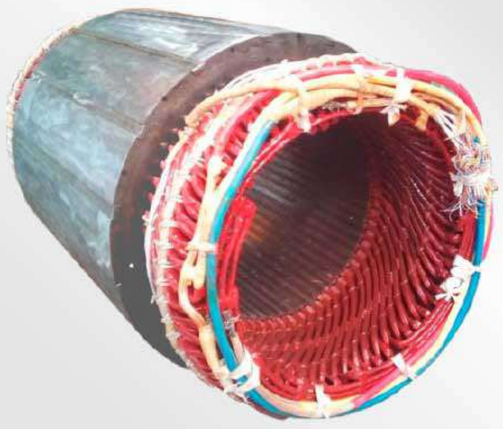
1. Power Plants & Industries
2. Cooling Water & Irrigation
3. Sea Water Intake for Desalination Plants.
4. General Water Supply Duties



Design : **MOTOR END**

The Totally Enclosed, Self Water Cooled *[**TESWC IC-4A1W1** to **IEC/IS-60034_6**]* motor is similar to Dry Type Induction Motor, the major difference being the Degree of Protection - it is of **IP-68** Enclosure – to ensure **Hermetic Sealing** *(even under water immersion)*.

HT Motor



LT Motor

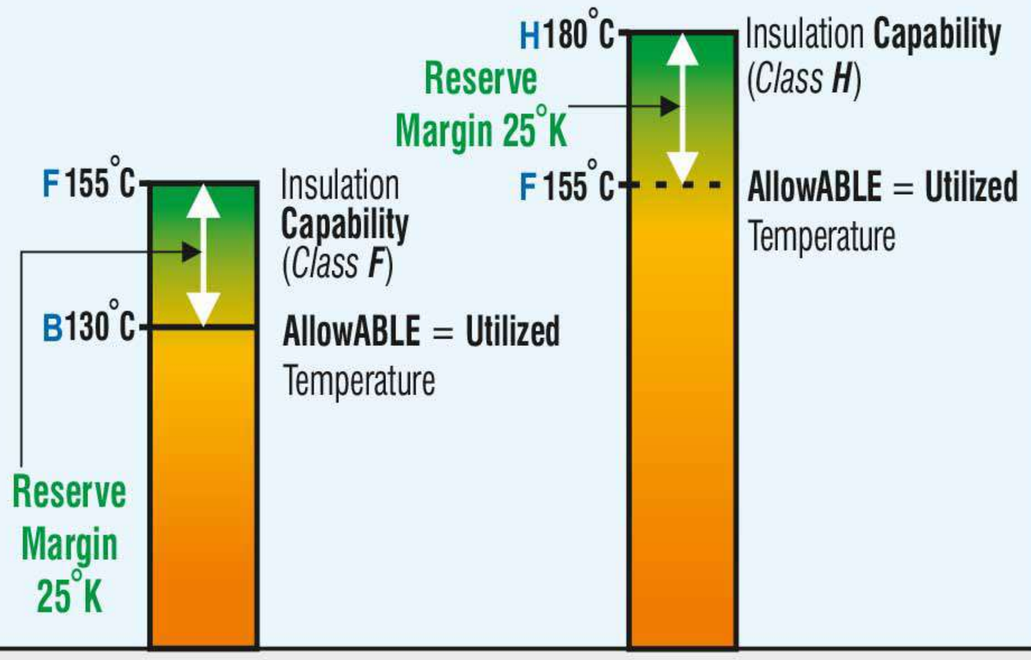
Huge Reserve Margin

As a rule of thumb in Motor Industry *(based on **Arrhenius** Equation)*; for every 10°C *(or more precisely 10°K)* Drop in Temperature, the useful Life of Insulation is Doubled.

Hence with a 50°K Reserve Margin *(v/s just 25°K of Competitors)*; Aqua's *(Motor {Stator Insulation})* will have a **6 times Higher Life** *(than competitors)*...!

Thanks to generous Reserve Margins & Optimized Design: Aqua's Motors keep coolly working even in scorching Indian summers.

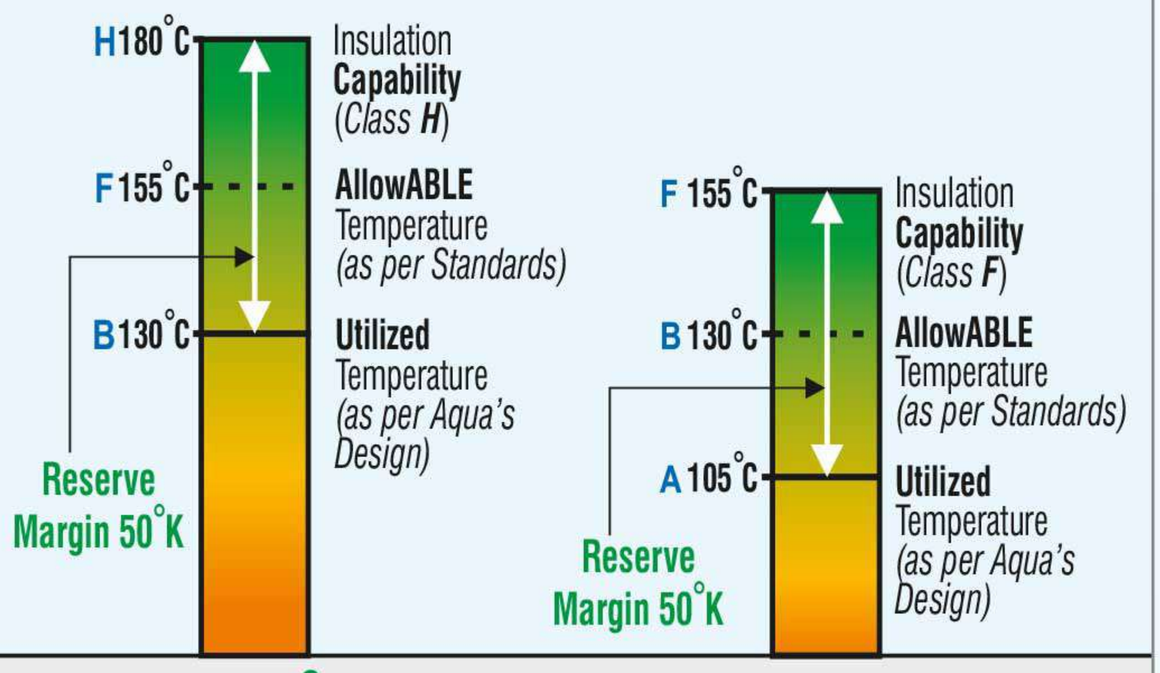
Competing Designs / Motors



Just 25°K Thermal Reserve **Margin**

Class "**F**" Insulation x Class "**B**" Utilization	Class "**H**" Insulation x Class "**F**" Utilization

Aqua's TESWC Induction Motors



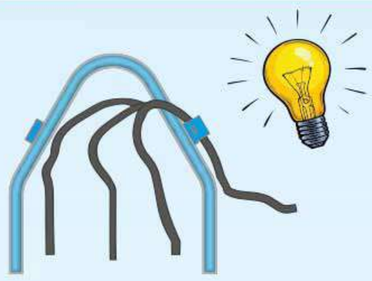
50°K Thermal Reserve **Margin** leads to **6x** Higher Life.

Option1 : *(Medium & Large LT Motors)*	**Option2** : *(HT & Smaller LT Motors)*
Class **"H"** Insulation x Class **"B"** Utilization	Class **"F"** Insulation x Class **"A"** Utilization

Larger motors can be offered with **Ultra High Efficiency, Copper Bar Rotors** resulting in a **IE3** Equivalent* **Efficiency even for H. T. Motor** *(at a price premium)*.

IE2 Equivalent*	**High** Efficiency	✓	**STANDARD**
IE3 Equivalent*	**Premium** Efficiency	✓	**OPTIONAL**

Option of IEC IE3 Equivalent * Motor Efficiencies are available (at a price premium) even for HT Motors.



How to reduce Cable Size?

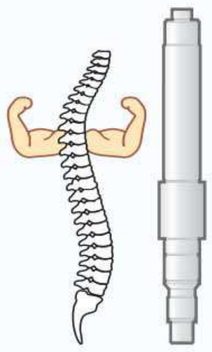
Consider a High Voltage Motor to reduce Cable Size.

*Refer our White Paper on 'IE Efficiency Submersible Motors...'

At **Non Drive End** Bearing *(NDE)*, we offer *(at no extra cost)* **Increased Internal Clearance Class Bearings** *({for most models (larger than 15kW 2P, 30kW 4P & 40kW 6P})* for **Increased Safety** against **Accidental Dry Running.**

Design : **Pumpset**

A **Strong, Mono Shaft** for Fail Safe Operation



Single, Robust & oversized Shaft is Common between the motor & pump. It is (upto 1550kW 4P, 1200kW 6P, 900kW 8P) made from Stainless Steel & designed without any Sleeves (below the Mechanical Seals) thereby reducing maintenance problems & eliminating need of Costly Spare Parts.

Smart Set Hydraulics

For **Restoration of Efficiency** *(after prolonged usage)*, most models have **Replaceable** Wearing Rings / Wear Plates Liners.

Shaft Sealing is by means of **Two**, Independent, high quality Bi-Directional; **Mechanical Seals** permitting reverse running due to accidental back-flow. The Primary seal is always of **Silicon Carbide** faces to withstand Erosion incase of increased silt content in water.

Seals are rated for at least 16 bar pressure capability for L10H life in excess of 50,000 hours &/or 10 years.

Superb Bearing Life

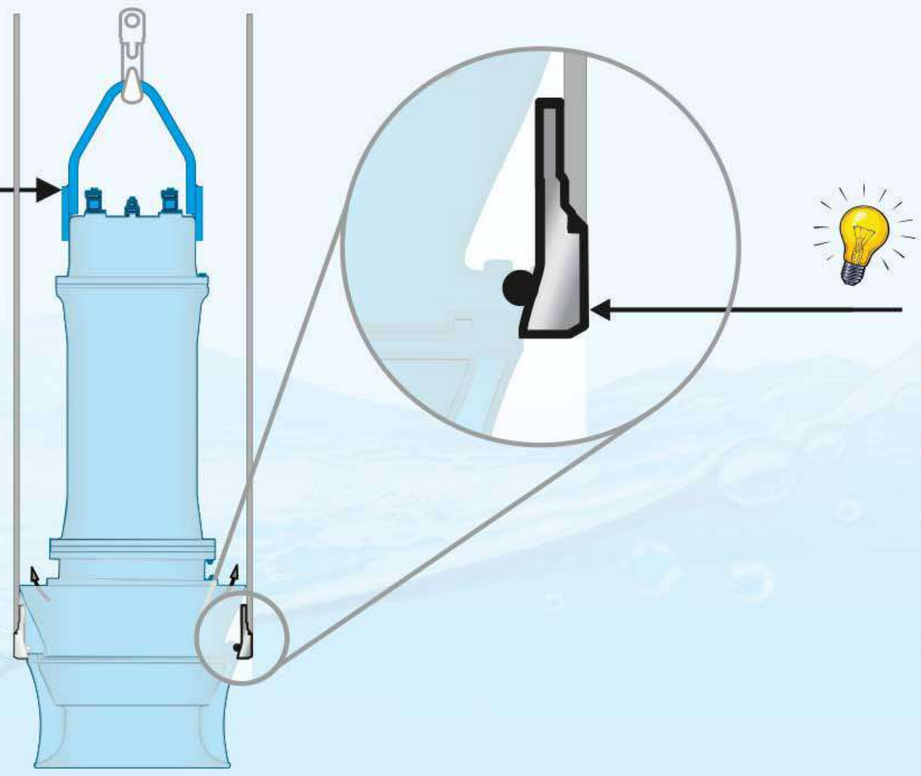
thanks to Heavy Duty Designs (upto Quadruplex arrangements are offered)

All **Thrusts** are absorbed by **Grease Lubricated, Anti Friction Bearings** located deep inside the motor & inherently **isolated from the pumped media -** this makes the **bearings Fail Proof** even in case of increased Silt/ Abrasive levels in Pumped Liquid.

