

# AQ | AQUA ADVANCED

WASTEWATER & IRRIGATION SYSTEM

## INSTALLATION MANUAL

# **Aqua Advanced Wastewater & Irrigation System**

## **Installation manual**









## SITE PREPARATION

Aqua Advanced may be installed above ground or in ground. In areas where the groundwater level is high or where soil drainage is poor, special consideration should be given to anchoring the system in place. The same considerations are present if there is a risk of flooding at the point of installation of the system. Consider ensuring that the base of the system when in ground is at or above the expected water table level. These considerations need to be made with the required invert level in mind.

Above ground installations must be on a level area that has been lined with 50mm of sand or gravel. The area must be appropriately shored to prevent the scarification of any supporting materials.

Similarly an AQ Advanced installation may be installed partially above ground or in sloped areas. In both instances the area must be levelled after installation so that the tank cannot be displaced by soil movement.

The highest risk environment is severely sloped areas (**<30%**). In these environments the system must be supported by using appropriate shoring materials to allow backfilling so that the side of the installed tank is not visible.

In all instances hold down anchors do not need to be installed if they are exposed.

Areas where the soil may be aggressive (e.g. acid sulphate soils) some consideration should be given to the possibility of corrosion and other issues. The polymer tank and stainless steel anchors / fixings are designed to withstand attack from acid sulphates, however if there is any doubt seek advice from Everhard Industries.

The hole depth required to install the system depends on the fall of pipe due to the distance of the tank installation from the wastewater source. The excavated hole must not be so deep that Tank Top Covers will be completely covered. Tank Inspection and Access Covers MUST be above final ground level.

### **Key excavation dimensions for the single tank polymer system are:**

Surface to floor of inlet pipe trench	551 mm
Inlet trench to base of excavated hole	1,800 mm
Total maximum depth required	2,351 mm
Excavation diameter (single tank system)	2,200 mm
Depth to discharge pipe connection	248 mm

### **Key excavation dimensions for the single tank Concrete system are:**

Surface to floor of inlet pipe trench	781 mm
Inlet trench to base of excavated hole	1,764 mm
Total maximum depth required	2,545 mm
Excavation diameter (single tank system)	2,200 mm
Depth to discharge pipe connection	517 mm

The hole should have no matter projecting inwards. No roots or foreign material should be present. The finished excavation must allow two anchors for the tank, from 100 mm uPVC Sewer grade pipe not less than 1700 mm long. Stainless Steel cables with Shackles are provided to secure the anchors to the Everhard Tank. This anchorage system will meet the minimum normal requirements. Extra anchorage may be needed in adverse or difficult conditions.

The hole should be finished with clean bedding sand, to a depth of 50 mm when compacted. The base of the hole must be even, flat and level.

## **JOB PREPARATION**

No special tools are required for the installation of the AQ Advanced system by the installing plumber or electrician. Standard ranges of tooling typically carried by these trades should be sufficient.

Lifting operations need to be considered where the system is not placed directly into the hole by the delivery vehicle and driver. Make sure that a suitable crane is available with appropriate lifting slings, including a spreader bar to eliminate the risk of side loads being applied to the tank.

The system should only be installed by licensed trades people, who must follow these instructions precisely in order to ensure the correct method of installation for the system is achieved.

## **DELIVERY OF THE SYSTEM**

Please ensure that the following parts are included in the delivery of the system:

- / Water treatment system assembly, comprising a 4,000 litre polymer tank with welded in riser, polymer lid and polymer inspection cover (1 of)
- / Tank inlet fitting (1 of)
- / Sealing gasket (1 of)
- / Stainless Steel screws (approx. 36 total, including 16 for the lid, 6 for the inspection cover, 6 for the inlet, 4 to secure the control box, 4 to secure the control box lid)
- / 100 mm cap with fitted mozzie proof vent (1 of)
- / Stainless steel rope and shackles (8 of)
- / Control box (1 of)
- / 12mm uPVC Air Elbow (2 of)
- / Foam Insulating Seal Sleeve (2 of)
- / Air Pump (2 of)
- / Transparent Tube (1 of)

- / Spring Clips (4 of)
- / Control Box Cover (1 of)
- / Screwed Hose Connector (1 of)
- / Recycled Water Sign (2 of)

The specified irrigation package should also be included. Several packages are available, each comprising a number of sprinklers or discharge nozzles, and the appropriate hoses, control valve, and fittings to allow them to be correctly installed. Some packages may include an In-Line Filter for the treated discharge. Refer to the selection list for details.

