

ELEMENTAL SOLUTIONS

NATURAL WASTEWATER TREATMENT · CONSERVATION · REUSE

AQUATRON KIT MANUAL

INSTALLATION
STARTUP
MAINTENANCE
HARVESTING
CHAMBER MANUAL
TROUBLESHOOTING



Version 1 - 1/99

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AQUATRON

The Aquatron is a Swedish invention developed to separate solids from a flow of liquid. In sewage treatment the Aquatron separator is inserted in the waste-water pipe-run to take the solids - faeces, toilet paper etc - to a compost chamber, and the liquid - flush water and urine - to a soakaway or sewage system.

The list below gives the parts which are in this package and which will enable you to construct an Aquatron solids separation and composting installation.

Whilst all the special parts are here you will need to purchase and arrange all the blocks/bricks, cement and concrete, shuttering and pipes bringing sewage to the chamber and taking the liquid away. These parts are available from most builders merchants.

The placement of the tank and the pipe runs are dependent on your situation and whilst Elemental solutions can assist with these plans, we must make it clear that you have only the generic design suitable for a medium sized family in your hands and that this may need adapting for your circumstances.

Please be aware that sewage treatment is under the jurisdiction of several authorities - Building Control, the Environment Agency, and the Health and Safety Executive. Permission to install this system may be denied by any of these authorities although all have given their permission in the past. It is up to you to make sure that this installation is permitted in your situation although Elemental Solutions will assist in the process of seeking permission if required.

AQUATRON KIT CHECKLIST

- This manual
- Aquatron separator
- 160 mm Polypipe coupler
- 150 mm x 160 mm stub
- 2 off plastic false-floor panels
- 2" Osma coupling and 1m pipe
- 7 m Irrigation pipe
- 14 off stainless screws 2" x No. 8
- 20 off brown rawl plugs
- Shade net
- Rake

AQUATRON INSTALLATION MANUAL

If the elements are set up correctly the water leaving the separator will be of a higher quality than septic tank effluent, and, being aerobic, virtually odourless. The solids are moist and perfect for composting. This means that the final product is a positive soil amendment rather than an anaerobic sludge.

There are several possible arrangements for the Aquatron system. For instance the separator and chamber can be in the cellar or on the ground floor and the waste water goes by a pump or direct from the separator by gravity to the outside. Alternatively the whole system can be out of doors with access to the chamber being from the top.

The most appropriate installation for your situation depends on your terrain and the layout of the house. All these variables need to be sorted out before you should choose to use an Aquatron.

INSTALLATION

There are key elements in getting the Aquatron set up correctly;

I. Inputs to Aquatron

II. Incoming pipe-run

- A. Slope**
- B. Distance**
- C. Angles**
- D. Junctions - especially the final junction**

III. Aquatron orientation

- A. Level**
- B. Central fixing**
- C. Security**

IV. Solids outlet from Aquatron

V. Water outlet from Aquatron

I. Inputs to Aquatron

The Aquatron was originally designed for WCs only and the maximum number of toilets to be used on each Aquatron was strictly regulated. For the smaller separator 3 WCs are recommended as a maximum and for the big separator 12. This was specified because if all these WCs were flushed simultaneously there was the possibility of overflow and some over-wetting of the composting chamber. If using Aquatron's own chambers and not the self-build chamber then these guidelines should be followed as outlined in the guidance supplied by Aquatron AB, with their chambers.

There must be no settlement tank between the fittings in the house and the Aquatron. If kitchen water has to go through the Aquatron - see next section - an adequately sized grease-trap can be used for this water alone and must be maintained regularly. Waste disposal units are not compatible and all compostable materials should be composted separately.

A note on using the separator for more than just WCs

Elemental Solutions have used bigger chambers than the Swedes in line with our own experience of composting toilets. These have a bigger drainage area than the Swedish chambers and are able to take the very rare occasional overflows that arise from simultaneous discharge of fittings from the house. (3 WCs x 6 litres over 10 seconds = 1.8 l/s or 114 l/min!)

