Vortex Operation Manual

This building is served by a Vortex™ sewage treatment plant.

This manual provides information on the following:

- How the system works.
- Do's and Don'ts of using Sewage Treatment Plants and Septic Tanks.
- Owner checks.
- Servicing.
- Desludging.

This manual is correct at time of printing but for the latest version please go to www.crystaltanks.com or contact our sales office.

How the System Works

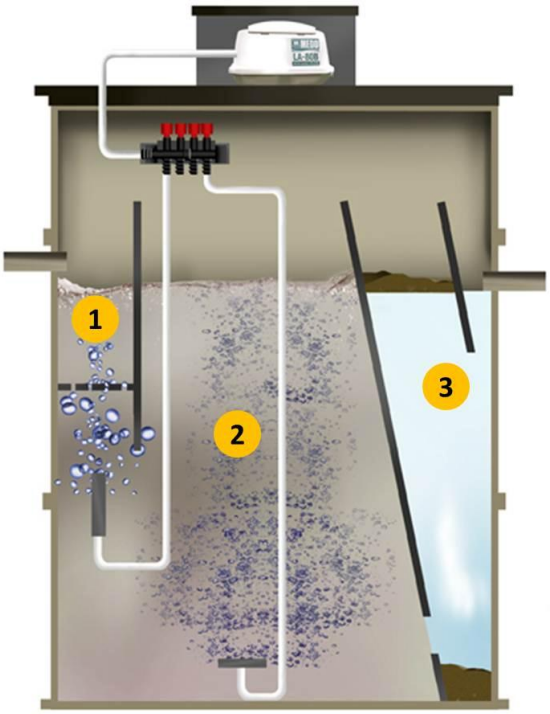
The Vortex is an advanced Activated Sludge Process (ASP) sewage treatment plant.

It is capable of receiving wastewater from properties not connected to mains drainage and processing it so that only a clear effluent is discharged into the environment.

The Vortex Treatment Process

Unlike most sewage treatment plants the Vortex is designed to treat both the solid and liquid components of wastewater. It does this by using a combination of coarse and fine air bubbles

1. Wastewater from the building enters to Vibro Screen. Here course air bubbles are used to physically break down solid matter and form a mixed liquor with the water.
2. The mixed liquor flows into the Aeration Chamber. A bacterial culture is present in the Aeration Chamber which digests the pollutants in the wastewater. The bacterial culture must have a constant oxygen supply and this is provided by a fine bubble diffuser at the base of the tank.
3. The mixed liquor then flows into the Clarification Chamber where it is able to separate into clear, treated effluent and sludge. The clear effluent is able to flow past the scum baffle and out of the tank.



The Sludge Management System (SMS)

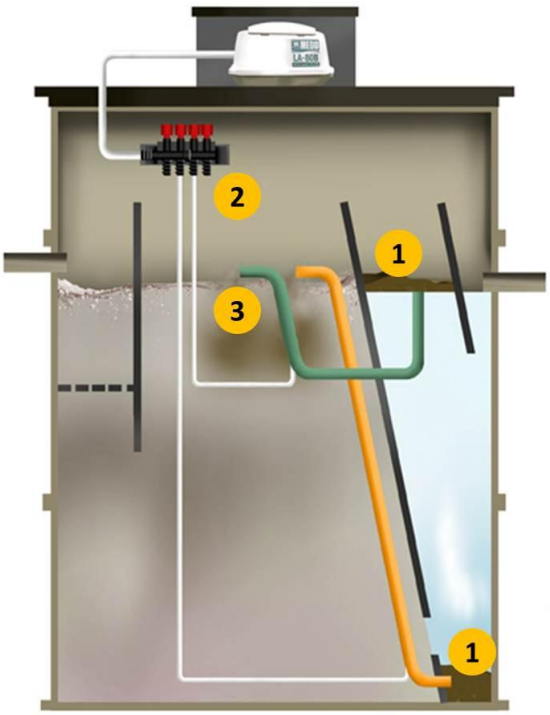
All Activated Sludge Process (ASP) sewage treatment plant produce sludge as part of the treatment process. The vortex's Sludge Management System is one of the elements that make it an **advanced** ASP.

