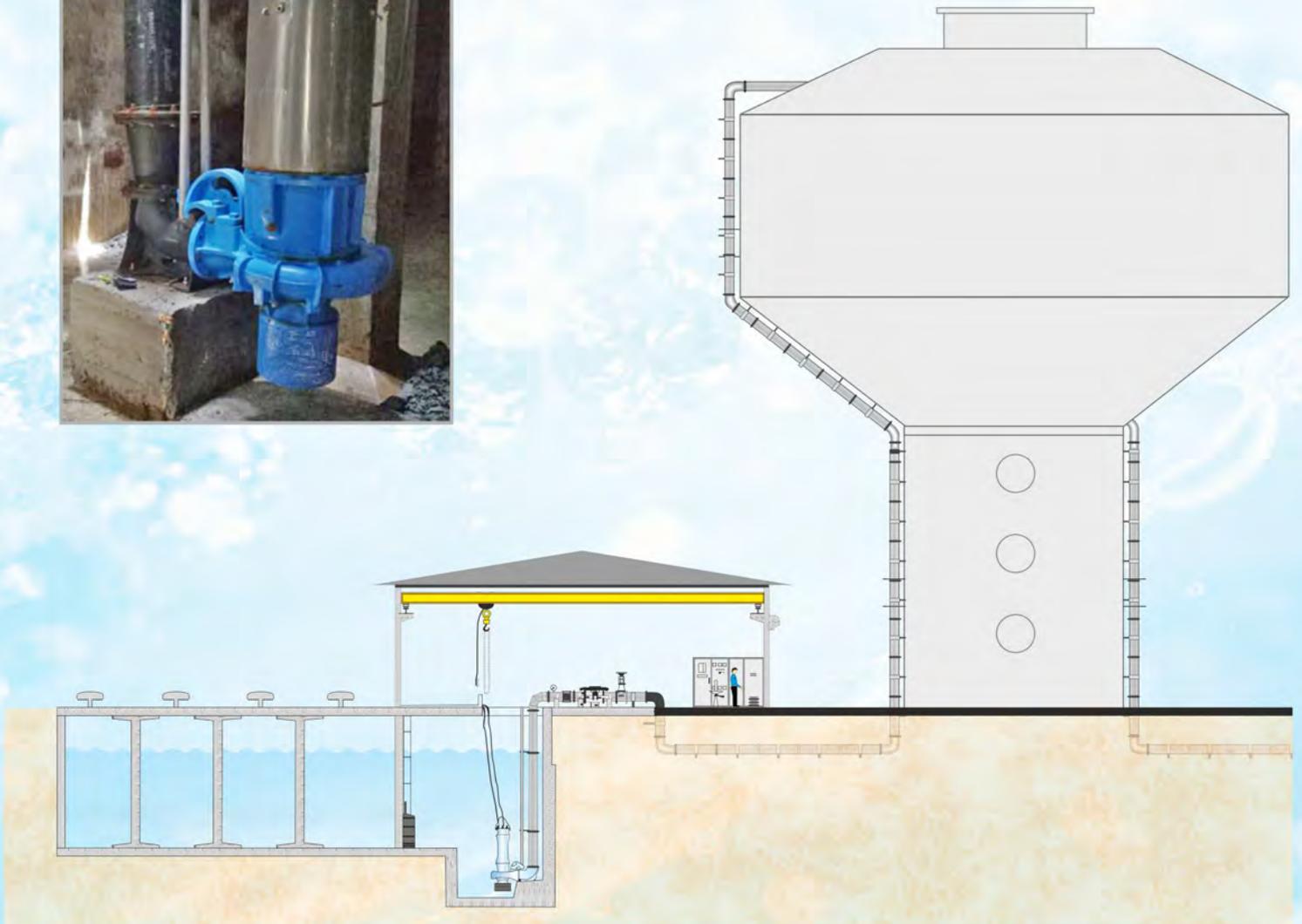




*Land, Energy & Cost Saving,  
Ultra Low Maintenance & Least Life Cycle Cost (LCC);  
Drinking Water Pumping Stations*

*enabled by  
Aqua's Submerged  
Centrifugal Pumpsets*

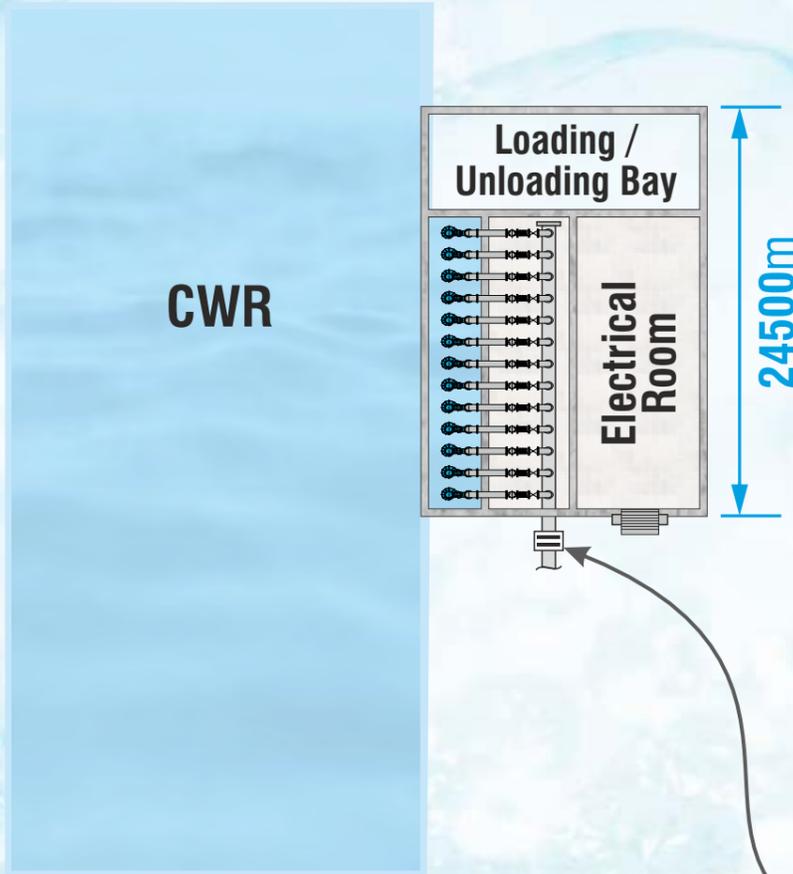


# Comparison : Space & Cost : Pumping Stations

All PS with 10W + 3S x 1364m<sup>3</sup>/hr pumps each

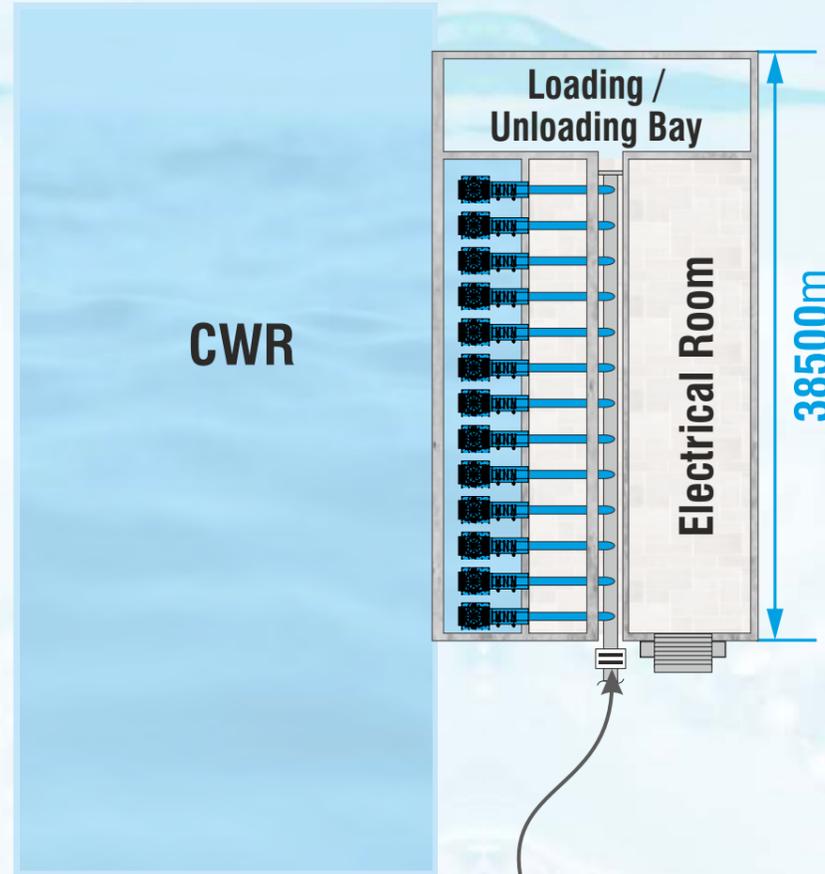
## SubCF based Flooded Suction Pump Room

😊 Due to Self **Water Cooled** Motors & ability to quickly pull up any single pump within minutes (for maintenance at Loading/Unloading Bay), in SubCF pumpsets; the Pumpset Center to Centre SPACING can be kept **LOW** (as per minimum permissible by HIS Suction standards) & hence the WIDTH & Cost of Pump Room & Common Header is **Compact**.



