

Marsh Industries

Domestic wastewater treatment products

Pump chambers

Ensign™ package sewage treatment plants

Euro:Septic™ septic tanks

Uni:Gem™ septic conversion units

Cesspools



WE are the **innovators** in domestic, commercial and agricultural water and wastewater treatment products

WE are Marsh Industries

Our brand communicates the straight talking approach we have become known for

WE deliver world-class water/wastewater treatment products and solutions to the domestic, commercial and agricultural sectors from our UK manufacturing plants in Kettering and Bridgwater.

WE think smarter

Efficiently meeting the demands of our customers

We strive to be recognised as a collaborative and trusted partner for our customers, aligned to their business, and with a reputation for providing quality products that really do add value.

WE innovate

Enabling technologies that deliver tangible benefits

Working across many areas of the UK and European construction sectors our specialist 'innovation' team combines 100+ years' experience of designing, manufacturing and testing wastewater treatment products that are proven to be economic, efficient and environmentally sensitive.

WE comply

With UK/EU building and environmental regulations

Our products are fully type-tested and certified to ensure compliance with relevant environmental permitting programmes and Building Regulations.

WE deliver

UK nationwide and overseas

With one of the largest merchant distributor networks available in Europe, customers specify Marsh products and services because they know WE deliver from a solid foundation of knowledge, experience, product quality and proven performance.

WE support

Specialist services to further enhance customer requirements

There are times when our customers need a little extra support. Whether this is on-site advice, backup support, specialist testing or bespoke project solutions, WE offer a range of services when and where required.

TOGETHER we are a strategic partnership

Our core strength lies in the knowledge, experience and enthusiasm of our staff and our customers combined





Domestic sewage treatment

What are your options?

Choosing the right sewage treatment and disposal method for your site is essential to ensure effective long-term performance, protection of public health and the environment, and compliance with relevant legislation.

Sewage treatment and disposal can be provided by either public (foul) sewer or by a private sewage system. Use of a private system is only usually acceptable where connection to the public sewer is not possible, and as such should be discussed with your local Planning Authority at an early stage.

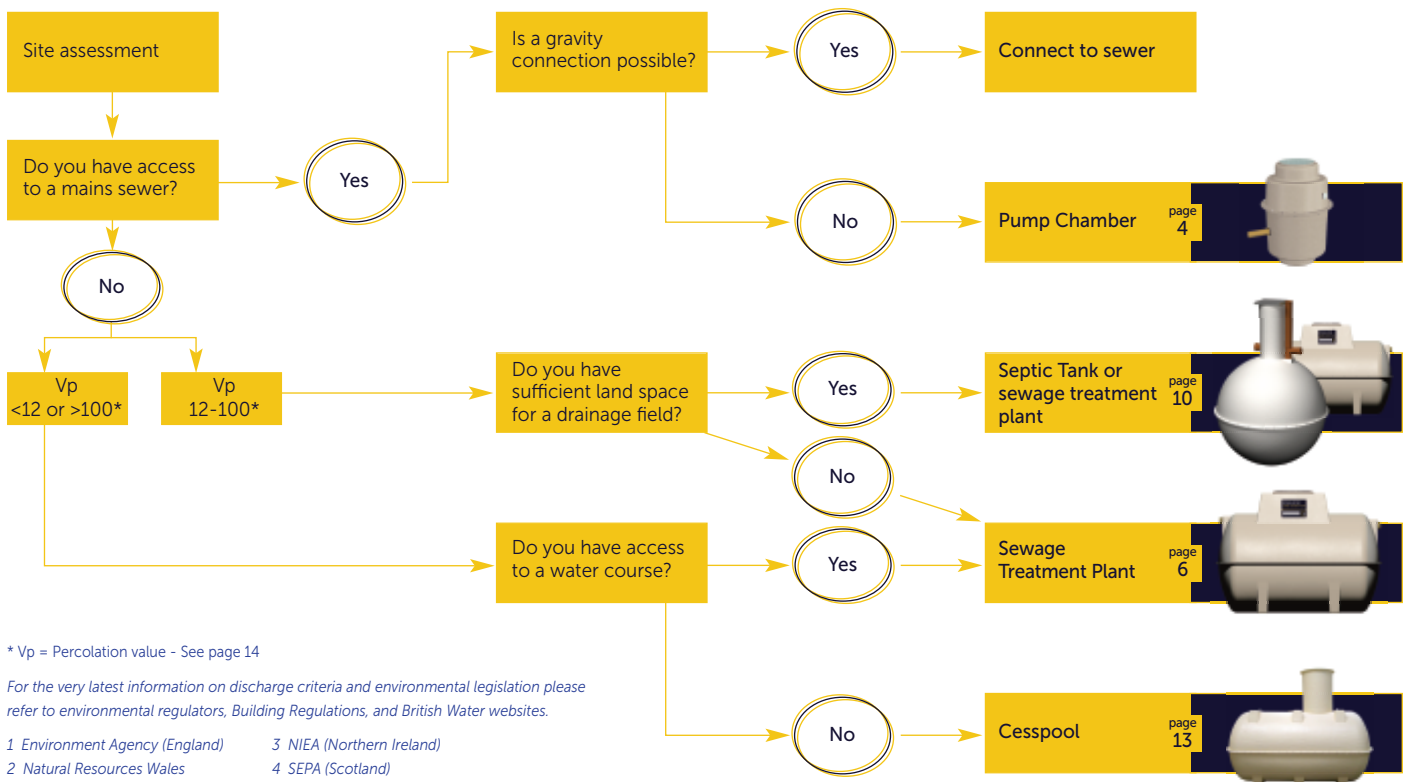
Before sewage effluent can be discharged to 'controlled waters' it must receive at least primary and secondary treatment:

- For a discharge to ground the micro-organisms in the soil provide the secondary treatment
- For a discharge to a water course the sewage treatment must be provided by a Package Sewage Treatment Plant (PSTP) or equivalent

See page 14 for further guidance on sewage treatment.

System selection

Hierarchy of off-mains discharge routes as laid out by the environmental regulators and British Water



* Vp = Percolation value - See page 14

For the very latest information on discharge criteria and environmental legislation please refer to environmental regulators, Building Regulations, and British Water websites.

1 Environment Agency (England) 3 NIEA (Northern Ireland)
 2 Natural Resources Wales 4 SEPA (Scotland)

Pump chambers

For pumping sewage and water to mains

Overview

When discharge to mains is required, but to do so by gravity is impractical, a pump chamber system will be needed. Although available as floor-mounted units for indoor applications such as basements, the vast majority are installed outdoors at levels to suit on-site conditions and topography.

The Marsh range incorporates systems for pumping surface water or domestic sewage to mains, septic/PSTP effluent to drainage fields/watercourses, and bespoke systems for larger domestic and industrial applications.



Operating principle

Each pump chamber contains a number of float switches linked to a control panel that automatically controls flow and levels.

In a **single pump chamber** there are three float switches:

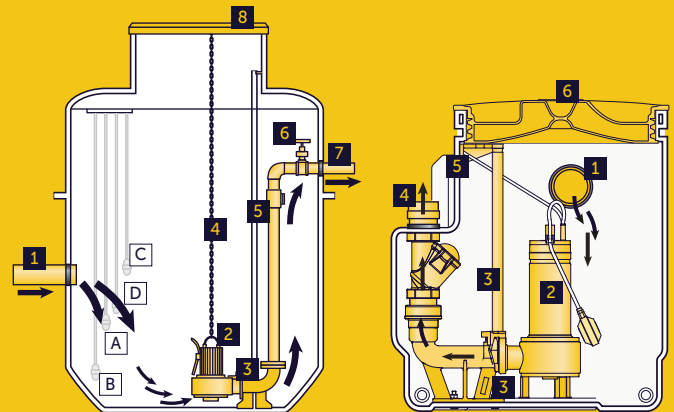
Float A: Actuates the pump cycle until level drops to low level.

Float B: Low level float stops the pump.

Float C: High level alarm – positioned above the pump actuator float (min 100mm).

For **twin pump chamber** operation there is an additional float switch (Float D) – usually positioned 150mm above first actuator (A) – which actuates the second pump in periods of higher flow.

After each cycle the pumps alternate to extend pump life and are designed to run for a minimum of 60 seconds with no more than 15 starts per hour.