Anti Drip, Fully Synthetic; Super Premium Synthetic Grease ensures a minimum Regreasing Interval (F10H) of 75,000h (for Pumpsets rated upto 650kW) & 45,000h (for larger kW)

Smart Lifting Handle

- **Simple** hoisting
- **Quick** Installation / Removal in One **continuous** action
- Allows **'Fishing'** of Pumpsets *(even when Pumpset is Submerged under water & invisible to operator)*



Self Centering Auto Coupling Ring

Can be Welded *(on to Metallic Riser)* or Grouted *(on RCC Floor)* or Flange to Flange Bolted is always built of **Stainless Steel**.

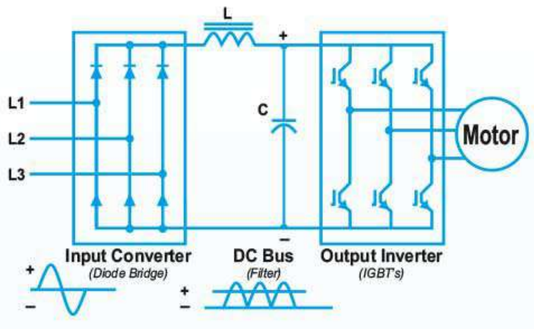
Intelligent InBuilt Monitoring

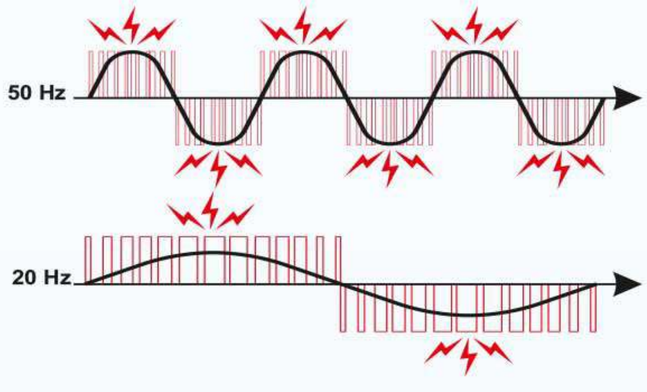
Easy Monitoring (& Remote Control#) of your Pumpset's Health.

- **PSLD** detects Pressurized Water Leakage from Mechanical Seals.
- **CCWLD** detects Accidental Water Leakage from Cable Sheath's Cuts &/or Nicks into the Motor.
- **SBWLD** detect Accidental Water Leakage in to Motor's Stator Chamber.
- **BTDs** in the form of Bi-metallic Switches *(for All Pumpsets)* & **RTD's** *(PT100 - 3 Wire Simplex type - from Size > 150kW)* to Monitor Bearing Temperature *(without any Additional Cost)#*.
- **WTDs** in the form of Bi-metallic Switches *(for All Pumpsets)* & **RTD's** *(PT100 - 3 Wire Simplex type - 1 per each Phase - from Size > 150kW)* to Monitor Winding Temperature *(without any Additional Cost)#*.

#requires additional communication hardware

VFD



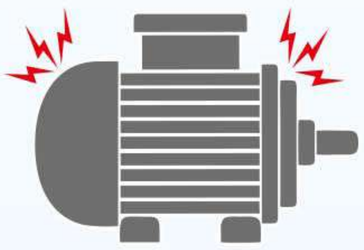


Side Effects of **Speed Control** of Pumpsets via **VFD's :**

1) Generate PWM Output with **High Harmonic Distortion** which causes **severe Di-Electric stress** *(on Motor's Stator's Winding Insulation)*,
2) Excite Motor Stator - Rotor **Bearing Circulating Currents** (*which flow through **NDE bearings***),
3) May cause **Shaft Vibrations** & **even Structural Resonance** *(if the Critical Speed of the Shaft lies below the maximum speed)* &
4) Reduce the Motor Speed which inturn **reduces the Volume Flow** of Motor **Fan's Cooling Air** *(in TEFC, CACA, TETV type Air Cooled Motors)* leading to Motor Stator **Winding OverHeating** *(despite over all speed & kW reduction)*...!

VFD Compatible

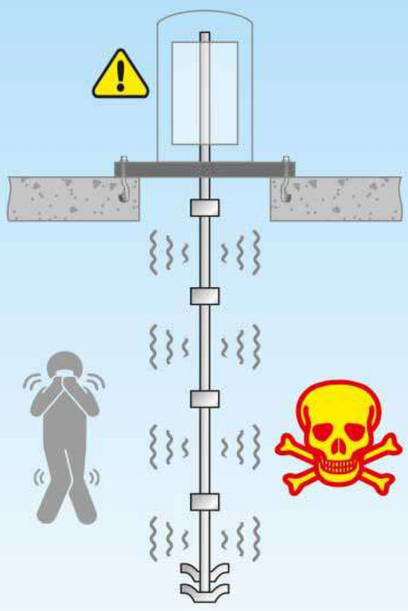
Thanks to Additional **Mica** *(Over & Above Glass Fibre Aramid)*, **+ Dual Vacum Pressure Resin Impregnation** *(VPI)*; Aqua's Motor's **Insulation** has **Extremely High** Stator **Winding Di-Electric Strength** enabling it to work satisfactorily even when fed by **VFD.**



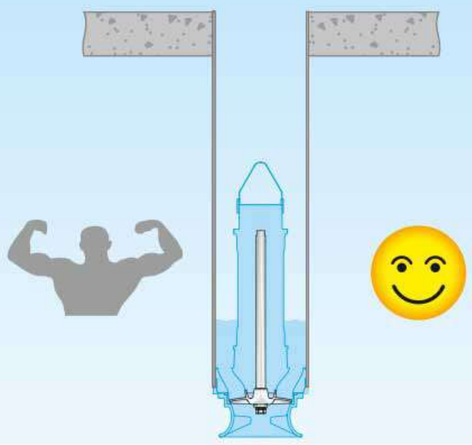
Larger & HT motors are always offered with Current Insulated NDE Bearing Housings, reducing the risk of bearing failures arising from internal Rotor-Stator-Bearing Circulating Currents excited by VFD's.

As the motor itself is submerged in water, it is Excellently Cooled irrespective of the Motor Speed.

Rotor Critical Speed & Variable Speed Operation



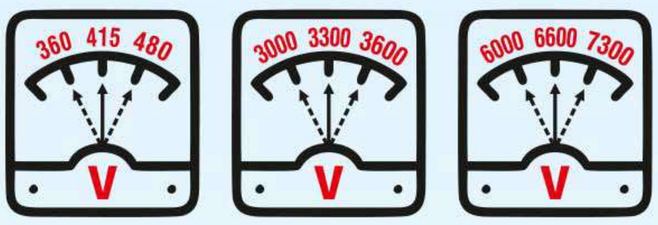
Multiple, Jointed;
Long Slender Shafts
*(Vertical Turbine Pumpset **(VT)**)*



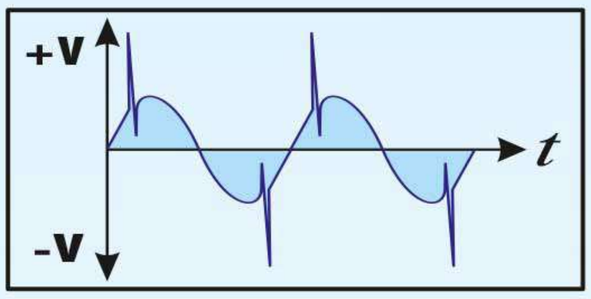
Rigid, Single; Robust Shaft
*(Submerged Tubular Column Pumpset **(ATBx))***

As the Critical Speed of Submerged Tubular Column Pumpsets lies Safely ABOVE it's Maximum Speed, there is No Risk of Resonance or Vibration (when speed is varied with VFD)

Tolerates...



...Wide Voltage Variation



...Power Spikes & Surges

Standard **Technical Specifications**

Pump	Discharge Sizes	DN 550 to 2,100mm
	Flow Rate	Upto 27,000 m^3/hr
	Head	Up to 40m
Motor	Ratings	15kW to 2500kW
	Speeds	1500, 1000, 750, 600, 500 & 375 rpm *(synchronous)*
	Duty & Enclosure	S1 & Exceeding IP 68
	Supply Options	3Ø; 415V, 550V, 690V, 3300V, 6600V, 11000 V
InBuilt Monitoring	Primary Seal Leakage Monitoring *(PSLD)*	By built in Detection System
	Cable Connection Chamber Water Leakage Detector *(CCWLD)*	Available from size 200kW & above
	Winding Temp Detector *(WTD)*	Available by default by Bimetallic Switches in each phase *(PT100 optionally available for sizes 150kW & above)*
	Drive End Bearing Temperature Detector *(BTD) (DE)*	Available by default by Bimetallic Switches from size 22 kW & above *(PT100 optionally available for sizes 150kW & above)*
	Non Drive End Bearing Temperature Detector *(BTD) (NDE)*	Available by default by Bimetallic Switches from size 22 kW & above *(PT100 optionally available for sizes 150kW & above)*
	Stator Chamber Water Leakage Detector *(SBWLD)*	Available from size 22 kW & above

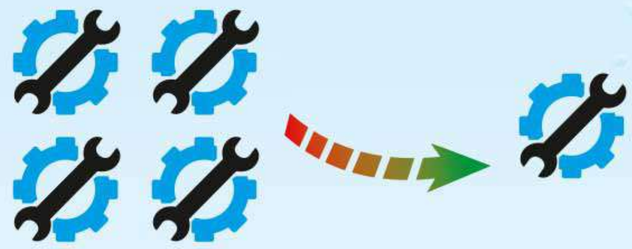
Material of Construction *(MoC)*

		Option 1	Option 2
Pump Casing *(Bowl)* & Suction Bell Mouth		Grey Cast Iron, Ductile CI, NiResist, NiAL Bronze *(NAB)*	CF8, CF8M, CD4MCu
Impeller / Propeller		NiResist, NiAL Bronze *(NAB)*	CF8, CF8M, CD4MCu
Motor Casing, Cable, Terminal Chamber		Grey Cast Iron	NiAL Bronze *(NAB)*
Oil Chamber		Grey Cast Iron, Ductile CI, NiResist, NiAL Bronze *(NAB)*	CF8, CF8M, CD4MCu
Shaft		Stainless Steel	
Fasteners *(Exposed to Liquid)*		Stainless Steel *(A2 - SS304)*	Stainless Steel *(A4 - SS316)*
Elastomers		Nitrile	Viton
Mechanical Shaft Seals	**Primary** *(Pump Side)*	Silicon Carbide v/s Silicon Carbide	Tungsten Carbide v/s Tungsten Carbide
	Secondary *(Motor Side)*	Cast Chrome Moly Steel v/s Resin Impregnated Carbon	Silicon Carbide v/s Silicon Carbide
Wearing Ring / Plate *(Casing)*		Stainless Steel	
Motor Squirrel Cage Rotor Bars		Aluminum bar	Copper bar
Cables		PVC insulated, Copper Cored	ERPS insulated, Copper Cored
Oil		Eco friendly Paraffin White Oil ISO VG 20 or 40	
Auto Coupling	**Canister Ring**	Stainless Steel	
Riser		Mild Steel, Stainless Steel	RCC

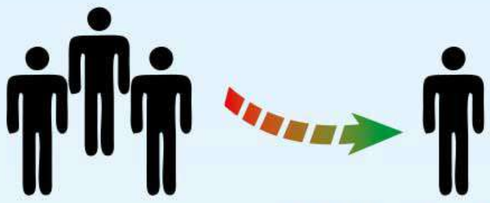
Concept Benefits

Saves *(upto 40%)* **Land** Requirement*

Saves *(upto 33%)* **Capital Cost** of Entire Pumping Station*



Saves *(upto 75%)* **Spare Parts** & **Consumables***



Saves *(upto 66%)* **O&M Staff***

Low Energy Cost : Due to Elimination of Ancillary & Auxiliaries; **Wire to Water Power Consumption** of Submerged Tubular Column Pump based Pumping Station **is slightly Lower** *(compared to Conventional Bare Shaft Pump - Motor Set based Pumping Stations).**

***** *(refer marketing@aquapumps.com for additional white papers)*

Requires No Special Pre – Post / Ancillary-Auxillary Operations; like Operating & Maintaining the Forced Water Lubrication systems operation, No damage due to Flood or Rains.