**IMPORTANT:** Advise the householder NEVER to alter any part of, or add to, the irrigation system supplied without the manufacturer's advice. Otherwise, alterations may overload the Treatment Tank Discharge Pump, contravening the terms of the operating licence and / or Warranty.

## INSTALLATION OF THE SYSTEM

If it is possible to do so, the delivery vehicle may be able to lift the system directly into a properly prepared excavation to prevent the need for double handling and extra lifting operations. If this is not possible, the system will need to be lifted using approved lifting methods that include the use of spreader bars to ensure that the system is not damaged when it is lifted. Make sure that when you are ready to lower the system into place, the inlet is aligned with the sewer pipe that will be feeding into the system.

Installation of the system must be completed according to AS/NZS 3500.1 and AS/NZS 3500.2 (or any standards that may supersede them).

Once installed, all surface water and storm water must drain away from the system, with no pooling or ponding of surface water allowed around the installation.

**Follow this process for completing the installation.**

## PRE-INSTALLATION ASSEMBLY

- / Assemble Inlet Fitting (short tailed Tee) and Seal Gasket into the inlet hole in the wall of the Tank. The longer tail of the Tee must point downwards inside the tank. Secure with six Stainless Steel Screws. Tighten all Tank Inlet and Outlet Fitting Screws enough to pinch Gaskets.  
**DO NOT OVER-TIGHTEN SCREWS.**
- / Add the inlet extension to the inlet fitting, and glue into place using PVC Adhesive.
- / Push the 100mm uPVC Cap firmly home on the upper end of Inlet Fitting to stop unpleasant odours entering the Treatment Tank.

## GROUND ANCHOR PREPARATION

- / Fill Ground Anchors (100mm uPVC Sewer pipe not less than 1700mm long) with sand, and cap ends. Attach to the Tank. Two Anchors is the absolute MINIMUM. If only using two Anchors these must NOT be positioned under tank inlet. More Anchors will be necessary if the soil can saturate with water, or cannot form a homogenous mass to hold the Tank in place, or if required by Local Authority. Four Anchors should form a square around each Tank. Secure the free end loops of cable around the ends of each Ground Anchor Pipe, with two cables to each Anchor.
- / Fit Shackle pin in each Stainless Steel cable through pre-drilled holes in vertical ribs of each Tank. Make it secure.
- / All Anchor Pipes must hang level beside the Tank, and be about 150mm off the bottom of the excavation, with cables fully secure and all fastenings completely tightened. Sand-fill and cap Anchors to help tighten cables and ensure maximum effect. If sand is not available then use material from site providing it can be adequately compacted inside the anchor tube. Cables MUST NOT be run through the anchor pipes as they may cut through the pipe when under load.

## SYSTEM INSTALLATION

- / Lower the Tank carefully into the prepared hole (DO NOT DROP the Tank into the hole) and adjust to the correct position using only suitable and approved lifting equipment. The Tank Inlet should be in line with the inlet pipe trench.
- / Use a spirit level across and along the flat sections of Tank Top Covers to ensure the Tank is level and firmly seated. Pipe Anchors should hang horizontal beside Tanks with NO SLACK in the cables.
- / Natural Tank buoyancy tends to allow flotation in wet soil. Ground anchorage is needed to ensure that partially empty Tanks remain in the ground. Where backfill may not provide a homogenous mass able to overcome the uplift effect on Pipe Anchors, extra anchorage is essential - for example where the water table is very high and/or the soil is stony. Typical examples are precast Reinforced Concrete Slabs placed over Anchor ends, or several bags of pre-mixed Concrete over the ends of Pipe Anchors. Quantities of concrete may also be poured at equal intervals around the base of the Tank so that the lower ribs of the Tank wall are covered. When set, these will help secure the Tank and prevent movement.
- / The tank lid should be screwed into place, ensuring the screws are driven into the securing rib moulded into the side of the tank.
- / Do NOT complete backfill operations at this point. Backfill should be carried out AFTER final connections etc.
- / Connect inlet piping to the tank connection fitting. This accepts standard 100mm uPVC SWV pipe with socket end for a rubber ring joint to permit minor misalignment. DO NOT use a Pan Connector, or rely on Solvent Cement for pipe connection.