For instance, a single separator has been serving a development containing housing for 33 people and a workshop, for over 2 years. The longer pipe runs necessary for such a development even out the peaks in flow such that these lesser peaks are dealt with in a very satisfactory manner.

A problem with inputs other than toilet waste is that, in theory, fats from cooking can congeal on the surface of the separator impeding its function. In practice we have found this to be only theoretical if the kitchen habits are good - oils and fats are wiped off plates and pans and the paper binned elsewhere.

II. Incoming pipe-run

A. Slope

Normal pipe runs should be used in line with building regulations. However, the final meter of pipe before the separator should be at 1:20. This ensures that the separator receives water with a reasonable momentum which increases the efficiency of separation. If at all possible, drop-manholes should be avoided on the run into the separator.

B. Distance

The pipe from the WC to the separator should be as short as possible. To put it another way - the separator and composting chamber should be as close to the fittings as is possible. (In Sweden many systems are in basements.) 20 m is the distance recommended by the manufacturer but we have used longer runs with well laid drains.

The reason for this is that the faecal matter and paper will start to disperse within the flushing water. The less this happens the better in terms of the amount that will be composted and the cleanliness of the water which is separated.

C. Angles

The last 2 metres of pipe before the separator should be free of bends which interfere with the flow into the unit

D . Junctions - especially the final junction

If junctions are badly assembled there is a very good chance of flushed materials catching in them causing blockages and disintegration of the solids. Special care should be taken on the junction of the separator and the incoming pipe that the two pipes butt up closely and completely.

Aquatron orientation

A. Level

The Aquatron should be vertical over the composting chamber. It is tricky to get the asymmetrically shaped Aquatron exactly level given the slope of the pipe coming in and the difficulty of knowing where to put a spirit level. However, using the level in several places should give a good idea and this is sufficient. Wedges (not supplied) can be used to make the final adjustments and keep the unit secure.

B. Central fixing

The waist of the Aquatron should be secure. This means making sure that there are no gaps between the two halves of the moulding and the ring holding the filter wires. The Jubilee clip should be fastened securely without pinching the separator out of shape. The wires should not cross each other but run parallel and come slightly into the centre of the Aquatron separator away from the waist.

C. Security

The Aquatron can be dislodged by the momentum of the incoming flush unless firmly located and supported with 3 packing pieces or wedges under the Aquatron body as shown in the drawing - Aquatron Separator and Chamber.

IV. Solids outlet from Aquatron

The solids leave vertically through the base of the moulding. On the Aquatron's own chambers this is a direct connection to the chamber. On Site Built chambers the connection is to a 150 mm fitting set vertically in the chamber lid. This should have no elements such as rough edges which might obstruct the outlet.

V. Water outlet from Aquatron

This is a 50 mm outlet on the smaller separators and 110 mm on the larger models. The water should be able to 'get away' as soon as possible so it does not impede the water which follows. Therefore, the pipe leaving the Aquatron should fall away as close to the separator as is possible. A connector and short length of pipe have been included in the chamber kit for convenience.

UK waste pipe fittings vary in size and if 50 mm DIN fittings are not available then 2" (50 mm) Osma push fit couplings give a loose but watertight fit.

START UP.

On the day the chamber receives its first use the coir compost (or equivalent) should be thoroughly soaked by spraying via a hose through the inspection chamber. Worms should then be placed in the chamber. The best ones are the composting or dung worms - brandlings, tiger worm (*Eisenia foetida*). These are very common and a handful of compost in the right stage is usually enough - a good initial addition of 1000 worms + eggs and bedding (considered important) is a good start.

Worms can also be purchased from such places as Wiggly Wigglers 01981 500391 (Herefordshire) or Wonder Worms UK in Yorkshire 01442 831112 who will supply by mail order.