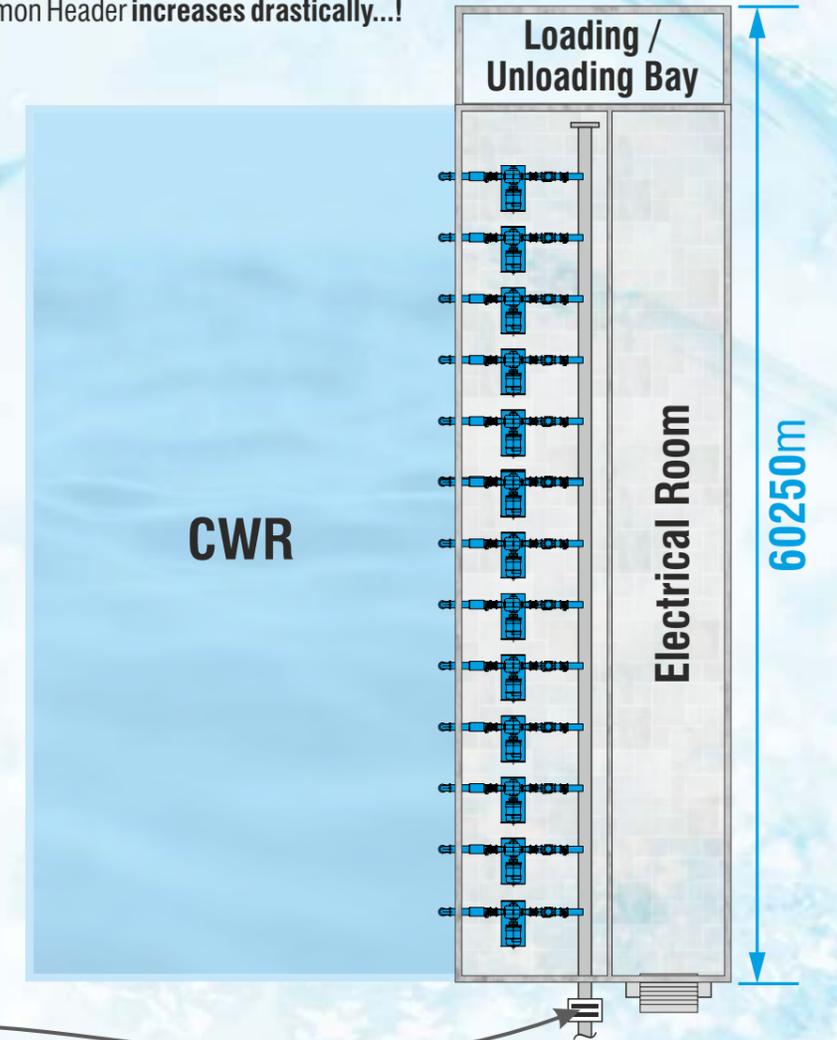
## VT based Flooded Suction Pump Room

⚠️ Due to **Air Cooled Motors** (requiring ample free space between motors to avoid each other's heat pickup) & Operator Access Space (required between every pumpset for their O&M), in VT pumpsets; the Pumpset **Center to Centre SPACING is HIGHER** (than the minimum permissible by HIS Suction standards) & hence the WIDTH & Cost of Pump Room & Common Header **increases...!**



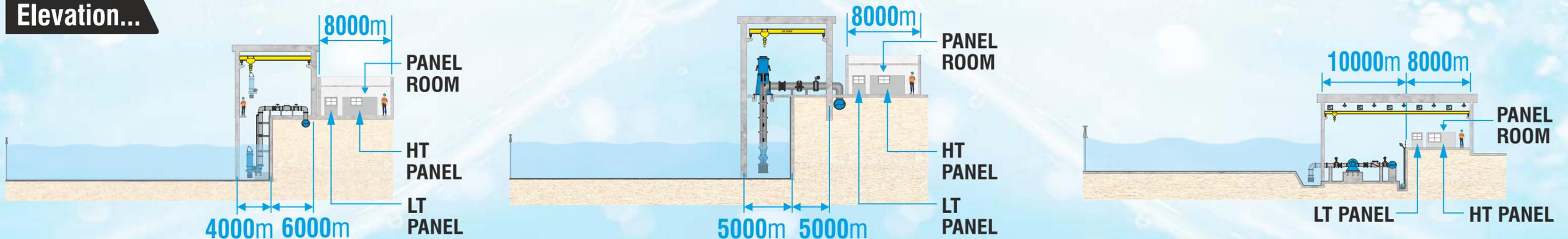
## HSCF based Positive Suction Pump Room

⚠️ ⚠️ Due to **Perpendicular Orientation** (of Motor with respect to Piping); in HSCF pumpsets the pump Center to Centre SPACING & hence the WIDTH (& Cost) of Pump Room & Common Header **increases drastically...!**



Flow Meter DATUM LEVEL for P.S. Specific Energy Consumption

## Elevation...



**Conclusion: Submerged Centrifugal Pumpset based Pumping Station Saves Substantial Land...**

# Comparison : Capital Cost of Pumping Stations

All PS with 10W + 3S x 1364m<sup>3</sup>/hr pumps each

Component / Type of Installation		Unit	SubCF Pumping Station	VT Pumping Station	HSCF Pumping Station	
Time Frame of Project Completion		month	<b>6</b>	<b>9</b>	<b>18</b>	
Capital Cost : Civil Structure (Pump Room)	Pumpset Portion	Carpet Area : Under Ground Portion	m <sup>2</sup>	82.0	172.5	562.5
		Rate / m <sup>2</sup>	₹/m <sup>2</sup>	17,000	17,000	22,000
		<b>Cost of Under Ground Portion</b>	₹	<b>13,94,000</b>	<b>29,32,500</b>	<b>1,23,75,000</b>
		Carpet Area: Above Ground Portion	m <sup>2</sup>	163.0	212.5	40.0
		Rate / m <sup>2</sup>	₹/m <sup>2</sup>	14,000	14,000	14,000
		<b>Cost of Above Ground Portion</b>	₹	<b>22,82,000</b>	<b>29,75,000</b>	<b>5,60,000</b>
	Electrical (Switch Gear) Room	Carpet Area	m <sup>2</sup>	196	340	480
		Rate / m <sup>2</sup>	₹/m <sup>2</sup>	12,500	12,500	12,500
		<b>Cost of Electrical Portion of Pump Room</b>	₹	<b>24,50,000</b>	<b>42,50,000</b>	<b>60,00,000</b>
	Pump Room	<b>Total Component Capital Cost</b>	₹	<b>61,26,000</b>	<b>1,01,57,500</b>	<b>1,89,35,000</b>
	Land Coast of Pump Room	Area	m <sup>2</sup>	759	1,261	1,546
		Rate / m <sup>2</sup>	₹/m <sup>2</sup>	<b>20,000</b>	<b>20,000</b>	<b>20,000</b>
		<b>Total Component Capital Cost (IV - not time interest adjusted)</b>	₹	<b>1,51,80,000</b>	<b>2,52,20,000</b>	<b>3,09,10,000</b>
	<b>CAPEX - Capital Cost : Pumping Station (Civil)</b>		₹	<b>2,13,06,000</b>	<b>3,53,77,500</b>	<b>4,98,45,000</b>
		comparative %	<b>100%</b>	<b>166%</b>	<b>234%</b>	
Capital Cost	Pumping Machinery	Pump Set Qty. (W)	nos.	<b>10</b>	<b>10</b>	<b>10</b>
		Pump Set Qty. (S)	nos.	<b>3</b>	<b>3</b>	<b>3</b>
		Nearest Standard Motor Rating	kW	<b>82</b>	<b>82</b>	<b>82</b>
		Approx. Total Rating of Installed Pumping m/c	kW	1066	1066	1066
		Rate of Pumpset (Pump+Motor+Suction & Delivery manifolds)	₹/kW	<b>18,000</b>	<b>24,500</b>	<b>22,000</b>
			₹/kW	1,725	2,100	2,760
		Rate of Common Header		Due to Perpendicular Orientation of Motor with respect to Piping; in HSCF pumpsets the pump Center to Centre SPACING & hence the WIDTH (& Cost) of Pump Room & Common Header increases drastically		
		Lump Sum Capital Cost P/M	₹	<b>2,10,26,850</b>	<b>2,83,55,600</b>	<b>2,63,94,160</b>
<b>CAPEX - Capital Cost : Pumping Station (Civil) + Pumping M/c</b>		₹	<b>4,23,32,850</b>	<b>6,37,33,100</b>	<b>7,62,39,160</b>	
		comparative %	<b>100%</b>	<b>153%</b>	<b>175%</b>	



