Installation & Technical Handbook for Marsh Industries Products

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A Member of

BRITISH WATER

SBWWI
Introduction.
Our products are manufactured to the UK’s and European’s highest standards and to the Quality standards, ISO 9001:2000. Marsh Industries Limited, occupies a unique position in the field of reinforced plastics, having the technical expertise and experience gained from over 30 years in the Construction Industry in the United Kingdom. The experience places Marsh Industries in a position to offer an advanced range of superior products and systems to meet the requirements of its customers

• Our product range can be put into service immediately as its pre-commissioned, once the installation instructions have been fully complied with.
• They should be checked once the electrical connection is completed, to ensure that it is running correctly.
• For sewage plants you should hear a hum from the blower and there will be bubbles of air coming up through the water.
• If the electrical connections are not completed correctly, the system will not run and a critical failure may result.
• Always refer to the electrical drawings in this handbook and supplied with the system.
• In the case of systems not being wired up correctly, warranties will be null & void.

Sewage & Septic Tank Ranges Only

Please Do.
• Ensure that all of the information contained in the handbook is adhered to at all times.
• The end user (not the purchaser) of the plant is responsible for the operation and maintenance of the system and its discharge either direct to a watercourse or through a percolation area.
• It is important that the product is operated under the conditions for which it is designed. Any variation in these conditions could lead to the unit not performing to its full potential and the discharge may not meet the required standards.
• Ensure that the system has been installed correctly, in accordance with the manufacturers specifications.
• Ensure that the air blower has been wired up, by a competent electrician.
• Pre-Commissioned plant: Once it is put into use (plumbed to the house and electrical wiring completed) it is now up and running. Check that there is a hum from the blower and that there are bubbles rising from the middle chamber.
• Maintain the system in accordance with section this handbook.
• Servicing is mechanical only, and does not include de-sludging (emptying of the system). You must desludge the system in accordance with the guidelines laid down in this handbook.
• Soak ways, drains and the emptying of primary tanks remain the responsibility of the client and damage to the installation due to the influx of surface water or the backing up of soak ways or drains is not covered by this service agreement.
• Phone Marsh Industries if you have any technical queries regarding the maintenance and servicing of your system.

Please Don’t.
• Alter in any way, any part of the system or internal parts supplied with the system.
• Open the plant cover without firstly isolating the mains power.
• Marsh Industries Limited shall not be liable for any damage or loss, including consequential loss, caused by the failure of any plumbing equipment or failure caused by the inclusion of gross solids, (e.g. – disposable diapers or sanitary towels etc) in the waste water treatment unit.
• To ensure the continuance of the systems performance, the user has to take certain precautions including the following:
  • The design loading of the plant should not be exceeded.
  • High volume discharges such, as those from swimming pools and Jacuzzi’s must never enter the system.
  • Surface water must not enter the system.
  • Do not allow large quantities of chemicals to enter the system including:
    ~ Water softener regenerate.
    ~ Disinfectants.
    ~ Strong Acids and Alkalis.
    ~ Oil or Grease.
    ~ Pesticides.
    ~ Photographic Chemicals.

For Guidance Only
Locating the Septic Tanks & Sewage Plant

Minimum distances for locating Sewage Plant are set out below. These are minimum distances only; the unit should in fact be located as far away as is practically possible. However, when locating the unit, consideration should be given to allow adequate access for the vacuum tanker. The unit should be located not nearer than 7m from any other dwelling as set out in the wastewater treatment manual. Guidelines of minimum distances for locating the sewage plant are set out in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Any dwelling</th>
<th>Watercourse or stream</th>
<th>Spring or well</th>
<th>Lake</th>
<th>Site boundary</th>
<th>Road</th>
<th>Slope, break or cuts</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Plant</td>
<td>7m</td>
<td>10m</td>
<td>30m</td>
<td>50m</td>
<td>3m</td>
<td>4m</td>
<td>4m</td>
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<tr>
<td>Percolation area</td>
<td>10m</td>
<td>10m</td>
<td>30m</td>
<td>50m</td>
<td>3m</td>
<td>4m</td>
<td>4m</td>
</tr>
</tbody>
</table>

Minimum separation distances in metres

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**Marsh Ensign & Uni:Gem & Five Filter Installation Detail**


Select a suitable location for the sewage plant (s). This will be normally at a ground level lower than the properties being drained and allow for the falls in site drainage. Check that no other structure – or special access – is required over the selected spot. Check that no underground cable, pipe or service duct, lies underneath.

In normal to good ground conditions the plant requires a 150mm Concrete Base with a 150mm pea-shingle surround to the top of tank. Excavate the minimum opening in the ground to receive the plant and pipe work to be used. This opening should be 150mm wider and deeper than the sewage plant in normal/good ground conditions. The sides of the excavation should be battened for stability. Fill with clean water to overcome the effect of buoyancy as you pour the pea-shingle surround consolidating around the base of the plant. Place further pea-shingle as before, at least 150mmm thick around the chambers or shafts.