No need for Frequent Periodic....

...Aligning / Replacing **Shafts/Sleeves** &/or **Coupling**

...Adjusting / Replacing **Gland Packing**

...Refilling **Oil** &/or **Grease**

Minimal Noise, Vibration & Heat Emission; due to **elimination** of Auxiliary & Ancillary systems *(like Forced Water Lubrication, Thrust Bearing Cooling system, Motor Hear Exchanger)*.

Low Life Cycle Costs *(LCC)**

*(refer marketing@aquapumps.com for additional white papers)

- **Minimal Station Superstructure**
- **Simple Pipe Work**
- **Simple Foundation -** *conducive for Water Logged Terrain*
- **Quick Connection & Disconnection of Pumpset.**
- **Inherently Flood Proof**

Installations

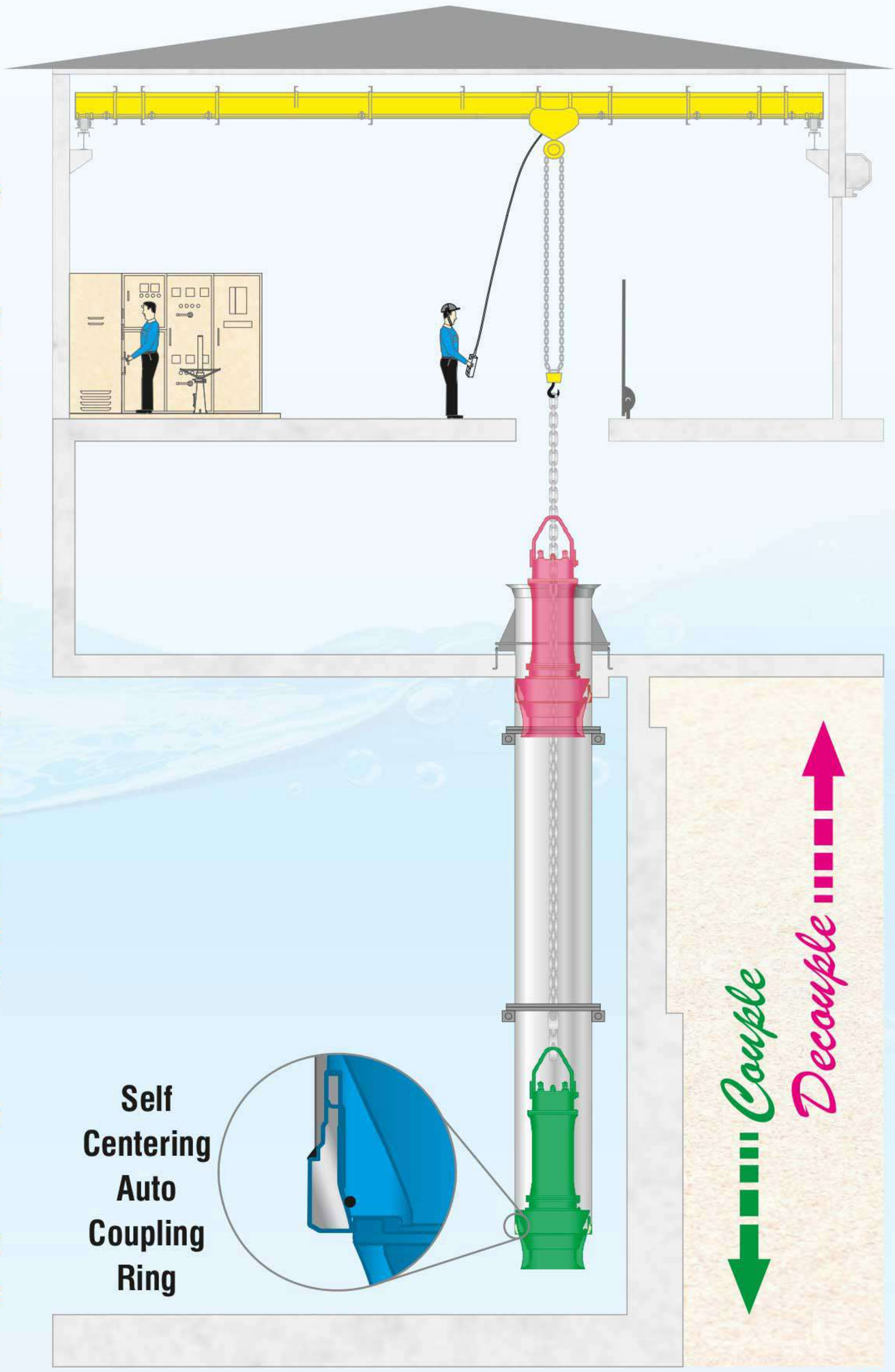
This represents the most Compact Economical & User-friendly Axial Flow pumping station design.

The Pumpset is installed directly at the bottom of the Riser Tube using **Aqua's Automatic Coupling System** which ensures that the pumpset is Concentrically Lowered *(& firmly connected to the discharge piping)* or Lifted out *(disengaged from discharge piping)* in a **simple,** precise manner & **within minutes...!**

It uses Riser Tube *(which guide the pumpset correctly downwards)* till it's Conical Discharge Flange meets that of the Auto Coupling Canister Ring's Conical Flange - the contacting surfaces are well machined & designed such that the weight of the Pumpset *(along with a O'Ring for High Head ATBM pumps)* ensures a **Leak-Free joint.**

The pumpset is kept in place by its weight - **there is no need for any fastening of Bolt-Nut**.

Removing the pumpset for maintenance is equally simple - **just pull it up; there are no bolts to be dismantled.**



Pumping Station Design

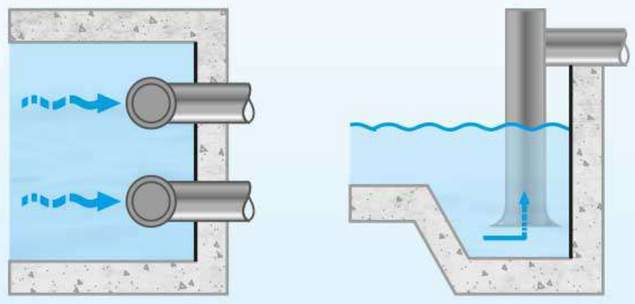
A Unbeatable Variety of Design Options enable Simple & Space Effective layouts in any Terrain, Site & Space Constraints...

1. Options of **Intake**

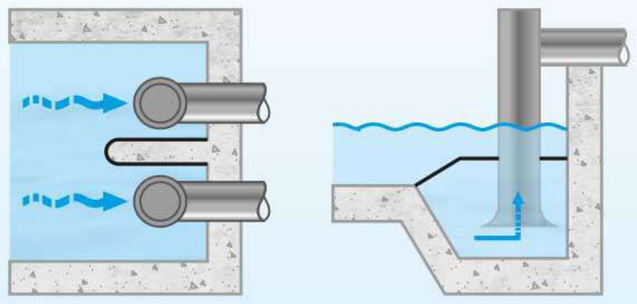
1.1 Options of Intake of **Open** *(Free Surface)* type

1.1.1 Options of **Rectangular Dead End** *(Open Free Intake Suction)*

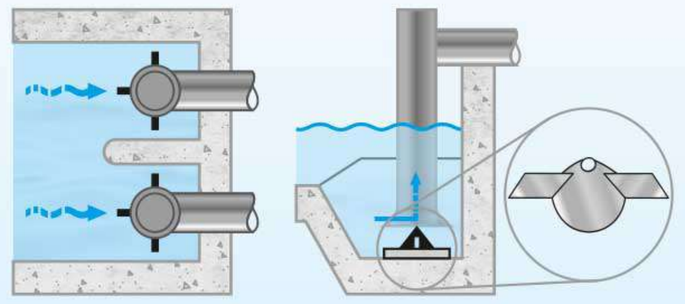
1.1.1.1 Open **Free Rectangular Dead End** *(without Splitter Wall or without Floor Cone)*



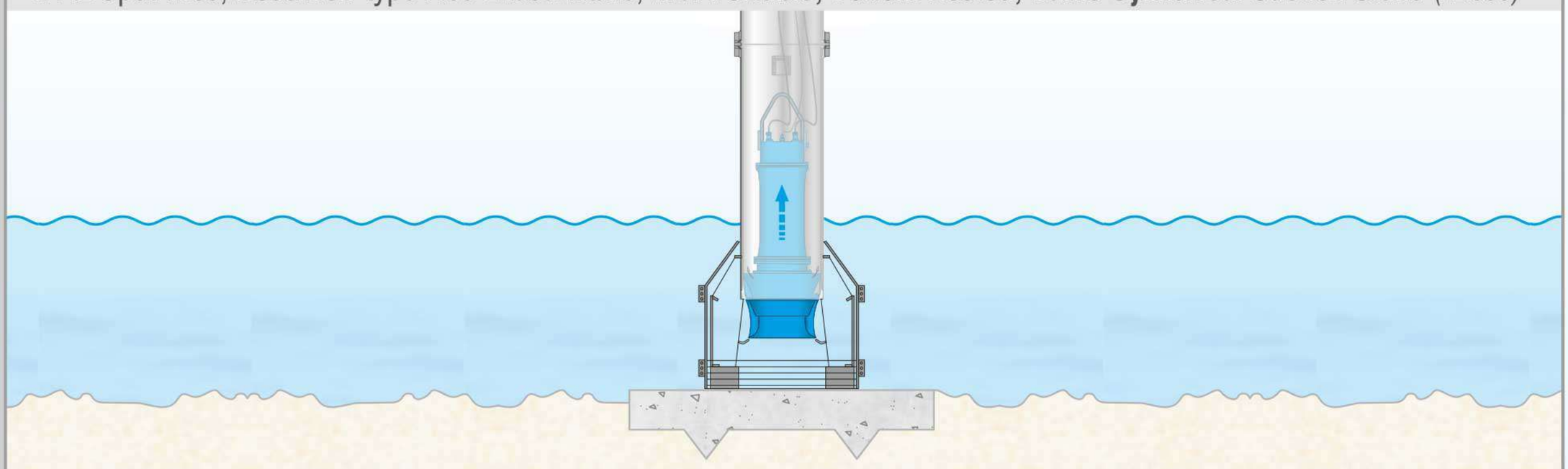
1.1.1.2 Open Free **Rectangular Dead End** with **Splitter** *(Partition Walls between 2 Pumps)*