**Conclusion: Submerged Centrifugal Pumpset pump based Pumping Station is much more Economical (& Land saving too)....**



# Layout

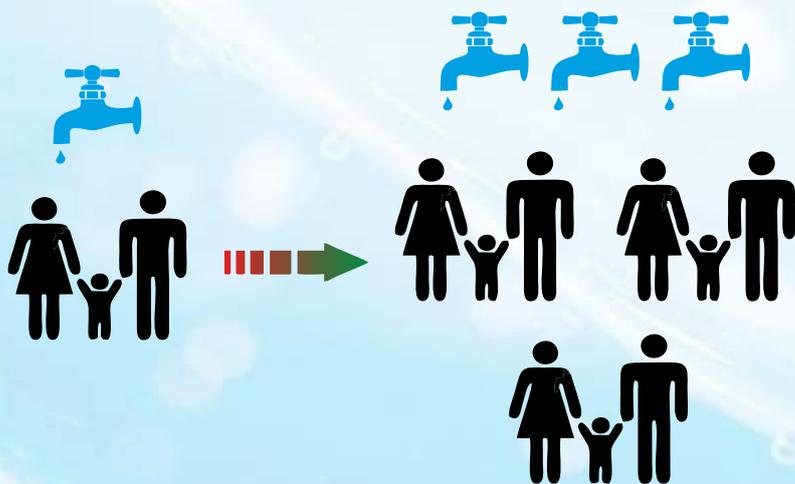


Air Cooled Motor - Pumpsets require Costly & Spacious Pump Rooms



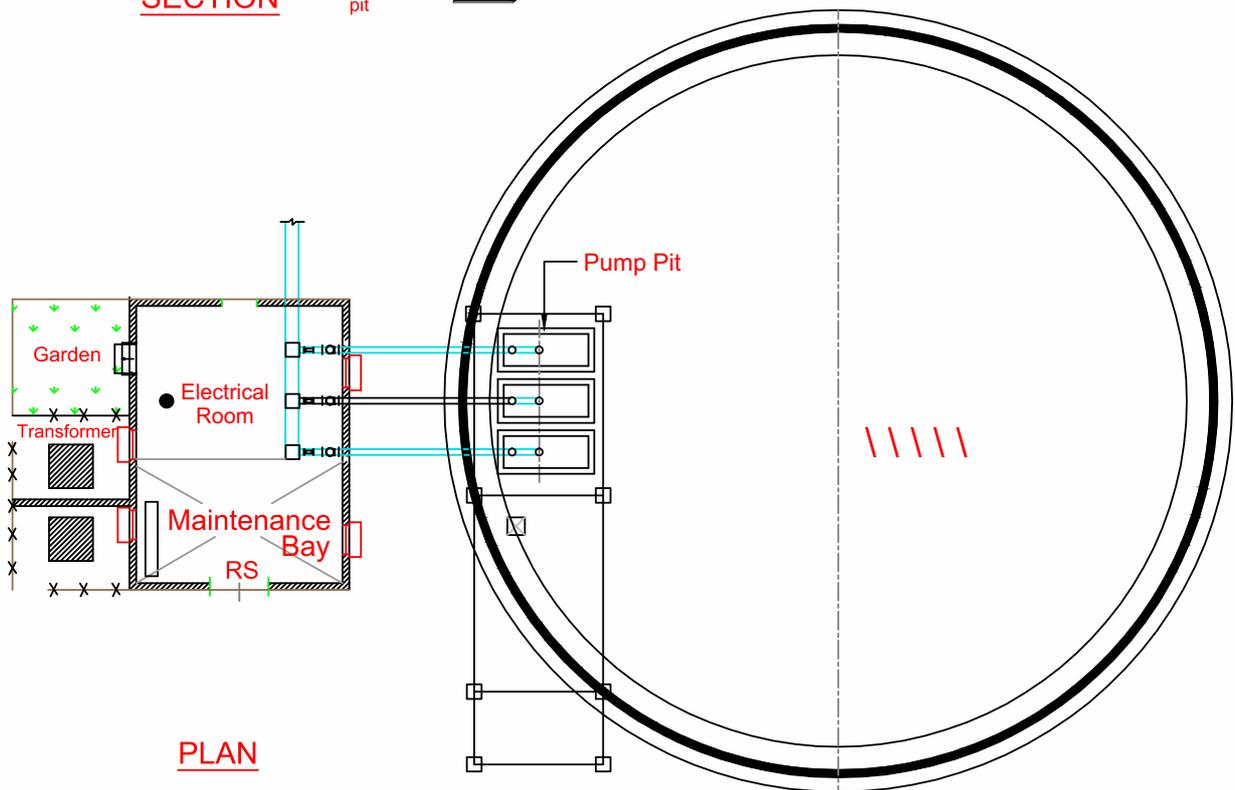
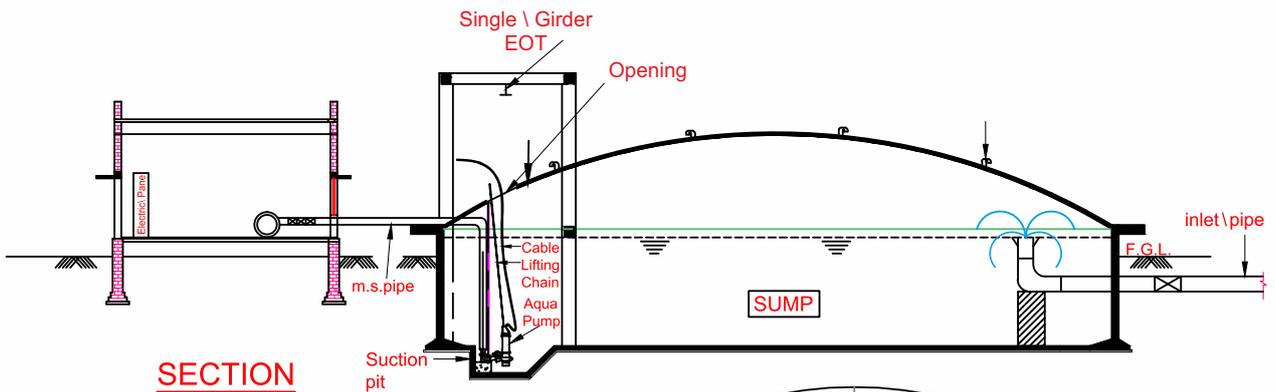
Submerged Centrifugal pumps can be installed in existing Clear Water Sumps by simply cutting open the top slab

SubCF pumpsets can be immersed directly in to Wet Pit (CWR); hence **eliminating** the need of Dry Pump Room resulting in **upto 55% saving in Land** required \*.



The use of SubCF pumps saves a Lot of Land which can be **better utilized** to make a **Larger Clear Water Reservoir (CWR)** thereby **serving a Larger Population** (in same available land) for **additional years** to come.

# Layout



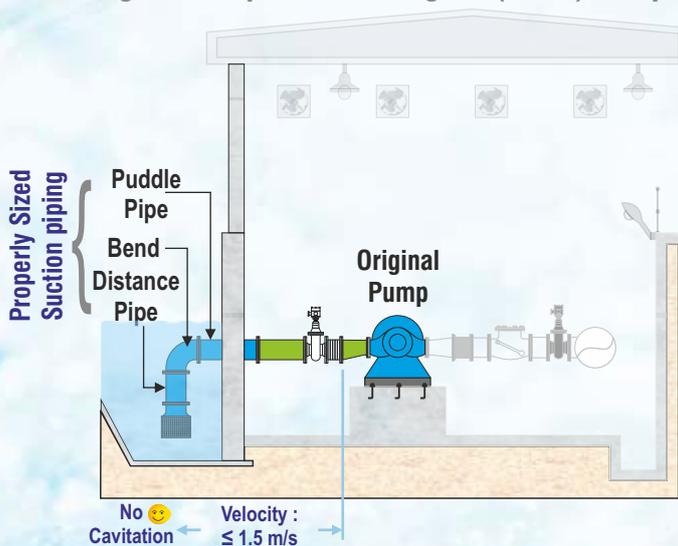
## Flow Augmentation (in the same piping) upto 2.5X within existing pump rooms is easily possible with SubCF...!

- Old city WDS were developed around **1950's-80's** – but now Old Bungalows have given way to High Rise Flats which impose approximately **4 to 6** times more Population Density...!
- Naturally, such **increased population** requires more water & hence will **severely stress the existing WDS's rated output**.
- Old design Dry Installed HS Centrifugal pumpsets are installed in Dry Pit (*Underground Pump Rooms*) & “**suck**” water from a **Cast Iron suction manifold** which:
  - Is **Grouted** into a **thick RCC partition wall** which separates Water of Clear Water Reservoir (*CWR*) from Under Ground Pump Room (*UGPR – Dry Pit*) – hence chipping out the old small suction pipe to replace it with a new large suction pipe is :
    - **Tedious** (to chip off concrete in suffocating underground *CWR*),
    - **Time Consuming** (leads to total shutdown of WDS for weeks) disturbing public water supply &
    - **Risky** (the new cement mortar plugging may never be as leak free as the old mono lithic casting).

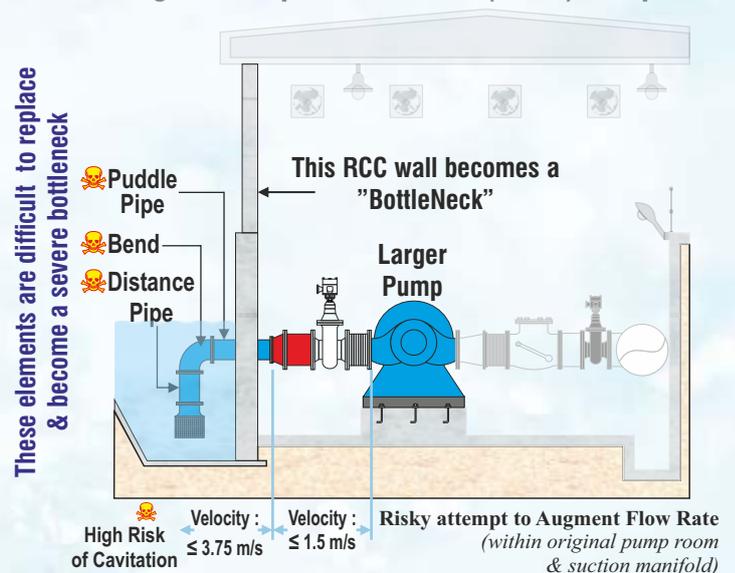


**Unless**, a larger flow; Dry Installed HS Centrifugal pumpset is **also** fitted with a **Larger Suction Piping**; increasing pump's flow rating will (also inevitably increase Suction Velocity) **lead to dangerous Cavitation, Vortexing, & even premature pump failure..!**

Original Pump Room + Original (HSCF) Pumps



Original Pump Room + New (HSCF) Pumps



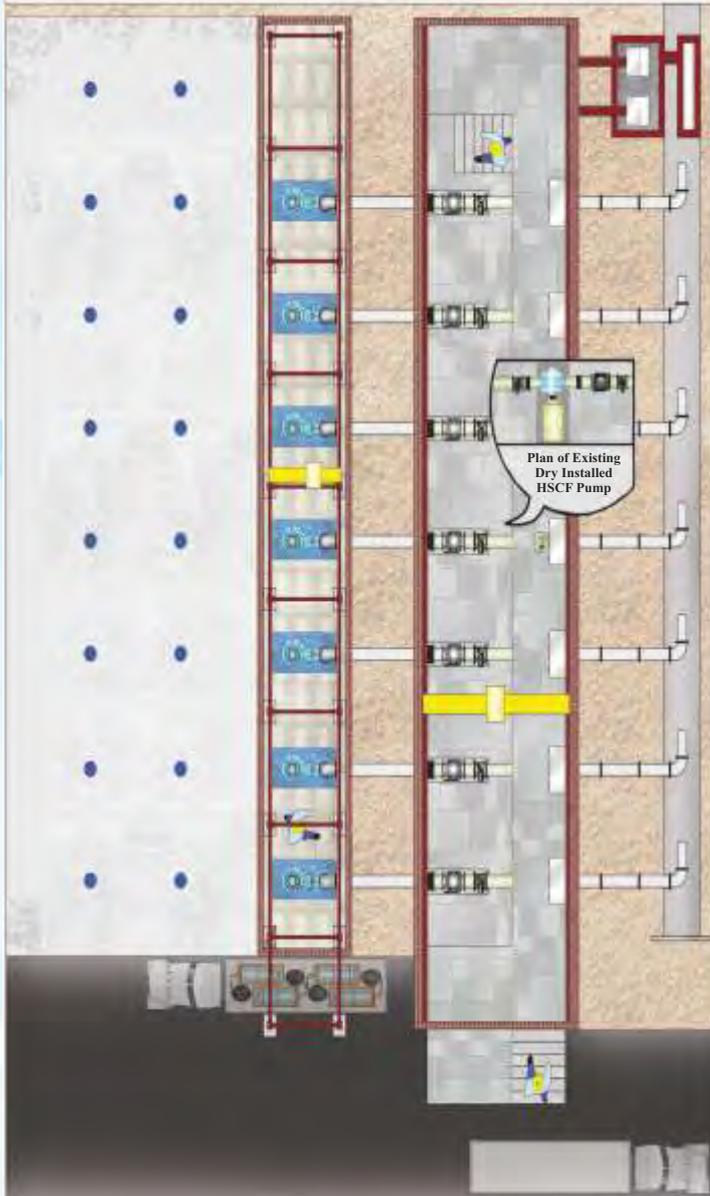
This is where, SubCF pumpsets **are a Blessing** – they can be immersed directly in to Wet Pit (*Clear Water Sump*); hence :



