VORTEX/QUANTUM Operation Manual

This building is served by a VORTEX / QUANTUM sewage treatment plant.

This manual provides information on the following:

- How the system works
- Sludge Management
- Do's and Don'ts of using Sewage Treatment Plants and Septic Tanks
- Cleaning Products
- Owner checks
- Servicing
- Desludging
- Problems and solutions

This manual is correct at time of printing but for the latest version please contact our sales office.

How the System Works

VORTEX and QUANTUM are advanced Activated Sludge Process (ASP) sewage treatment plant.

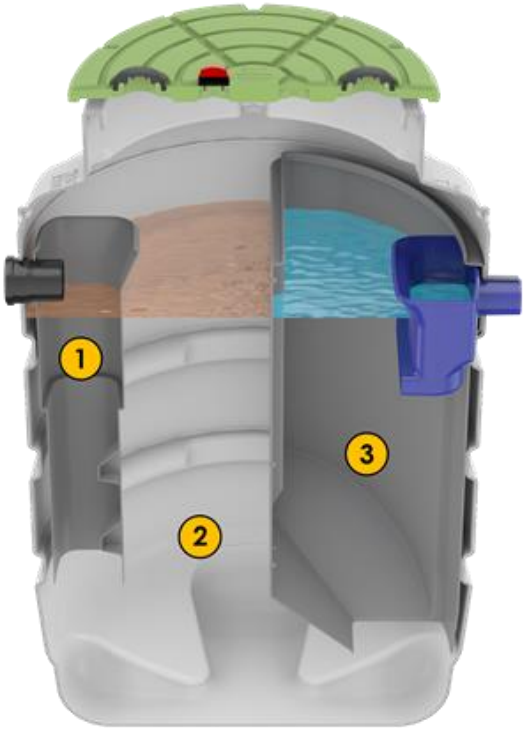
QUANTUM is an economy version of VORTEX and works in the same way.

The system 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 **Biozone**. A bacterial culture is present in the Biozone which digests the pollutants in the wastewater.
   The bacterial culture must have an oxygen supply. This is supplied by an external air blower that supplies air to a fine bubble diffuser at the base of the tank.
3. The mixed liquor then flows into the **FST** (**Final Settlement Tank**) 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

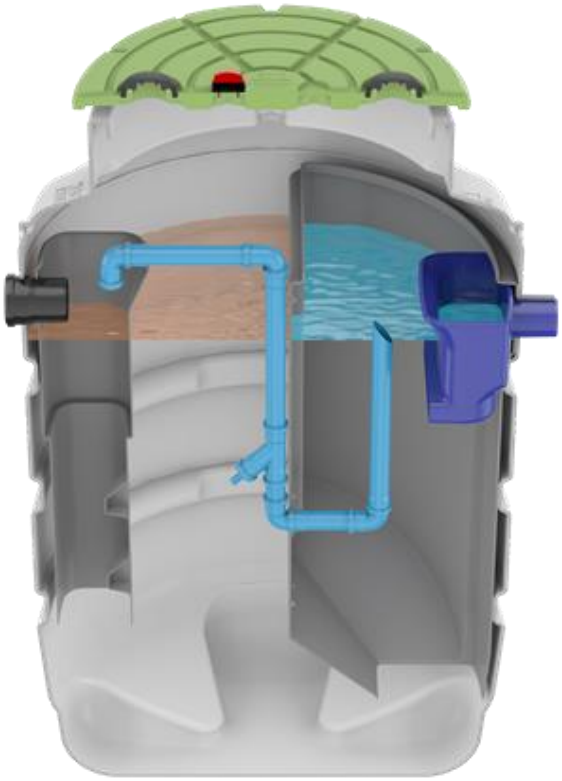
All Activated Sludge Process (ASP) sewage treatment plant produce sludge as part of the treatment process. The VORTEX's Sludge Management System is one of the elements that make it an **advanced** ASP.

The sludge is composed of partially digested solid matter. VORTEX is able to recycle the sludge for further digestion by the bacteria.

