ISO 9001 REGISTERED
MGMT. SYS.
RvA C 024
DNV Certification B. V., The Netherlands

ADS – Aqua Dredging Submersible pumpsets
ASS – Aqua Sludge & Slurry Submersible pumpsets

Reliable & Economic Import Substitution pumps for Dredging, Sludge & Slurry

ADS : Rugged, non clog submersible pumpset with integral Agitator for Hydraulic Dredging

ASS : Rugged, non clog, submersible portable pumpset for pumping of heavily concentrated slurries &/or highly viscous sludge

Applications

Marine : Capital / Maintenance Dredging at Docks, Harbours, Jetties, Channels, Tidal gates, Estuaries, etc. Dewatering of Dry Docks, etc.

Water bodies : Maintenance Dredging to increase /restore capacity of Dams, Check dams, Weirs, Rivers, Lakes, Reservoirs. Desilting raw water intakes of pumps/turbines, etc.

Construction : Dewatering cum dredging of ballast from Coffer Dams/Caissons prior to concreting; to excavate or mine aggregate, gravel or sand; Land reclamation; to bury or retrieve channels for Pipeline /Cable laying; drainage of seepage/leakage water from Tunnels; etc

Mining : Drainage, fines reclamation, Lagoon cleanup, tailings removal, etc

Industry : To pump Abrasive slurries / Viscous sludges in Thermal Power stations, Stone processing units, Sewage / Effluent treatment plants, Steel plants, etc

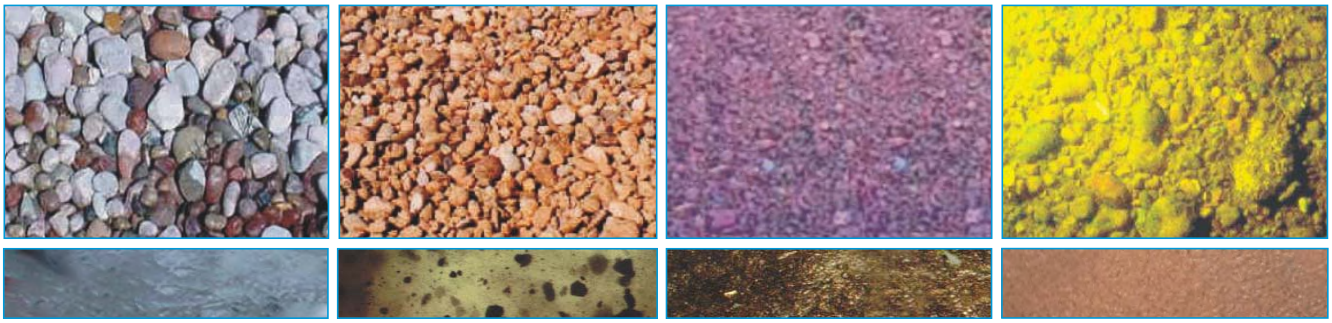
These pumpsets represent the most cost effective solution of transporting solids (firstly by suspending solids in fluid & then pumping them through pipe lines to desired location). As compared to conventional non submersible pumps (which *suck* liquid via a suction pipe thereby failing to lift the denser solids), these submersible pumps (located in the solids) forcefully *push* solids resulting in higher solid discharge.

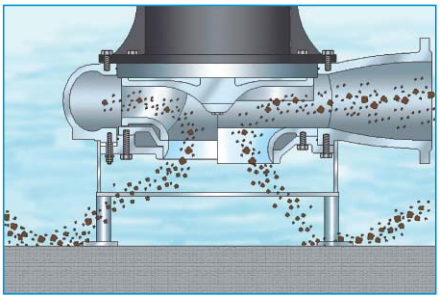
ADS pumps offer a substantially cheaper alternative for many light to medium duty dredging applications by obviating the need of full fledged dredgers.