In areas of high water, shifting running sand or water logged sites a polyethylene membrane must be fitted between a 250mm hard core base and the concrete. A dewatering pump must be used to control any ground water present until the concrete backfill is set. In wet or high water table sites/ground conditions the plant requires a 250mm Concrete Base with a 250mm concrete surround to the top of tank. Excavate the minimum opening in the ground to receive the plant and pipe work to be used. This opening should be 250mm wider and deeper than the sewage plant in these ground conditions.

Place in position the mass concrete base, minimum thickness 250mm of CP 25Kn/mm² strength. Lower the pump chamber onto the damp concrete allowing the base to settle in, ensuring that the inlet and outlet pipes are correctly aligned. Fill the tanks evenly from both ends of each unit, or in multiple chambers through each turret evenly. With clean water to overcome the effect of buoyancy as you pour the concrete consolidating the concrete around the base of the plant. Place further mass concrete, as before, at least 250mmm thick around the chambers to just below the top of the pipe connections. Consolidate the concrete, being careful not to damage the tank or tank inlet/outlet pipes. Where there are multiple tanks there must be a minimum of 450mm distance between the tanks this 450mm void must be filled with concrete during the pouring.

Do not under any circumstance use vibrating pokers. Use warning signs around the access turrets. Connect up the site pipe work to the inlet and outlet of the plant, and draw the cables and nylon diffuser tubing through the ducting from the pump/s diffuser and high level alarm if included. Ensure the sewage plant is fully ventilated connecting 110mm pipe to the air vent ports on the tank. Finish off the surface at the required level, depending on the final ground cover required i.e. topsoil, tarmac, gravel etc. It is most important that once the sewage plant is in situ with all the inlet connections made, the drainage system should be flushed out, and all sand, debris etc. removed from the sewage plant.

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** For Uni:Gem installation ensure the septic tank is vented and the head of the soil run is not vented via an air admittance valve, to avoid odour escaping from the septic tank (when the solids are disturbed by incoming sewage from the dwelling) it may be advisable to fit a 100mm non-return valve between the septic tank (drainage pipe) and the Uni:Gem. Please ensure the Uni:Gem is vented with a 4” (110mm) pipe, the 4” air port is predrilled in the top of the Uni:Gem.

**Non vehicle loading**

The plants are designed for a minimum cover of 600mm of backfill or 300mm plus 100mm reinforced concrete slab. **Vehicle Loading – Car Axle Weight 10 Tonne Maximum.**

For vehicle loading the tanks must have a minimum cover of 750mm of backfill plus a minimum 200mm reinforced concrete slab designed to take the maximum load without such loadings being transferred to the tank itself for this application a structural engineer must be consulted.

**The electrical installation of the unit. All 230v. Single Phase.**

**Standard Gravity system with Air blower:** These will conform to European Standards.

All electrical work to be carried out by a qualified electrician, the work must be carried out strictly to the manufacturer’s instructions and to the relevant national rules for electrical installations. A 230V, 6 Amp, water proof plug and socket connector will be supplied with this unit.

The customers’ minimum responsibility shall consist in the provision of:

A single run of 1.5mm (or greater than 1.5mm dependent on distance) two core + earth – two conductors plus earth conductor – steel wire armoured (SWA) cable from the customers distribution cabinet to the tank unit socket.

Cable protection via 10 amp MCB protected by residual current detector (RCD), rated 230V, AC and tripping current 0.03amps. The cable armour must be properly bonded to the main earth at the premises.

A control panel with alarm is available at an additional cost. Please refer to the manufacturer for further details. Once commissioned, do not disconnect the air pump. It is imperative that it is running 24 hours a day.

**Compressor alarm**

Make a small hole 1/16th of inch into the clear nylon hose that is connected to the compressor, the hole should be two inches from the actual point where the hose connects to the compressor, the unit is supplied with a small free of charge black alarm, this is normally battery powered, it can be wired. The small white tee piece needs to be cable tied to the hose, after the end opposite the valve opening is inserted into the small 1/16th hole. The one remaining end of the small white tee piece is then connected to the small clear hose that then connects to the silver port on the compressor alarm. Do not turn on the alarm until the compressor is running, once running turn the alarm on if the white valve is closed you will hear the alarm beep, and small red light will glow as you open the valve it will stop sounding and the light will turn green. A more sophisticated alarm is available at an additional cost of £350 +vat.

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Systems with and High Level Alarm and / or Pumped Outlet
All the electrical work must be carried out by a fully qualified electrician using suitable materials for the application. Electrical work must be a 230V, 6Amp, waterproof IP plug and socket connector will be supplied with this unit for the compressor and a separate IP plug and socket will be supplied for the pump and or high level alarm These will conform to European Standards.