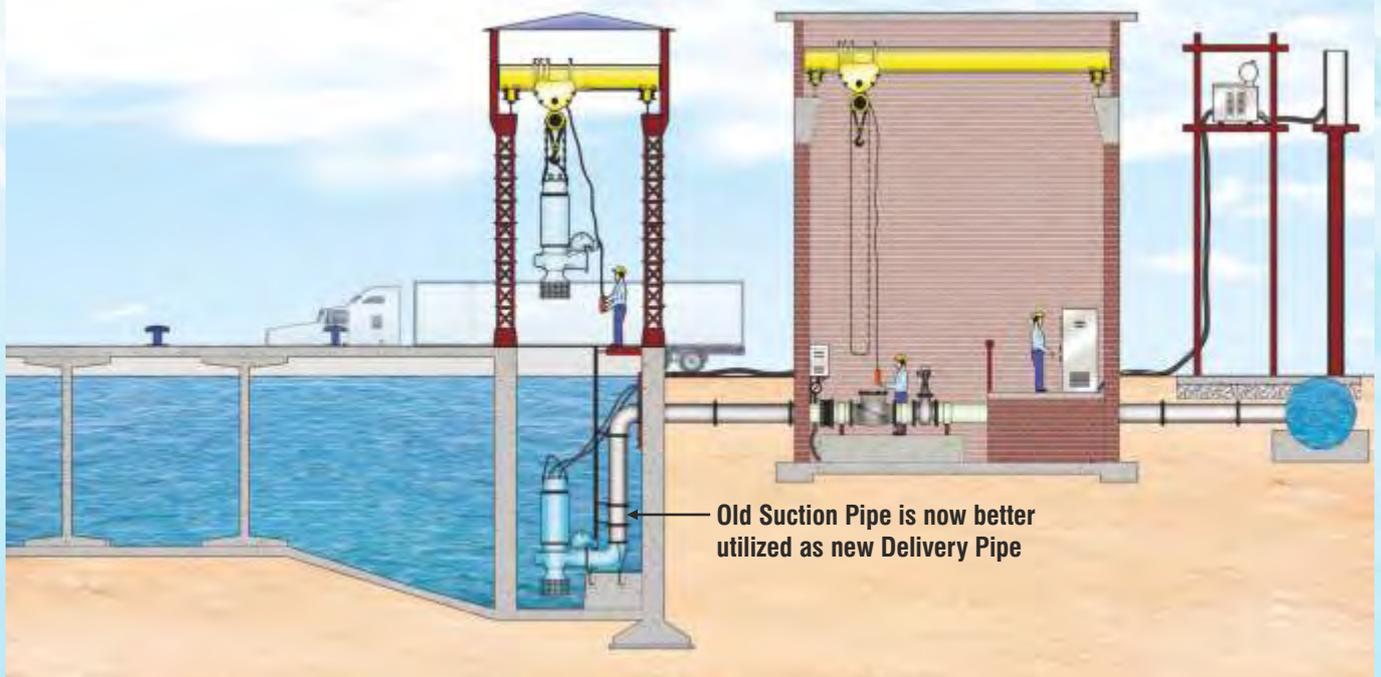
- They don't need a Suction Piping so there is **no risk of Cavitation, Vortexing or premature damage**
- They can simply be lowered into *CWR* Sumps so as to sustain Water Supply 24x7x365 **without** pump change over **interruption** or **shut down**.



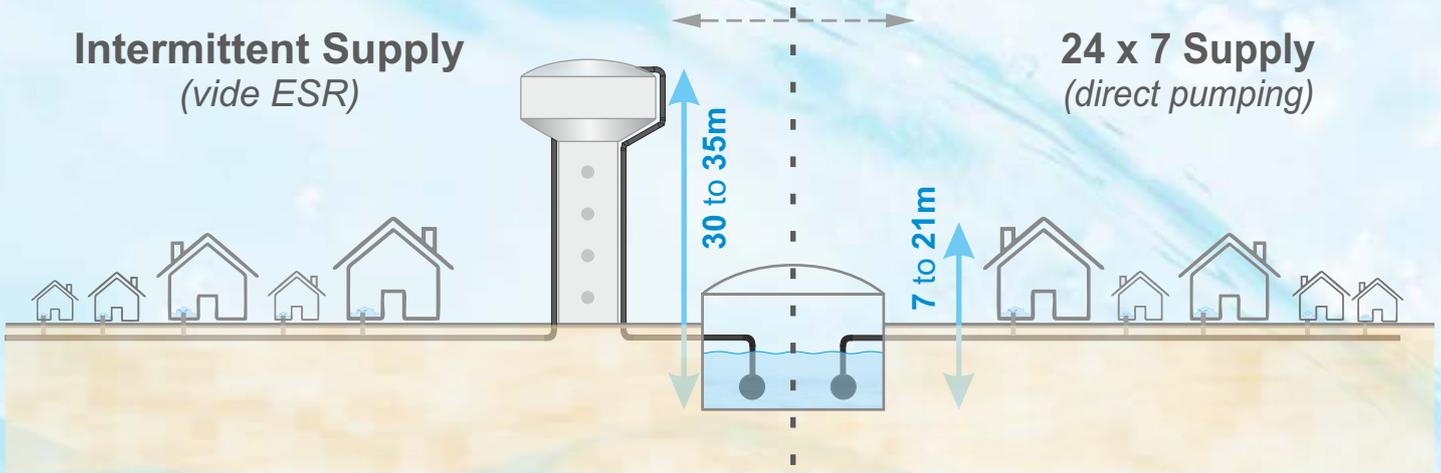
**Augmentation of existing Dry Installed HSCF Pump based Water Pumping Station without disturbing Civil Structure & Grouted Suction Manifold.**



**Replacing Dry installed HS CF pumpsets by Wet installed Submerged Centrifugal pumpsets; utilizing Old Suction pipes as Delivery pipes**



# Optional Water (Distribution) Supply Systems



In **Intermittent** Water (Distribution) Supply, water is Lifted (pumped) from Underground Tanks (CWR) to Elevated Service Reservoirs (ESR) & Supplied (released) at odd hours (typically for just 2-4 hours in Morning (& sometimes 1-2hours in the Evening)).

- i) Hence the Pumps have to pump against a **Fixed** (mostly Static) **High Head** (of the ESR) thereby consuming (wasting) a lot of Energy.
- ii) Due to Receipt of water in a short span at odd hours; public has a Psychological tendency to **Store water** increasing it's wastage
- iii) The Distribution Pipe Network is Non Pressurized during Non Supply hours which may lead to the unfortunate **accidental Ingress of Waste Water** (like sewage, effluent, etc.) adversely impacting Public Health.

In **24 x 7** systems; water is supplied Round the Clock which :

- a) eliminates the need of ESRs (as pressurized (vide pumps) water is fed Directly into Pipelines) hence instead of pumping all the way 30-35m (to an ESR), now water is to be pumped just upto 1 or 2 Floor (8m to 11m) thereby **reducing Static Head**.
- b) reduces Instantaneous Flow Rate (as people use water as & when required instead of concentrated time zones).

Since System's Frictional Head is Squarely Proportional to the Flow Rate; there is a **great reduction in the Required Total Head** to be pumped - also there is a **reduction in Rate** of water to be pumped (albeit variable during the 24hour clock cycle).

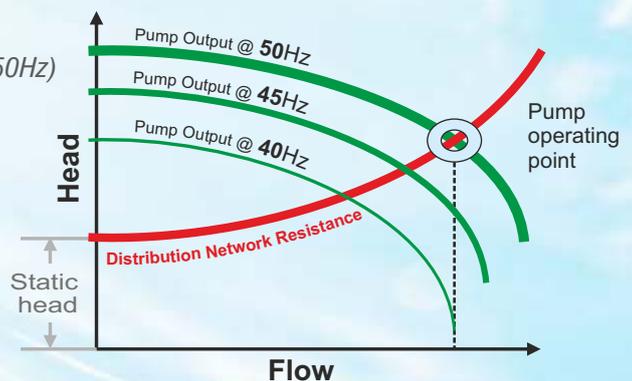
This subsequently opens up an lucrative potential of using VFD driven pumps which apart from **varying Pump's Discharge Flow & Head** (in accordance with system's requirement) **can result in huge Energy savings**.

Of course, the above presumes that End Users don't waste water (mostly ensured by Water Metering)

## Typical effects of VFD on Pump-Motor sets

(rated parameters 125kW, 1500rpm (sync) 4P; 35m x 1000m<sup>3</sup>/hr @ 50Hz)

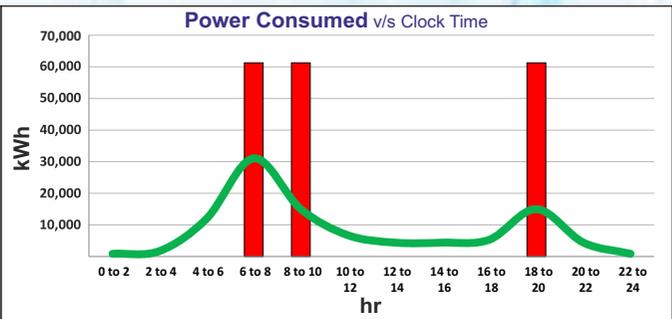
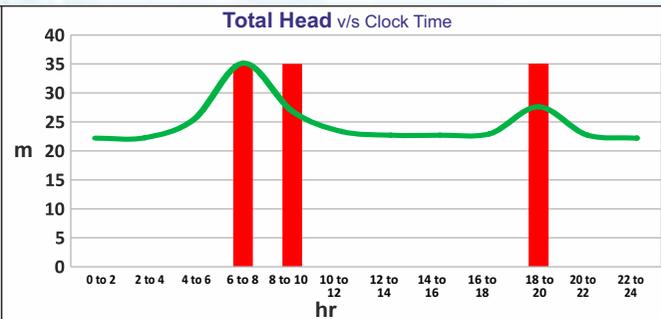
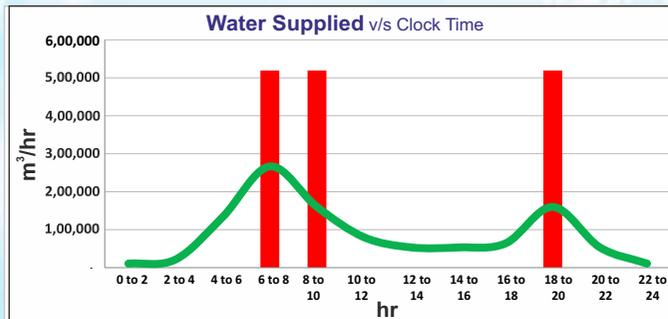
Frequency		Hz	50	45	40	35	30
Pump	Speed (sync)	rpm	1500	1350	1200	1050	900
	Head	m	35.0	28.4	22.4	17.2	12.6
	Flow	m <sup>3</sup> /hr	1000	900	800	700	600
	bkW	kW	112.1	86.9	61.0	50.3	34.3