The sludge is composed of partially digested solid matter. The Vortex is able to return the sludge back to the Aeration Chamber for further digestion by the bacteria.

The return of sludge back to the Aeration Chamber gives the bacteria a food supply even when there is little or no wastewater coming from the building. This makes the Vortex better able to handle low occupation stress than other Asp sewage treatment plants.

This recycling of sludge is done without the use of electrical or mechanical components in the tank.

1. In the Clarification Chamber sludge accumulates at the bottom (settled sludge) and top (floating sludge) of the tank.
2. Air from the blower is spurred from the regulator to two sludge return pipes.
3. This creates a continuous vacuum that sucks the sludge from the top and bottom of the Clarification Chamber back to the Aeration Chamber.



Do's and Don'ts

A sewage treatment plant is collection of living, breathing organisms and must be respected as such

DON'TS

DON'T allow antibacterial products to go down the drains (toilets, sinks, baths, showers, gutters etc).

- This is very important as antibacterial products can destroy sewage treatment plants.
- All products that are designed to kill germs are antibacterial.
- Disinfectants are antibacterial.
- "Carex" type hand cleaners are antibacterial.

- Hand sanitisers are antibacterial.
- Alcohol is antibacterial.
- Toilet rim blocks and cistern blocks are antibacterial.
- Antibiotics and medicines are antibacterial.
- Baby bottle sterilising fluid is antibacterial.
- Most agricultural chemicals are antibacterial.
- Many kitchen cleaning products are antibacterial.
- Many bathroom cleaning products are antibacterial.
- Some washing powders are antibacterial.
- Some washing up liquid is antibacterial.
- Some dishwashing products are antibacterial.
- The use of bleach to clean toilets once a week is OK however every care should be taken to avoid the use of antibacterial products for other cleaning tasks.

DON'T allow chemical toilets to be emptied into the foul drains or treatment system.
These chemicals are highly antibacterial and will kill the system.
DON'T put non degradable material down the toilet.
This includes sanitary towels, tampons, baby wipes, condoms and any other item that won't breakdown naturally.
DON'T empty large amounts of detergents and bleach down the drains.
If you have a 'spring clean', pour the buckets down your outside drains, as these are not connected to the unit.
DON'T empty fats, oils or greases (FOGs) down the drains.
For cuisines that use fats and oils a grease trap to be fitted to the kitchen drains
DON'T install a waste disposal unit.
A waste disposal unit can overload a sewage treatment plant or septic tank.
DON'T discharge a water softener into a sewage treatment plant.
Water softener regenerate is very high in salt and this can stop a system working.
DON'T allow a hot tub to discharge into a sewage treatment plant or septic tank.
The volumes are too great and require sterilising chemicals that will severely damage your system.
DON'T use sterilising chemicals to clean a whirlpool bath.
Many manufacturers recommend cleaning with sterilising fluid but this must not be done.
DON'T empty animal faeces down the foul drains.
The BOD in animal faeces is far higher than for people.
DON'T allow the condensate from heating systems to enter the foul drains.
This has a very low pH and can destroy a sewage treatment plant or septic tank.
DON'T allow blood or milk to go down the drains.
Blood and milk have a very high BOD and can overload your system.
DON'T empty paints, thinners or any other decorating products down the foul drains.
Such chemicals will kill bacteria and can degrade the tank.
DON'T allow any surface water (roofs, driveways, hard standings etc.) to enter the foul drains.
This will allow an enormous volume of water to flow through the system and destroy the process.
DON'T allow any unqualified person to tamper with the system.

<u>DO'S</u>
DO take out a maintenance contract.
All sewage treatment plants require periodic servicing by trained personnel.
DO use soap for household cleaning tasks as much as possible.
Soap will kill bacteria and germs but it is far kinder to sewage treatment systems.
DO use cleaning products supplied by Northern Environmental.
These are manufactured using naturally derived plants extracts and are much better for sewage systems.

