OPERATION & MAINTENANCE MANUAL

FOR AES PACKAGED SEWAGE PUMPING STATION

CONTRACTOR:

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PREFACE

This Operating & Maintenance Manual is divided into various sections, each section providing information for the equipment supplied for this contract. Each section is prefaced by a detailed contents list to assist the reader in locating the required information.

WARNING: THIS IS GIVEN TO DENOTE DANGER TO PERSONNEL WHERE FAILURE TO OBSERVE THE INSTRUCTIONS COULD RESULT IN INJURY OR DEATH.

CAUTION: THIS IS GIVEN WHERE FAILURE TO OBSERVE THE INSTRUCTIONS COULD RESULT IN DAMAGE TO EQUIPMENT OR POLLUTION OF A SYSTEM BUT NOT A DANGER TO PERSONNEL

Note: This is given as necessary to add emphasis.

IMPORTANT NOTE

The information contained within this manual is intended for use by personnel suitably trained and adequately qualified in the technologies applied to the equipment supplied.

Whilst every care has been taken during the compilation of this manual to ensure that the information provided is correct, no liability can be accepted by Automated Environmental Systems LLP or any of its employees for loss, damage or injury caused by any errors in, or omissions from, the information given.

HEALTH & SAFETY

IT IS ESSENTIAL THAT ONLY THOSE WHO ARE QUALIFIED AND AUTHORISED TO DO SO ARE ALLOWED TO WORK ON THIS EQUIPMENT.

WARNING: PERSONNEL SHOULD ALWAYS ENSURE THAT ADEQUATE ELECTRICAL AND MECHANICAL ISOLATIONS ARE APPLIED WHEN WORKING ON THE PLANT

IT SHOULD BE NOTED THAT THE PLANT CAN START AUTOMATICALLY AND WITHOUT WARNING.
WARNING!
Your Sewage Pumping Station is designed to handle effluent from a single domestic property. However, the pumps may struggle to cope with sanitary towels and it is advisable to stop these from entering the pump station!

The following items must be kept out of the pump chamber:
1. Baby Wipes.
2. Nappies.
3. Toilet Cleaning Wipes.

THESE PRODUCTS WILL BLOCK THE PUMP, ANY CALL OUT TO UNBLOCK YOUR PUMPS WILL BE CHARGEABLE AND NOT COVERED UNDER WARRANTY!
VERTICAL CHAMBER INSTALLATION GUIDE

As with all site work the dangers of working with water and electricity pose severe threats to health if obvious and fundamental precautions are not taken. Therefore if you are in any doubt to any of the following, please do not hesitate to contact us.

All site work should be undertaken by qualified personnel only.

TANK INSTALLATION

1) Select a suitable location for the tank. This will be normally at ground level lower than the properties being drained and allow for the falls in site drainage.

2) Check that no other structure – or special access – is required over the selected spot. Provision can always be made, if necessary, to place the tank on a roadway, provided that protective backfill is placed around it and a suitable heavy-duty manhole cover is used over the opening.

3) Check that no underground cable, pipe or service duct, lies underneath.

4) Excavate the minimum opening in the ground to receive the tank. If a machine is used to remove the spoil, the sides of the excavation should be battened for stability and a sump pump left in one corner for dewatering purposes.

5) The excavation needs to be at most 500mm deeper than the overall tank depth or length. If it is dug by hand, the sides will require shoring up for safety, to prevent earth slippage.

6) A dewatering pump MUST be used to control any ground water present until the concrete backfill is set.

7) Some clean hardcore should be placed and consolidated in the base of the excavation. Usually this will need to be about 200mm thick.

8) Place in position the mass concrete base, minimum thickness 200mm of CP 20Kn/mm² strength.

9) Lower the tank onto the damp concrete allowing the base flange, to settle in, ensuring that the inlet and outlet pipes are correctly aligned. Note: In certain circumstances the Guiderails can be supplied loose for transport (e.g. when turret extensions are shipped detached). You must ensure that the guiderail poles are fitted to the Guiderail Duck Foot at the bottom of the tank and attached to the upper Guiderail Bracket at the top of the access before concreting in the tank.

10) Place mass of concrete, a maximum of 1000mm high again ensuring water level is 50mm below concrete backfill level, repeating process once more, being careful not to damage the tank or tank inlet/outlet pipes. (The concrete backfill is designed to protect the chamber from external ground and water pressure. Therefore we cannot accept responsibility for damage to the chamber caused by ground or water pressure after installation.)

11) Place further mass concrete, as before, 1000mm high again ensuring water level is 50mm below concrete backfill level, repeating process once more, being careful not to damage the tank or tank inlet/outlet pipes.

12) Connect up the site pipework to the inlet and outlet of the tank, and draw the pump and float cables through the conduit to the control panel.

13) Backfill around the tank with more concrete, remembering to fill the tank with clean water to overcome the effect of buoyancy.