1.1.1.3 Open Free **Rectangular Dead End** with **Floor Cone** *((Suction Vortex Breaker) under each pump)*

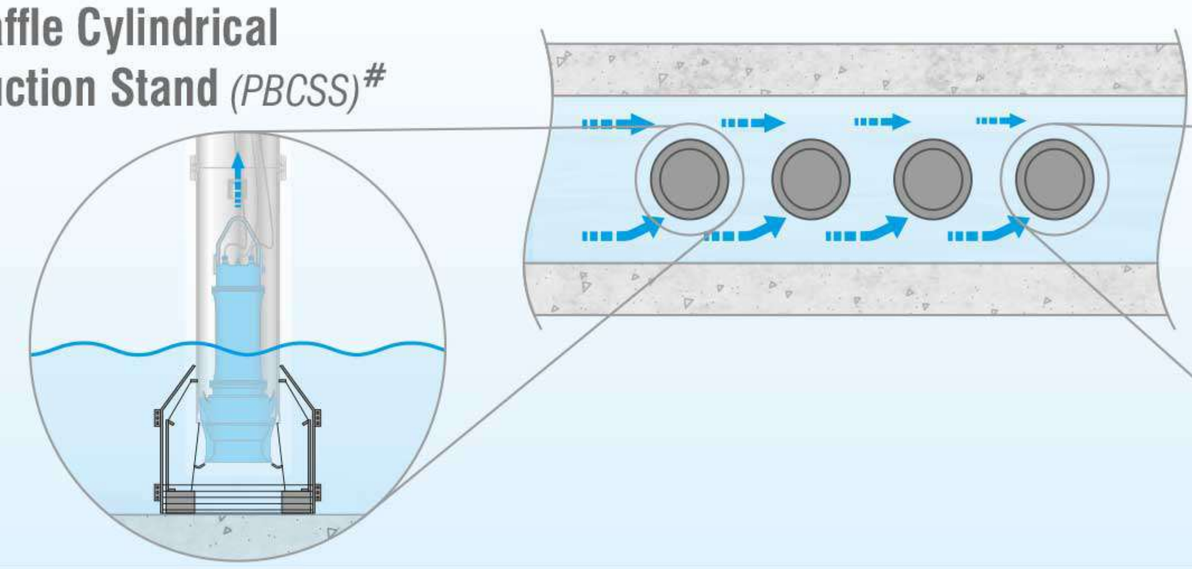


1.1.2 Open Free, **Reservoir** type Free Ended Intake; with **Portable, Bottom Rested; Baffle Cylindrical Suction Stand** *(PBCSS)*#

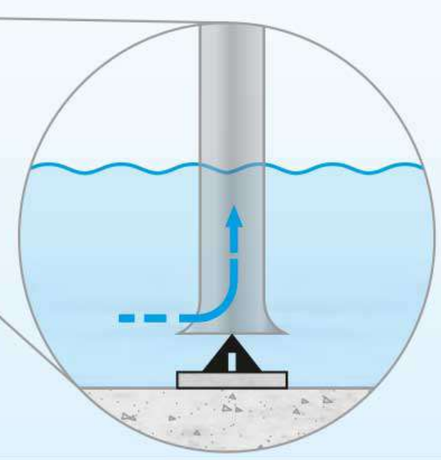


1.1.3 **Trench InLine Series** *(Open Ended)* type Intake:

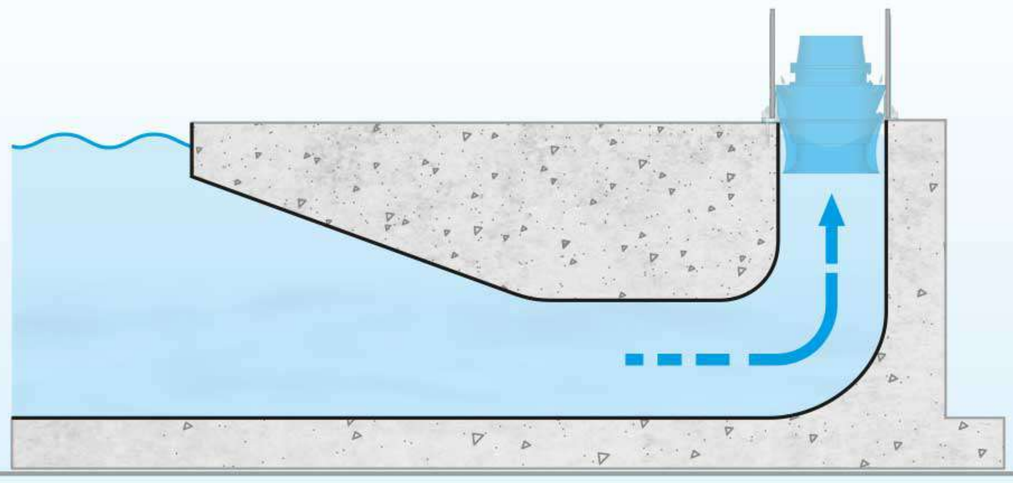
1.1.3.1 with **Portable, Bottom Rested, Baffle Cylindrical Suction Stand** *(PBCSS)*#



1.1.3.2 Suspended Installation with **Floor Cone** *(Suction Vortex Breaker)*



1.2 **RCC Formed Suction** Intake *(FSI)*

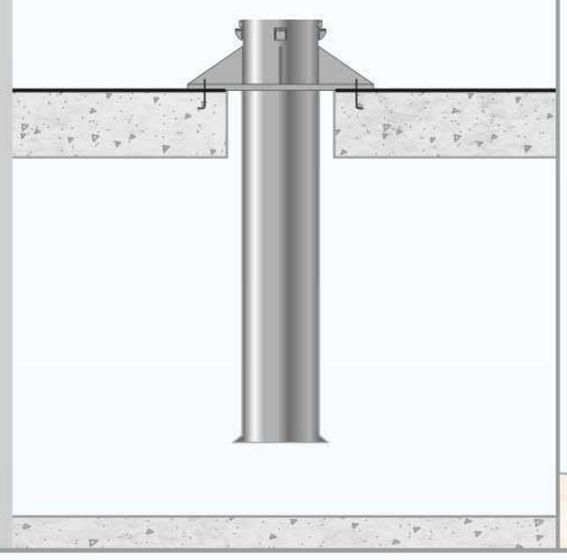


#**Patent** Pending

2. Options of *(Vertical)* **Riser**

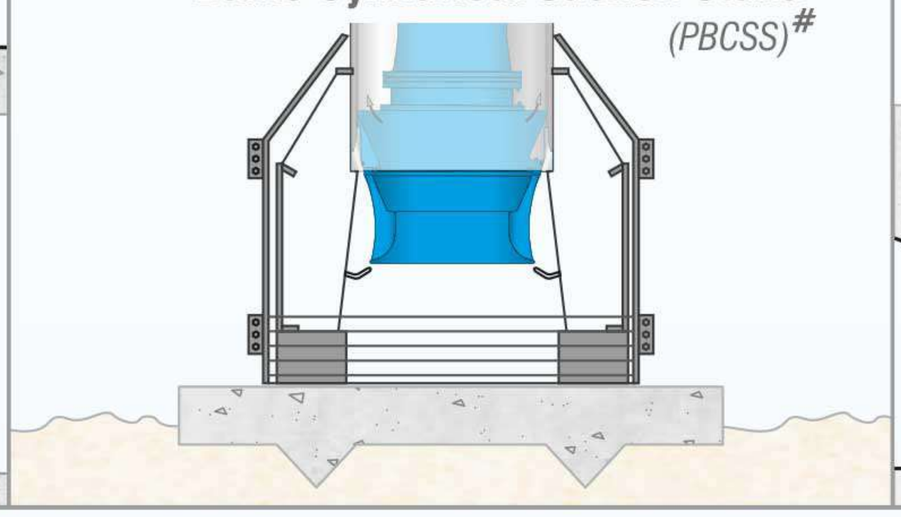
2.1 **Resting** of Riser

2.1.1 **Suspended** from Operating **Floor**

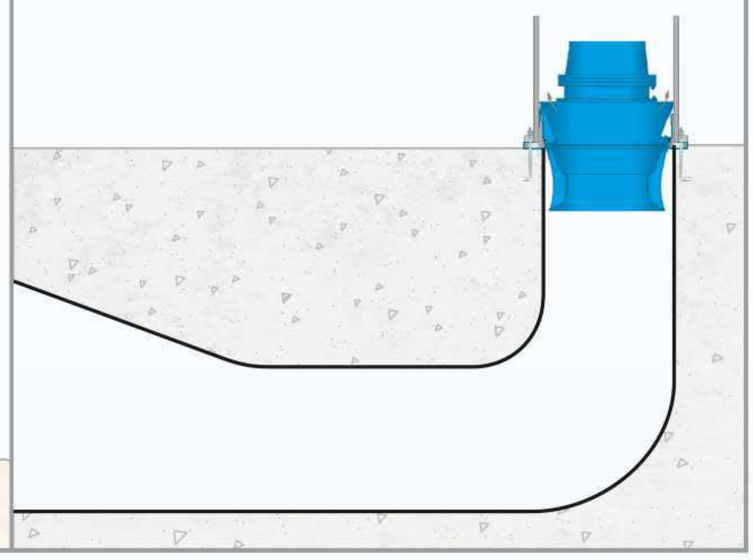


2.1.2 Options of **Bottom Rested**

2.1.2.1 On **Portable, Bottom Rested; Baffle Cylindrical Suction Stand** *(PBCSS)*#

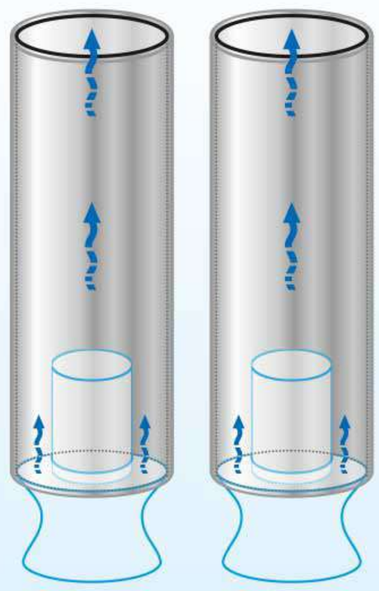


2.1.2.2 On **Formed Suction** Intake *(FSI)*



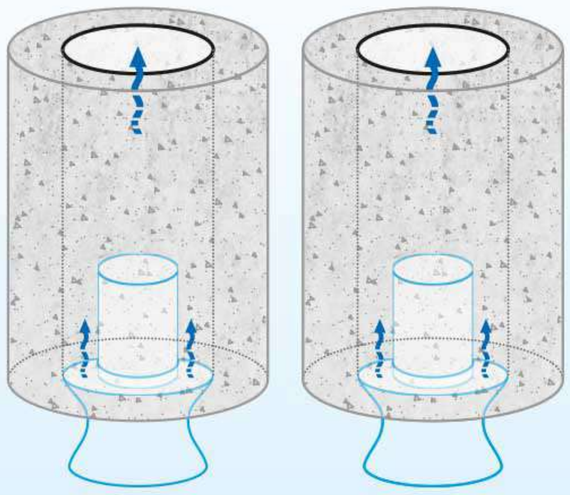
2.2 **Material** of Construction *(MoC)* & **Shape** *(of Riser)*

