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OPERATION AND MAINTENANCE OF PUMPING STATIONS

Section 1

Health and Safety

1.1 UNITED KINGDOM HEALTH & SAFETY AT WORK ACT 1974	
The User's attention is drawn to the following:	
Section 6a of this act requires manufacturers to advise their customers on the safety and the handling precautions to be observed when operating, maintaining and servicing their products.	
The User's attention is drawn to the following:	
1) 2) 3)	All sections of this manual must be read before working on the equipment. Installation must be carried out by suitably trained and qualified personnel. Normal safety precautions must be taken and appropriate procedures observed to avoid accidents.
1.2	Health
	The following is extracted from a health warning card supplied to all staff. It is the client's responsibility to ensure that all necessary protective clothing equipment is available.
1.2a	Leptospirosis
	There are two types of Leptospirosis which can affect people in the UK
1) 2)	Wiel's disease. This is a serious infection transmitted to humans by contact with soil, water or sewage which has been contaminated with urine from infected rats. Hardjo-type Leptospirosis which is transmitted from cattle to humans. Both diseases start with flu-like illness with a persistent and severe headache, muscle pains and vomiting. Jaundice appears about the fourth day of illness.

Typical Symptoms?

How is it caught?

The bacteria can enter your body through cuts and scratches and through the lining of the mouth, throat and eyes.

1.2b Sensible Precautions

After worked in sewage or anything contaminated with sewage, wash your hands and forearms thoroughly with soap and water. If your clothing or boots are contaminated with sewage, wash thoroughly after handling them.

Take immediate action to wash thoroughly with clean water any cuts, scratches or abrasions of the skin immediately prior to applying any protective covering.

DO NOT handle food, drink or smoking material after coming into contact with sewage, report to your doctor immediately and advise him/her of the circumstances.

Health and Safety -(continued)

1.3 Safety

Sewage gases are potentially explosive and toxic. DO NOT enter any below ground compartments.

Before carrying out any maintenance work, the equipment must be electrically isolated.

Do not leave covers open for any longer than necessary. Temporary barriers and warning signs should be erected around any open covers or manholes as appropriate.

Any visiting personnel must report to site office on arrival and fully acquaint themselves with safety regulations applicable.

Section 2

Description and Overview of Operation

Single Pump Station

The pump station chamber is constructed from heavy-duty reinforced polymer suitable for underground applications and needs no attention.

One heavy-duty sewage pump is installed with an integral clamp and accessed by a galvanised lifting chain.

Power supply is single-phase 240 volts or three phase 415 volts.

The control box is supplied with manual/off/auto switch audible alarm and connection terminals for flashing alarm.

Liquid level in the station is controlled by two floats which will switch on the duty pump at the present level and off at low level.

A third float operates the high level alarm which indicates a fault within the system.

Dual Pumps Station

The pump station chamber is constructed from heavy-duty reinforced polymer suitable for underground applications and needs no attention.

Two heavy-duty sewage pumps are installed with integral clamps and accessed by galvanised lifting chain.

Power supply is three phase, 50 cycle 415 volts or 2 /single phases, 50 cycle 240 volts.

The control box is supplied with manual/off/auto switch, audible alarm and connection terminals for flashing alarm.

The liquid level in the station is controlled by three floats which will switch on the duty pump at the present level and off at the low level and the duty assist pump at the intermediate level. A fourth float operates the high level alarm, which indicates a fault within the system.

Section 3

Installation Instructions

These instructions are only a guide for installation in normal ground condition. You should assess your site and make suitable allowances for any unusual conditions. All work should be carried out by qualified staff. Normal site work precautions should be taken. Please read these instructions in full, prior to commencement of installation. If you are unsure on any point then ask for advice before proceeding.

CHAMBER INSTALLATION

- 1) Select a suitable location for the chamber. If possible, avoid vehicular traffic areas. Where this cannot be done, a heavy duty access cover will be required, along with additional structural support.
- 2) Check that there are no existing underground services in the chosen location.
- 3) Excavate an opening at least 0.5m deeper and at least 0.75m greater in diameter than the pump chamber. The sides of the excavation should be stabilised as required by normal site works good practice. De-watering may be required in case of groundwater.
- 4) Place at least 150 mm of hard-core in the base of the excavation and compact well. Pour mass concrete of CP 20 strength 200 mm thick on top of the hard-core and smooth to provide a firm level base for the pump chamber. The concrete should be agitated and consolidated to avoid cavities. Whilst the concrete is still wet, lower in the tank as follows:-
 - a) Carefully sling the pump chamber from a suitably rated crane / machine, using the lifting points. Carefully lower the chamber into the excavation and position it such that the inlet and outlet pipe work is correctly aligned. The top of the chamber should be around 150 mm below the anticipated finished cover level. Allow the concrete to partially cure before proceeding with the back fill process.
 - b) Connect the inlet & outlet pipe work utilising one or more of the inlet connections incorporated into the chamber. It is advisable to use an inlet 'stack' (readily available from all reputable drainage fittings supplies to ensure that the correct inlet height is achieved and that the chamber is installed at the correct depth below the ground (see sketch A). Connect the cable duct with draw cord.
 - c) Fill the chamber with water to the level of the incoming invert to stabilise the unit.
 - d) Pour mass concrete around the chamber to the inlet invert level and consolidate well. Let the concrete set before further completing the back filling process. (If you wish to continue back filling immediately then you must continue to fill the chamber with water to match the external concrete level).
 - e) After installing the inlet stack (if applicable) and the outlet connections pour further concrete to fully surround the tank at least 200 mm thick.
 - f) Provide some suitable shuttering around the access opening of the chamber. Then cast a concrete cover slab around 150 mm thick to accept the access frame and to provide a finished cover inlet. In vehicular area's the slab dimension should be at least 0.5 metres greater than the chamber diameter.
 - g) After the concrete has set drain the water from the chamber and remove all debris

