



# Installation & Technical Handbook for Marsh Industries Products

A Member of



BRITISH WATER





# Marsh Sewage Treatment

## 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

- The system can be put into service immediately as its pre-commissioned, once the installation instructions have been fully complied with.
- The system should be checked once the electrical connection is completed, to ensure that it is running correctly.
- 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.

## Please Do.

- Ensure that all of the information contained in the builders & homeowner's 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 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.
- 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 "Homeowners maintenance" of 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.

# Marsh Sewage Treatment



- 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.

## **Locating the Plant.**

Minimum distances for locating Uni - Sewage treatment 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 Uni plant are set out in the table below.

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

*Minimum separation distances in metres*



# Marsh Sewage Treatment

Liquid is introduced and discharged from the plant unit under gravity. This may have a bearing on the location of the unit. Where site conditions do not allow gravity discharge, a pumped discharge option is available. The plant is designed for pedestrian traffic only. Adequate protection should be given to avoid super-imposed loads. Vehicles must be restricted from the region surrounding the plant. Vehicles should maintain a distance equal to the depth of the excavation unless the necessary structural protection around the tank has been provided. The manufacturer will advise on the suitable protection. Suitable fencing to restrict farm animals should be erected.

## Installation of the Plant.

**Note:** We recommend that when the system arrives on site that it is inspected for damage, from mis-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 unit, as per manufacturers instructions. A suitably sized digger will be required to excavate the hole and lower the Uni Sewage treatment Plant.

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 plant should not be placed into a water logged site. Please contact the manufacturer if there are difficulties on site due to adverse water logging.

## Installation of the unit.

- 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 unit
- 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 plant.
- A complete concrete backfill may also be required where the Uni Sewage treatment Plant may be prone to some superimposed load.

## Installation procedure.

- The unit 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 150mm and grade 25 N) to ensure that the unit is fully supported with due regard to subsoil conditions and loads imposed by the unit. Care shall be taken to eliminate voids.



- The system is lifted carefully into position using slings in accordance with the certificate holder's instructions. Lifting hooks are provided with the Uni Sewage treatment Plant. 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 unit using a spirit level. The unit 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 house 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 excavation is then backfilled with a minimum of 150mm pea shingle surround.

Ensure that the connections remain exposed.

- Connect up the pipe work. The plant is plumbed for either 110mm or 160mm uPVC pipe. A short length of pipe with flexible joints should be used immediately before and after the unit 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.

## 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).
- 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 110mm uPVC pipe. A short length of pipe with flexible joints should be used immediately before and after the unit 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 Sewage Treatment

## **Electrical Installation of the unit.** (See separate notes on Compressor Alarm)

Standard Gravity system with Air blower:

NO High Level Alarm - NO Raised Percolation bed pump.

Note:

All electrical work to be carried out by competent person using suitable materials for the application. Electrical work must be carried out strictly to the manufacturer's instructions and to the relevant national rules for electrical installations.

- A 230V, 16Amp, water proof plug and socket connector will be supplied with this unit.
- These will conform to European Standards, 1&2. e.g. Legrand 3-pin socket 0553-03 and Legrand 3-pin plug 0563-03.

## **Electrical Installation of the unit.**

Systems with a High Level Alarm and / or Raised Percolation bed pump.

Note:

All electrical work to be carried out by competent person using suitable materials for the application. Electrical work must be carried out strictly to the manufacturer's instructions and to the relevant national rules for electrical installations.

- A 230V, 16Amp, waterproof plug and socket connector will be supplied with this unit.
- These will conform to European Standards. e.g. Legrand 3-pin socket 0553-03 and Legrand 3-pin plug 0563-03.

## **Disposal of treated water.**

The plant discharges treated water to the required standards (20:30:20) or better as detailed in BSEN12566-3 This water is now suitable for disposal. By any of the following means:

- Direct to a watercourse (consent to discharge approval will be required from the Environment Agency)
- Sub-surface irrigation (Herring bone land drainage or constructed soak away area)
- Raised bed

The best disposal method can depend on a variety of site factors including percolation results, soil type, water table level and topography of the site. Please refer to the manufacturer for further details.

