

Vortex Maintenance Manual

The Vortex sewage treatment plant should be serviced by trained personnel only.

Service training is available from WTE Ltd. Please contact our office on +44 (0) 1759 369 915 for further information.

Health & Safety

Sewage poses a serious risk to health.

Pathogens in sewage and wastewater can lead to many diseases such as:

Campylobacteriosis	Hepatitis A	Salmonellosis
Cryptosporidiosis	HIV	Shigellosis
Escherichia coli Diarrhoea	Leptospirosis	Typhoid Fever
Encephalitis	Methaemoglobinaemia	Yersinosis
Gastroenteritis	Paratyphoid Fever	
Giardiasis	Poliomyelitis	

Every precaution should be taken to ensure a safe working environment.

General Checks

Prior to servicing the Vortex sewage treatment plant an inspection of the general installation should be undertaken. Examples of things to consider are:

- Is the Vortex installed in a depression/hole?
- How close is the installation to buildings, mounds or other heavy structures?
- How close is the installation to a roadway?
- Is the plant susceptible to flooding?

Check to ensure that the FSR pipe has been cut so that it is approximately 10mm below the waterline.

The owner should be made aware of any issues regarding the general installation of the plant.

Vibro Screen

Non-degradable Items

If non-degradable items are observed then they must be removed and disposed of. The user(s) of the system must be informed of their presence and the need to prevent such items entering the foul drains in the future.

Aeration

If required the coarse air diffuser should be adjusted using the regulator to ensure sufficient aeration in the Vibro Screen. If aeration is not sufficient then solids will not be adequately broken down to form a mixed liquor.

Solids

If a build up of solids is observed then there is insufficient aeration from the coarse air diffuser. Air supply to the coarse bubble diffuser should be increased and the holes in the base of the Vibro Screen cleaned out if required.

Biozone

Non-degradable Items

If non-degradable items are observed then they must be removed and disposed of. The user(s) of the system must be informed of their presence and the need to prevent such items entering the foul drains in the future.

Aeration

If required the fine air diffuser should be adjusted using the regulator to ensure sufficient aeration. If aeration is not sufficient then the bacteria will be oxygen limited and the treatment process will be hindered.

The dissolved oxygen in the Biozone should be measured. There should be at least 4mg/L of O₂.

Suspended Solids Volume – 30 Minutes (SSV30)

An SSV30 test must be performed on the wastewater in the Biozone.

This is done by taking a 1L graduated beaker and taking a sample of the wastewater whilst the blower is aerating the Biozone. This sample must be left to stand for a minimum of 30 minutes.

If the volume of sludge is over 90% of the mixed liquor then the tank should be desludged.

Bulking

The unit may “bulk” if the system is supplied with too much air relative to the organic loading. This is also referred to as “under loading”. It can occur when the system is only being used by a few people or if the system is only being used intermittently.

Signs to look for are as follows:

- Foaming in the Biozone that resembles foam created when brewing beer.
- Excessive floating sludge production in the Final Settlement Tank.
- Mixed liquor not settling in the SSV30 beaker.

To eliminate bulking the ratio of oxygen (O₂) to organic matter needs to be corrected. This can be done by either reducing the amount of O₂ in the system or by increasing the amount of organic matter.

Steps you can take are as follows.

- Reduce the aeration to the Biozone by increasing aeration to the SSR.
- Fit a smaller air blower (this should be done only after the above has been trialled for at least eight weeks).

If the owner has a dog then you can advise that they put the dog droppings into the Vibro Screen.

Thick Floating Sludge Blanket in the Final Settlement Tank (FST)

This can occur as a result of the sewage treatment plant being too efficient.

It is often associated with units that are under loaded (less than 50% of the design load).

Generally, this can be remedied by:

- Removing a timer so that the air blower runs continuously (older systems only).
- Increase the airflow to the SSR to increase the rate of return of settled sludge. This will also reduce airflow to the Biozone.
- Increase airflow to the Vibro Screen to further reduce airflow to the Biozone.

It may be necessary to increase the frequency at which the FSR operates.

Final Settlement Tank (FST)

Non-degradable Items

If non-degradable items are observed then they must be removed and disposed of. The user(s) of the system must be informed of their presence and the need to prevent such items entering the foul drains in the future.

