

Findlater PA 5x5

Aerated Wastewater System

Technical Booklet

PA 5X5 AERATED WASTEWATER SYSTEM
TECHNICAL BOOKLET

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Contents

1. Introduction.....	2
2. Key Features	2
3. How the System Works	3
3.1 Tank 1 - Primary Tank.....	3
3.2 Tank 2 - Secondary Tank.....	3
3.3 Aeration Chamber 1 & 2.....	3
3.4 Clarification Chamber.....	3
3.5 Pump-out Chamber	4
4. Biological Performance and AS/NZS Standards.....	4
4.1 Biological	4
4.2 AS/NZS Standards.....	4
5. Daily Loading Rates	4
5.1 Recommended Daily Loading Rates	4
6. Findlater PA 5x5 System Tank Volumes, Dimensions and Weights	4
6.1 Primary Tank.....	4
6.2 Secondary Tank	4
6.3 Dimensions	4
6.4 Weight	5
7. Key Component Specifications.....	5
8. System Power Usage	5
8.1 Nitto LA80B Air Pump.....	5
8.2 Davey D42 A/B Pump-out Chamber Pump.....	5
9. Warranties.....	5
10. Maintenance	5
10.1 Maintenance (Cont.)	6
11. OSET NTP Trial 8 (2012-2013) Rotorua	6
12. Contact Us	6
12.1 Office and Factory	6

1. Introduction

With the help of industry leading process engineers, overseas component suppliers and our own practical experience we have designed the **Findlater PA 5x5** aerated wastewater system. The system has been designed without compromise to be a simple, robust and low maintenance domestic aerated wastewater system that uses only quality components.

Our system utilises the latest proven aerated wastewater system technologies and is housed in two durable 5,000 litre concrete tanks.

2. Key Features

- Two tank system with a large working volume.
- Orenco Bio Tube outlet filter.
- Low noise level Nitto piston air pump.
- Quality disc type fine air diffusers – Each independently adjustable.
- Superior Bio Blok media – Specifically engineered for aerated wastewater systems.
- Industry standard Davey D42A/B-3 pump-out chamber pump.
- Electrical controller
 - Programmable air pump timer - Run air pump as required.
 - Both audible and visual alarms are part of the controller mounted on top the tank.
 - Air and Pump-out chamber pumps plug into normal household sockets, so there is no need for an electrician when replacing either pump.
- Primary wastewater cannot overflow into other chambers as it is in its own separate tank.
- Easy to install - As tanks can be lifted by a 12 t digger - Handy on difficult or remote sites.
- Low invert level 1.625 m – Makes installation easy, great for high water table sites.
- Concrete tanks that won't rupture, tear, crush, warp or puncture like plastic or fibreglass tanks.
- Easily transportable on trucks 2.4 m long x 1.5 m wide.
- Two large access points which can be extended using standard concrete manholes and concrete pipes.
- A service person following correct *confined spaces safety practices* for wastewater tanks can easily enter all tank chambers, should this ever be required.
- All components can be removed and replaced through the access points.
- All chambers have large working volumes to ensure a robust waste water treatment process.
- Low long term ownership costs – Not just short term power saving costs.

3. How the System Works

3.1 Tank 1 - Primary Tank

This tank is divided into two chambers by a longitudinal division wall, which creates a long flow path two sided primary treatment tank.

Household wastewater flows into the first half of this tank where under quiescent conditions the settle-able solids sink to the bottom of the tank to form a sludge layer. Oil, greases and other light materials float to the surface, where a scum layer forms as floating materials accumulate. The organic material on the top and bottom of the tank undergoes facultative and anaerobic decomposition and is converted into more stable compounds and gases. While the sludge layer in the bottom of the tank will eventually decompose biologically, it will still need to be periodically emptied due to the gradual build up and very slow decomposition.

In the second half of this tank, liquid wastewater from the first half comes into contact with recycled wastewater from the end of the process. This assists with reducing the nitrogen content of the treated effluent.

All wastewater leaves through the outlet filter.

3.2 Tank 2 - Secondary Tank

This tank is divided into four large chambers

- Aeration chambers 1 & 2
- Clarification chamber
- Pump-out chamber

Wastewater from the primary tank enters *aeration chamber 1*, it then flows down through the Bio Blok media and enters *aeration chamber 2*. Here in *aeration chamber 2* the wastewater then flows up through the Bio Blok media, before flowing into the *clarification chamber*. After this, the wastewater flows into the *pump-out chamber*.

3.3 Aeration Chamber 1 & 2

Each aeration chamber has a disc type fine air diffuser located centrally below the media. Air is pumped through the diffusers, creating fine air bubbles that rise through the media. This process mixes the wastewater and provides oxygen, whilst still keeping the solids in suspension. Naturally occurring bacteria, which require oxygen to grow, form a biomass on the media. Through an aerobic biological oxidation process, these microorganisms consume the oxygen and wastewater pollutants, which reduce the levels of bio-chemical oxygen demand (BOD), suspended solids (SS) and ammonia (NH₃) in the wastewater. As the bacteria die they fall off the media and flow through to the clarification chamber.