Pump chambers

- 1 Inlet
- 2 Submersible pump
- 3 Pump guide rails/pedestal
- 4 Pump retrieval chains
- 5 Non-return valve
- 6 Isolation valve
- 7 Outlet
- 8 Access cover

Marmicro

- 1 110mm inlet (horizontal or vertical)
- 2 Submersible pump c/w integral float
- 3 Pedestal and guide rails
- 4 Outlet (2" BSP Female)
- 5 Vent/cable ports c/w rubber seals
- 6 Pedestrian access cover (100kg max)

Pump chamber benefits

- Designed to BSEN12050 for structural strength and water-tightness and to BSEN752 to comply with hydrostatic and electrical requirements
- Smooth internal walls and integral pump well improves pump efficiency and eliminates 'dead spots' which can lead to odours and septicity
- Pre-assembled pipework for fully automatic operation (pump/control equipment separate)
- Heavy duty (industrial) 'peardrop' floats and market leading pumps throughout ensure robust, reliable design and maximum efficiency of pump with minimal clogging or wear
- Unique 'keying-in' lip to assist anchoring into concrete surround
- High level alarm as standard
- Variable invert depths and orientations to suit individual site conditions

Marmicro benefits

- Designed to BSEN12050 for structural strength and water-tightness
- Suitable for floor mounting or burying
- Chamber design and smooth internal walls improve pumping efficiency and eliminate 'dead spots' which can lead to odours and septicity
- 2" Lowara (Xylem) vortex pump with integral float ensures simple, robust and reliable design with minimal clogging or wear
- Pedestal positively locates pump in position for optimum performance, guide rails allow simple removal for easy maintenance
- Pre-assembled outlet pipework assists quick and easy installation
- Options include 300mm 'riser' for deeper installations (max 2), grinder pumps, and alarms

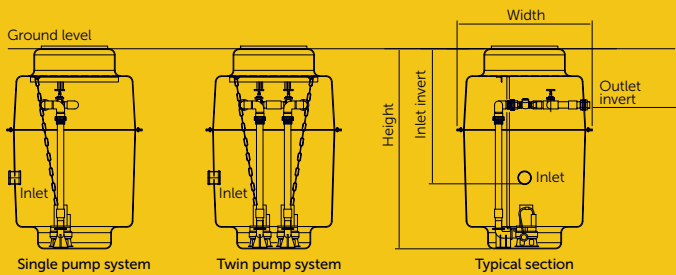
Guidance notes

- Where foul water drainage from a domestic property is to be pumped to the mains the effluent receiving chamber should be sized to contain 24-hour inflow to allow for disruption in service, the minimum daily discharge being taken as 150 litres per person per day
- For other building types the capacity of the receiving chamber should be based on the calculated daily demand of the water intake for the building, or when only a proportion of the foul sewage is to be pumped then the capacity should be based pro-rata
- If the sewer is to be 'adopted' by a local water authority, please contact Marsh Industries as Sewers for Adoption (SFA) specification and additional local authority related criteria may apply

Specifications

Vertical pump stations

For housing projects and small commercial developments



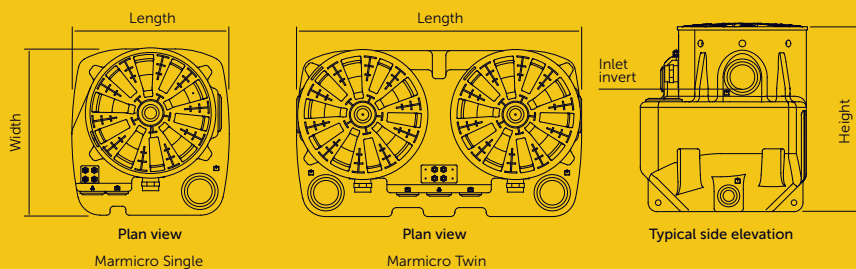
Model	Dia	Height	Inlet		Outlet		Storage below invert	Total Storage Litres
			Invert	Ø	Invert	Ø		
Mini	600	1100	500	110	300	63	120	234
Midi	600	1500	500	110	300	63	280	421
Maxi	600	2000	500	110	300	63	421	561
CPS1	1100	1100	500	110	300	63	470	867
CPS2	1100	1500	700	110	300	63	780	1183
CPS3	1100	2200	900	110	300	63	1025	1735
CPS4	1100	2600	900	110	300	63	1340	2050
CPS5	1700	2100	900	110	300	63	2440	3700
CPS6	1700	3400	900	110	300	63	4000	6000

Notes:

- All pump chambers are available for dirty water (DW) or sewage (SW), in single pump (SP) and twin pump (TP) configurations. Pump chambers are usually bespoke.
- The dimensions given on this page are for guidance only
- For precise tank sizes and configurations, please contact Marsh Industries
- All dimensions in mm