Advantages

- Approved by Indian Defence Ministry
- Available upto 450hp & 24" discharge size
- Flooded suction eliminates NPSH problems
- Zero Maintenance & Non clogging
- Heavy duty wear resistant design
- Quick & easy installation in any direction
- Compact, robust &versatile
- Dewaters as well as Desilts/Dredges
- Prevents sedimentation
- Higher productivity & Low Power Consumption

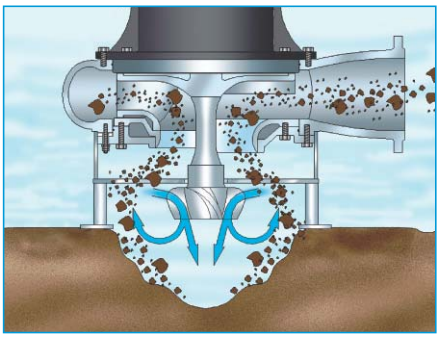
Operational Mechanics





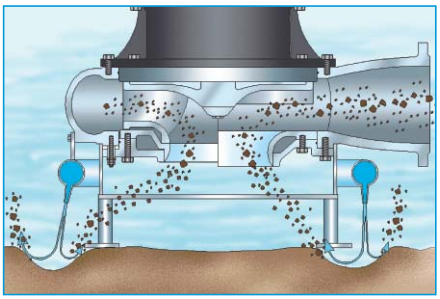
ASS (Aqua Sludge & Slurry Submersible Pumpset)

The wide passage & liberal clearance hydraulics ensure non clog & wear resistant pumpage of slurries with fine grain solids (primary treated effluent, fly ash settling tank, stone processing units, etc)



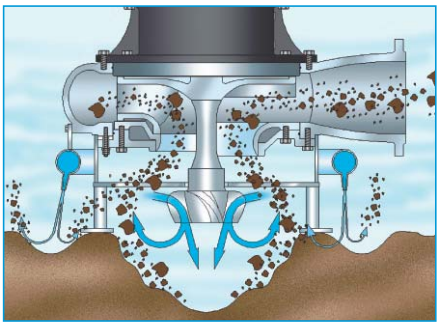
ADS (Aqua Dredging Submersible Pumpset)

Built in agitator forces high-energy vortices onto the bottom, stirring & churning up sedimented material below the pump's suction. This effect in tandem with the resultant pressure differential between pump suction versus down pressure of agitator, thoroughly mixes & homogenizes the stirred up material, which is then sucked by the pump. Especially useful for bulk pumpage of slurries with fast settling fine to coarse solids (dredging,etc)



ASS with Jetting ring (Aqua Sludge & Slurry Submersible Pumpset)

The optional jetting ring has multiple nozzles which spray pressurized water onto the bottom thereby suspending settled solids. Especially useful for pumpage of slurries with fast settling, fine grain solids (primary treated effluent, fly ash settling tank, stone processing units,)



ADS with Jetting Ring (Aqua Dredging Submersible Pumpset)

Built in agitator & optional Jetting ring working in tandem for bulk pumpage of medium & coarse solids in thick & viscous sludge

ASS with Jetting ring (Aqua Sludge & Slurry Submersible Pumpset)

The multiple nozzles of the optional jetting ring inject pressurized water into the pasty sludge thereby thinning it down to a pumpable viscosity.

Especially useful for pumpage of very viscous sludge (Sewage, effluent sludge, etc)

Construction of a typical ADS pump - Rugged Design to the Core !

(ASS pumps are vastly similar to ADS, a major exception being that of Agitator)

Rugged Motor : Heavy duty, Class "F" insulated (withstands upto 155ºC max winding temp, Class "H" optionally available to withstand 180 ºC). High starting torque & generous service factor (1.25 for ASS & 1.7 for ADS) allows stall free Star Delta/ATS starting even if pump is fully buried under sedimented solids. Adapts well to real life Indian supply conditions (poor & unbalanced voltage) better than imported counterparts.

Shaft : Rigid & deflection proof. Oversized to take shock loads from rocks,etc. Corrosion resistant stainless steel, has no wearing sleeves for a maintenance free long life

Motor cooling : By media submergence. For amphibious applications (where submergence may or may not be possible) an optional cooling jacket can be provided.