- / Using Solvent Cement, fit the Air Supply Pipe Bend to the Air Manifold on the Inner tank Assembly. The upper end of the Supply Pipe should project up through the Tank Top Cover Inspection Opening opposite the Treatment Tank Inlet.
- / Place the lid on the tank. Screw it into place, making sure that the screws are driven into the thick part of the rib. This ensures the lid is firmly affixed and helps to prevent unauthorised access to the system. The lid does not need to be sealed, however if sealing is desired we recommend the use of an adhesive backed foam tape. This provides a good seal and is re-usable without creating the mess and waste associated with using caulked sealing products.
- / Position Control Box on the Tank Top Cover. The Air Pipe should enter through the smaller of the pair of holes in the base. The larger hole of the pair is for the leads to the discharge pump and float switches. The remaining Electrical Main Connection point should be above the Tank rim. Secure the Box to the Top Cover with four Stainless Steel Screws.
- / Use solvent cement to secure the uPVC Elbow on the upper end of the Air Supply Pipe, with the open end facing towards the Tank centre.
- / Run cables from the two Float Switches and Submersible Pump in the Inner Assembly through the larger hole of the pair in the Control Box bottom. Pass the pump plug through first, then the switch connections. Fit the cables into the Insulating Seal Sleeve and work it into the hole in the Control Box floor.
- / The lead from the High level Float should be plugged into the special small socket marked HW on the plate mounted inside the Box. The Low level switch should be fitted to the small socket SW on the plate mounted inside the box. The Lead from the Submersible Pump is plugged into one outlet in the double mains socket inside the Control Box.
- / Place the Air Pumps inside the Control Box. The blower for the aerators is plugged into the second outlet of the double outlet. This Air Pump outlet should be connected with a short piece of flexible transparent tube to Elbow. Secure with Spring Clips. The other blower is plugged into the single power outlet, as this outlet is turned on and off intermittently under certain operating conditions.
- / Connect the small bore tube from the Pressure Switch inside the Electrical Connection Box to the barb-tail on Elbow.
- / Fit the Box Cover to the Box.

## **ELECTRICAL CONNECTIONS**

- / Electrical connections must be made by a qualified and licensed Electrician, and must be completed to the relevant Standards, Codes of Practice, Legislation etc.
- / Connect Control Box to power supply. Cables must be installed by a qualified electrician and protected by suitable conduit. Rigid conduit from supply should connect to underground flexible conduit at Control Box allowing a free loop of cable at the side of the Tank for ground movement etc.



- ## WIRING SCHEMATICS

## DISCHARGE TO OUTLETS

- / Attach the screwed Connector on the 25mm heavy flexible tube to the Discharge Outlet in the sidewall of the Tank, and run the tubing in a prepared trench to the approved disposal area.
- / Attach the secondary lines from the heavy tubing to the chosen sub-surface irrigation devices, or above-ground sprays using the barbed connector and clips supplied.
- / Where Rotary Sprinklers are used, an In-Line Filter should be fitted into the discharge pipe before the first Sprinkler.
- / The disposal area should be clearly marked at each end with Caution signs. The area must not be open to general traffic.
- / Irrigation area access must be restricted to maintenance personnel. Do not disturb ground once suitable vegetation is planted.
- / Failure to display Caution signs is an offence. Altering any part of standard discharge systems may affect contracts.

**Note:** if power is not yet available on site (due to progress of a new build for example) a suitable generator set may be used for the purposes of setting up and commissioning the system.