The customers’ minimum responsibility shall consist in the provision of:
A single run of 1.5mm² four core + earth – five conductors plus earth conductor – steel wire armoured (SWA) cable from the customers distribution cabinet to the tank unit socket.
Cable protection 10 amp MCB protected by residual current detector (RCD), rated 230V, AC and tripping current 0.03amps.
The cable armour must be properly bonded to the main earth at the premises.
A control panel with alarm is available. Please refer to the manufacturer for further details.
Leave the compressor running. It is imperative that it is running 24 hours a day, every day.
Note: The steel wired armoured cable is to be routed through 25mm glands in the pump chamber, then to be terminated to the junction box.

Connections:
One core from 3 to 3, Neutral core from 4 to 4. One core from 5 to 5, One core from 6 to 6. Earth core from PE Terminal to PE Terminal.

Electricians System Start Up:
Once the electrical connection has been put in place between the plant and the fuse board in the house, the system is now operational. If the system is running correctly, a slight “hum” will be heard from the air blower and there will be air bubbles coming up from the bottom of the middle chamber, rising to the surface.

Further alarm options, for high water level or compressor power loss.
We are pleased to be able to offer our customers, the protection and peace of mind of an alarm system, specifically designed to protect your home. Various alarm systems, to a variety of different standards & specifications are available. Please consult with Marsh Industries, in order to get an alarm system that will suit your requirements. Phone alarms are also available as an optional extra.

Marsh Ultra Polylok Sewage Plant Installation Detail

Installation of the Sewage Treatment Plant.
Note: We recommend that when the system arrives on site that it is inspected for damage, from miss-handling etc. If any damage is seen or suspected, please notify the manufacturer immediately, as problems cannot be rectified easily after installation.
It is then the responsibility of the homeowner or builder to undertake the installing of the Ultra Polylok, as per manufacturers instructions. A suitably sized digger will be required to
excavate the hole and lower the Ultra Polylok Sewage treatment Plant slinging points are marked on the unit.
Once a suitable site has been chosen and excavated the following steps must be followed:

When installation is completed and the system filled with water and is plumbed to the relevant sewers etc, the electrical installation must be completed. Only then, can final commission of the system be completed.

**Note: water logged sites.**
The Sewage treatment Plant should not be placed into a water logged site. Please contact the manufacturer if there are difficulties on site due to adverse water loging.

**Installation of the Ultra Polylok.**
- A partial concrete installation is required for a dry site. A dry site is one where the water table never rises higher than the base of the Ultra Polylok.
- A complete concrete backfill may be required for wet sites. A Wet Site is one where the water table may rise higher than the base of the Ultra Polylok Sewage treatment plant.
- A complete concrete backfill may also be required where the Ultra Polylok Sewage treatment plant may be prone to some superimposed load.

**Installation procedure.**
- The Ultra Polylok shall be installed at the required depth to accommodate incoming drainage pipes. Remove any soft spots or boulders or sharp objects of any significant size (tennis ball) from the base and sides of the excavation. A level graded base is then formed using sand binding.
- A foundation of semi dry concrete is laid and levelled. The concrete shall be of sufficient grade and thickness (minimum 200mm and grade 25 N) to ensure that the Ultra Polylok is fully supported with due regard to subsoil conditions and loads imposed by the Ultra Polylok. Care shall be taken to eliminate voids.
- The system is lifted carefully into position using slings in accordance with the certificate holder’s instructions. Care should be taken to prevent damage to external flanges or pipe work and to ensure the **CORRECT ORIENTATION** of the inlet and outlet pipe work. These are clearly marked on the system.
- Level the Ultra Polylok using a spirit level. The Ultra Polylok should be 100% level. The lip of the lid should sit flush with proposed finished level of the ground so just the lid will protrude above ground. Line up the inlet and outlet pipes with the drainage pipes and percolation pipes respectively.
- The concrete is hunched up around the base of the system. Ensure that the “feet” are embedded. Ensure that the top of the tank is “dead” level and that all of the connections are lined up correctly.
- As backfilling progresses, the system is progressively filled with water, to prevent uplifting (stop the system popping out of the ground).
- The backfilled concrete is to be carefully compacted around the system, to ensure transfer of ground loads and to prevent concentrations. Vibrating pokers must not be used, as these may damage the GRP system.
Additional requirements for wet sites.

- A wet site is a site where the local water table can rise above the base of the system. Installation in a wet site may be precluded by site considerations in relation to effluent disposal. A 250mm hardcore sub-base is laid, compacted and levelled.
- The excavation is kept dry, by pumping excess water using a site pump/sump, hole/suction hose arrangement. Dewatering should be continued for as long as necessary and at least until the concrete has set. The excavation is then lined with a continuous layer of 1200 gauge polyethylene sheet. The grade and thickness of the concrete base should be designed to suit the site conditions (minimum 250 mm thickness, grade 25N).
- Where there are multiple tanks there must be a minimum of 500mm distance between the tanks this 500mm void must be filled with concrete during the pouring
- The system is to be installed and the excavation backfilled generally in accordance with the requirements for a dry site from this point on. The excavation shall be backfilled with concrete to approx. 300mm below the ground level. Allowances must be made for flexible joints at pipe connections where necessary.
- Connect up the pipe work. The system is plumbed for 160mm uPVC pipe. A short length of pipe with flexible joints should be used immediately before and after the Ultra Polylok to allow for movement between the tank and the pipe work. A suitably qualified person should then connect up the power according to the electrical installation instruction.