Oil Chamber : Lubricates & cools both the mechanical seals ensuring that seals can endure temporary dry running. Also acts as a collection sump for leakage between the primary seal & secondary seal

Mechanical Seals : Two independent, bi directional rotation seals ensure good sealing. The primary seal is of Silicon Carbide faces for superb erosion resistance in abrasive media

Stuffing box : Hybrid, multi stage design. The synergistic effect of multiple mechanisms of the stuffing box maintains low pressure, minimum swirl & very low solids near the seal thereby minimizing erosive seal wear.

Strainer : (For ADS only) - Larger solids which could foul the pump-pipe system are screened out by the strainer screen. Long service life due to thick walled SS construction

Stand : Large base Stainless Steel Stand ensures secure topple free base even on unlevelled fluid beds

Fasteners : In corrosion resistant materials for long service life

Comprehensive Cable Gland : Four stage sealing ensures pressure resistant moisture proof sealing even in case of protective sheath puncture, ensuring moisture free motor environment

Reverse Rotation Protection : (Optional) Electromechanical device senses wrong rotation direction & cuts off power supply

Motor protection : Thermal overload protection protects the windings against burn out by cutting off the supply in case of overheating

Long bearing life : Maintenance free, greased for life, heavy duty ball/roller bearings with L10 & actual field working lives exceeding 1,00,000 hours. Apart from ideal lubrication conditions (moisture free environment thanks to superior shaft sealing), the use of 3 or 4 oversized bearings (instead of 3 to 5 undersized bearings) eliminates redundancy of loading & cross location, hence there is no chance of premature failure

Seal Condition Monitoring : (Optional) Moisture leaked into the oil chamber from the primary seal is sensed & displayed in the control panel. Back up seal ensures that the pump can still be run for some time before the primary seal is serviced

Wear resistant Pump Casing : Long life due to the CAD designed smooth contoured geometry thereby reducing internal eddies & erosive wear. Extra thick sections at known points of wear. Optional coatings available to enhance wear against corrosion/erosion.

Wear Plates : Abrasion resistant, Generous thickness for extra life in erosive media. Replaceable.

Agitator : (Only in ADS) Abrasion resistant, heavy duty CAD designed agitator forces a stream of water to the bottom thereby stirring up the sedimented solids into suspension, which are then sucked up by the pump. Agitator helps pump upto 80% solids by weight. Is fool proofed against opening up in case of reverse motor rotation

Impeller : Non Clog, handles solid upto 125mm. CAD design ensures high efficiency, minimum eddy losses & thus low erosion. Design (Enclosed / Semi Open or Vortex) & material selected to be compatible with hardness, sedimentation rate, solid size, specific gravity & corrosiveness of the media. Keyed onto shaft. No close running hydraulic joints plus a high torque motor mean no clogging even after extended periods of stoppage under silt.

Typical Applications

Dewatering & Desilting of Dry Docks

The ADS pumps can start up even under severe sedimentation!

Dry docks need to dewatered before maintenance/repairs on vessels can be started. The vessel floats in with brackish water having a very high content of silt, sand, shells & weeds. Metallic swarf from welding, gas cutting, etc processes is also added to this water.

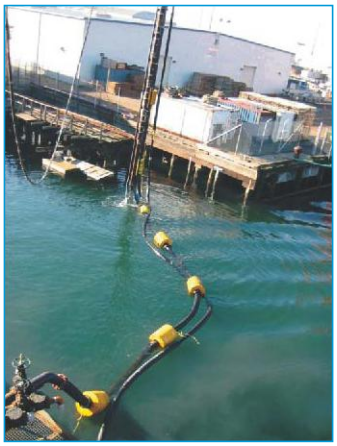
The ability of ADS/ASS pumps to startup with severe sedimentations of abrasive silt, sand & swarf; make them ideally suited to these conditions. They dewater as well as desilt thereby obviating the need for secondary desilting.

Typically placed in the collection pit they are also run at frequent intervals to handle leakage from the gates.

Maintenance Dredging of Marine Terminals

Marine terminals require to be periodically dredged to restore their draft, failing which the capacity of the vessels which can be docked goes on reducing.

Non cohesive & mildly compacted silt, sand & gravel is dredged effectively by ADS pumps without the aid of jets/cutterheads (plain suction dredging). The inbuilt Agitator (with or without Jetting Ring) pumps out the the sedimented solids. This can either be side cast / piled up onboard hopper or pumped away via floating pipe line to a dump site a few kilometers away.