DO try to stick to the same brands of cleaning products.
Your unit will become tolerant to the brands you use.
DO use liquids instead of powders.
Liquids are kinder to the bacteria in the unit.
DO spread out your washing through the week.
Don't have a washing day as the volume of water will shock load the system.
DO try to use paper towels instead of cloths.
By using paper towels to wipe down surfaces with cleaning products the paper towel can go in the bin and no chemicals will go down the drains.

Be aware that visitors to the property can also cause problems for the sewage treatment plant such as cleaners bringing their own cleaning products or friends / relatives who are on medication.

Owner Checks

The Vortex should be checked regularly to ensure that it is functioning correctly.

These checks should be as follows:

- Check the air blower is running.
- Check that the effluent in the outlet trough / sample chamber is clear and does not present an unpleasant odour.
- Check that there are no non-degradable items (baby wipes, sanitary towels etc.) in the tank and remove them if they are present.
- Check that there isn't a high build up of floating sludge in the Clarification Chamber. If sludge is present open the controlling valve on the regulator (tanks supplied before October 2012) or turn on the timer in the blower housing (tanks supplied after October 2012) to return the floating sludge back to the Aeration Chamber.

If you are unsure about the functioning of your Vortex sewage treatment plant please contact your service engineer.

Servicing

All sewage treatment plants require periodic servicing by trained service engineers. This is to ensure the correct functioning of the system and is a legal requirement to prevent pollution of ground and surface waters.

The Vortex must only be serviced by personnel who have had specific training on the Vortex sewage treatment plant. Personnel trained on the Vortex system will be able to produce a WTE Ltd Approved Contractor certificate.

WTE Ltd supports the British Water Service Engineer Accreditation Course but this course primarily covers theoretical aspects of servicing and **does not** include practical training on the Vortex system.

WTE Ltd recommends Sapphire Environmental for the servicing of Vortex tanks. Sapphire Environmental can be contacted on 01757 289681.

Failure to correctly service and maintain a Vortex sewage treatment plant may invalidate the warranty.

The service interval for the Vortex is as follows:

First service after the system is put into use	Three months
Normal service interval	Six months
Service interval if owner manages sludge return*	Twelve months

*If the owner is prepared to monitor and manage the sludge removal system in the Vortex tank then it will extend the service interval by a trained service engineer. Your service engineer will show you how to manage the sludge return system.

Following each service you should be issued with a service report sheet outlining the work done and any additional action that should be taken to improve the performance of the system. It is important that you retain service records for at least five years in order to comply with Environment Agency legislation and British Water guidelines.

In order to facilitate servicing the area around the sewage treatment plant must be open and kept clear to allow the service engineer un restricted access to the tank. This applies equally to any pump chambers, sample chambers, inspection chambers and points of effluent discharge that the engineer will need to access.

Desludging

Periodically the Vortex system will need to be desludged (emptied).

This work must be carried out by a licenced waste disposal contractor.

At full loading the average desludge interval for the Vortex system is twelve months however this will vary as no two systems will be used in exactly the same way.

As part of the servicing the service engineer will perform an MLSS check to determine the volume of sludge in the tank. The tank must be desludged if the level of sludge is greater than 65% after thirty minutes of settlement

The tank may require desludging regardless of the sludge content if other conditions are observed in the tank. Such as:

- Presence of non-degradable material.
- Presence of fats, oils or greases
- Evedidence of antibacterial agents being discharged into the Vortex.

After desludging the tank must be immediately refilled with water to its operating depth (until water flows out of the outlet pipe). This is especially important for sites with a high water table or high groundwater levels.

On sites with high water tables there is the potential that the Vortex tank may deform or float if it is fully emptied. To avoid this the tank should be only partially desluged (not more than 50% of its total volume) and immediately refilled with water to its operating depth.

When a Vortex is desludging it is the sludge, not the water that is needed to be removed. When you partially desludge the tank the air blower should be turned off for 4-8 hours prior to the desludging in order to allow the sludge and water to separate. The sludge will settle in the bottom of the tank with the water at the top. When the tank is desludged the tanker should remove sludge from the bottom of the tank.

On sites with high water tables it is recommended that tanks be desludged when the water table is at its lowest in order to avoid problems of deformation and floatation.

It is important that you retain desludge records for at least five years in order to comply with Environment Agency legislation and British Water guidelines.