# Comparison of Pumping : Intermittent v/s 24 x 7

Population		Souls													7,500,000													
Salient Features	Per Capita Consumption	lpcd													135													
	System of Supply	Intermittent (vide ESRs)													24x7 (Direct Pumping to Piped Network)													
	Utility (1/Wastage) Factor	%													65%													
	Total Water (Supplied) Pumped/day	m3/day	1,557,692													1,065,789												
		MLD	1,558													1,066												
Clock Time	Clock	0 to 2	2 to 4	4 to 6	6 to 8	8 to 10	10 to 12	12 to 14	14 to 16	16 to 18	18 to 20	20 to 22	22 to 24	0 to 2	2 to 4	4 to 6	6 to 8	8 to 10	10 to 12	12 to 14	14 to 16	16 to 18	18 to 20	20 to 22	22 to 24			
	duration (hr)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2			
Supply (Pumping) On/ Off	1=On, 0=Off	0	0	0	1	1	0	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1			
	Cumulative hr	6													24													
Supply (Pumping) Rate	m3/hr	-	-	-	519,231	519,231	-	-	-	-	519,231	-	-	10,658	21,316	133,224	266,447	159,868	79,934	53,289	53,289	63,947	159,868	53,289	10,658			
Head	Static / Pressure	m	32	32	32	32	32	32	32	32	32	32	32	21	21	21	21	21	21	21	21	21	21	21	21			
	Demand Variation Factor	%	1.0%	2.0%	12.5%	25.0%	15.0%	7.5%	5.0%	5.0%	6.0%	15.0%	5.0%	1.0%	1.0%	2.0%	12.5%	25.0%	15.0%	7.5%	5.0%	5.0%	6.0%	15.0%	5.0%	1.0%		
	Piping Frictional & Station Losses	m	0.0	0.0	0.0	3.0	3.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.02	3.07	5.64	13.56	6.80	3.95	3.42	3.42	3.61	6.80	3.42	3.02		
	Total Head to be Developed by Pump	m	0.0	0.0	0.0	35.0	35.0	0.0	0.0	0.0	0.0	35.0	0.0	0.0	24.0	24.1	26.6	34.6	27.8	25.0	24.4	24.4	24.6	27.8	24.4	24.0		
Pump	Power Consumed by Pump Motor Sets (assuming Constant Efficiency (85% Ep, 95% Em) & Constant Station Losses & Ancillary Auxiliary Power Consumption)	kWhr	-	-	-	61,289	61,289	-	-	-	-	61,289	-	-	863	1,730	11,970	31,058	14,990	6,726	4,389	4,389	5,307	14,990	4,389	863		
			183,867													101,665												
			100%													55%												

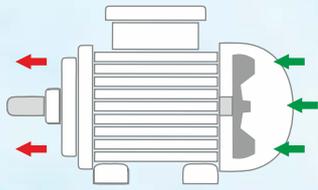


■ Intermittent  
■ 24x7

The use of VFD driven SubCF pumpsets for direct (to network) pumping water supply systems is a promising Opportunity to Save Energy between 33% to 45% (& Regulate Flow too)



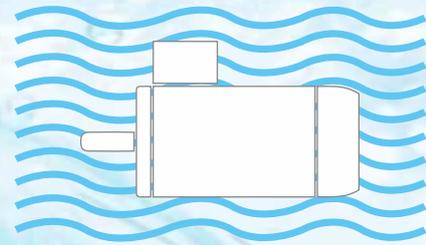
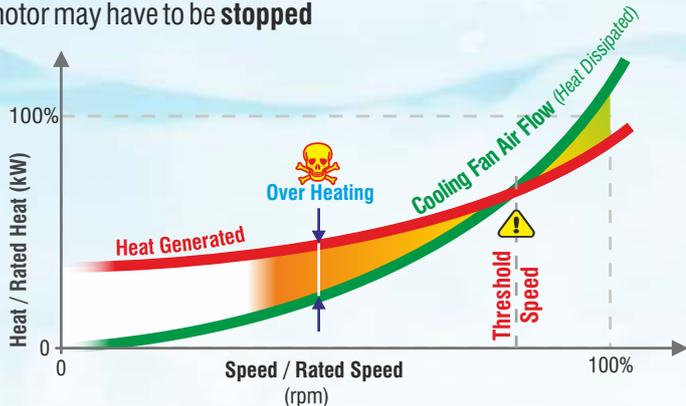
## ⚠️ VFDs & their Side Effects on Motors : Overheating due to Speed Reduction



Totally Enclosed  
**AIR Fan Cooled (TEFC)**  
(Squirrel Cage Induction)  
**motor**  
(Shaft Mounted Fan - IC4A1A1)

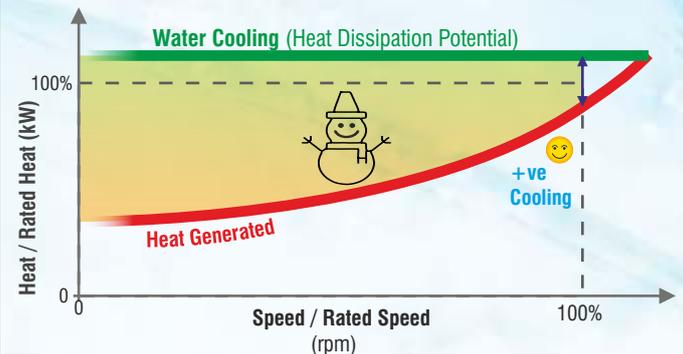
In case of typical Air Cooled (TEFC) motors, Heat Dissipation (Cooling) is by mode of Forced Air blown by a (centrifugal axial) **Fan mounted on the motor shaft itself**. Due to the basic law of centrifugal m/c, the **Fan's Output** (heat dissipation) is proportional to the **cube** of its speed.

When TEFC motor's speed is slowed down, the Cooling Fan also slows down & subsequently the **Cooling Air Flow** (heat dissipation) reduces drastically leading to motor tendency to **overheat** - infact, below a certain speed the motor may have to be **stopped**



Totally Enclosed (IP68) **WATER Cooled (TESWC)**  
(Squirrel Cage Induction) **Submerged motor**  
(Self surface water cooled - IC4A1W0)

Totally Enclosed (IP68) **Water Cooled (TESWC)** (Squirrel Cage Induction) **Submerged** motors are cooled (quenched) by **Surrounding Water** - hence it's cooling effectiveness is not dependent on the speed (or VFD).



Frequency		Hz	50	45	40	35	30
<b>Pump</b>	bkW	kW	112.1	86.9	61.0	50.3	34.3
<b>Motor</b>	<b>Total Heat Generated</b>	kWh	<b>11.39</b>	<b>8.60</b>	<b>6.70</b>	<b>4.98</b>	<b>3.48</b>
<b>TEFC Air Cooled motor</b>	<b>Cooling Fan Flow (Heat Dissipated)</b>	cfm (kWh)	<b>11.75</b>	<b>8.57</b>	<b>6.70</b>	<b>4.97</b>	<b>3.48</b>
	<b>Heat Dissipated / Heat Generated</b>	%	<b>103%</b>	<b>100%</b>	<b>90%</b>	<b>81%</b>	<b>73%</b>
Condition		<b>Cool</b>	<b>Cool</b>	<b>⚠️ Heats up</b>	<b>⚠️ Heats up</b>	<b>⚠️ Heats up</b>	
<b>Submerged Water Cooled motor</b>	<b>Water Cooling (Heat Dissipation Potential)</b>	kWh	<b>11.75</b>	<b>11.75</b>	<b>11.75</b>	<b>11.75</b>	<b>11.75</b>
	<b>Heat Dissipated / Heat Generated</b>	%	<b>103%</b>	<b>137%</b>	<b>175%</b>	<b>236%</b>	<b>337%</b>
Condition		<b>Cool</b>	<b>Cool</b>	<b>Cool</b>	<b>Cool</b>	<b>Cool</b>	

*Due to Constant Cooling by surrounding Water; Submerged motors always operate coolly at any Speed. . .*

## ⚠️ VFDs & their Side Effects on Motors : Bearing Current & Static Charges

Due to the Non Sinusoidal (**PWM** (Pulse Width Modulated)) Power Output of VFDs :

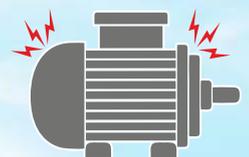
- 1) there is a strong risk (especially in Larger sized motors) of (Bearing Rotor Stator) **Internal Circulating Currents** which can **damage** (especially the Non Drive End) **Bearings &**
- 2) VFD induces **Capacitive Voltage (Static Charge)** to build up which unless grounded can give shocks to Operators.

Aqua's (Larger & all HT) motors are (by default) offered with **Current Insulated NDE** Bearing Housings, reducing the risk of bearing failures. Also due to being Submerged in Water; the Static Charge is automatically & safely dispersed without any special earthing/ additional efforts.