Marmicro

For small flows from single developments

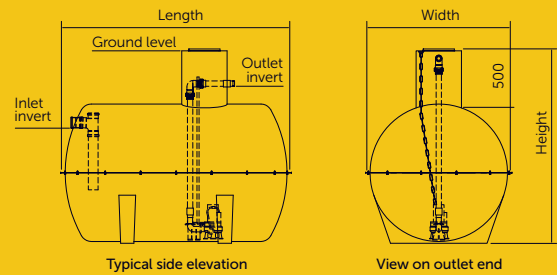


Model	Length	Width	Height	Inlet		Outlet		Total storage Litres
				Invert	Ø	Invert	Ø	
Marmicro Single	700	740	840	350	110	250	50	270
Marmicro Twin	1270	740	840	350	110	250	50	550

All dimensions in mm

Horizontal pump stations

For larger housing projects, and commercial/industrial developments



Model	Length	Width	Height	Inlet		Outlet		Total Storage Litres
				Invert	Ø	Invert	Ø	
AT2800	3000	1250	1750	800	110	300	63	2800
AT3800	4000	1250	1750	800	110	300	63	3800
AT4500	2650	1600	2100	800	110	300	63	4500
AT6000	2950	1900	2400	800	160	300	63	6000
AT8000	3640	1900	2400	800	160	300	63	8000
AT10000	4200	1900	2400	800	160	300	63	10000
AT12000	5200	1900	2400	800	160	300	63	12000
AT14000	5840	1900	2400	800	160	300	63	14000
AT16000	6700	1900	2400	800	160	300	63	16000
AT18000	7500	1900	2400	800	160	300	63	18000
AT20000	8100	1900	2400	800	160	300	63	20000

Ensign™

Package sewage treatment plants

Intensive biological processing for off-mains wastewater

Overview

The Marsh Ensign is widely regarded as one of the most efficient, reliable and economical sewage treatment plants on the market.

The standard Ensign has been adapted to improve reliability and the Ensign:Ultra now brings unique enhancements to further improve noise level, treatment efficiency and final effluent quality.

Class leading performance

Tested and approved to BSEN12566-3/A1:2009 all Ensign units provide treatment well within national consent requirements. Published test results of 11.5:19.2:8.4mg/ltr (BOD:suspended solids:ammonia), with influent concentrations on test higher than those chosen by most competitor plants, effectively equates to 97% pollutant removal.

Unrivalled choice

Ranging in size from 4 to 50 PE in Ultra, Standard and Shallow versions of each, and with a wide range of ancillaries, almost all site, consent and budget requirements can be met by units from the range.

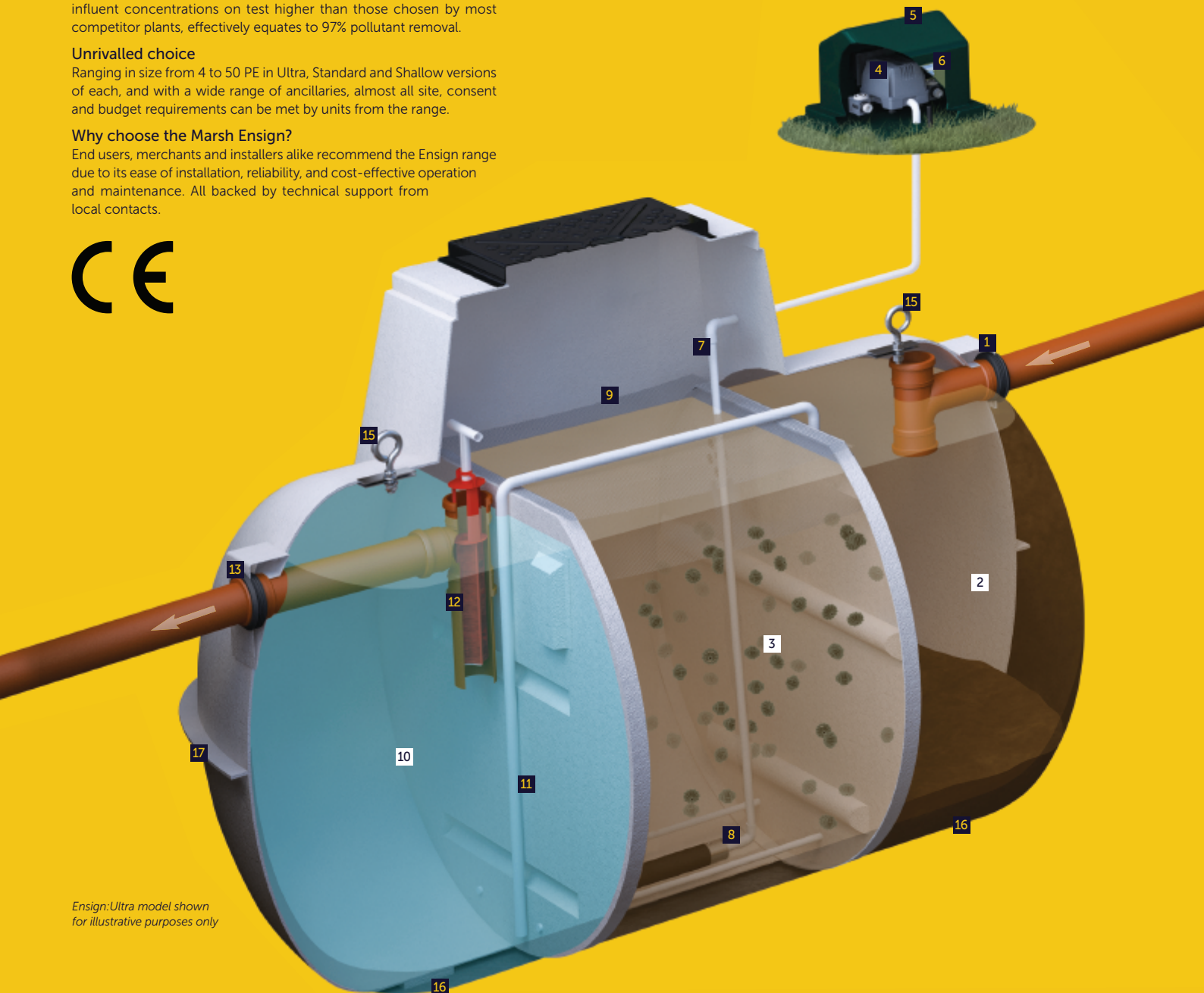
Why choose the Marsh Ensign?