MAINTENANCE

When the system is in use the faeces and paper will form a pile vertically below the separator. Worms will thrive here, especially around the edges of the pile in the moist bedding. However, as the pile grows the worms will not be able to get access to the centre of the heap which will be very dense and lacking in structure.

To assist the breakdown of this matter two things are done. The first is to spread the pile using the rake (which should be left in the chamber). The first times this is done will help establish a broad range of decomposer organisms throughout the bed. Having done this sprinkle some wood shavings over the top of the material in a thin layer so that the bed is the colour of the shavings.

This operation needs to be done regularly. How often depends upon the use the system receives. Check after a month and if the pile is about a foot high you have come at about the right time. If the pile is interfering with the separation in the Aquatron you have left it much too late.

This regular check is a good time to see whether there are any unusual problems. If so please confer with the trouble-shooting section and if this does not sort the problem contact Elemental Solutions for technical support. Our preference is for email or you can phone during office hours.

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HARVESTING

After many months of use the compost will have built up in layers. All being well the material you have raked towards the door will have been in there for many months and the worms and other creatures will have transformed your muck into a dark material like garden compost. Many people will be disappointed just how little of this there is and some people will be delighted. (There is no need to remove this compost if there is enough room in the chamber.)

This mature material should be removed with care using the rake or a spade. Take care not to leave holes in the compost layer that expose the netting over the drainage floor.

This material is not free of pathogens; so gloves should be worn and hands washed after the operation.

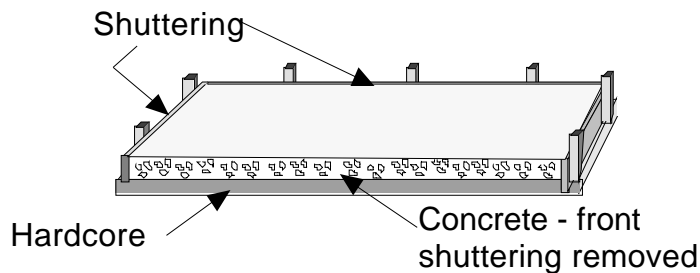
The material is fit for use in the garden although we err on the side of caution and put a sprinkling of garden soil over it. We cannot guarantee that there will be no problems if this is used around vegetables so suggest it is used in ornamental beds.

AQUATRON COMPOSTING CHAMBER MANUAL

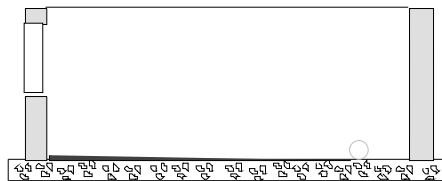
This chamber is designed for a medium sized family dwelling (up to 6 people) and can be used for direct composting using a pedestal or using the Aquatron for WCs. Elemental Solutions have used a bigger chamber than that suggested by the Swedes. This allow for longer maturing and to avoid problems caused by insufficient drainage area. However, if less space is available and great care is taken on the inputs to the system, a smaller chamber can be use at the expense of extra raking and more frequent compost removal.

The accompanying drawing ('Aquatron separator and chamber') shows a typical installation with the chamber situated above ground. The first thing to do is find the site for the chamber. If using the Aquatron this must include the space for the separator too.

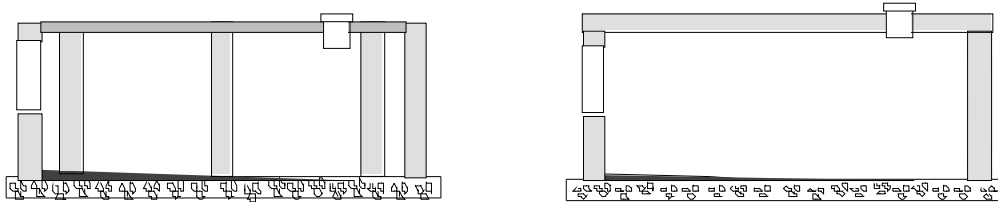
1. After any necessary excavation the base must be cast - most simply done using the earth as the base and planks as the shuttering. For details on mixes, reinforcements, techniques and timing please refer to a basic DIY manual such as Collins' DIY etc.