3.4 Clarification Chamber

Here the wastewater settles and the solids collected at the bottom of the chamber are returned to second half of the primary tank to reduce nitrogen levels in the wastewater (through a process called denitrification). The wastewater finally flows up through a circular weir to the pump-out chamber.

3.5 Pump-out Chamber

Here the wastewater can settle out again before being pumped out, via a 130 µm (micron) disc filter to some form of land disposal system, usually in the form of effluent drip line.

4. Biological Performance and AS/NZS Standards

The **Findlater PA 5x5** waste water system has been designed to meet or exceed the following performance standards:

4.1 Biological

5-day Biological Oxygen Demand	BOD ₅	20 g/m ³
Total Suspended Solids	TSS	30 g/m ³
Total Nitrogen	TN	25 g/m ³

4.2 AS/NZS Standards

Tanks	AS/NZS 1546.1	: 2008
On Site Domestic Wastewater Treatment Units		
Aerated Wastewater Treatment Systems	AS/NZS 1546.3	: 2008
On-site Domestic Wastewater Management	AS/NZS 1547	: 2012

5. Daily Loading Rates

Please contact us for further information if you have any questions regarding Daily Loading Rates.

5.1 Recommended Daily Loading Rates

- 6 to 8 people
- 1600 litres per day

6. Findlater PA 5x5 System Tank Volumes, Dimensions and Weights

Both primary and aeration tanks have internal volumes of 5,000 litres each.

6.1 Primary Tank

- Working volume	4,200
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6.2 Secondary Tank

- Aeration chamber 1 working volume	830
- Aeration chamber 2 working volume	811
- Clarification chamber	1,360
- Pump-out chamber	<u>960</u>
	8,161 litres
Emergency storage capacity in Tank 2	1,039 litres

6.3 Dimensions

Each tank has external dimensions of 2.4 m long x 1.485 m wide x 1.9m high (excluding access turrets which are usually another 0.5 m higher than the top of the tank lid).

6.4 Weight

Each tank weights approximately

3.6 Tonnes when empty

7. Key Component Specifications

- 5,000 litre reinforced 35 MPa concrete tanks and lids manufactured in our factory
- Orenco Bio Tube septic tank filter
- Nitto 80 litre/minute piston air pump

Model	LA80B
Power	86 Watts
- Bio Blok 200 media
- Environmental Dynamics International 9" disc fine air diffusers
- Programmable electrical controller from Taylex Industries
- Findlater Construction designed clarification chamber outlet weir
- Davey D42A/B S/S pump

Amps	4.0 A
Input	0.9 kW
Output	0.6 kW
Max. Flow	130 L/min.
Max. Head	30 m
- Azud 130 micron disc filter, 50mm outlet and inlet

8. System Power Usage

8.1 Nitto LA80B Air Pump

86 Watts

Under normal operation this pump will run continuously, but it can be programmed by use of the electrical controller to run less frequently if required.

8.2 Davey D42 A/B Pump-out Chamber Pump

0.9 kW

This pump will only run on demand when the pump-out chamber requires emptying, and will not have a significant effect on the systems overall power usage.

9. Warranties

The electrical controls, air and pump-out chamber pumps have a two year full replacement warranty.

10. Maintenance

When the system is first installed it **must** be filled with fresh water and commissioned by a trained service person. They will check that the system is working correctly and make adjustments as required. This will ensure that the system gets off to the best possible start.

10.1 Maintenance (Cont.)

It is important that the system be maintained regularly at six monthly intervals by a trained service person. The Local Regularity Authority will usually require any owner of this type of system to enter into a service contract with an experienced service provider.

When servicing the system the service provider must follow our detailed check list to ensure the system is operating correctly. They will also clean parts of the system, make adjustments and report on the overall condition of the system.

Normally three copies of this service check list are required:

- Firstly, one for Findlater Construction's records.
- One is sent to the system owner along with the service invoice.
- Another is usually sent to the Local Regularity Authority. This is quite often a condition of the Consent the Local Regularity Authority approved when the system was first installed. It could also be part of a Resource or Discharge Consent.

It should be noted that a lot of consents to install wastewater systems now only run for a prescribed time, quite often 15 years, after which the wastewater system owner has to apply to renew the consent.

11. OSET NTP Trial 8 (2012-2013) Rotorua

This system is entered in the 8th On-Site Effluent Treatment National Testing Programme (OSET NTP) trial being held in Rotorua. Operation will commence in October 2012, with testing taking place in November 2012. Initial results from the trial should be available by the end of 2012.

If after the testing, it is deemed that system modifications are required to meet the standards specified above, we would naturally make these modifications standard on new systems and retrofit these changes to any existing systems.

12. Contact Us

12.1 Office and Factory

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