2.2.1 **Metallic**

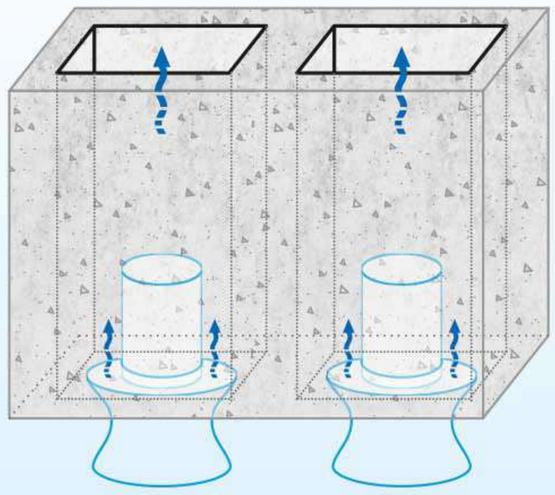


2.2.2 **RCC**

2.2.2.1 **Cylindrical**



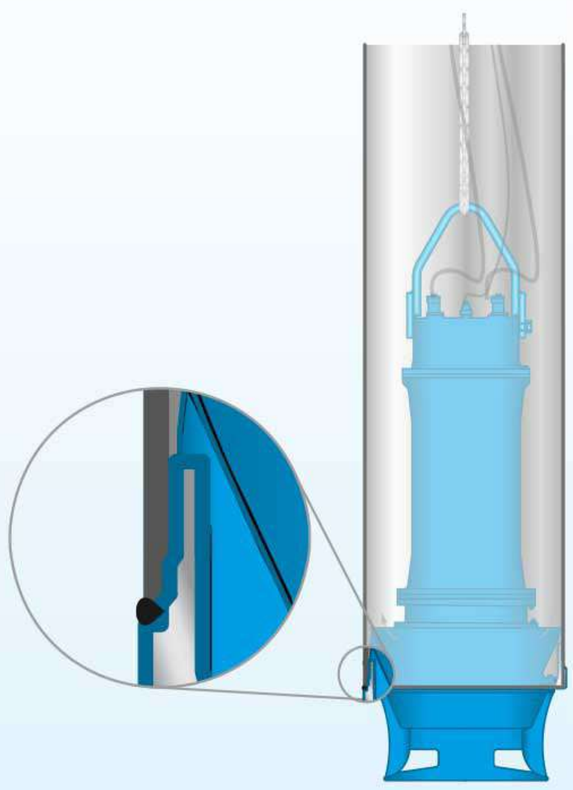
2.2.2.2 **Cuboidal**



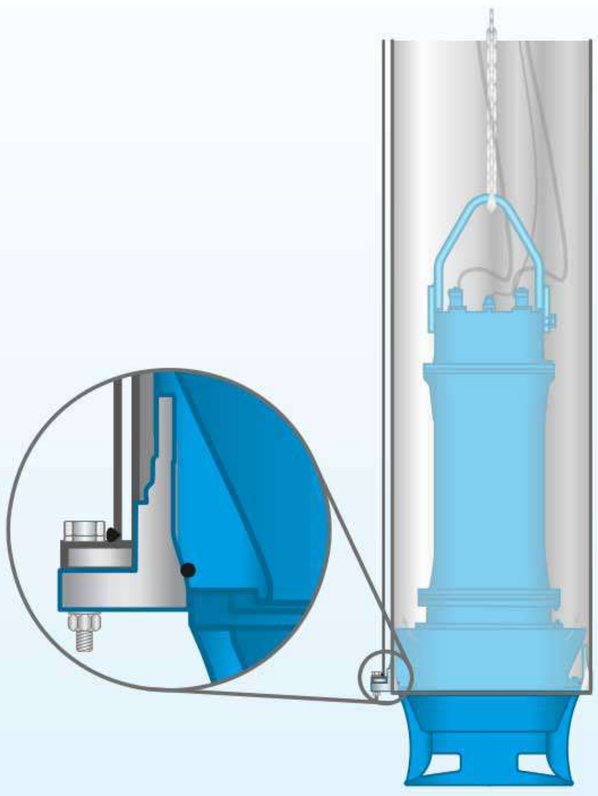
3. Options of **AutoCoupling's Canister Ring** *(Resting / Securing)*

3.1 **Metallic** *(Riser)* **Pipe**

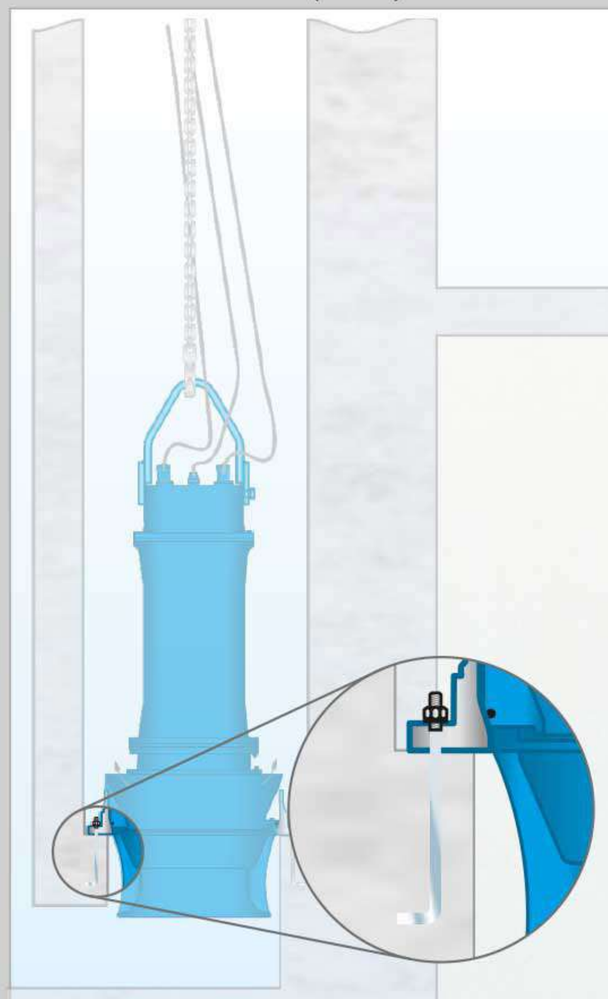
3.1.1 **Welded**



3.1.2 **Flange** to **Flange Bolted**



3.2 **Grouted** in **RCC** *(Riser)*

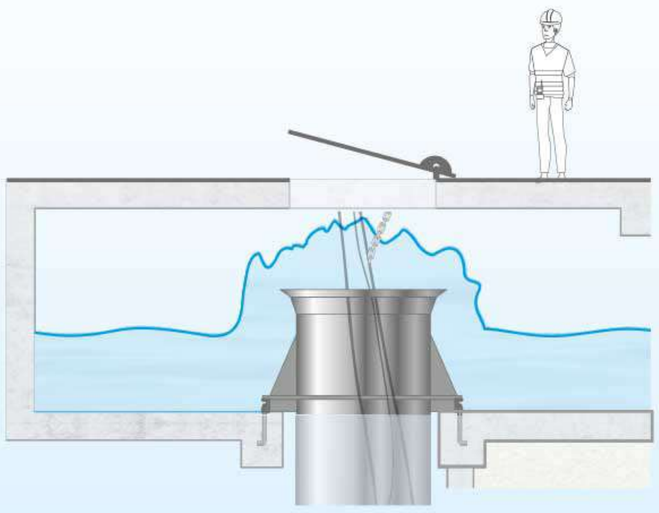


#**Patent** Pending

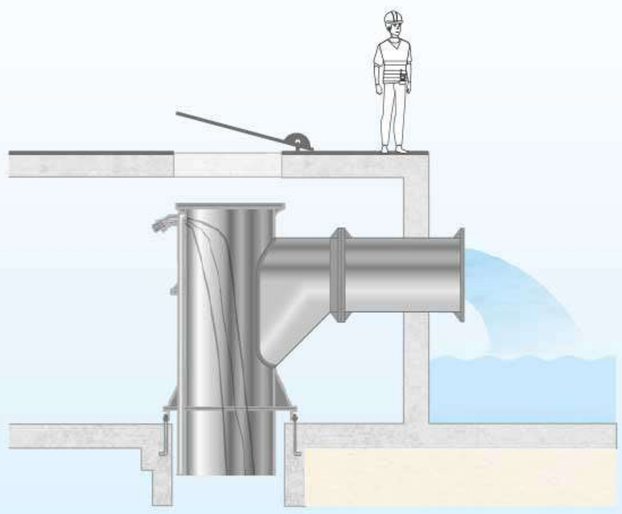
4. Options of **Location** of **Discharge Head / Flume**

4.1 **Below** Operating Floor

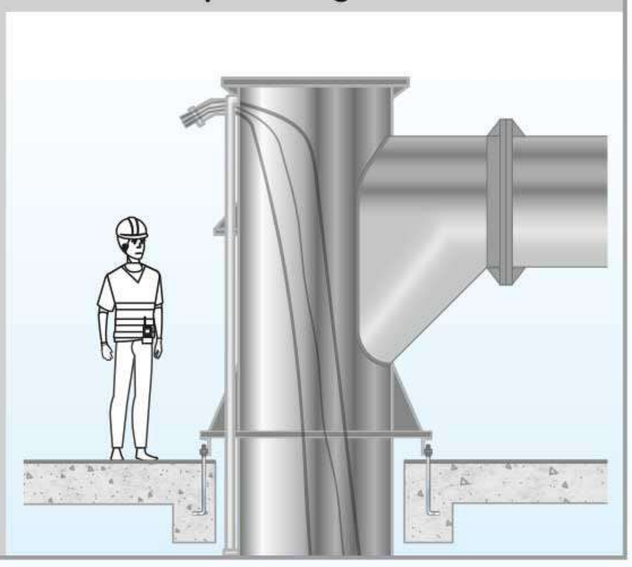
4.1.1 **Flume**



4.1.2 **Discharge Head**



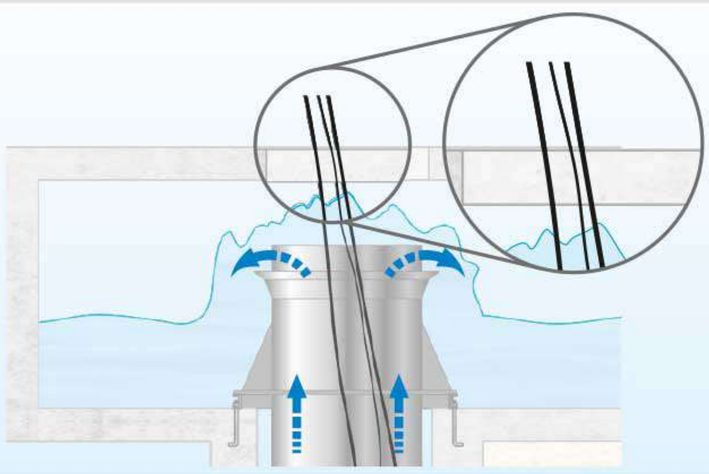
4.2 Discharge Head **Above** Operating Floor