Installation Instructions -(Continued)

IMPORTANT NOTICE

- 1) It is most important that once the chamber is in situ, with all inlet/outlet connection made, the drainage system is flushed out and all sand, debris, etc. removed from the chamber before the pumps are installed and commissioned.
- 2) Please allow the concrete back fill to set before pumping out the water in the tank.
- 3) In area's where there is a high water table, it is most important that the concrete surround is complete and free from voids and air spaces. If the concrete is placed in position in several stages, it is important that each stage keys into the preceding.

RISING MAIN INSTALLATION

The rising main should be continued from the pump chamber to the discharge point and should be at a minimum of 600 mm below ground. It should terminate at your discharge point in a position directly opposite the sewer pipe work so as to direct the sewage straight into the sewer run without deviation or any change in level. If in doubt, speak to your local building inspector who will explain this regulation to you. Any bends that are required on the rising main should be as slow as possible.

PUTTING INTO SERVICE

It is recommended that the physical installation of the pump into the chamber and the pump electrical connection, are supervised by a qualified engineer.

The following notes give outline guidance for pump installation and may be followed at your own risk.

- 1) Fit the float switch counterweight in position as shows in the accompanying instructions and secure by using cable ties below the counterweight, Suspend the float switches, by their cables, from the support bracket at the top of the chamber. Mark the float switch cable ends for ease of identification.
- 2) Adjust the float switch levels as follows (please also see sketch A): STOP FLOAT -level with base of the pump motor START FLOAT -level with the top of the pump motor STANDBY/ALARM FLOAT -200 mm above the top of the pump
- 3) Stand the pump alongside the chamber access and check that the impellers are free to rotate. Draw the pump float switch cable, through the cable duct, to the control panel position. Do not bundle the cables together or use cable ties. Leave enough slack to allow adjustment of the float switches and to allow for easy installation and removal of the pump. Ensure that all electric cables are secured and do not hang loose in the sump to avoid being drawn into the pump suction.
- 4) Connect the pump and float switches into the control panel terminals, following the wiring diagram provided in the control panel.
- 5) Briefly switch the pump controls to the Manual (Hand) position, to check correct pump rotation. The pump body will "Kick" in the opposite direction to the actual pump rotation. If rotation is incorrect on a 3 phase installation reverse any two phase wires in control panel.
- 6) Using the lifting chain provided carefully lower pumps down the guide rails into position at the base of the chamber. Attach the free end of the chain to hook, provided at the top of the chamber.
- 7) Switch the pump controls to Auto position and check for correct operation of the float switches. If at any time you are in doubt, then stop and ask for advice.

Installation Instructions -(Continued)

ELECTRICAL

Control Panel -this should be mounted on a wall or other vertical surface, preferably in a dry room or inside a weatherproof box if situated outdoors.

Pump power supply and float level control cabling should be drawn back to your selected panel position through the underground conduct. The cabling should **not** be cleated to surfaces but should be tidied by means of cable ties, so that in future years the cabling can be easily withdrawn from the panel position for maintenance. Wiring connections should be made by a competent electrician.

Float switch cables should be connected into the panel using two cores only. The green/yellow core is not used and should be cut off (it is advisable to colour code the float switch cables before drawing them through from the chamber to ensure ease of identification when connecting to the control cabinet).

Wiring Up -connect mains supply into the control panel through a cable gland as indicated on the manufacturers wiring diagrams, connecting the earth lead to the main earth terminal.

Before allowing the sump to fill, check that the system works correctly as follows:-

- A) Switch control to auto
- B) Hold STOP level float switch in “UP” position, nothing should happen
- C) Hold START level float switch in “UP” position, pump should now run.
- D) Lower START level float, pump should continue to run.
- E) Lower STOP level float, pump should now stop.

MAINTENANCE

No routine maintenance is necessary on the pump itself, as the motor bearings are generally permanently lubricated. However, we recommend that the pump is taken out of the sump at six monthly intervals to check the oil chamber. See separate pump maintenance instructions.

The chamber should have an annual “spring clean” service, see operating instructions.