Marsh Polylok Filters

Marsh Polylok Filters are fitted in the final outflow chambers please check the drawing for the positioning of these, they need checking and cleaning on a regular basis normally once a month. A high level alarm should be fitted to alert the site owner of when the filter needs cleaning.

Septic Tank Installation

All site work should be undertaken by qualified personnel only.

Green Filter Septic Tank Standard Installation Good Ground conditions

**Please Note Installation Details For High Water Table In Good Ground not high water table 150mm concrete base 150mm surround.
1) Select a suitable location for the tank. This will be normally at ground level lower than the properties being drained and allow for the falls in site drainage.

2) Check that no other structure – or special access – is required over the selected spot. Provision can always be made, if necessary, to place the tank on a roadway, provided that protective backfill is placed around it and a suitable heavy-duty manhole cover is used over the opening.

3) Check that no underground cable, pipe or service duct, lies underneath.

4) Excavate the minimum opening in the ground to receive the chamber and pipe work and concrete to be used. If a machine is used to remove the spoil, the sides of the excavation should be battened for stability and a sump left in one corner for dewatering purposes if required.

5) The depth of excavation needs to be at most 500mm deeper than the overall tank depth. If it is dug by hand, the sides will require shoring up for safety, to prevent earth slippage.

6) A dewatering pump MUST be used to control any ground water present until the concrete backfill is set. Dewatering must be continued until the concrete is fully set A wet site is where the local water table can rise above the base of the unit.

7) If the tank is to be installed in a high water table a polyethylene membrane 1200 gauge in a high water table the base should be 250mm thick. In extreme cases of high water, consideration should be given to laying a 250mm hardcore sub-base before the concrete.

8) In good ground place in position the mass concrete base, minimum thickness 150mm of CP 25Kn/mm2 strength.

9) Lower the chamber onto the damp concrete allowing the base, to settle in, ensuring that the inlet and outlet pipes are correctly aligned. Slowly fill the tank with water up to the inlet pipe as the concrete is poured.

10) Place further mass concrete, as before, at least 150mm thick around the tank to just below the top of the tank. Consolidate the concrete around the top of the tank, being careful not to damage the tank or tank inlet/outlet pipes.

11) Connect up the site pipe work to the inlet and outlet of the tank, buoyancy. Finish off the surface of the concrete at the required level for the positioning of the lid, depending on the final ground cover required i.e. topsoil, tarmac, gravel etc.

For The Five Filter Ranges A Qualified Electrician Must Make The Connections To The Compressor, 230V Single Phase
The Compressor Can Be Sited Up To 10m From The Tank.

Optional Extras:
High Level Alarm, Service Contracts, Commissioning Please Contact The Office For Details
<table>
<thead>
<tr>
<th>APPROX EST. FOR THE CORRECT PLANT SIZE</th>
<th>6PE</th>
<th>10PE</th>
<th>12PE</th>
<th>16PE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUITABLE FOR ANY OF THESE COMBINATIONS</td>
<td>4 bed residence 6 people</td>
<td>2 no. 3 bed residences 10 people</td>
<td>2 no. 4 bed residences 12 people</td>
<td>2 no. 4 bed &amp; 1 no. 3 bed residences 16 people</td>
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<tr>
<td>AT WORK OR OFFICE NO CANTEEN</td>
<td>9 people working</td>
<td>15 people working</td>
<td>18 people working</td>
<td>25 people working</td>
</tr>
<tr>
<td>HEIGHT TANK</td>
<td>1935mm</td>
<td>1935mm</td>
<td>2139mm</td>
<td>2284mm</td>
</tr>
<tr>
<td>WIDTH TANK</td>
<td>1650mm</td>
<td>1650mm</td>
<td>1912mm</td>
<td>1912mm</td>
</tr>
<tr>
<td>LENGTH TANK</td>
<td>2602mm</td>
<td>2602mm</td>
<td>2860mm</td>
<td>2860mm</td>
</tr>
<tr>
<td>GROUND LEVEL TO INLET INVERT</td>
<td>500mm</td>
<td>500mm</td>
<td>600mm</td>
<td>700mm</td>
</tr>
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<td>GROUND LEVEL TO OUTLET INVERT</td>
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<td>GRAVITY OR PUMPED OUTLET</td>
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<td>Both available</td>
<td>Both available</td>
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<td>Yes</td>
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<td>250kg</td>
<td>360kg</td>
<td>375kg</td>
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<td>TESTED &amp; CERTIFIED TO EN12566-3</td>
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<td>Yes</td>
<td>Yes</td>
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<tr>
<td>VOLUME OF SURROUND CONCRETE PEASHINGLE</td>
<td>2m²</td>
<td>2m²</td>
<td>3m²</td>
<td>3.2m²</td>
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</tbody>
</table>

A treatment system for a single house with up to and including 3 bedrooms shall be designed for a minimum population (P) of 5 people.