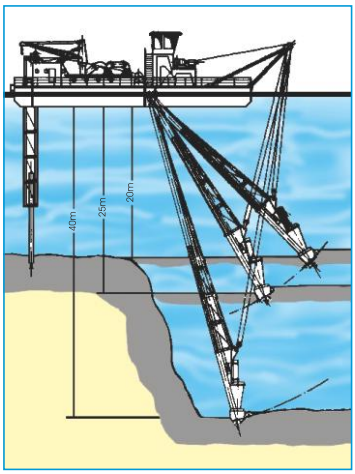


Plain Suction Maintenance Dredging with ADS pump !

ADS pump is suspended directly from crane on self propelled & powered barge. The inbuilt agitator effectively dredges out sand, silt & shells without the help of any cutter. The ballast is transported via floating HDPE pipeline to a dump site a few kilometers away without any booster pump thanks to the high velocity head & pressure generated by the ADS pump.

Typical Applications
Capital Dredging

Compared to mechanical dredging (clam shell/buckhoe,etc) hydraulic dredging with ASS pumps is cheaper, silent, easier & has higher production rates. To excavate sedimented shells, silt, sand & gravel, cutterheads (rotary or auger) are used. ASS pump is mounted just behind the cutterhead. The excavated ballast is powerfully sucked up by ASS pump with minimum spillover due to high inlet velocity & proximity to cutterhead



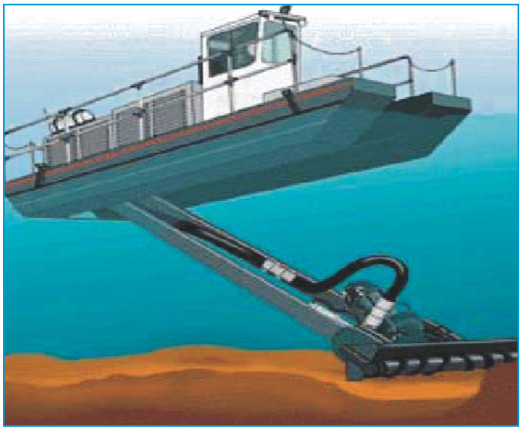
Solids respond to velocity flow & not to pressure. Thus higher the suction velocity (momentum), the higher the concentration / size of solids that pump sucks.

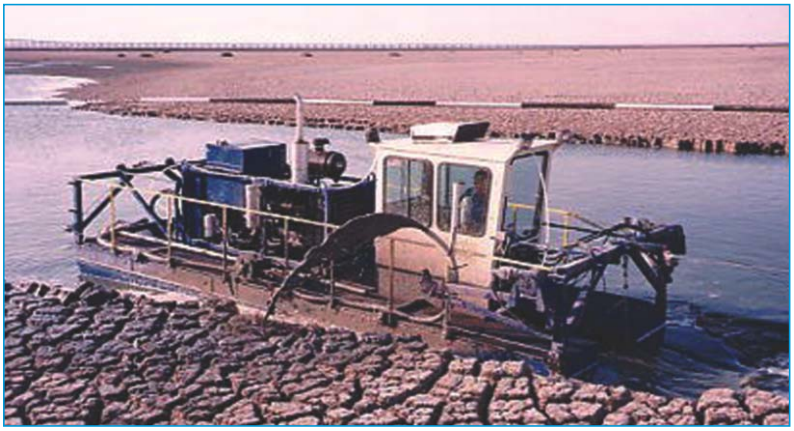
Non submersible hull mounted pumps suck liquid-solid admixture through a long suction tube & thus operate at lower velocities. Since the impeller (main pump body) is located far from the cutterhead/dustpan, solids have to travel a considerable distance before reaching the impeller.

ASS & ADS pumps operate at much higher suction velocities & are placed very near to the cutterhead. Thus they can pump higher concentration / size of solids & operate at higher discharge pressure & velocities. This helps in dredging to deeper levels, pumping to longer distances & higher solid pickup.

For those who would still prefer non submersible hull mounted pump & yet want to dredge deeper , ASS pumps can be used as feeder/booster pumps installed in the suction tube just behind the cutterhead.