The return of sludge back to the Vibro Screen gives the bacteria a food supply even when there is little or no wastewater coming from the building. This makes 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 FST, sludge accumulates at the bottom (settled sludge) and top (floating sludge) of the tank.
2. Air from the blower is spurred to two sludge return pipes.
3. The Settled Sludge Return (SSR) is active all the time. It creates a continuous vacuum that sucks the sludge from the bottom of the FST back to the Vibro Screen.
4. The Floating Sludge Return (FSR) is activated automatically by a solenoid valve.



Please note that the new design of Floating Sludge Return (FSR) recycles back to the surface of the FST and not the Vibro Screen.

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 empty large amounts of detergents and bleach down the drains.

All detergents will adversely affect a sewage treatment plant. Every effort should be made to keep the amount of detergents discharged into the drains to a minimum. High foaming products such as bubble bath should not be used. If you have a 'spring clean', pour the buckets down your outside drains, as these are not connected to the unit.

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 fat, oil or grease (FOG) down the drains.

All commercial kitchens must have a grease separator. This must be a mechanical separator. **Never** use a separator that uses bacteria/enzymes.

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 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.

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.

DO'S
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 made from natural plant or mineral sources.
Some cleaning products 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 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.

Cleaning Products & Appliances

WTE recommends the use of cleaning products derived from natural sources, that break down quickly in the sewage treatment plant and have no persistent chemicals.

Our favoured brands are:

- Miniml
- Bio D
- Faith in Nature
- Ecover
- Method

Laundry

Washing machines represent the single biggest source of wastewater. To prevent overloading the sewage treatment plant, washing should be spread equally over the week.

To reduce overall wastewater production, full loads should be washed. If a part load is washed, the settings should be altered to reflect this and reduce water consumption.

Wherever possible, non biological washing powder, with no bleaching agent, should be used. Powdered detergents will aid the function of the FST (Final Settlement Tank) and improve the effluent quality.

The minimum amount of detergent should be used. This is often less than prescribed by the manufacturer.

If you have a phosphate reducing sewage treatment plant or are in a phosphate sensitive area – only use phosphate free detergent.

Toilet Cleaning

Ideally, toilets should be cleaned with a product made from natural sources.

If bleach is used, it should be kept to a minimum and used once per week for toilet cleaning is usually not a problem.

Cheaper, own brand bleach, is preferred as it usually a basic chloride solution with limited persistent chemicals. More expensive bleaches have persistent chemicals that are detrimental to the sewage treatment plant and harm the environment.

If bleach is used, it should be left in the toilet for as long as possible. This will better clean the toilet and allows the chlorine to evaporate out of the water.

Hand washing and personal cleaning

Antibacterial soaps must never be used. If hands must be sterilised, an alcohol gel that dries on the skin should be used.

Water Softeners

Water softeners are not recommended as the efficiency of the sewage treatment plant is dependent on suitable alkalinity in the wastewater.

Where a water softener is installed, it is essential that the regenerate does not enter the foul drains as the high pH will prevent the sewage treatment plant from working.

If a water softener is used, it is probable that alkalinity will need to be dosed into the sewage treatment plant. Please contact WTE for details.

Owner Checks

To ensure the correct function and ongoing performance of the sewage treatment plant, it is recommended that the following checks are done by the owner or other nominated person:

These checks to not negate the need for routine servicing by a WTE approved service engineer.

Monthly

- Check the air blower is running.
- Check that the effluent in the outlet box / 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 FST (Final Settlement Tank).
- Check the aeration in the Vibro Screen. Large air bubbles should be constantly rising up from the base of the tank and vigourously disturbing the surface of the water so that it looks like it is boiling.
- Check the aeration in the Biozone. Fine air bubbles should be constantly rising up from the base of the tank and vigourously disturbing the surface of the water.
- Check that the Settled Sludge Return (SSR) is recycling water back to the Vibro Screen.
- The odour in the plant should be 'earthy'. There should not be a noticeable 'rotten eggs' smell.

Six Monthly

- Monthly checks.
- Replace the air blower filter.

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.

VORTEX and QUANTUM must only be serviced by personnel who have had specific training on the system. Personnel trained on the VORTEX system will be able to produce a WTE Approved Contractor certificate.