The size of a treatment system for a single house with more than 3 bedrooms shall be designed by adding 1 P for each additional bedroom to the minimum single house value of 5 P.

E.g.:  
- House with 3 bedrooms = minimum 5 P system
- House with 4 bedrooms = minimum 6 P system (5+1)
- House with 6 bedrooms = minimum 8 P system (5+3)

will be 31 P (38 x 0.8 = 30.4)

For groups of small 1 and 2 bedroom houses:
- Flat with 1 bedroom = allow 3 P
- Flat with 2 bedrooms = allow 4 P

A treatment system serving a group of houses:
- For a group of two houses (3 and 4 P) – if the calculated total P for a group of houses is less than the minimum for a group of houses (round UP not down)
  - Where the total is 13-25 P multiply P will be 24 P (4 x 6) and the adjustment.
  - Where the total is 26-50 P multiply four-bedroom houses the total P will

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## Marsh Sewage Treatment

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>16PE</th>
<th>20PE</th>
<th>25PE</th>
<th>30PE</th>
<th>35PE</th>
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<td>5 no. bed or 6 no. 3 bed residences 30 people</td>
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<td>9 no. 3 bed residences 45 people</td>
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<td></td>
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### British Water Loads & Flows

2 bedroom houses or flats
- 12 = allow 3 P
- 16 = allow 4 P

A group of houses shall be designed by adding together the P values for each house calculated independently.

For two houses (3 and 4 bedrooms, respectively) the system shall be for a minimum of 11 P (5+6)

If a group of houses exceeds 12 P then some reduction may be made to allow for the balancing effects on daily flow of a P not down)

For 13-25 P multiply the total by 0.9 to give an adjusted P value, e.g. if there are four four-bedroom houses the total (4 x 6) and the adjusted P will be 22 P (24 x 0.9 = 21.6)

For 26-50 P multiply the total by 0.8 to give an adjusted P value, e.g. if there are four three-bedroom houses and three houses the total P will be 38 P (4 x 5 and 3 x 6) and the adjusted P
IMPORTANT NOTES
It is most important that once the tank is in situ with all the inlet connections made, the drainage system should be flushed out, and all sand, debris etc. removed from the chamber.

ADDITIONAL NOTES
If vehicular traffic will be passing over the chamber, it is ESSENTIAL that the cover slab is constructed so that there is NO DIRECT LOAD on the chamber. Also an access cover with the correct specified S.M.W.L. must be used.
THE CONCRETE BACKFILL IS DESIGNED TO PROTECT THE CHAMBER FROM EXTERNAL GROUND & WATER PRESSURE.
PLEASE ALLOW THE CONCRETE BACKFILL TO SET BEFORE PUMPING OUT THE WATER IN THE CHAMBER.

Annual Maintenance All Products:
Annual De-sludge & Inspection Of The Percolation Bed, Green Filter & Five Filter Ranges-Clean & Wash down The Polylok Filters And Refit.

Marsh Pump Chamber Installation Detail

Select a suitable location for the tank(s). This will be normally at a ground level lower than the properties being drained and allow for the falls in site drainage. Check that no other structure – or special access – is required over the selected spot. Check that no underground cable, pipe or service duct, lies underneath.
In normal to good ground conditions the plant requires a 150mm Concrete Base with a 150mm concrete surround to the top of tank. Excavate the minimum opening in the ground to receive the plant and pipe work to be used. This opening should be 150mm wider and deeper than the pump chamber in normal/good ground conditions. The sides of the excavation should be battened for stability. With clean water to overcome the effect of buoyancy as you pour the concrete consolidating the concrete around the base of the plant. Place further mass concrete, as before, at least 150mm thick around the chambers to just below the top of the pipe connections.

In areas of high water, shifting running sand or water logged sites a polyethylene membrane must be fitted between a 250mm hard core base and the concrete. A dewatering pump must be used to control any ground water present until the concrete backfill is set.
Place in position the mass concrete base, minimum thickness 250mm of CP 25Kn/mm2 strength. Lower the pump chamber onto the damp concrete allowing the base to settle in, ensuring that the inlet and outlet pipes are correctly aligned. Fill the tanks evenly from both ends of each unit, or in multiple chambers through each turret evenly. With clean water to
overcome the effect of buoyancy as you pour the concrete consolidating the concrete around the base of the plant. Place further mass concrete, as before, at least 250mm thick around the chambers to just below the top of the pipe connections. Consolidate the concrete, being careful not to damage the tank or tank inlet/outlet pipes. Where there are multiple tanks there must be a minimum of 450mm distance between the tanks this 450mm void must be filled with concrete during the pouring.