Aqua also offers its AMSM & ASM series of submersible motors for direct drive of cutter heads, etc





Feature	Jet Eductors	Conventional pumps	ADS pumps
Distance between Pump & cutterhead / auger / dustpan	-	Far away	Near
Solid Concentration pumped	Medium	Poor	High
Ability to pump out larger sized solids	Poor	Medium	Good
Fuel to Gravel efficiency	low	Medium	High
Momentum of Solids at Discharge	Medium		High
Dredging Depth permissible	Medium	Shallow	Deep
System Weight & Space required	Heavy & Massive		Light & Compact
Clean Water Source & Associated machinery	Required	Not Required	
Clogging	Frequent	Medium	Rare

Typical Applications

Maintenance Dredging of Water Bodies

Reduced capacity overtopping, flooding, induced seismicity & environmental concerns are among the prime problems caused by siltation, which largely determines the useful lifetime of a water resource project (hydropower station, check dams, reservoirs, etc). This can be corrected by periodic desilting/dredging.

River bed dredging curtails overflow when water is released from the dam. The dredged soil can be deposited on the sides to enhance Levi height, thus creating ever greater capacity to hold the released water without flooding.

Despite the long term macro economic benefits, dredging is not carried out in a major way due to prohibitive costs of conventional dredging.

Now ADS pumps offer a substantially cost economic option of dredging by doing away with the need of expensive full fledged dredgers. Simple & effective " Dredgers" can be made with ADS pumps, like the one shown on the right. ADS pumps can be suspended from overhead chain pulley block aboard a simple structure comprising floating pontoons & overhead gantry. Delivery pipes dispose the pumped silt at a dumping site. Once sufficient desilting is done at a spot the "dredger" is tugged to newer spots

Dredging for Construction

Jetty Construction

Plain Suction dredging with ADS pump : The pump is suspended from crane arm & dredged ballast is pumped via pipeline to a dump site a few kilometers away

Pipeline / Cable laying

ADS pumps help in burying or retrieving under water pipe lines for oil, gas, waste disposal, etc

Typical Applications

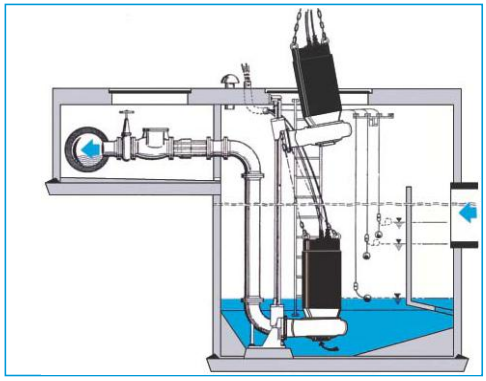
Dewatering cum Dredging for Construction

Dewatering & dredging of coffer dams/ caissons ballast

Construction in the vicinity of water bodies invariably leads to water, silt & gravel seepage. Caissons /coffer dams have to be dewatered & dredged before concreting. ADS pumps are fully portable, can be quickly commissioned & dredge out the ballast without much fuss.

Industry

ADS / ASS pumps offer sedimentation free pumpage of fly ash, scrubber waste, in Thermal Power Stations & process water in Stone processing units, Quarries, Steel plants, etc with minimum wear & zero maintenance. Sewage/Effluent treatment plants benefit from the viscous sludge handling ability especially with the allied use of jetting ring. These pumps start up even under full sedimentation & pump out substantially higher concentrations of silt/sludge than non submersible pumps, thereby reducing sedimentation at sump bottom. Additional pluses include minimal piping system, flexibility & no pumphouse requirement.



For Permanent Installations

Aqua's unique Auto Coupling System enables coupling / discoupling ASS/ADS pump from the piping system by simply lowering/pulling the pump ! Ideal for wet pit arrangement as there is no need to enter into the sump at all!