Settled Sludge Return (SSR)

The SSR should run continuously. As the viscosity of the mixed liquor changes the sludge return rate may reduce and the regulator should be adjusted accordingly.

The pipework should be checked for blockages and the sludge return reversed (back syphoned) if necessary.

It is possible for the SSR to block if the recycle rate is insufficient. This allows the settled sludge to become very thick in the base of the FST and the SSR is unable to recycle it.

To clear the blockage the following procedure should be followed:

- Turn the air blower off.
- Alter the regulator so that air is provided to the SSR only.
- Cover the SSR outlet.
- Turn the air blower on.

This will cause air to be blown back through the SSR pipe and clear any blockages. It will also break up any settled sludge.

Once the blockage has been cleared the regulator should be re set correctly.

Floating Sludge Return (FSR)

The FSR is operated by a solenoid valve and timer in the blower housing.

The default setting for the FSR is to be active for 5mins every hour.

Please see Timer & Solenoid section.

If there is a build up of floating sludge then the FSR should be turned on and all floating sludge returned to the Biozone.

Any sludge in the outlet channel should also be returned.

The pipework should be checked for blockages and the sludge return reversed if necessary. See above

If an Automatic FSR Kit has been fitted but there is a high build up of floating sludge then the timer controlling the solenoid valve should be adjusted so that the solenoid valve opens more frequently (try every six hours). The solenoid valve should never be open for more than five minutes. Always increase the solenoid opening **frequency**, not the opening **duration**.

Please note that excessive sludge formation may be caused by bulking and increasing the opening frequency of the solenoid will not solve the problem.

Air Blower & Blower Housing

Check that the correct size air blower is fitted to the tank.

Vortex	Air Blower (L/min)
4	60
6	60
9	100
12	120
16	150
21	200
30	2x 150

The Air Blower should not be making excessive noise or be overheating.

We recommend that air blowers are maintained in accordance with manufacturer's instructions.

Below is a summary of how often consumable parts should be replaced on Europe's most common air blowers.

Pressure Test

A closed back pressure test should be performed on the Air Blower.

The optimum pressure in the air line for each size of blower is as follows:

Model (L/min)	Optimum Operating Pressure (mbar)	Maximum Operating Pressure (mbar)
60	150	200
100	150	200
120	150	200
150	150	200
200	150	200

Adjustment of the Regulator in the tank will increase/decrease the pressure in the air line.

Air Filters

The air filter should be replaced every service and at least every twelve months regardless of their visible condition.

Diaphragms

These should be replaced when they fail or show signs of wear. When diaphragms fail, the alarm on the front of the blower housing will be activated.

Once diaphragms have been replaced, the micro switch inside the blower must be reset so that power is sent to the drive unit and not the signal cable (alarm).

For preventative maintenance, the diaphragms should be replaced every twelve months.

Valve Boxes

These should be replaced when they fail or show signs of wear.

For preventative maintenance, the valve boxes should be replaced every twelve months.

Gaskets

The rubber gaskets should be inspected for wear and replaced if required.

Air Line & Fittings

All airlines and fittings must be checked for air leakage.

If air is escaping the pipe clips should be tightened. If this does not solve the problem then the airline should be replaced.

Check to make sure the blower housing is securely fastened to the lid of the tank and that the ventilation holes are clear.

There should be no water in the base of the housing.

Timer & Solenoid

It is recommended that all Vortex tanks are fitted with a solenoid valve to manage the floating sludge. The automatic FSR kit can be retro fitted to all Vortex tanks.

Timer

The default setting for the solenoid timer is:

- ON 5 minutes
- OFF 60 minutes

If high levels of floating sludge are present in the Final Settlement Tank then the timer should be set to turn on and off more regularly rather than being active for a longer time.

Solenoid Valve

The Solenoid Valve should be function tested to ensure it is working.

If necessary the solenoid should be replaced.

The solenoid has an expected life of 7,500,000 cycles however it is recommended that the solenoid valve is replaced every five years.

Effluent Testing

Biochemical testing of effluent is not possible for service engineers to undertake on site. Basic effluent analysis is possible if a sample of the effluent can be taken.

The most appropriate test to do on site is for turbidity as this gives a very good indication of how the system is performing.