Do not under any circumstance use vibrating pokers. Use warning signs around the access turrets. Connect up the site pipe work to the inlet and outlet of the plant, and draw the cables through the conduit from the pump/s and high level alarm. Ensure the tank is fully ventilated connecting 110mm pipe to the air vent ports on the tank Finish off the surface at the required level, depending on the final ground cover required i.e. topsoil, tarmac, gravel etc. It is most important that once the pump chamber is in situ with all the inlet connections made, the drainage system should be flushed out, and all sand, debris etc. removed from the chamber.

Non vehicle loading.
The plants are designed for a minimum cover of 600mm of backfill or 300mm plus 100mm reinforced concrete slab.

Vehicle Loading – Car Axle Weight 10 Tonne Maximum
For vehicle loading the tanks must have a minimum cover of 750mm of backfill plus a minimum 200mm reinforced concrete slab designed to take the maximum load without such loadings being transferred to the tank itself for this application a structural engineer must be consulted. The concrete surround needs to be 300mm around the entire tank.

Marsh Technical Percolation Test Procedure
A hole should be excavated 300mm square to a depth approximately 250mm below the proposed invert level of the land drain. Fill the 300mm square section of the hole with water to a depth of a 250mm (minimum) and allow the water to seep away overnight. Next day, refill the test section with water to a depth of at least 250mm and observe the time taken, in seconds, for the water to seep away completely. Divide the time by the depth (mm) of water in the hole. The answer gives the average time required for the water to drop 1mm (Vp in sCare should be taken, when carrying out the test, to avoid abnormal weather conditions such as heavy rain, severe frost or drought. This test should be repeated at least three times, and an average calculated. If any of the results are 50%+/- the average, carry out a further three tests and calculate a further average. A satisfactory result is an average value, Vp of 24s/mm or less. If the measured values exceed this, then carry out further tests at a minimum of three different locations on the proposed land drain route, or at least three tests on separate days on the site proposed for the soakaway.

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Where deep excavations are necessary a modified test procedure may be adopted using a 300mm earth auger. Bore the test hole vertically to the appropriate depth taking care to remove all loose debris.

Make water level observations referring to a fixed datum using a dipstick or some suitable alternative water level indicator.

The value found in this way is called the percolation value (Vp in s) of the soil and can be used to determine the area of drainage trench floors required to disperse effluents.

If the percolation value exceeds 140s then BS6297 considers that the soil is not suitable for a soakaway system.

The main factor for sub-surface irrigation is the ‘T’ value as obtained for the percolation test. This will determine the length of pipe needed in the percolation area based on 450mm-meter wide trenches.

1. ‘T’ values <5 may indicate a percolation rate that is too fast. Consult the manufacturer for percolation area sizing.
2. ‘T’ values >60 may indicate a percolation rate that is slow. Consult the manufacturer for percolation area sizing.

<table>
<thead>
<tr>
<th>Estimated number of people in the house based on number of bedrooms</th>
<th>Required length of trench (m) for T/P values 21-50 (loading at 25 l/m².d)</th>
<th>Required length of trench (m) for T/P values 1-20 (loading at 50 l/m².d)</th>
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</thead>
<tbody>
<tr>
<td>6</td>
<td>96</td>
<td>48</td>
</tr>
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</table>

The treated water is discharged by gravity. A network of 110mm perforated pipes is laid in the percolation. The percolation area spreads the treated water evenly over a large area thus minimising the risk of the ground getting over saturated. The length of percolation pipe recommended should be sub-divided into a number of equal lengths. No trench should be longer than 20m. There should be a minimum distance of 2m between any two trenches. The trenches should be 450mm wide and 800 mm deep. The pipe should be laid on 250mm of clean 20mm stone. The pipe should be covered by another 150mm of stone. A layer of geotextile soil barrier should be placed on top of the stone and the remaining 300mm should be back filled with topsoil. The pipes should be laid with a fall of not more than 1 in 200. There should be at least 1200mm of unsaturated soil from under the bottom of the trench to the bedrock / water table.

**Percolation Trench Characteristics.**

Note: Always connect from the plant, to a correct Distribution Box and then into the percolation trenches.