Options

Jetting Ring	Suction Shredder for fibrous solids
Deeper Submergence models	Higher ambient temperature rating models
Inverter duty motors	Flame proof motors for Mines
Reverse Rotation Protection	Special Anti Corrosive / Erosive coatings
Seal Condition Monitoring	Special voltage & frequency
Aqua s AMS & AMSM motors for submersible applications (prime mover for cutter heads, etc)	

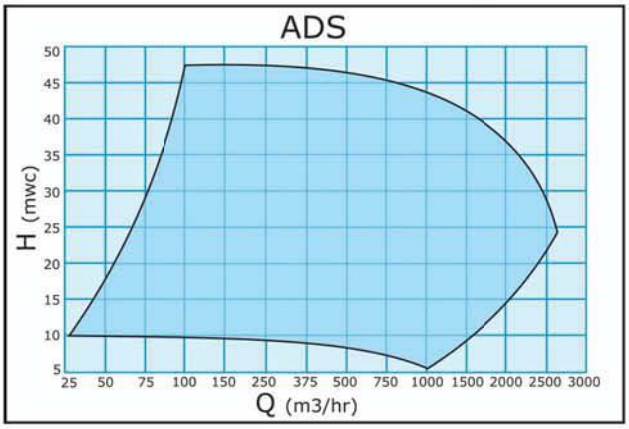
Technical Specifications

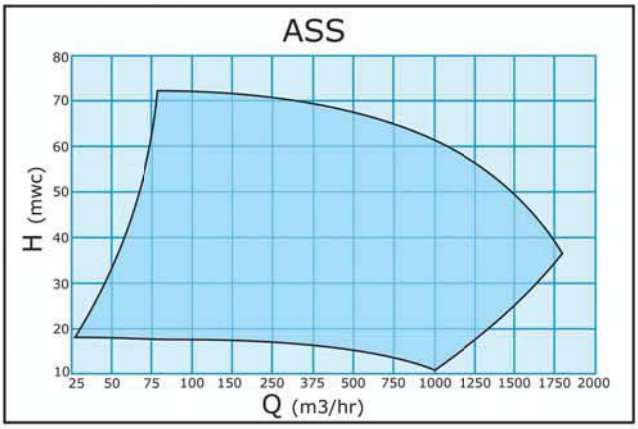
Pump Discharge sizes		DN 50 to 600 mm
Operating Temperature		Standard : upto 50 degree
Depth of Submergence		Standard : 15m (deeper submergence models available)
Motor	**Ratings**	5 to 450 hp
	Speeds	1500, 1000, 750 rpm (synchronous)
	Duty & Enclosure	S1 & IP68
	Supply	3Ø, 415V @ 50Hz (options available)
	Thermal Protection	By Thermistors
	Starting	DOL / Star Delta / ATS / Soft Starter

Materials of Construction

	Option 1	**Option 2**	**Option 3**	**Option 4**	**Option 5**
Pump Casing & Suction Cover	Ductile Cast Iron	Wear Resistant High Chrome Iron	Ni Resist	Austenitic Manganese Steel	Austenitic Stainless Steel
Impeller, Agitator & Wear Plates			Ni Hard	Abrasion resistant, Cr Mo White Iron	Duplex Stainless Steel
Motor Casing, Cable Terminal Chamber,	Grey Cast Iron	Ductile Cast Iron	Austenitic Stainless Steel	NAB	-
Oil Chamber (stuffing box)	Grey / Ductile Cast Iron	Wear Resistant High Chrome Iron / Ni Resist			Duplex Stainless Steel
Shaft	SS 410	SS 431	SS 420	SS 316	-
Cooling Jacket	MS Galvanized	SS 202	NAB		-
Fasteners	SS 304	GM	Naval Brass	AB	SS 316
Elastomers	Nitrile	Neoprene	Viton/Kalrez	EPDM	Silicone
Mechanical Seal (primary)	Tungsten Carbide v/s Tungsten Carbide	Silicon Carbide v/s Silicon Carbide	-	-	-
Mechanical Seal (secondary)	Cast Chrome Moly Steel v/s Resin Impregnated Carbon	Tungsten Carbide v/s Antimony Impregnated Carbon	Silicon Carbide v/s Antimony Impregnated Carbon	-	-
Other materials to suit exacting requirements available on request material pairing depends upon the exact media & duty					

Performance Range





Due to constant R&D we reserve the right to change any specifications without prior notice