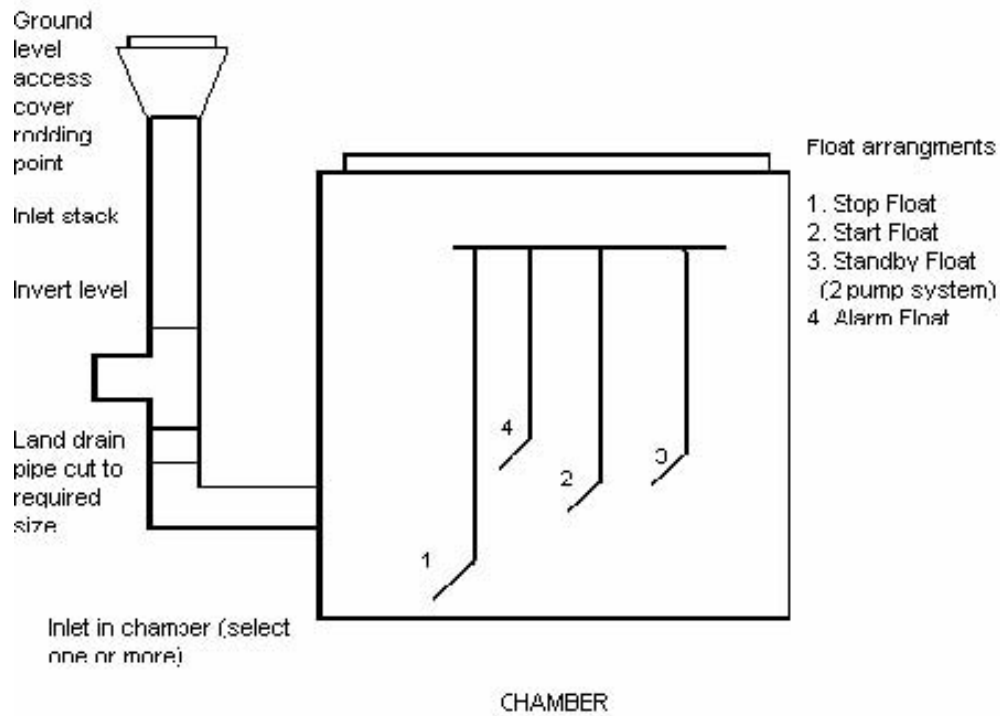
If, for any reason, you have any doubts about the above procedures, please contact Centrifugal Pump Services Ltd on 0161 428 0133

Manual Operation (For Control Panels with AUTO -OFF-MANUAL Switches)

The selector switch may be set to “Manual” and this will cause the pump to run continuously.

This is a setting for MAINTENANCE AND TESTING PURPOSES ONLY. Do not leave the pump chamber unattended whilst set to “Manual”.

SKETCH A



Section 4

Operating Instructions

Your Packaged Pump Chamber has fully automatic operation and once initially set up, should need no further adjustment.

The working parts of the Packaged Chamber comprise the pump(s), the level regulating float switches and the control panel.

Before Switching On

The level regulators (float switches) should be set at the levels shown in the installation instructions.

The pump(s) should be fully lowered down the guide rails position on the base plate(s).

Check that the electrical supply is connected to the control panel and that the cover is securely in position.

Switching On

First set the pump operating switch (es) on the front of the control panel to OFF, and 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 now start. (In twin pump stations, only one pump should run the other is a standby unit).

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

Allow water to enter the chamber until the “start” float is reached and fully tilted. The pump should now run.

Operating Instructions -(Continued)

The pump will continue running 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. (Note: On twin pump stations, the pumps will run alternately to share the wear and tear).

Manual Operation

The “Manual” or “Hand” setting on the selector switch is for testing purposes only. DO NOT leave the switch in this position with the chamber unattended.

Fault Finding

If your control panel is fitted with indicator lights, these will show whether a pump is running or tripped. If a “tripped” light is illuminated, this means that an overload has occurred and the pump has been isolated.

DO NOT ATTEMPT TO RESTART THE PUMP CALL A QUALIFIED ENGINEER TO CHECK THE FAULT

“Water in the chamber will not go down”.

- 1) There is insufficient water to fully tilt the “start” float. 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) Pump is blocked. Switch MAINS SUPPLY OFF. Lift pump from the chamber and remove blockage.
- 4) Outlet pipe is blocked. Call an engineer
- 5) Electrical supply has failed. Check mains supply and setting of control panel switches.

“Water goes down but pump keeps running”

- 1) “Stop” level float set too low. Check the setting level and adjust if necessary.

- 2) Pump selector switch set to MANUAL. Set switch to AUTO (for control panels with

AUTO -OFF -MANUAL switches only). For further fault finding procedures, check separate pump operation manual.

If any faults are noticed, check the above, call your pump service engineer or call Centrifugal Pump Services

Ltd on 0161 428 0133

Maintenance (see also separate Pump Instruction Manual)

We recommend that your Package Chamber has an annual “spring clean” service. This comprises the removal of accumulated debris, flushing through and checking for correct operation. The pumps are lifted and given visual check.

If you wish to have your chamber serviced, call 0161 428 0133 during normal office hours.

Section 5

Routine Maintenance

To be carried out monthly	
1)	Lift manhole cover and secure site for Health & Safety reasons.
2)	Check pumps are operational by switching each pump to hand from auto.
3)	Check start level (middle) float is operational by lifting the float switch 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 uppermost float switch.
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.