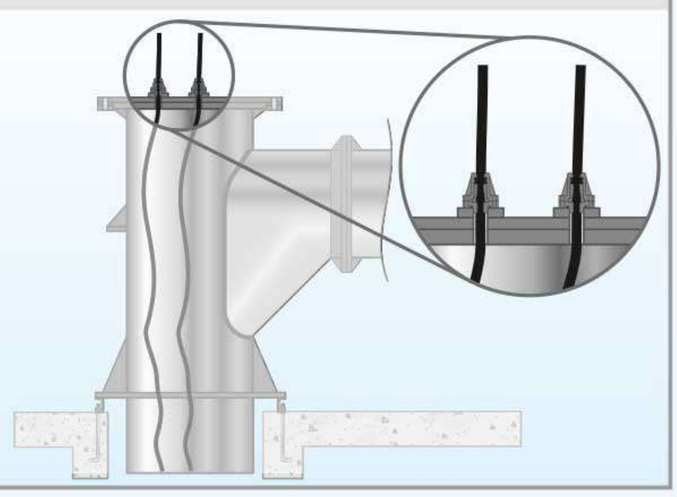
5. Options of **Cable Entry**

5.1 **Top Entry**

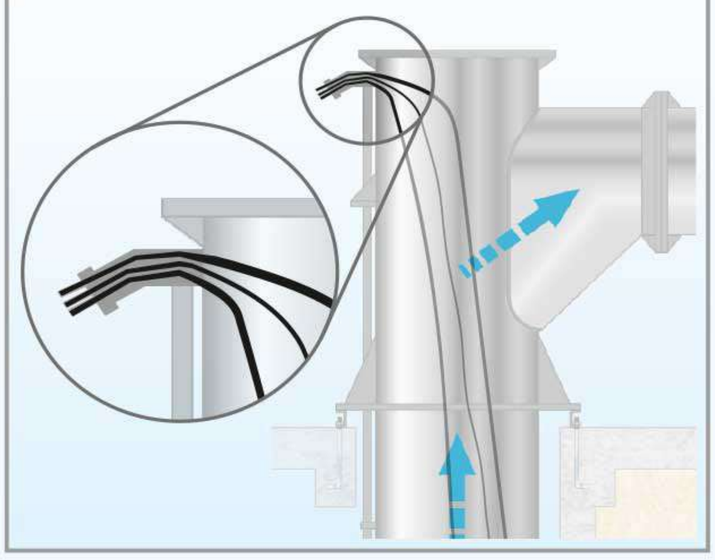
5.1.1 **Flume** *(Open Top) (Portable)*



5.1.2 **Enclosed Top** Cable Gland *(Permanent)*

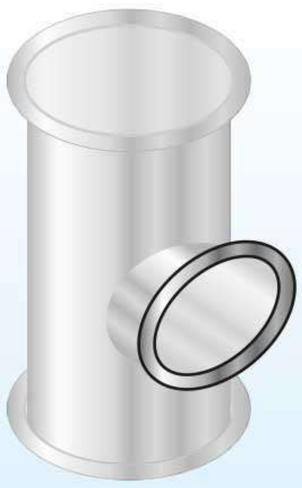


5.2 **Side Entry** Cable Gland *(Permanent)*

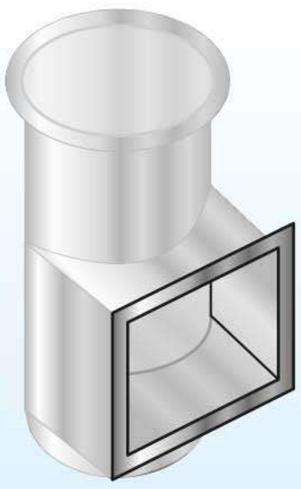


6. Options of **Shape** of Discharge Head's **Tail End**

6.1 **Circular**



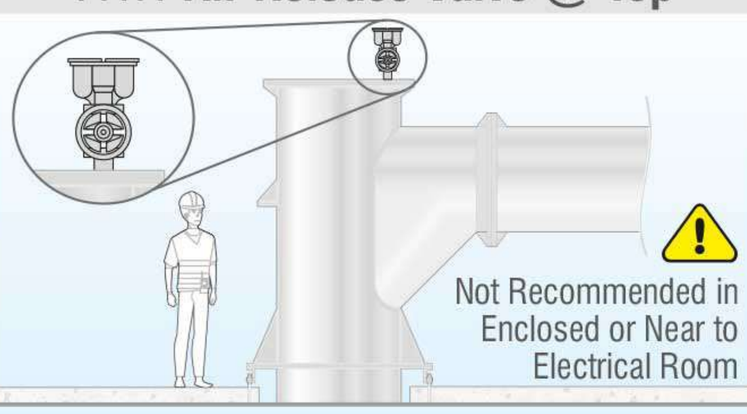
6.2 **Rectangular**



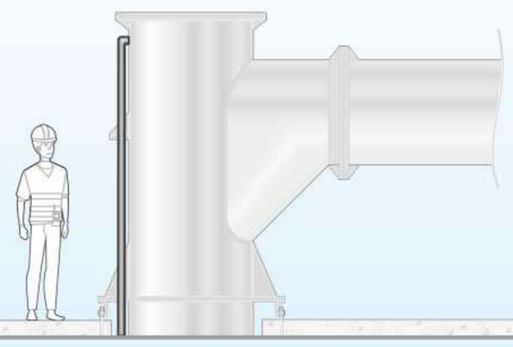
7. Options of **Air Venting Mechanism**

7.1 @ **Discharge Head**

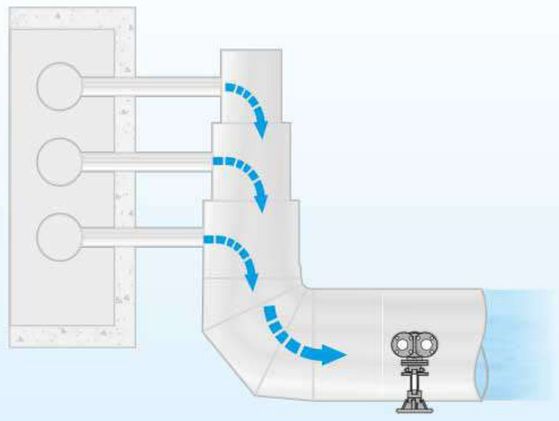
7.1.1 **Air Release Valve @ Top**



7.1.2 **Vent Tube**



7.2 @ **Header**

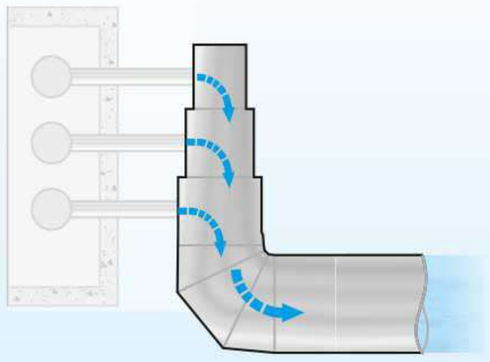


8. Options of **Header**

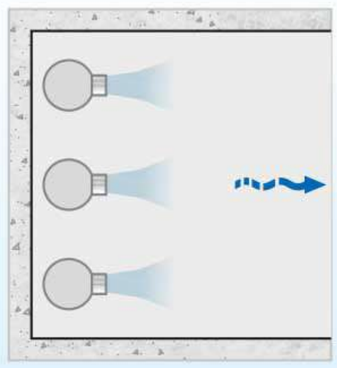
8.1 Options of **Type** of Headers

8.1.1 **Common**

8.1.1.1 **Metallic**

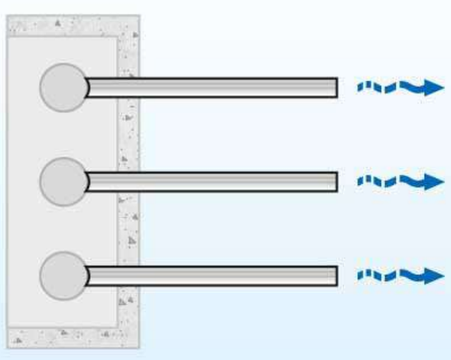


8.1.1.2 **RCC**

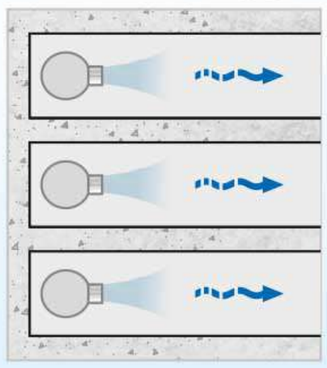


8.1.2 **Individual**

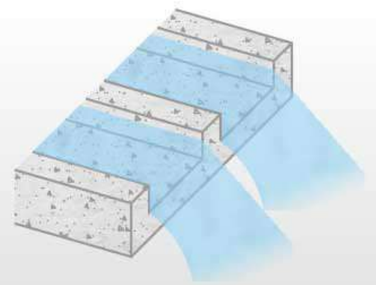
8.1.2.1 **Metallic**



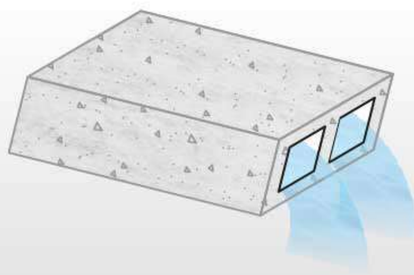
8.1.2.2 **RCC**



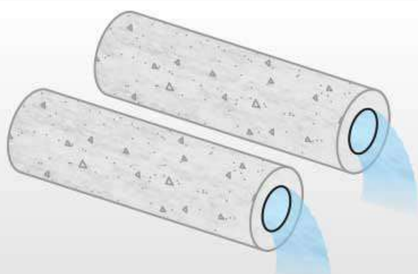
8.1.2.2.1 **Open Channel**



8.1.2.2.2 **Cuboidal** *(Duct)*

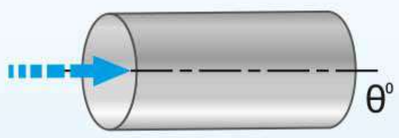


8.1.2.2.3 **Cylindrical**



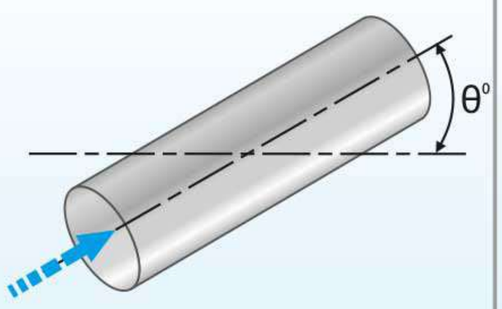
8.2 Options of Common Header's **Gradient**

8.2.1 **Horizontal**



θ° = 0°

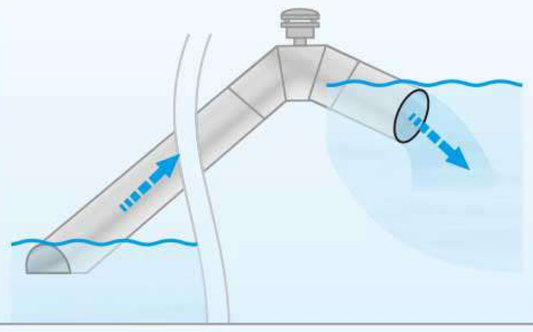
8.2.2 **Inclined Rising**



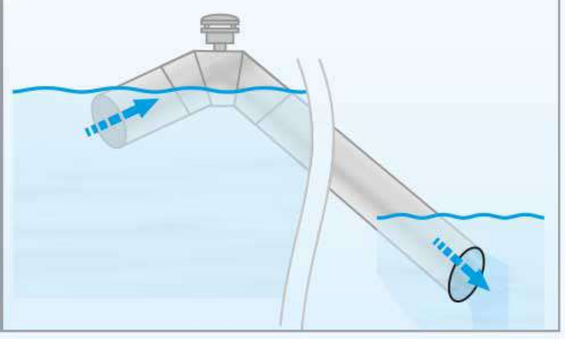
θ° > 0°

8.2.3 **Syphonic**

8.2.3.1 **Positive** Static Head *(Syphon breaker required)*



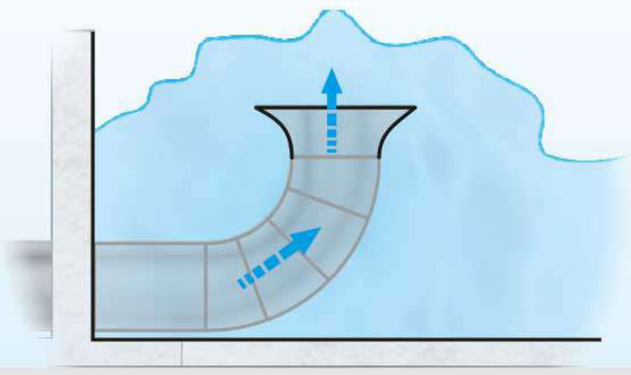
8.2.3.2 **Negative** Static Head



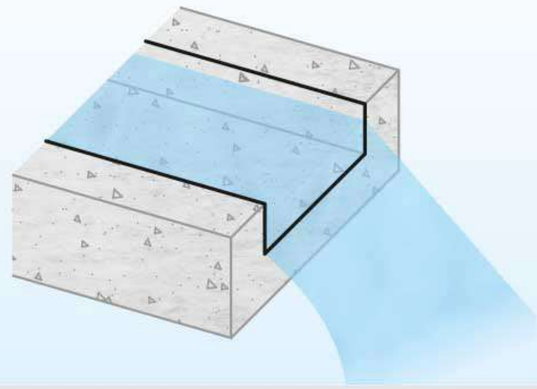
8.3 Options of **Outfall**

8.3.1 Options of **Shape** *(of Outfall)*

8.3.1.1 **Flume**

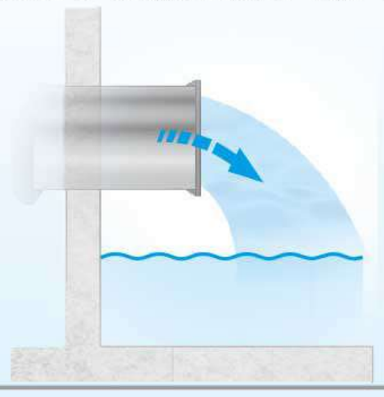


8.3.1.2 **Weir**

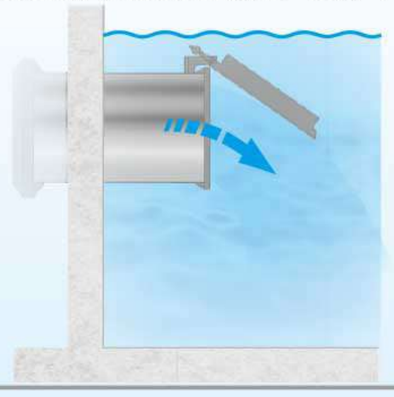


8.3.2 Options of **Piped** *(Outfall)*

8.3.1.1 **Above** Maximum Tail Water Level



8.3.1.2 **Below** Maximum Tail Water Level



Typical Pumping Stations

Suitable for :

ATBP	✓
ATBN	⚠
ATBM	⚠

Portable, Low Head & Depth; Installation for Water Logged Terrain

Portable, Bottom Rested; Baffle Cylindrical Suction Stand *(PBCSS)*#

Minimal Foundation Hassles...