# Marsh Sewage Treatment



## 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 ( $V_p$  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,  $V_p$  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.

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 ( $V_p$  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.

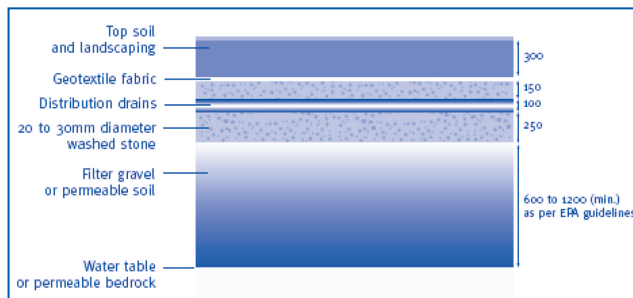
Estimated number of people in the house based on number of bedrooms.	Required length of trench (m) for T/P values 21-50 (loading at 25 l/m <sup>2</sup> .d)	Required length of trench (m) for T/P values 1-20 (loading at 50 l/m <sup>2</sup> .d)
6	96	48

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.
- Slope of pipe from tank to distribution box. 1 in 40 for earthenware or concrete. 1 in 60 for uPVC.
- Slope of percolation trench from distribution box, 1 in 200.
- Distribution (percolation) pipes. 110mm bore, perforated (typically at 4, 6 and 8 o'clock) smooth wall PVC drainage pipes with perforations of 8mm diameter at about 75mm centres along the pipe or pipes with similar hydraulic properties.
- Width of percolation trench, 450mm.
- Depth of percolation trench is about 800 mm below ground surface depending on the site.
- Back-filling of percolation trench. 250 mm of 20 to 30 mm washed gravel or broken stone aggregate on invert; pipe laid at 1 in 200 slope surrounded by 20-30 mm clean washed gravel or broken stone aggregate and width 150 mm of similar aggregate over pipe: geotextile layer followed by topsoil to ground surface.





## 10.0 Homeowners Maintenance.

“PLEASE REFER TO SAFETY SECTION OF THIS HANDBOOK”.

NOTE: The air pump 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. To maintain it's efficiency, the Uni sewage plant will require yearly de-sludging and maintenance. The desludging of the Uni plant is the responsibility of the homeowner. De-sludging should be carried out a minimum of once yearly, however depending on usage and house population, more frequent or infrequent de-sludging may be required. The plant will require de-sludging yearly, depending on usage. The guidelines (summary below) carry detailed instructions on dipping and measuring the depth of sludge in the system. Desludging is done with a vacuum tanker (we would recommend the use of a licensed company) or other suitable means. It is the homeowner's responsibility to provide access for the vacuum tanker, to de-sludge the plant.

Never let this equipment drive over the system. Keep at least 4 metres away from the covers on the plant.

1. Remove the de-sludging access cover by undoing the nuts and removing the safety bar. The de-sludging cover can now be removed.
2. Empty the plant using the vacuum tanker. Care must be taken not to damage the treatment plant with the hose of the vacuum tanker.
3. Replace the de-sludging access cover and safety bar.

### Notes:

- The access cover should never be left off while the unit is unattended
- De-sludging should never be carried out alone
- The Uni Sewage treatment plant should be clearly marked and vacuum tanker should never come closer than the dept 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. Units should be de-sludged a minimum of once per year, The depth of sludge can be checked using the following technique,

- Use a 2-meter pole and wrap the bottom 1.2m 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.



# Marsh Sewage Treatment

## 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. 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 small-scale sewage treatment systems, the following aspects are critical,

- Protective clothing/gloves 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. Equipment should not be wet when working with it.
- 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 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.

## 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 builders & homeowners 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.



# Marsh Sewage Treatment

- 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.

## **Marsh Industries Limited.**

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