2 The blocks or bricks should be suitable for the site. If frost is likely to be an issue then these must be able to withstand such conditions. Remember to leave holes for the drainage pipe (best cast in to the tank wall) and inspection hatch. This is the time when you will have best conditions for benching the floor.



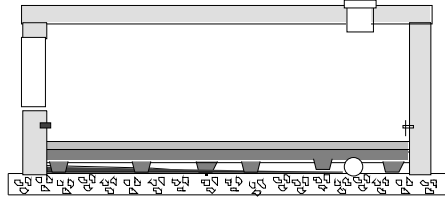
3. The roof can be flat or arched to shed water if the chamber is outside. A temporary roof and supports should be set as formwork in such a way that it can be removed once the concrete has set. Also remember that you will have to get the form work out of the holes you have left; 600 mm strips of shuttering ply can be removed easily enough. If the roof is to arch this can be flexed in place but take care not to push the walls out. Do not forget to allow the right holes in the roof for the Aquatron socket and the water outlet if this is to pierce the box.



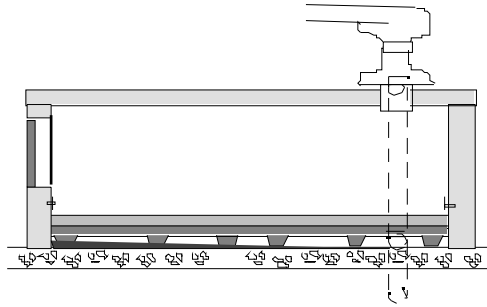
4. With the formwork out of the chamber the innards can now be inserted. In order for them to go through the inspection hatch the false floor panels need to be cut in two in such a way that they will still be self-supporting - ie the cut should go through their 'feet'. A tie-wrap can hold them together when in situ. The net is laid over these panels with enough spare all round to go up the walls at least 150 mm. The net is held against the wall by the black pipe supplied which is screwed into place using stainless screws. A nick in the pipe at the corners will help them go as close in as possible.



The compost bed consists of 50 mm of coir compost or other coarse fibrous equivalent. This should be spread evenly over the netting to a depth of 50 - 100 mm. (120 -240 litres broken up if compressed)



5. The door can now be fitted and the Aquatron and pipe work completed as per the Aquatron manual



TROUBLE SHOOTING

1. Saturated bio-bed

- **Bad drainage**

Check that the outlet is not blocked. Use rodding point(s).

- **Too much water in the bio-chamber**

Check that the separator is installed level and as per instructions

Check that the wires in the wire-ring are placed correctly.

Check that extra water is not coming down the drains

Check that the the inlet pipe is not at too great an incline

- **Stoppage in the humus layer**

Check that fat is not being sent down the drains

Check that correct number of people on system - not overloaded

2. Odour in the room

- **Wrong ventilation**

The ventilation-pipe is too short, does not extend over the roof. Note: air admittance valve should **not** be used instead of a vent pipe.

Chamber is not sealed or inspection door is left open

3. Odour when windy.

- **Air is pressed into ventilation**

Extend the ventilation-pipe over the roof.

Chamber has air leaks, must be airtight

Mount a vane on the ventilation pipe.

4. Stoppage in the Separator

- **A too high peak has been built up in the bio-chamber.**

Rake the peak.

- **The wires in the separators wire-ring are bent or crossed.**

Straighten the wires,

- **The inlet of the separator is not fully inserted into the socket.**

Adjust.

5. Stoppage in the outlet

See installation guidance

The inclination of the pipe from the WC is too great

Unblock the outlet

6. Flies in the Bio-chamber

Wrong material added to chamber - eg kitchen scraps

Remove offending material &/or spray the inside of the Bio-chamber with an appropriate insecticide.