- Length of distribution pipe, 20m maximum.
- Minimum separation distance between percolation trenches 2m (2.45 centre to centre).
- Diameter of pipe from system, 110mm.
Where deep excavations are necessary a modified test procedure may be adopted using a 300mm earth auger. Bore the test hole vertically to the appropriate depth taking care to remove all loose debris. Make water level observations referring to a fixed datum using a dipstick or some suitable alternative water level indicator. The value found in this way is called the percolation value (Vp in s) of the soil and can be used to determine the area of drainage trench floors required to disperse effluents. If the percolation value exceeds 140s then BS6297 considers that the soil is not suitable for a soakaway system. The main factor for sub-surface irrigation is the ‘T’ value as obtained for the percolation test. This will determine the length of pipe needed in the percolation area based on 450mm-meter wide trenches. 1. ‘T’ values <5 may indicate a percolation rate that is too fast. Consult the manufacturer for percolation area sizing. 2. ‘T’ values >60 may indicate a percolation rate that is slow. Consult the manufacturer for percolation area sizing. The treated water is discharged by gravity. A network of 110mm perforated pipes is laid in the percolation. The percolation area spreads the treated water evenly over a large area thus minimising the risk of the ground getting over saturated. The length of percolation pipe recommended should be sub-divided into a number of equal lengths. No trench should be longer than 20m. There should be a minimum distance of 2m between any two trenches. The trenches should be 450mm wide and 800 mm deep. The pipe should be laid on 250mm of clean 20mm stone. The pipe should be covered by another 150mm of stone. A layer of geotextile soil barrier should be placed on top of the stone and the remaining 300mm should be back filled with topsoil. The pipes should be laid with a fall of not more than 1 in 200. There should be at least 1200mm of unsaturated soil from under the bottom of the trench to the bedrock / water table.

**Marsh De-sludge Details For All Marsh Sewage Plants & Gems**

*Please read all these details before undertaking servicing or de-sludging.*

**Servicing of all sewage plants should be undertaken by a qualified service engineer.**

**NOTE:** The air pump/compressors and electric power must never be turned off. It is imperative that it is left running 24 hours a day, every day to ensure a constant supply of oxygen to the bacteria in the second chamber.

The sewage plant will require de-sludging and maintenance as designed;

- **6PE-35PE** - Yearly or as required
- **40PE-100PE** - Six monthly or as required
- **125P-300PE** - 90 days

The desludging of the plant is the responsibility of the site owner. De-sludging should be carried out according to the size of the plant and dependent on usage. It is the site owner’s responsibility to provide access for the vacuum tanker, to de-sludge the plant. Never vehicles drive over the system. Keep at least 4 metres away from the covers on the plant.

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1. Remove the de-sludging access cover by undoing the nuts. The de-sludging cover can now be removed.

**De-sludging**

De-sludging is to be carried out by others, not the Manufacturer of the Marsh Sewage treatment plant. De-sludging should normally be carried out by a vacuum sludge tanker. Never drive over the treatment system as it is only designed for “Man weight”. When a sludge tanker is to be used and access is poor, the tank should be de-sludged before the onset of winter. Licensed tankers are available commercially and the service is also provided by some local authorities. This sludge should be disposed of in accordance with local authority instructions or in a manner which will not cause pollution.

The sludge in the primary chamber(s) should not be removed completely, but approximately 75mm should be kept in the bottom of the tank to re-seed the new sludge, which will be formed when the tank is put into use again. On every alternative de-sludge “dead humus” scum should be removed from the final settlement tank(s). Ensure the Tee pieces in all chambers are clear.

Care must be taken not to damage the treatment plant with the hose of the vacuum tanker. Replace the de-sludging access cover and screws.

**Notes:**
- The access cover should never be left off while the unit is unattended
- De-sludging should never be carried out alone
- The Sewage treatment plant should be clearly marked and vacuum tanker should never come closer than the depth of the excavation for the system unless the appropriate precautions have been taken. Contact the manufacturer for the correct precautions.
- The continued performance of the plant will depend on regular maintenance and cleaning. It is the homeowner’s responsibility to de-sludge the unit and keep the vents clear.
- Regular maintenance of the unit and percolation area is very important for the satisfactory performance of the system.

The depth of sludge can be checked using the following technique:
- Use a pole that can touch the bottom of the tank and wrap the bottom 1.4m with a white rag.
- Lower the pole to the bottom of the tank and hold for several minutes to allow the sludge layer to penetrate the rag.
- Remove the pole and note the sludge line, which will be darker than the coloration caused by the liquid waste.

The percolation area should be inspected regularly.

Note: Signs of ponding indicate blockage or insufficient permeability.
Inspection General.
The inlet manhole should be inspected and any solid matter which may clog the inlet tee pipe should be removed. The cause of any blockage should be investigated. Only qualified personnel should carry out this. The inlet and outlet tee-pipes should be inspected and rodded so that scum does not collect and that the vertical leg is not obstructed.

Safety Precautions.
There is potential danger when de-sludging and therefore should never be done alone. Never enter a tank unless a safety line is attached to the person entering the tank and a second person is above ground to help if the entrant is overcome by gasses or foul air. Personnel entering the tank must have suitable breathing equipment and be fully trained in man entry techniques.
Naked flames should not be used in the vicinity of the tank due to the danger of explosion. The manhole covers should never be left off an unattended tank. Disused or abandoned tanks should be demolished, filled in or sealed so that accidental entry is impossible.