End users, merchants and installers alike recommend the Ensign range due to its ease of installation, reliability, and cost-effective operation and maintenance. All backed by technical support from local contacts.



Operating principle

In addition to anaerobic digestion taking place in the primary settlement chamber **2** the Ensign:Ultra unit allows the clarified water to pass into a second 'aeration' chamber **3** where it is treated to remove the dissolved constituents. Here aerobic bacteria, supported by diffused air and mobile media, ensures full treatment is achieved before the treated effluent and 'sloughed off' bacteria flows to a final settlement chamber **10**. The final effluent is then discharged to the drainage field or watercourse via a Polylok filter.



Ensign:Ultra model shown for illustrative purposes only

Benefits

- 1 Inlet with 'Forsheda seal'**
Forsheda seal provides flexibility in the joint for easier installation.
Optional risers to increase invert depth are available.
- 2 Primary settlement chamber**
- 3 Aeration chamber**
- 4 Advanced compressor with alarm (Ensign:Ultra units only)**
Near silent compressor ensures minimal running, maintenance and servicing costs. Integral alarm detects low pressure in air line. (Regular Low-energy compressor on Ensign:Standard models).
- 5 Compressor housing - internal or external options available**
The compressor can be housed internally or externally with no difference in cost.
External recommended to increase compressor life, and supplied as standard on 4PE, shallow and pumped outlet versions.
- 6 RCD/Electrical connection (Ensign:Ultra units only)**
The RCD box provides easier installation and provides a higher degree of safety. (Regular plug/socket connection on Ensign:Standard models).
- 7 PVC pressure pipe/diffuser(s)**
Provides a protective conduit for the air diffuser line. Can be easily removed for maintenance and cleaning.
- 8 Bio-media**
High specification bio-media (310m³ per m²) and membrane diffusers ensure even circulation to eliminate 'dead spots'. The bio-media is contained by a stainless steel securing mesh to ensure no migration during handling or potential flooding.
- 9 Stainless steel mesh**
Retains media in aeration chamber during transportation and handling, and in the event of flooding.
- 10 Final settlement chamber**
- 11 32mm sludge return**
Larger diameter sludge return prevents the possibility of blockages and improves system circulation. Provides higher effluent quality whilst balancing flow over a 24 hour period or periods of intermittent use.
- 12 Unique Polylok tertiary filter (Ensign:Ultra units only)**
The Polylok tertiary filter reduces suspended solids and BOD by a further 40% helping to extend drainage field life.
- 13 Outlet with 'Forsheda seal'**
Forsheda seal provides flexibility in the joint for easier installation.
Optional pumped outlets are available.
- 14 Impermeable lid (Ensign:Ultra units only)**
Heavy duty lid/frame improves strength and durability whilst blending into the surrounding environment. (Regular lid on Ensign:Standard models).
- 15 Integral lifting eyes**
For safe and secure on-site handling.
- 16 Stabilising feet**
Stabilising feet prevents the tank from rolling and allows safe and steady transportation and installation.
- 17 Unique 'keying-in' lip**
Assists anchoring into granular or concrete surrounds.