14) Finish off the surface of the concrete at the required level, depending on the final ground cover required i.e. topsoil, tarmac, gravel etc (see sketch figures 1 and 2).

IMPORTANT NOTES – PLEASE READ

All ground conditions should be checked prior to commencement of the excavations to access the suitability of the proposed installation.

Tank water should never exceed 300mm past backfill concrete level.

The inlet(s) and cable duct are to be cut on site to your own specifications, and should be properly sealed with silicon or rubber grommets.

It is important that once the tank is installed with the inlet / outlet connections made that the drainage system is flushed through and all sand / debris is removed from the chamber prior to commissioning.

In high water table area it is important that the concrete surround is complete and free from voids or air pockets. If the concrete is placed in stages you must ensure that each stage keys into the preceding stage.
Steel mesh reinforcement may be required to strengthen the concrete surround to the pumping chamber. A Structural Engineer should be consulted concerning this.

If vehicular traffic will be passing over the chamber, it is ESSENTIAL that the cover slab is constructed so that there is NO DIRECT LOAD on the chamber. Also an access cover with the correct specified S.M.W.L. must be used.

Please allow the concrete backfill to set before pumping out the water in the pump chamber.

A cable duct is required with no sharp bends, minimum size 100mm. ID

Additional Notes

The tank is only delivered on site and we do not offload or install the tank insitu. This should either be carried out by the main contractor or by our specialist sub-contractor by prior arrangement, WE CANNOT ACCEPT RESPONSIBILITY ON SITE DAMAGE TO TANK

We recommend that once the system has been completely installed, our engineer attend the site to commission the system.

Pump Installation

The following notes are a guideline for the installation of the pumps and electrical connection. We recommend that the installation is supervised by a qualified engineer.

1) The floatswitch counterweight (if applicable) should be in position as per the accompanying instructions, roughly 100mm along the cable from the float. Suspend the floatswitches by their cables from the float bracket at the top of the chamber. Mark the cable ends for easy identification.

2) The floatswitch levels should be adjusted to suit the size of your chamber. The general guideline is as follows:

<table>
<thead>
<tr>
<th>Floatswitch</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>STOP FLOAT</td>
<td>level with base of the pump motor</td>
</tr>
<tr>
<td>START FLOAT</td>
<td>level with the top of the pump motor</td>
</tr>
<tr>
<td>STANDBY/ALARM FLOAT</td>
<td>above the top of the pump</td>
</tr>
</tbody>
</table>

3) Draw the floatswitch cables through the cable duct to the control panel position (Do not install the control panel inside the pumping station). Allow enough slack for the adjustment of the floatswitches, easy installation and removal of the pump. Ensure that all electrical cables are secured and cannot be drawn into the pump.

4) Stand the pump alongside the chamber and check that the pump impellers are free to rotate.

5) Connect the pump and floatswitches to the control panel terminals using the wiring diagram provided with the control panel.

6) Switch the pump controls to manual to check for correct pump rotation. The pump body will “Kick” in the opposite direction to the pump rotation. If rotation is incorrect on a 3 phase installation reverse any two phase wires in the control panel.

7) Using the lifting chains provided, lower the pump down the guiderail into position on the pedestal at the base of the chamber. Attach the free end of the lifting chain to the top of the chamber.

8) Switch the pump controls to auto and check the operation of the floatswitches is correct.

Electrical Installation

The pump control panel should be mounted indoors on a wall or vertical surface, or if situated outdoors it should be placed inside a dry weatherproof kiosk.

The pump power supply and float cabling should be drawn back to your control panel position through the underground cable ducting. The cabling should not be cleated to surfaces but should be tidied by cable ties for easy removal for maintenance at a later date.

The floatswitch cables are to be connected using only two of the cable cores, the colour coding can be found in the instructions that come with the float. The core that isn’t used should be cut off and isolated. It is also advisable to mark each cable before drawing it through the duct to aid in easy identification when connecting to the control panel.

The mains supply is to be connected into the control panel through a cable gland as indicated on the wiring diagram provided inside the panel, connecting the earth lead to the main earth terminal. Wiring connections should always be made by a competent electrician.

Maintenance

Before filling the sump you should first check that the system is operating correctly:

1) Switch the control panel to AUTO

2) Hold the STOP level floatswitch in the UP position (Nothing should happen)

3) Hold the START level floatswitch in the UP position (Pump should start)

4) Lower the START level floatswitch (Pump should continue to run)

5) Lower the STOP level floatswitch (Pump should stop)

No routine maintenance is necessary on the pump itself, as the motor bearings are generally permanently lubricated. It is however recommended that the pump is taken out of the sump every six months to check the oil chamber for contamination – or as per the pumps included instructions. The pump should be checked for any blockages and cleaned of any fat build up.
MANUAL OPERATION
The pumps can be set to run continuously by setting the control panel selector to manual. This setting is for maintenance and testing purposes only and should not be left on unattended. You should take care to ensure that the pumps aren't allowed to run dry for any extended period of time.