## COMPLETING THE INSTALLATION

- / First, use fresh water to fill the pump out chamber to approximately two thirds full. This would be the point at which the float switch on the pump would activate if power was connected.
- / Fill the clarification chamber with clean fresh water until water enters the aeration chamber.
- / Continue to fill the system until the water has back flowed into the secondary and primary chambers. Approximately 3,000 litres of water will be required in total.
- / Check for leaks around the Inlet and Outlet Fitting and pipe connections. Apply silicone sealant and tighten the Screws if the Fitting Gaskets leak. It may be necessary to remove and reseal the rubber ring if the Inlet connection is leaking.
- / Switch on electrical power to the system. Switch on the Air Pumps. Switch on the Submersible Pump to ensure it operates satisfactorily, switching itself on and off. The Pump must leave sufficient water in the Chamber to submerge the Pump inlet.
- / Check the position of the air valves – these were set at the factory and should not need adjusting. Firstly, check the graduated valve is set to '45', then check that the sludge return valve is closed. There are two valves to balance the output of the aerators – throttle the most vigorous aerator back until it matches the performance of the other aerator. Finally, the skimmer valve should be set to 45 degrees, or about half way through its operating range.
- / Keep filling the Tanks and switch the Submersible Pump off to test the High Water Level Alarm. This will require another 1,000 litres of fresh water. When the water level in the Clarification Chamber is near the top, the house Warning Panel's Red Light and Buzzer should switch on automatically. Stop filling the system.

- / Switch the Submersible Pump on. The Pump should start. If it does not, check the Pump Float is free.
- / The air lift pump will pass water from the clarifier to the pump out chamber. When the water level in the clarifier falls, the Warning Light and Buzzer should switch off. If they do not, check the High Level Float is not jammed.
- / Pressing the Panel "Mute" Button only cancels the Buzzer, and does not cancel the light. Alarm conditions will remain until the system is back within design and operation parameters.
- / The Air Pump should produce bubbles in the Media Space water. Switch Air Pump off to test the low air supply alarm. It may take a few seconds before the Warning Light and Buzzer activate as pressure in the system dissipates. Switch Air Pump on. Alarm should go off automatically.
- / At this point, check all connections , inlets and outlets for any signs of leaks. If leaks are present, repair as necessary.
- / Check again that the graduated valve that supplies air to the air lift pump is set at '45'. A setting higher than this will reduce final effluent quality and setting lower than this will reduce system capacity. It is important to get this setting right to make sure the system runs as specified.
- / Place the required number of Chlorine Tablets in the Dispenser Unit. Chlorine cannot legally be transported with the system. Ensure the correct specification for Chlorine Tablets is used.
- / Fit the Tank Vent to the Inspection Opening above the Inlet and lock down.
- / Fit Tank Access Cover and secure with six Stainless Steel Screws. DO NOT OVER-TIGHTEN. If sealing is required, use a good quality adhesive backed foam sealing tape, as this is a cleaner, quicker and more environmentally friendly seal as it is re-usable and does not involve the mess / waste associated with caulked sealing products.
- / Ensure that all lids, covers and access holes are secure and will prevent the unauthorised or accidental access of persons or other creatures.

## BACKFILLING

- / Commence backfilling operations only when the system is filled with water AND the lid has been firmly screwed into position.
- / DO NOT BACKFILL WITH SAND.
- / Stabilise dense soil with cement and backfill to 300mm over Anchors.
- / LIGHTLY compact around Tank.
- / Complete backfill and fill irrigation trench with clean soil.
- / Clay smeared around the top of the excavation will help prevent stormwater penetration.
- / AVOID SOIL WITH SHARP ITEMS, GRAVEL, ROCK, RUBBLE, OR FOREIGN MATTER.
- / If you wish, you can cover sloped upper surfaces of the Tank Top Covers with light material such as pine bark or mulch. DO NOT cover with soil.