#**Patent** Pending

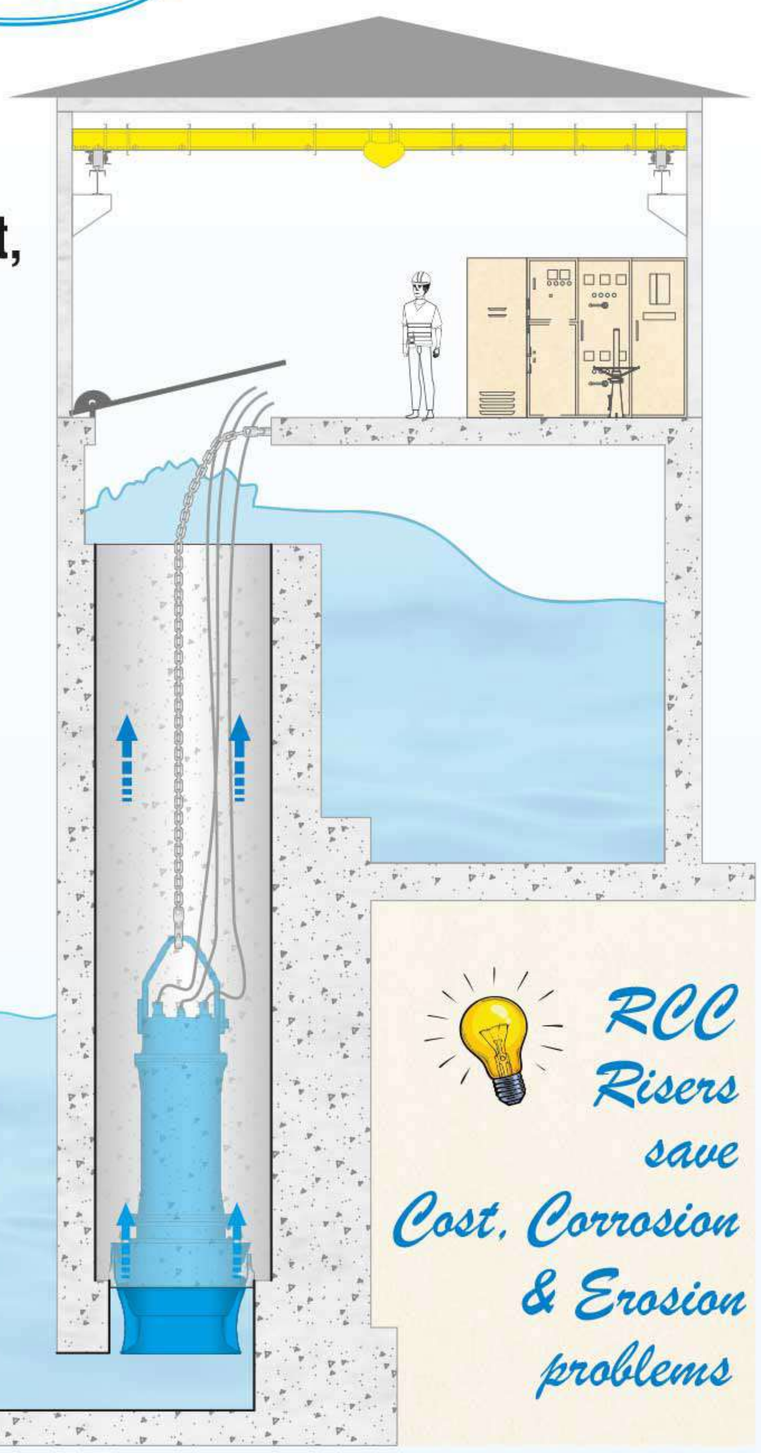
Permanent, Low to **Medium Head & Depth; Installation**

Minimalistic Head Losses in Piping & subsequently Low Energy Cost

Jackwell

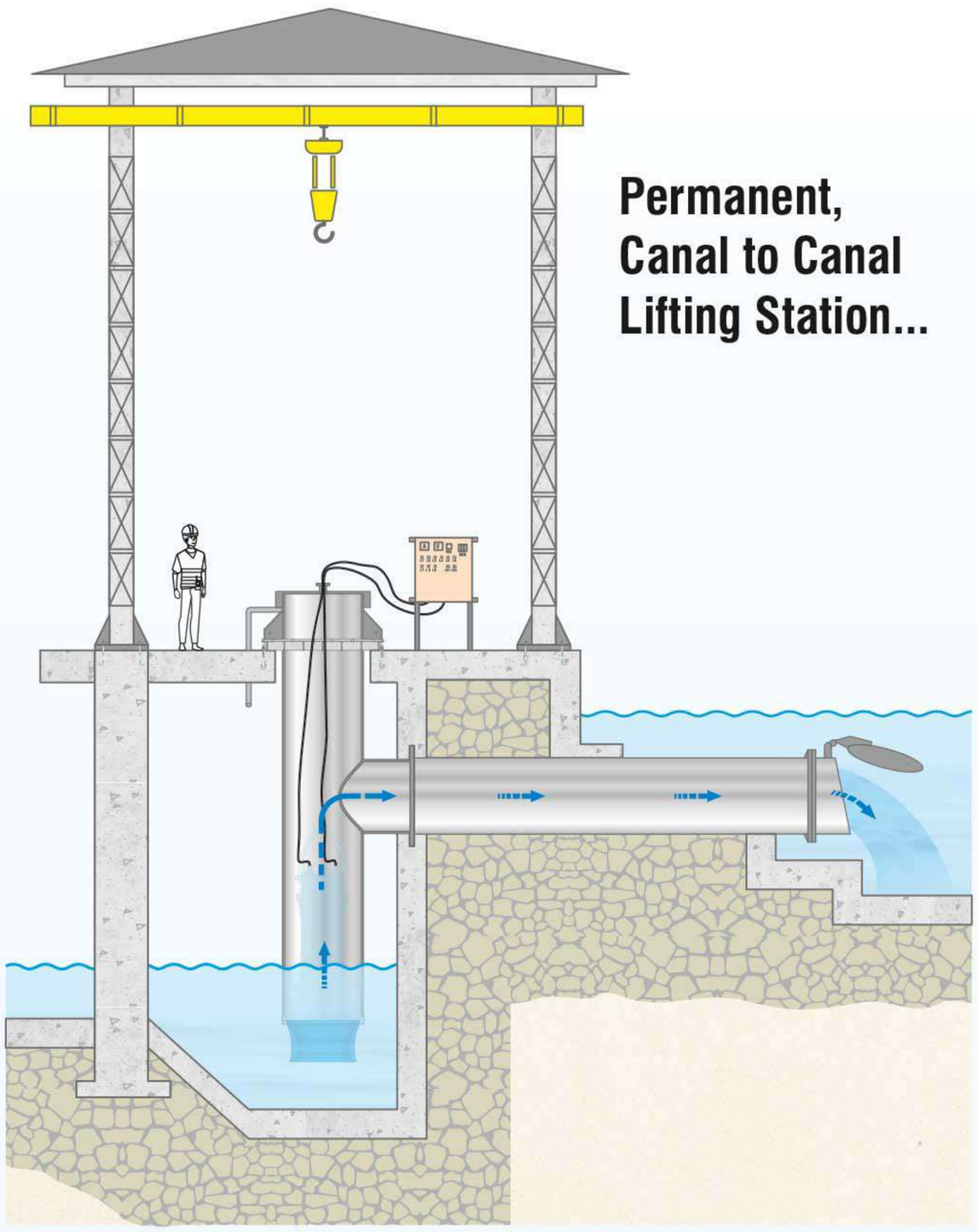
Intake

Permenant, Low Head Lifting / Drainage Station...

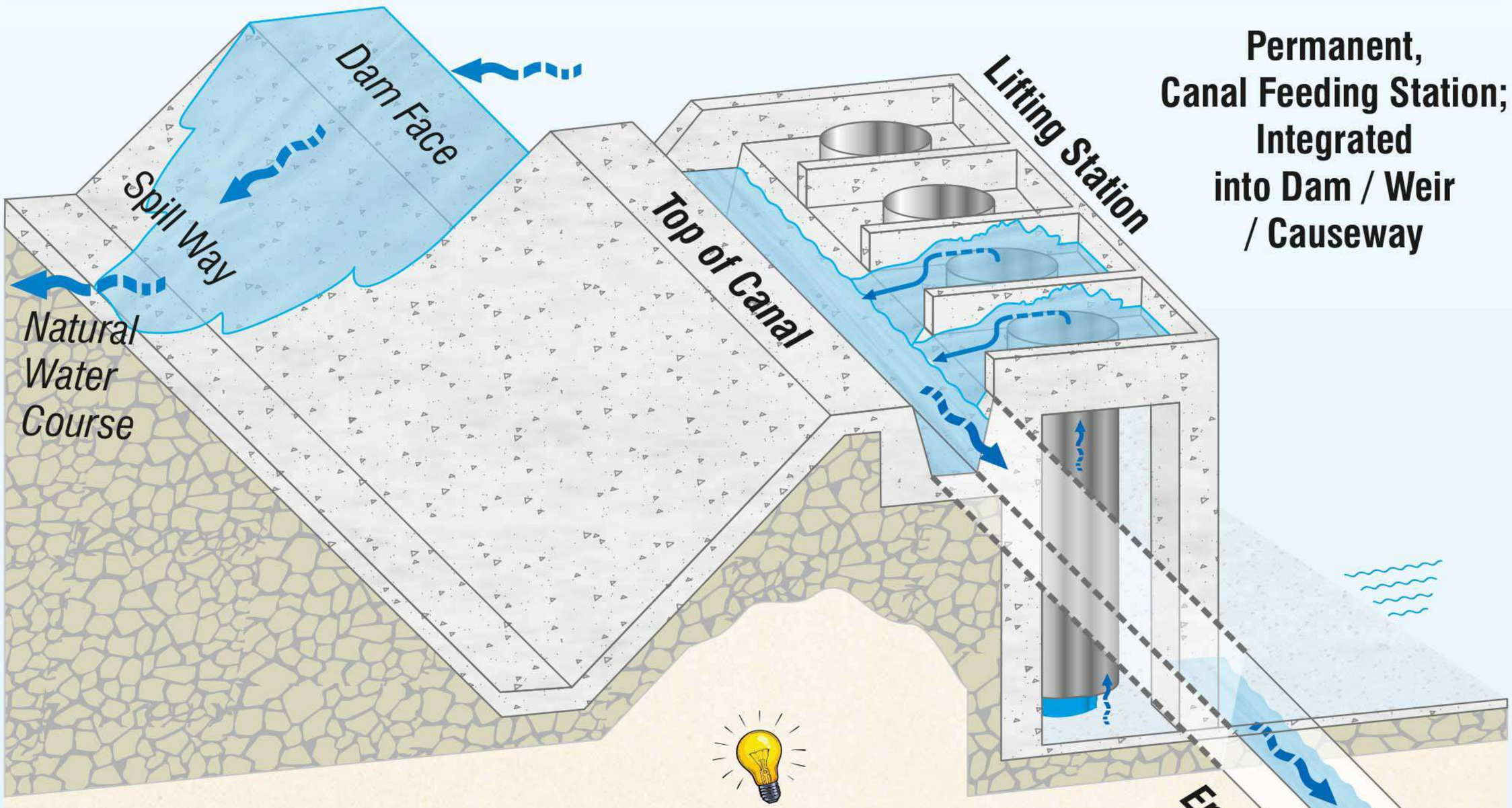


RCC Risers save Cost, Corrosion & Erosion problems

Permanent, Canal to Canal Lifting Station...