## ⚠️ VFDs & their Side Effects on Motors : Severe Di-Electric Stresses on Motor Insulation

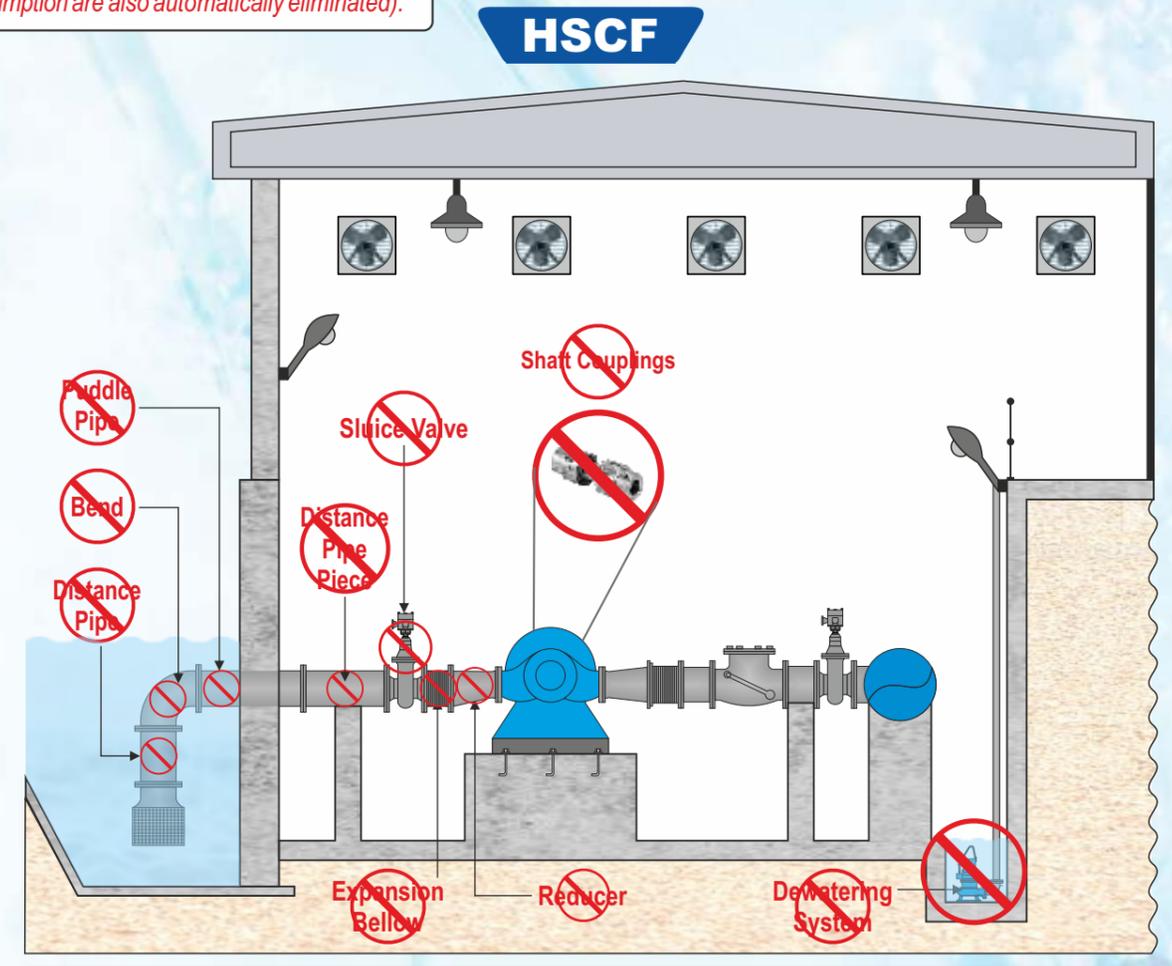
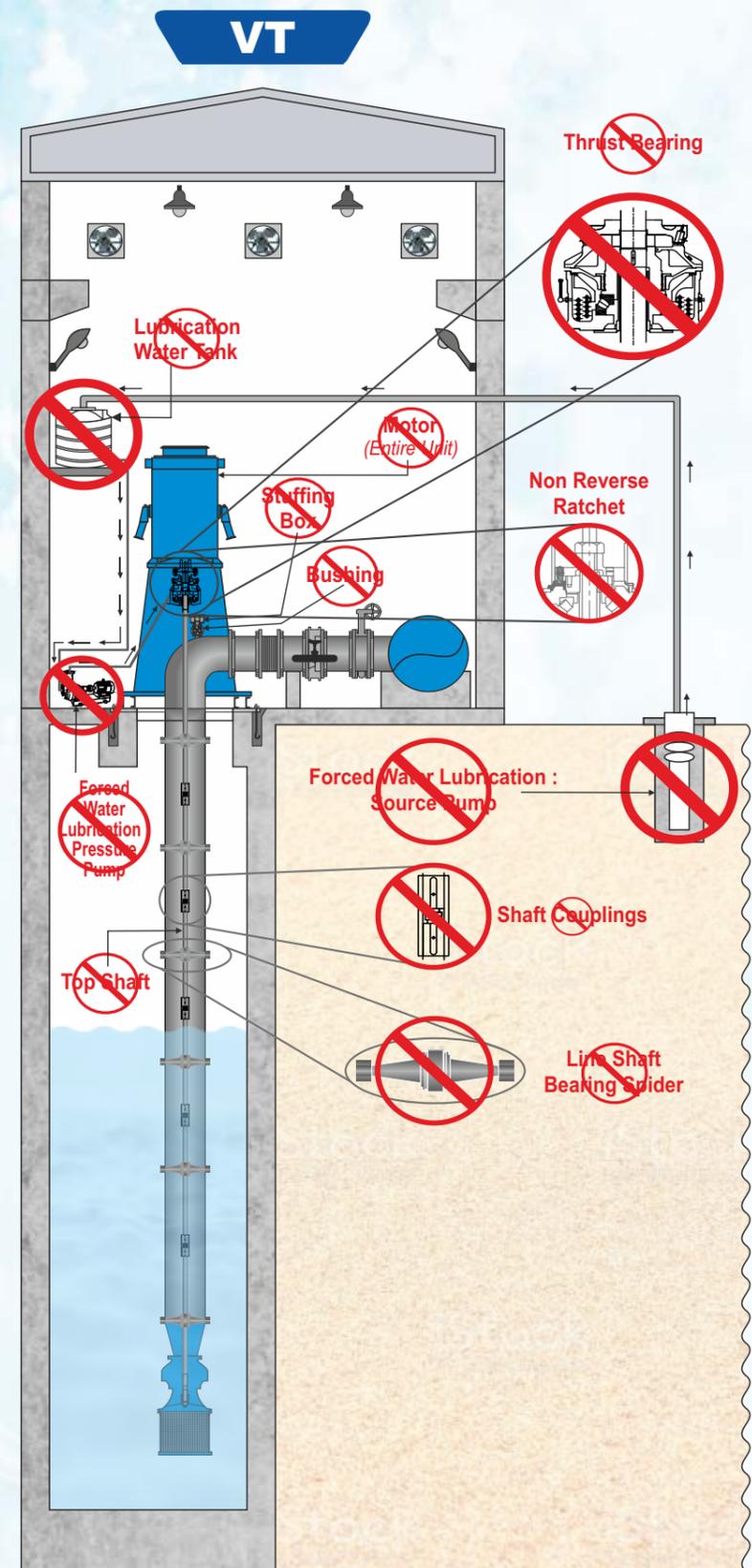
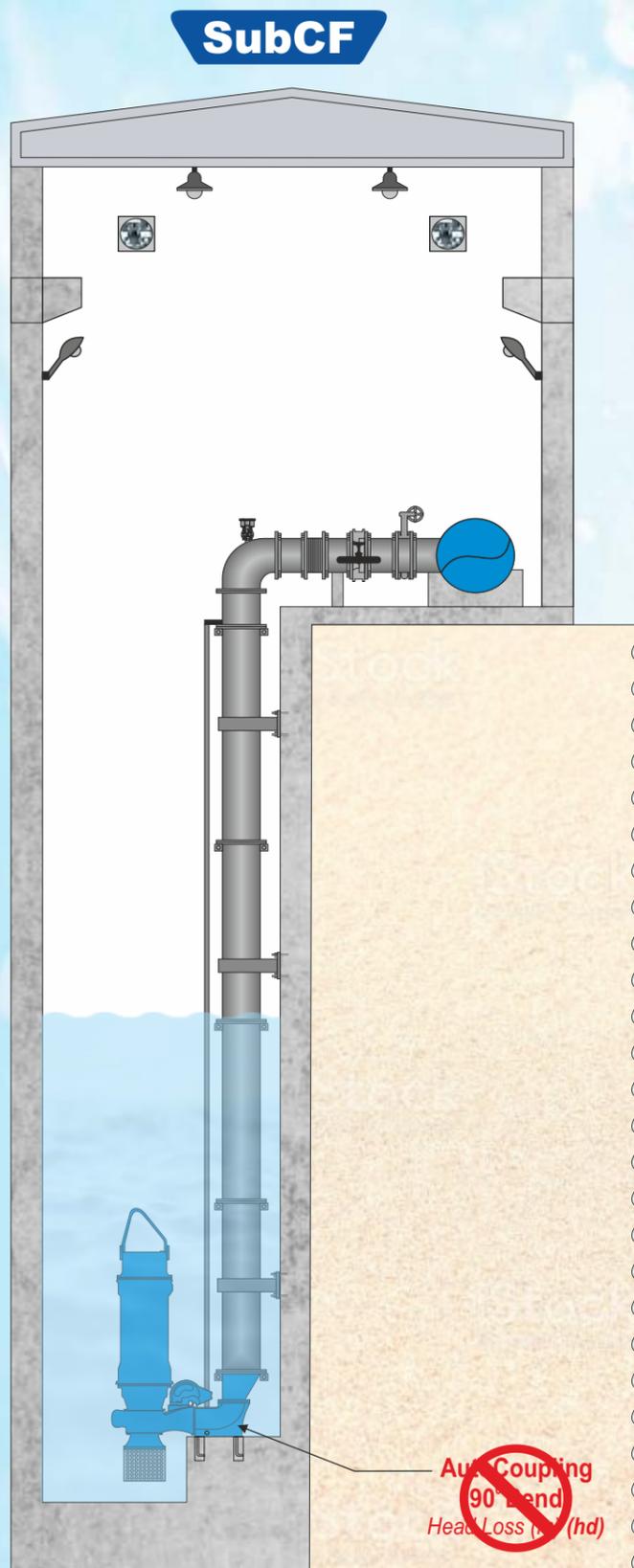
Due to the Non Sinusoidal (**PWM** (Pulse Width Modulated)) Power Output of VFDs; always motor's (stator) Insulation is stressed to higher dielectric levels...!

Aqua's motors use Additional **Mica** (Over & Above Glass Fibre Aramid) & **Dual Vacum Pressure Resin Impregnation (VPI)** to achieve **extremely high Winding Di-Electric strength** enabling it to work satisfactorily for years together even with **VFDs**.