As safety and security are of vital importance in sewage treatment systems, the following aspects are critical:
- Protective clothing/gloves/breathing apparatus, should be worn at all times. Always remove contaminated clothing and protective equipment after working with sewage treatment systems.
- Wash hands and face prior to eating, drinking or smoking.
- Adequate first aid boxes should be present.
- When working with machinery/electrical equipment, proximity of water should be noted. All tools and electrical equipment should be kept dry.
- A second person should be present when carrying out non-routine maintenance.
- The distribution box should be designed (& constructed by the builder) to facilitate sampling and inspection without placing personnel at risk.
- Only qualified personnel should carry out electrical repairs.
- Great care should be taken when handling sludge.
- Always lock the cover of the system.

Maintenance of the percolation area.
The percolation area should be inspected periodically and any signs of malfunctioning noted. This will show itself by obvious signs of blockage of the distribution box, or by ponding or smells or pollution in the surrounding area. In this event expert advice should be sought or use should be made of the reserve percolation area.

Servicing should be undertaken annually for treatment plants up to 32PE and then a minimum interval of 6 months for larger plants. British Water hold a list of qualified service engineers and companies.
Warranty and Servicing Agreement.
Marsh Industries Limited offers an initial, full 12-month warranty on every plant installed (provided that it is installed, commissioned & maintained in accordance with the manufacturers instructions and also provided that the unit has not been subject to damage or abuse). This warranty covers all of the GRP components and also all other additional installed components against malfunction.

Terms and Conditions.
• The manufacturers instructions outlined in the handbook must be followed at all times. A service contract does not remove this responsibility from the customer / homeowner.
• Under this agreement, Marsh Industries Limited will deliver a per-commissioned system.
• The maintenance must be carried out in accordance with the terms laid out in the Builders and homeowners handbook and this service contract.
• It is important that the unit is operated under the conditions for which it is designed. Any variation in these conditions could lead to the unit not performing to its full potential and the discharge may not meet the required standards. This will also make any agreement between the company and the customer null and void.
• Marsh Industries Limited shall not be liable for any damage or loss, including consequential loss, caused by the failure of any plumbing equipment or failure caused by the inclusion of gross solids, (e.g. – disposable diapers or sanitary towels etc) in the waste water treatment unit.
• The end user of the wastewater treatment system is entirely responsible for the operation of the unit and for ensuring that the quality of the effluent does not breach the discharge standards.
• Soak ways, drains and the emptying of primary tanks remain the responsibility of the client and damage to the installation due to the influx of surface water or the backing up of soak ways or drains is not covered by this service agreement
• To ensure the continuance of the systems performance, the user has to take certain precautions including the following:
• The design loading of the plant should not be exceeded.
• High volume discharges such, as those from swimming pools and Jacuzzi’s must never enter the system.
• Surface water must not enter the system.
• Do not allow large quantities of chemicals to enter the system including:
  ~ Water softener regenerate.
  ~ Disinfectants.
  ~ Strong Acids and Alkalis.
  ~ Oil or Grease.
  ~ Pesticides.
  ~ Photographic Chemicals, etc.
• If the system has been sized by others, Marsh Industries Limited will supply a system to these specification and not its own specifications. In this case, the responsibility lies with others, in relation to the maximum flow / litres per day, the system capacity and retention times.

• If Marsh Industries Limited sizes the system, and a greater load is placed on the system, by the addition of extra houses, bedrooms in the houses, schools, crèche etc or by any other means, Marsh Industries Limited is not responsible for the system in terms of overloading or the quality of the effluent as the retention times may be compromised.

• This is clarified in this as a selected text above. If desludging is required it should be done as soon as possible. Systems that are not de-sludged will overload and cease to work. In this case, others will be required to de-sludge and clean the system and components may require replacing especially if the system goes septic. The cost of these parts and the labour required, including specialist safety equipment is excluded from this servicing contract.

• If the electrical connection ceases to the air blower in the system, the system will not function correctly. It is imperative that a continuous air supply, via the air blower, enters the system in order for the system to function correctly. If this is interrupted for prolonged periods the system may go septic. A system that is neglected in this respect may require new components, media etc and cleaning if it goes septic. The cost of these components and labour is excluded from all servicing contracts.

• The discharge to the ground is also a critical part of the operation of the system. Correctly constructed distribution chambers and distribution drains / polishing filters are necessary as part of the treatment process. Marsh Industries Limited will aid in the design of these, however the construction is the responsibility of others. Incorrectly constructed drains or polishing filters could result in poor treatment of effluent and Marsh Industries Limited holds no responsibility in this regard.

**Note:**
In accordance with Marsh Industries Limited normal policy of product development, this specification is subject to change without notice. Marsh Industries Limited believes that the information contained in this handbook is accurate and is printed for informational purposes only. No warrants, express or implied, are contained therein, nor does any legal liability attach to Marsh Industries Limited, for any reason whatsoever. September 9th 2005.
Warranty & Guarantee

• The minimum design life of the tank structure is twenty five years. (internally & externally)
• The compressor blower is covered by a two year guarantee. 
• The diffuser is covered by a five year guarantee.
• Engineered using high performance materials.
• All metal components stainless steel.