## RISK AND SAFETY CONSIDERATIONS

Before starting any work, ensure that adequate provisions are made for any reasonably foreseeable elements of risk, including risk to personal safety and the safety of others, risk of damage to the system and components, and any risk of impact on the environment where the system is being installed. Aim to leave the site clean and tidy, and ensure that all waste / excess materials are removed or disposed of in a responsible manner. Some considerations may include (but are not limited to);

- / The lid to the AQ system is not designed to take pedestrian or vehicular traffic. Do not allow traffic to pass over the system or serious damage and/or injury may occur.
- / The movement of vehicles around the site, including delivery vehicles, plant and equipment.
- / Excavating holes for the system, consider depth and the risk of people, animals and wildlife falling into the hole. Also consider if shoring is needed for unstable ground or soil types.
- / Trenching for power and sewer lines – use services such as Dial Before You Dig to ensure that the excavation path is clear of obstacles.
- / Electrical safety when making connections and modifications.
- / Overhead power lines may need to be considered when lifting operations are completed.
- / Lifting of the system from the transportation vehicle and lifting the system into the excavated hole. Use approved lifting equipment that is rated for the job and safe to use. Do not work under slung loads.
- / Using plant, equipment and associated attachments (e.g. rock breaker) as part of the installation. Consider the size and type of access, whether the machines will fit, is there a licensed operator, start up and shut down of plant and equipment.
- / Operation of power tools, such as drills, demolition hammers / rock breakers, concrete cutting equipment (silica awareness), angle grinders, reciprocating and circular saws, battery chargers etc. It may not be safe to use electrical power tools around a wet environment.
- / Consider the noise generated as part of the installation. Adhere to local legislation, laws etc.
- / Handling of water needed to fill the system for commissioning. Ensure that persons (particularly children) and animals cannot fall into a partially filled system and drown.
- / Potential of site runoff entering creeks or other waterways.
- / Manual handling and lifting of heavy, large or bulky items.
- / Safe handling of chemicals (pipe adhesive, solvents, chlorine, fuels and oil etc).
- / Safe delivery, storage and transportation on site of any materials delivered in bulk.

## SYSTEM DESIGN SPECIFICATIONS

The Aqua Advanced Wastewater & Irrigation System is designed to conform with the following specifications:

SPECIFICATION	DETAILS OF CONFORMANCE
<b>Legislative Requirements</b>	Certified to conform with the requirements of AS 1546.3:2017 and any amendments – Onsite Domestic Wastewater Treatment Units Part 3: Secondary Treatment Systems
<b>Power Consumption</b>	1.22 kWh per 1000 litres processed
<b>System Performance</b>	Complies with the requirements for Advanced Secondary Treatment
<b>Hydraulic Loading</b>	System is rated for 0 to 1,200 L/day Equivalent to 8 Persons consuming up to 150 litres per day.
<b>Organic Loading (average)</b>	Suspended Solids and BOD5 - 70 g per person per day
<b>Organic Loading (range)</b>	Suspended Solids and BOD5 - 150 mg/L to 750 mg/L per day
<b>Nitrogen Load (average)</b>	15g per person (100 mg/L)
<b>Phosphorous Load (average)</b>	2.5 g per person (17mg/L)
<b>Filter Media</b>	Type 1: Polymer Bio Mesh Type 2: Polymer tube segments Type 3: Polymer Bio Balls
<b>System Capacity</b>	8EP, or a household of 8 persons
<b>pH of Influent</b>	pH 6 to pH 10
<b>Wastewater Temperature</b>	The system operates at air temperatures between -2 and 45 degrees C. Wastewater between 13.1 and 28.3 degrees C
<b>Disinfection Equipment</b>	Chlorine Tablet dispenser, min 30 minute contact time @ max flow
<b>Typical Sludge Pump Out Interval</b>	Two Person Household: <b>13.2 years</b> Four Person Household: <b>6.6 years</b> Six Person Household: <b>4.4 years</b> Eight Person Household: <b>3.3 years</b>
<b>Emergency Storage Capacity</b>	Minimum 1,086 Litres

All AQ Systems must be installed according to AS/NZS 3500.1 and AS/NZS 3500.2 (or any standards that may supersede them).





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## **MANUFACTURER'S DETAILS**

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