# Pumping Station's Wire to Water (Specific) Power (kW/ML) Consumption

Legend : Ancillaries/Auxiliaries /Parts marked  indicate that they are not required in All types of Pumping Stations (& hence their associated Losses & Energy Consumption are also automatically eliminated).



## Comparison

No.	Description	Unit	SubCF	VT	HSCF
1	<b>Total Capacity</b>	MLD	<b>150</b>		
2	<b>Pumpsets Quantity</b>	Working	<b>4</b>		
		Stand-by	<b>1</b>		
3	<b>Pumpset's Rated</b>	(Effective) Head (h)	<b>27</b>		
4	(Duty Point)	(Effective) Discharge (Q)	<b>473.5</b>		
5	<b>@ Discharge Bend</b>	$m^3/hr$	<b>1704.5</b>		
6	<b>Bowl Assembly Head (H)</b> to be developed by bowl to overcome ALL Head Losses upto Discharge Nozzle	m	<b>31.25</b>	<b>30.63</b>	<b>31.13</b>
7	<b>Bowl Efficiency (<math>\eta_b</math>)</b>	%	<b>84.50</b>	<b>85.00</b>	<b>85.00</b>
8	<b>Pump Efficiency (<math>\eta_p</math>)</b>	%	<b>73.00</b>	<b>73.71</b>	<b>72.99</b>
9	<b>Motor Efficiency (<math>\eta_m</math>)</b>	%	<b>95.4</b>	<b>95.1</b>	<b>95.1</b>
10	<b>Overall (PumpSET) Efficiency (<math>\eta_0</math>)</b>	%	<b>69.64</b>	<b>69.23</b>	<b>69.42</b>
11	<b>TOTAL Electrical Power Consumed</b> (PumpSET + Forced Water Lubrication system)	kW/hr	<b>179.96</b>	<b>183.99</b>	<b>180.55</b>
		kW-hr/Day	15,837	16,192	15,888
12	<b>Total Auxiliary &amp; Ancillary Power Consumption</b> 	Unit Rating kW/Day	43.7	86.3	209.1
13	<b>Pumping Station (P.S.)</b> 	P.S.Total Power Consumed kW/Day	<b>16,278</b>	<b>16,685</b>	<b>16,500</b>
		Specific Power Consumed kW/ML	<b>108.5</b>	<b>111.2</b>	<b>110.0</b>

For Detailed Calculations; please contact [marketing@aquapumps.com](mailto:marketing@aquapumps.com)



Due to Lower Ancillary, Auxiliary Components (& their inherent Lower) Submerged Centrifugal pump based Pumping Stations consume Lesser Energy per Liter of Water (as compared to HSCF &/or VT Pump based Pumping Stations)...!

<b>IE2</b>	High Efficiency	
<b>IE3</b>	Premium Efficiency	

Options of IEC IE2 & IE3 equivalent Motor Efficiencies are also available (at price premium).

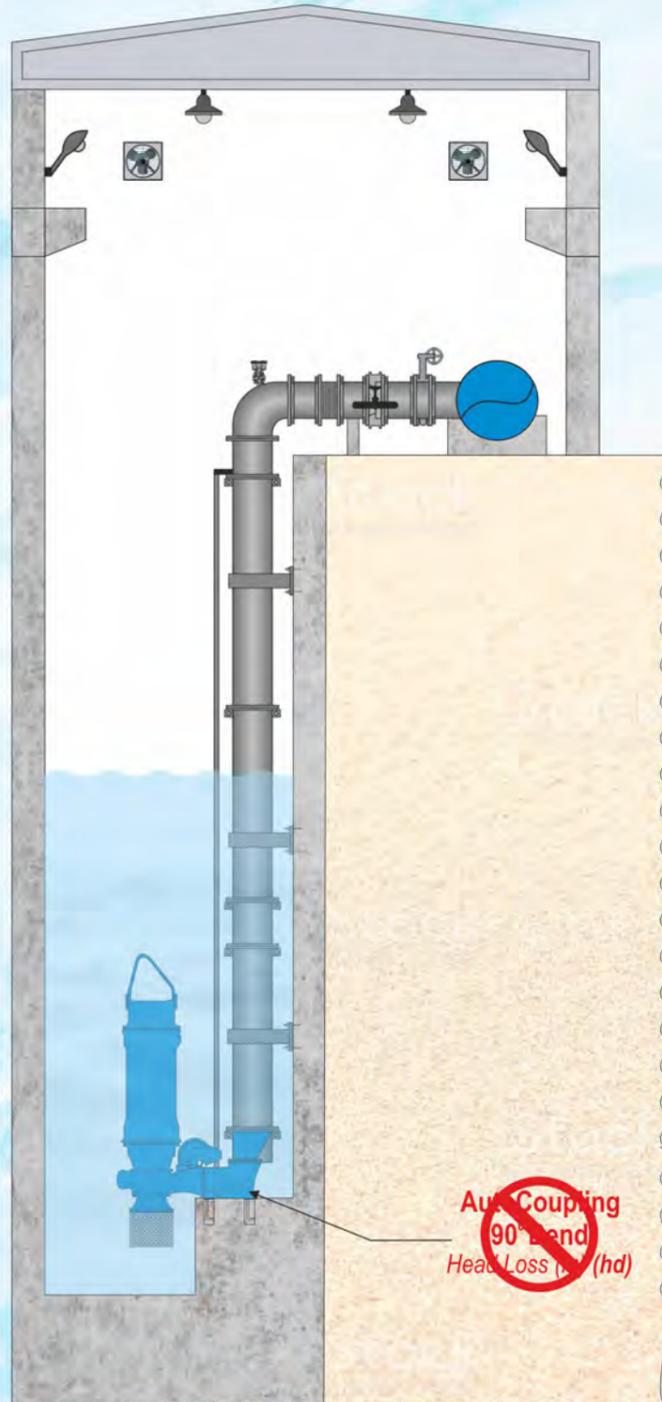


# Zero Ancillary &/or Auxiliary Systems & Fewer Parts

Lead to a Huge Reduction in Requirement of O&M ManPower & Spare Parts

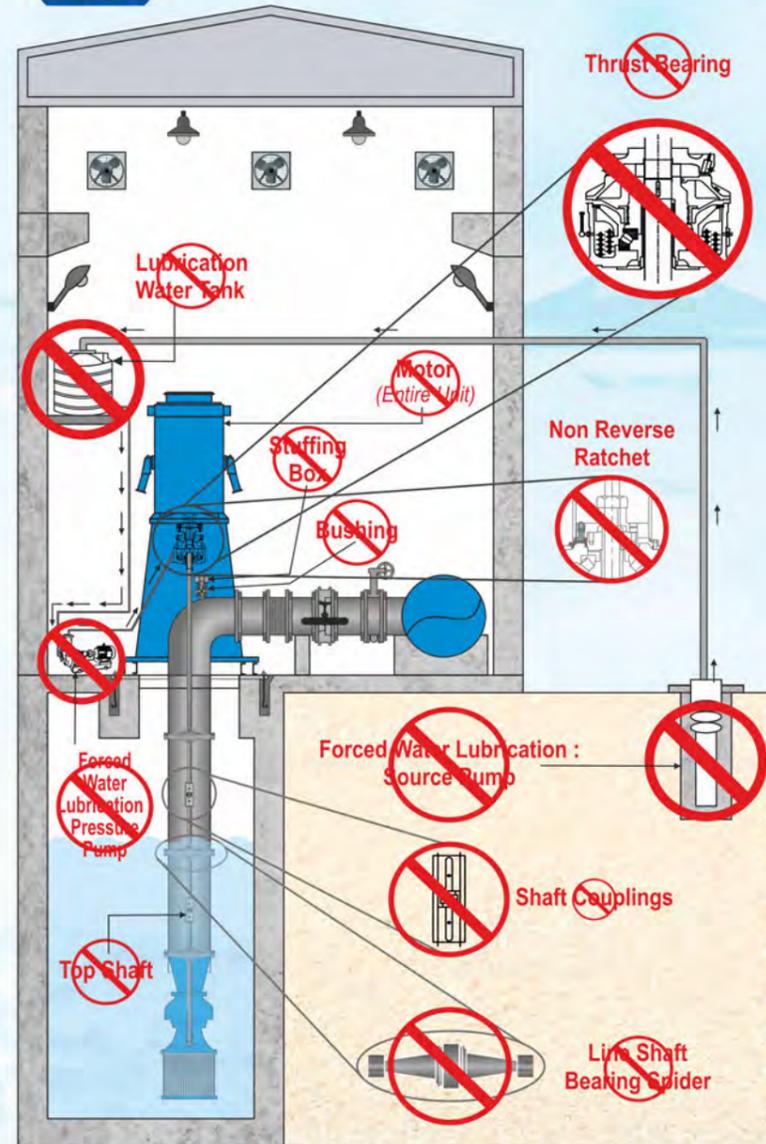


## SubCF



Recommended Types of Spare Parts to be kept in PumpHouse for 2year operation (as per DIN 24296)			
1	Impeller	6	Casing wear ring
2	Rolling Element / Angular contact ball bearing	7	Impeller wear ring
3	Rolling Element / Deep Groove ball bearing	8	Cable Gland
4	O-ring	<b>9</b>	Motor (Rotor, Stator)
5	Mechanical seal (set)		