OPERATING INSTRUCTIONS
The packaged pumping station has a fully automatic operation and once setup it should need no further adjustment. The working parts of the pumping chamber comprise of the pump(s), the level regulating floatswitches and control panel.

BEFORE SWITCHING ON
The floatswitches should be set at the levels shown in the installation instructions.

The pump(s) should be fully lowered down the guidersails onto the base pedestal, or lowered to sit upright at the bottom of the tank if freestanding.

The electrical supply should be checked that it is connected to the to the control panel, and that the cover is secured.

SWITCHING ON
Set the pump operating switch(es) on the front of the control panel to OFF, then switch on the electrical supply at the main isolating switch.

Turn the selector switch(es) to AUTO (or ON). Providing sufficient water is in the chamber the pump should start. For twin pump systems only one of the pumps should run at a time.

If there is insufficient water in the chamber the pump will not run.

Allow water to enter the chamber until the START floatswitch is reached and fully tilted. The pump should now run.

The pump will continue to run until sufficient water has left the chamber to allow the STOP float to hang vertical. Once this level has been reached the pump should stop.

Once sufficient water has again flowed into the chamber the above cycle will repeat. On twin pump systems the pumps will alternate each cycle to share on wear.

FAULT FINDING
The pump control panel is fitted with indicator lights to show whether the pump is running or tripped. If a tripped light is illuminated, this means that an overload has occurred and the pump has been isolated. A qualified engineer should be called to check any faults.

"Water in the chamber will not go down"
1) There is insufficient water to fully tilt the START floatswitch. Add more water.
2) Inflow to the chamber is too great for the pump to cope with. Check the cause of the excessive inflow and rectify.

3) The pump is blocked. Switch the mains supply off, lift the pump from the chamber and remove the blockage.
4) Outlet pipe is blocked. Call an engineer.
5) Electrical supply has fail. Check mains supply and setting of control panel switches.

"Water goes down but pump keeps running"
1) The STOP level floatswitch is set too low. Check the setting level and adjust if necessary.
2) The pump selector switch is set to MANUAL. Set switch to AUTO (for control panels with AUTO – OFF – MANUAL switches only).

For further fault finding procedures please see the separate operating manuals provided with the pumps.

ROUTINE MAINTENANCE
1) Lift manhole cover and secure the site for Health & Safety reasons.
2) Check the pumps are operational by switching each pump to manual from AUTO.
3) Check the start level floatswitch is operational by lifting the floatswitch on each pump.
4) Check they are not contaminated with grease or other debris.
5) Check pumps are secure visually.
6) Ensure high-level alarm is operational by lifting the floatswitch
7) Remove any large object which may have found their way into the chamber.
8) Check panel is secure.
9) Ensure the pump control panel is switched on and both switches are restarted to auto.
10) close manhole and electrical cabinet.

WIRING DIAGRAM(S)
The wiring diagram(s) for the control panel or alarm unit (if applicable) are usually contained within the panel or alarm unit for the convenience of your installer. A copy of this wiring diagram should be placed with this manual for future reference.

PUMP HANDBOOK
Each pump is supplied with its own handbook, which will normally be found within the pump packaging. A copy of this handbook should be placed with this manual for future reference.
Only two cores of the floatswitch cable are used (check the packaging / instructions with the floatswitch to see which colours should be used for emptying). In this condition, a contact closes in the floatswitch when raised.

The floatswitch for pump operation needs to hang no longer than halfway down the pump, and below the inlet level. The pump must not "run dry" before the floatswitch reaches its "off position".

The alarm floatswitch needs to activate above the pump floatswitch level and below the inlet level.

The pump lifting chain should be attached to the handle using the shackle provided so you’re able to lift the pump up without draining the tank. The other end will need to be attached at the top of the tank.

**Twin Pumps**
Packaged Pumping Station User Guide

By following a few simple guidelines your packaged pumping station will provide many years of reliable service.

This AES Packaged Pumping Station is designed to handle domestic waste water and sewage only.

The following items should be disposed of in a waste bin and should not be flushed down a toilet or sink:

- Glass or metal
- Nappies
- Sanitary towels, tampons or similar
- Facial wipes, antibacterial wipes or similar
- Any material such as rags or cloth
- Plastic objects
- Sand, rock, stones or other debris

Failure to follow these guidelines may invalidate your warranty, in which case any service visits and replacement pumps/parts as a result of misuse would be chargeable.

In addition to the items listed above you must never introduce the following into ANY sewer system:

- Explosives
- Flammable material
- Lubricating oil or grease
- Strong chemicals
- Petrol, diesel or similar

Power Failure

In the event of power failure the system will not be able to pump wastewater and sewage out of the tank, in this instance try to minimise the use of toilets, sinks and showers/baths until electrical power is restored.