WTE provides maintenance on all our sewage treatment plants. Please contact our office for a maintenance agreement.
01759 369 915
sales@wte-ltd.co.uk

Failure to correctly service and maintain the system may invalidate the warranty.

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 unrestricted 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.

WTE does not support the British Water Service Engineer Accreditation Scheme. This course provides no practical training on any aspect of the operation, servicing, fault finding or repair of sewage treatment plants.

Desludging

VORTEX and QUANTUM sewage treatment plants need to be periodically desludged (emptied).

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

The average desludge interval for VORTEX is 12 months.
The average desludge interval for QUANTUM is 6 months.

The desludge interval will vary as no two systems will be used in exactly the same way.

The fewer people using the sewage treatment plant , the longer the desludge interval will be.

The better a sewage treatment plants is used and maintained, the longer the desludge interval will be.

The table below gives the range of desludge intervals

	VORTEX	QUANTUM
Desludge Interval	6-36 months	3-18 months

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 5.2g/L.

Alternatively, the sludge content can be estimated by an SSV30 test (settled sludge volume after 30 minutes). The limit is generally ≥70% sludge content.

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.

After desludging the tank must be immediately refilled with clean 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 tank may deform or float if it is fully emptied and not installed correctly. To avoid this, the tank should be only partially desludged (not more than 50% of its total volume) and immediately refilled with clean water to its operating depth.

On sites with high water tables it is recommended that tanks be desludged when the water table is at its lowest.

If the tank requires desludging due to a problem (such as anti-bacterial use) then all the water in the tank must be removed, the tank washed down and the wash down water removed. When washing the tank, be sure to remove all sludge stuck to walls, baffles and pipework. The system must then be refilled with clean water.

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.

Problems & Solutions

If you experience a problem with your sewage treatment plant, please contact your service engineer.

Symptom	Cause	Solution
Poor quality effluent and/or Offensive smell from the tank	Poor aeration (less than 1.5mg/L O_2 in the Biozone)	Increase air flow to the fine bubble diffuser.
	No aeration – failed air blower	Check the air blower for the following: • Power • Blown fuse (replace if neccessary) • Split diaphragm (replace if neccessary) • Overheating (clear vents if neccessary) Replace the air blower if necessary.
	No aeration – blocked diffuser	Replace the fine bubble diffuser in the Biozone
	Antibacterial, bactericidal or bacteriostatic products entering the tank	Desludge the tank and ensure that it is fully washed down. The wash down water must also be removed.
	Lack of Alkalinity (as $CaCO_3$)	Alkalinity must be dosed into the tank. Please contact your service engineer or WTE.
	Poor settlement in the FST	This may be caused by Bulking. See below.
		Replace liquid soaps / washes / detergents with solid alternatives.
	SSR not working	Reinstate SSR function. See **Little or no flow from the SSR** (below).
	FSR not working	Reinstate FSR function. See **FSR not working** (below).
Vibro Screen not working or overflowing	Insufficient aeration	Increase the air flow to the Vibro Screen.
	Blocked holes in the base of the Vibro Screen	Clear any blocked holes in the base of the Vibro Screen. Increase the air flow to the Vibro Screen.
Little or no flow from the SSR	Insufficient airflow to the SSR	Increase airflow to the SSR.
	Blocked pipe	Back flow the SSR.
FSR not working	Broken Solenoid Valve or Timer	Replace the Solenoid Valve or Timer.
	Blocked Pipe	Back flow the FSR.
White foam on the surface of the Biozone	Detergents	Reduce the amount of detergents, bubble bath and other substances being used in the building.
Brown foam on the surface of the Biozone and/or	Bulking	Decrease the aeration in the Biozone by: • Increasing air flow to the SSR or • Fitting a smaller air blower

Mixed liquor not settling in the SSV30 beaker		
Thick floating sludge blanket on the surface of the FST (Final Settlement Tank)	System is too efficient Usually associated with under loaded units (less than 50% of the design load)	Increase the airflow to the SSR. This will also reduce airflow to the Biozone. Increase airflow to the Vibro Screen to further reduce airflow to the Biozone. This manipulation of the system is best done by your service engineer.