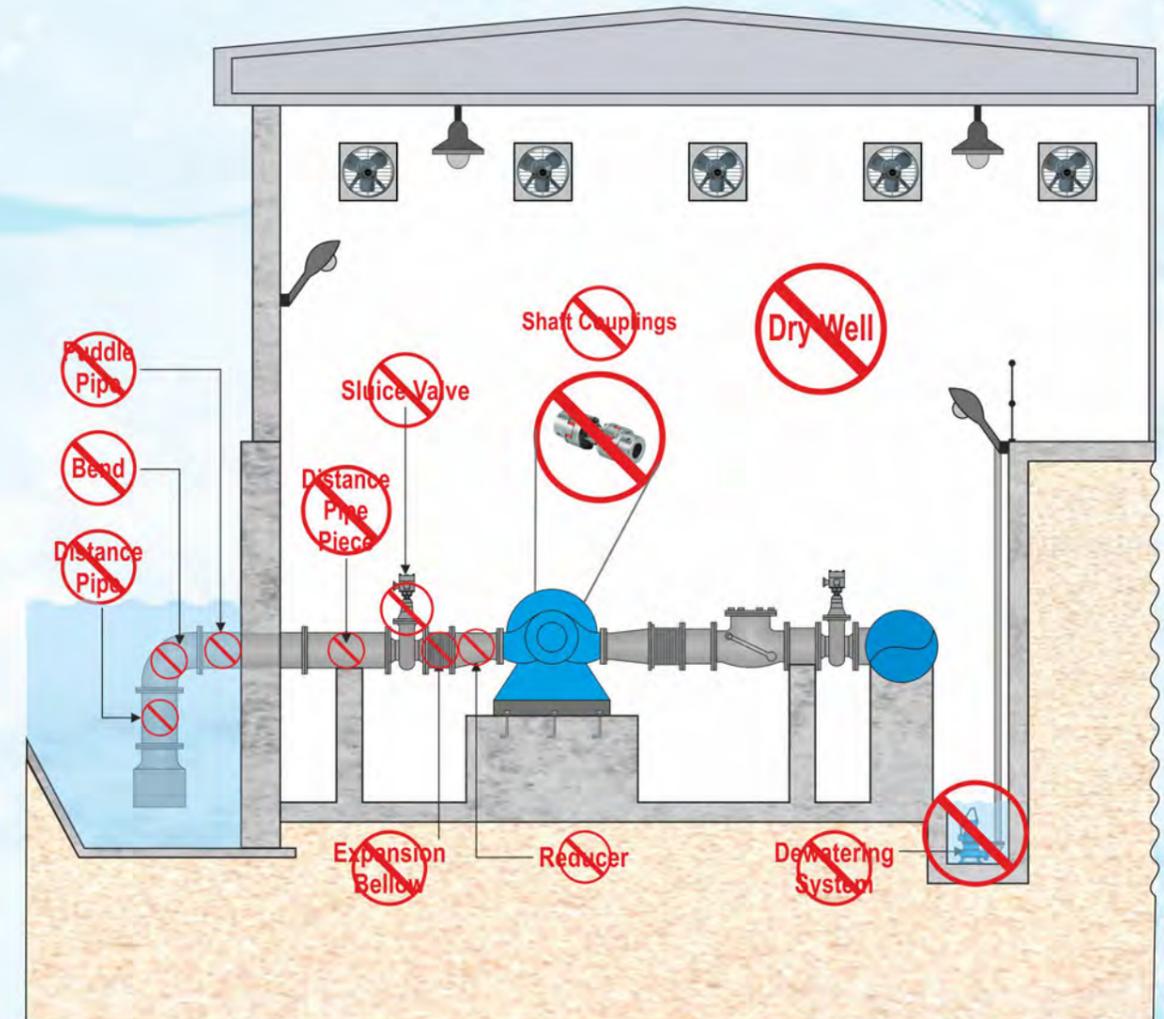
## VT



Recommended Types of Spare Parts to be kept in PumpHouse for 2year operation (as per DIN 24296)			
1	Pump shaft	17	Casing wear ring
2	Intermediate shaft	18	Impeller wear ring
3	Top shaft	19	Stage sleeve
4	Impeller	20	Shaft protecting sleeve
5	Suction stage impeller (if)	21	Centring sleeve/locknut
6	Rotor	22	Bearing sleeve
7	Rolling Element / Angular contact ball bearing	23	Bush (thrust and radial bearing)
8	Rolling Element / Deep Groove ball bearing	24	Interstage bush
9	Bearing carrier	25	Locking sleeve, complete
10	Thrust collar	26	Threaded bush
11	Gasket	27	Bearing bush
12	Joint ring	28	Torque transmitting coupling elements
13	O-ring	29	Conical/threaded coupling
14	Felt ring	30	Nut with two flats
15	Mechanical seal (set)	31	Lock washer
16	Gland packing (set)	<b>32</b>	Motor (Entire Unit)

Legend : Ancillaries/ Auxiliaries / Parts marked indicate that they are not required in All types of Pumping Stations (& hence their associated Operation Hassles, Maintenance Problems & Spare Parts Consumption are also automatically eliminated).

## HSCF

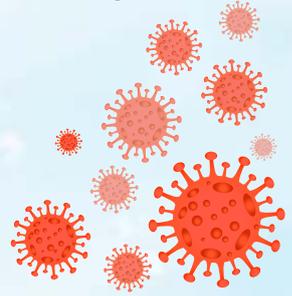


Recommended Types of Spare Parts to be kept in PumpHouse for 2year operation (as per DIN 24296)			
1	Impeller	15	Threaded bush
2	Rolling Element / Angular contact ball bearing	16	Bearing bush
3	Rolling Element / Deep Groove ball bearing	17	Torque transmitting coupling elements
4	Gasket	18	Lock washer
5	Joint ring	19	Grooved pin
6	O-ring	20	Fastening elements for the shaft
7	Mechanical seal (set)	21	Stuffing Box insert
8	Gland packing (set)	22	Gland follower
9	Casing wear ring	23	Neck ring
10	Impeller wear ring	24	Lantern ring
11	Shaft protecting sleeve	25	Spacer sleeve
12	Bearing sleeve	26	Seal cover
13	Bush (thrust and radial bearing)	<b>27</b>	Motor (Entire Unit)
14	Locking sleeve, complete		

**SubCF pumpsets require just 9 types of Spare Parts (as compared to 32 & 27 for VT & HSCF pumps respectively) .....**

# Lower Maintenance & Reduced O&M Costs Aqua's Submerged pumpsets

don't require Periodic Maintenance & Minimal Operational ManPower so that you can...

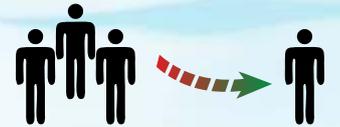


## Ultra Low ManPower Requirement



Requires No Special Pre – Post / Ancillary-Auxillary Operations; like :

- Suction Priming during Pump StartUp,
- Valve Opening- Closing during pump Starting- Stopping
- Operating & Maintaining the Forced Water Lubrication systems operation,
- Operating the Dewatering Pump to water leakage from Seepage / Gland Piping Leakage, etc.



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



Requires No Periodic Consumables; like :

- Oil,
- Grease,
- Gland Rope Packing,
- Coupling Rubber/ Pins,
- Sleeves, etc



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

## Intelligent InBuilt Monitoring



Easy Monitoring (& Remote Control<sup>#</sup>) 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)<sup>#</sup>.
- **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)<sup>#</sup>.

<sup>#</sup>requires additional communication hardware

## Long Life, Maintenance Free



### Mechanical Seals

Two, Independent; Seals rated for **L<sub>10H</sub>** life in excess of **50,000** hours &/or **5** years.



### Bearings

**Heavy duty, Anti Friction,** bearings are

designed for **L<sub>10H</sub>** life in excess of **1,00,000** hours &/or **10** years.



Tribologically Optimized **Bearing** Components for Bullet Proof Reliability



Vacuum Pressure Impregnation Treatment (**VPI**) for Superb VFD Compatibility



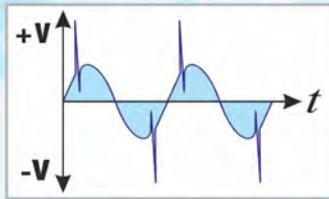
Thanks to generous Reserve Margins & Optimized Design; Aqua's Motors keep coolly working even in scorching summers

# Lower Maintenance & Reduced O&M Costs



VFD

Fully Compatible



Tolerates Power Spikes & Surges



Tolerates Wide Voltage Variation

No need to Periodically...



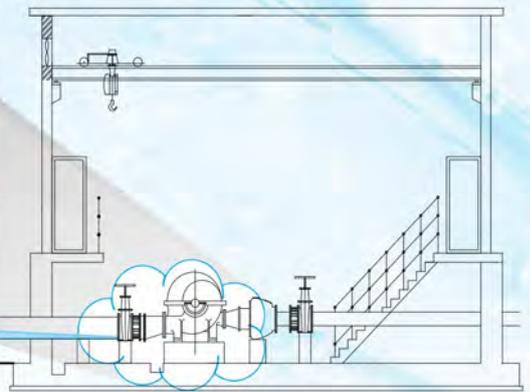
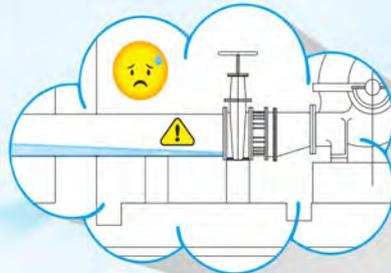
...Check /  
Align Shaft  
Coupling



...Check /  
Change Gland  
Packing



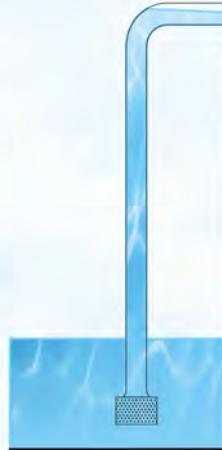
...ReGrease /  
Refill  
Oil



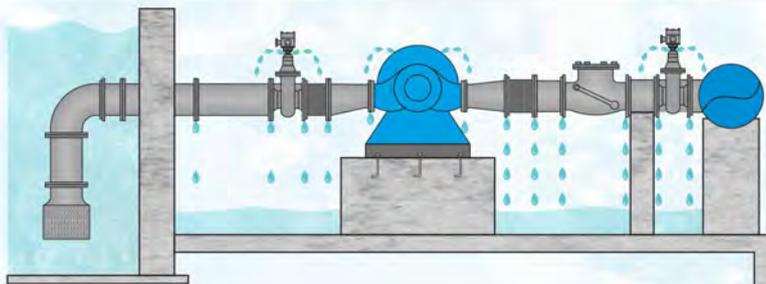
No need of Valve Opening / Closing  
(during Pumpset Start / Stop)



No Suction Piping &  
it's associated Friction Head losses



No need of ManPower for Suction Priming



No Nuisance Leakage (from Piping Flanges  
&/or Pump &/or Valve Glands) to be Regularly  
DeWatered



Minimal Noise,  
Vibration & Heat Emission



Low Energy Cost

Due to Elimination of Suction Losses, Coupling Losses & Auxillaries; Wire to Water Pumping Station Efficiency is slightly better than HSCF / VT based Pumping Station.



Low Life Cycle Costs (LCC)

Zero Consumables, Minimal Maintenance Spares & Good Efficiency.



User Friendly

- No risk of cavitations.
- No damage due to Flood or Rains.



Aqua Machineries Private Limited

[www.aquapumps.com](http://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.

[marketing@aquapumps.com](mailto:marketing@aquapumps.com)