Permanent, Canal Feeding Station; Integrated into Dam / Weir / Causeway



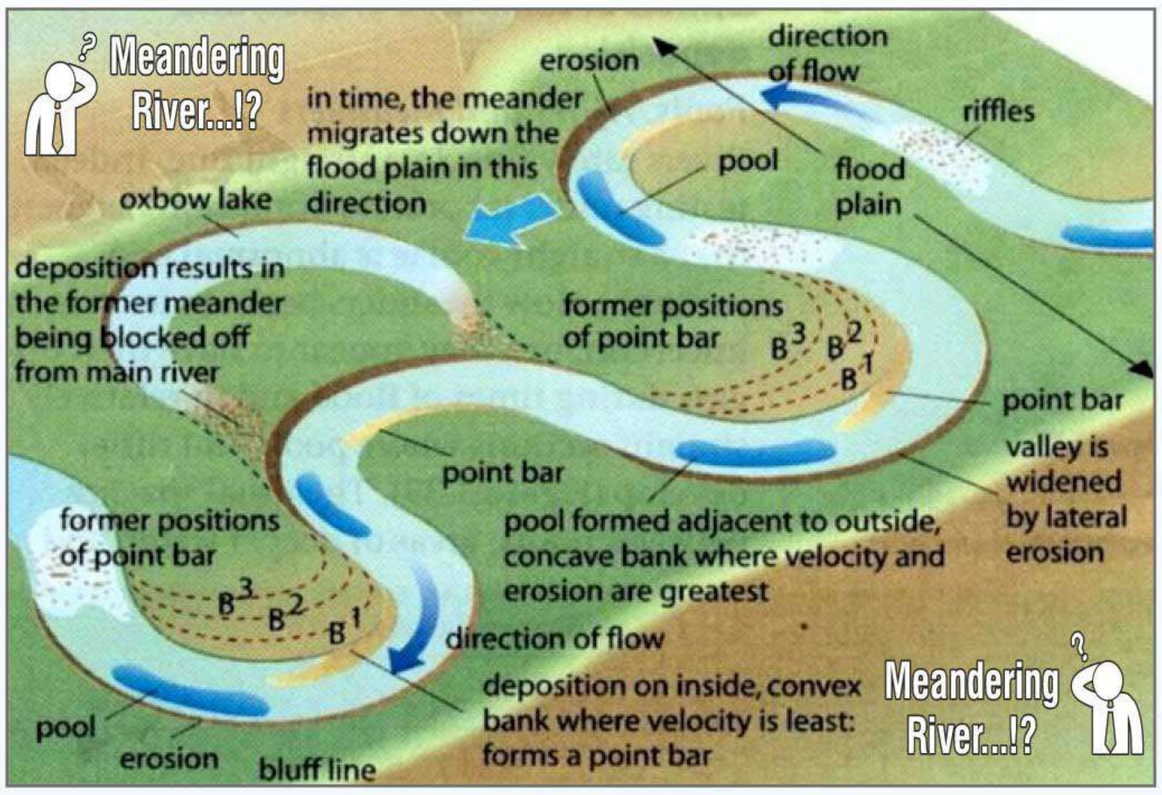
Simple yet Robust, Innovative Civil design saves (unnecessary) Head Losses (& subsequently saves Energy)

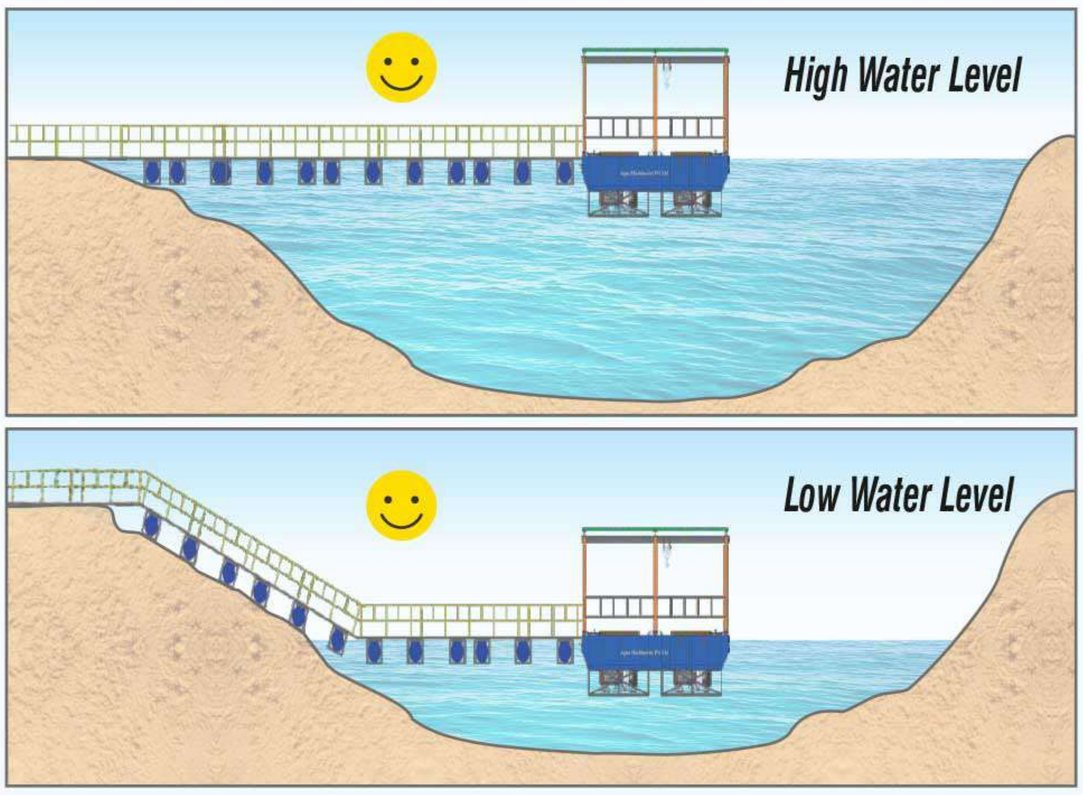
Applications

Floating Pontoon Pumping Station

Water Supply is **assured**, **Round the Year**; irrespective of :

1) **Rise** &/or **Fall** of Water **Levels** &/or
2) **Shifting** &/or **Meandering** of Water **Course**

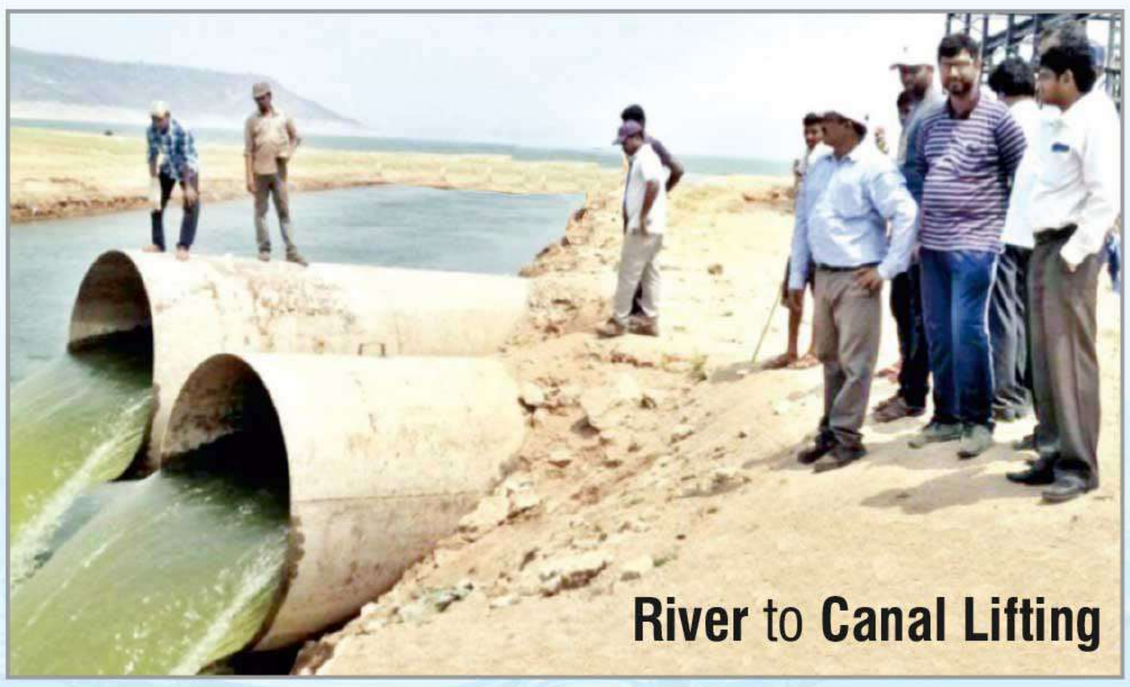




Effluent Pumping

Raw Water Intake

12,240 m³/hr Pumpsets

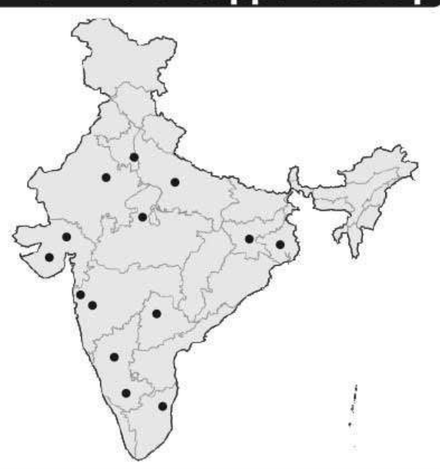


Aqua has been awarded the Prestigious

Best Quality Pump Vendor

by

A Pan India Support set up



Some of Our **Other Products**

Submerged Turbine Pumpsets *(AVT)*

Submerged Centrifugal Pumpsets *(SCF)*

Dry Pit Installed Submerged Centrifugal Flood Proof Pumpsets *(ARFP)*

Non Clog Submersible Sewage Pumpsets *(ANS)*

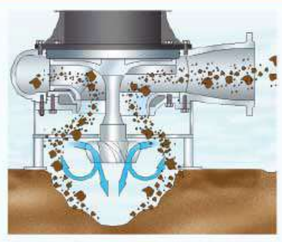
Pontoons & Walkways

Submerged Elbow Pumpsets *(AES)*

Submerged Mine Dewatering Pumpsets *(AMS)*

Submersible Slurry Hydro Electric Pumpsets *(ASSHE)*

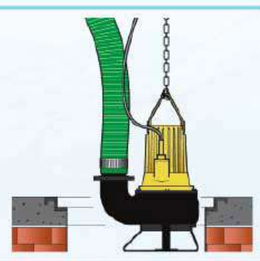
Submersible Slurry Pumpsets *(ASS)*



Submersible Dredging Pumpsets *(ADS)*

Dry Pit Installed Non Clog Flood Proof Submersible Pumpsets *(ANFP)*

Ultra Compact Submersible Sewage Pumpsets *(Scavenger)*



Submersible Sewer Manhole Pumpsets *(AM)*

Centralized Quotation Cell :
marketing@aquapumps.com
(+91-80001 53324)

After Sales & Services :
service@aquapumps.com
(+91-90167 53328)
(+91-98259 51116)

Feedback :
ajp@aquapumps.com

Aqua Machineries Private Limited

www.aquapumps.com

Registered Office & Manufacturing Plant

Survey No. 504/1-2, 442/2, Near Haridarshan Estate, Near Express Highway, Ramol, Ahmedabad-382 445. Gujarat, India.