Guidance notes

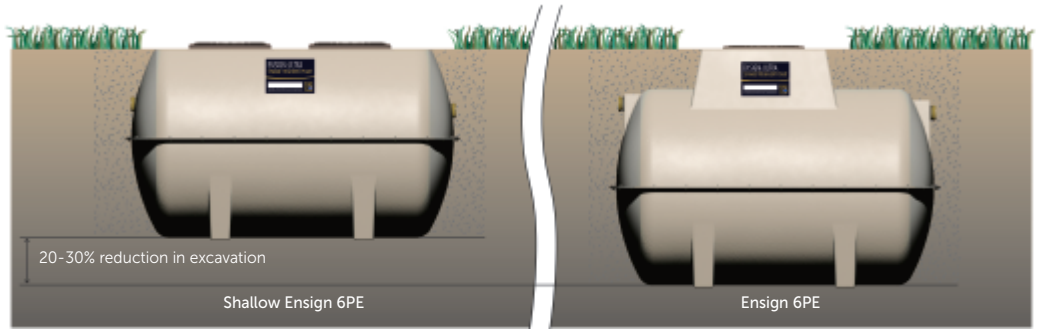
Package Sewage Treatment Plant's (or PSTP's) are often a suitable option where groundwater in the surrounding environment is vulnerable, drainage field percolation values are restrictive, or direct discharge to a drainage field/watercourse or surface water sewer is the preferred discharge method.

- *PSTP's should be sized using the latest version of British Water Flows & Loads which provides detailed information on sewage production figures and sizing calculations*
- *Regulatory authorities for the control of pollution in the UK normally require treatment plants conforming to BSEN12566:3 to be demonstrated as capable of producing a minimum effluent discharge quality of 20:30:20 (Biochemical Oxygen Demand;Suspended Solids: Ammoniacal Nitrogen in mg/ltr), although in certain areas more stringent site-specific qualities may be required*
- *No surface water should enter the system as this can reduce the system's capacity and cause solids to be flushed out which may prematurely block drainage field or cause pollution*
- *As with septic tanks sludge should be removed annually or in line with manufacturers instructions*

Shallow units

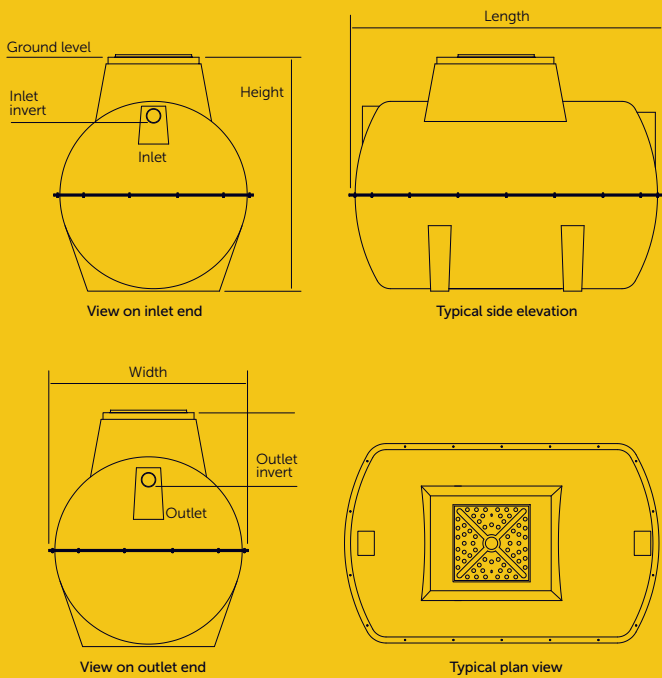
Common sewage treatment plants on the market often exceed 2.3m high. Marsh Industries offer a range of shallow plants from 4-35PE that are only 1.6m in height, meaning installation is not only possible*, but easier and safer too.

**Shallow Ensign's are often favoured when hard rock site conditions mean deeper alternatives, involving costly and time-consuming excavation.*

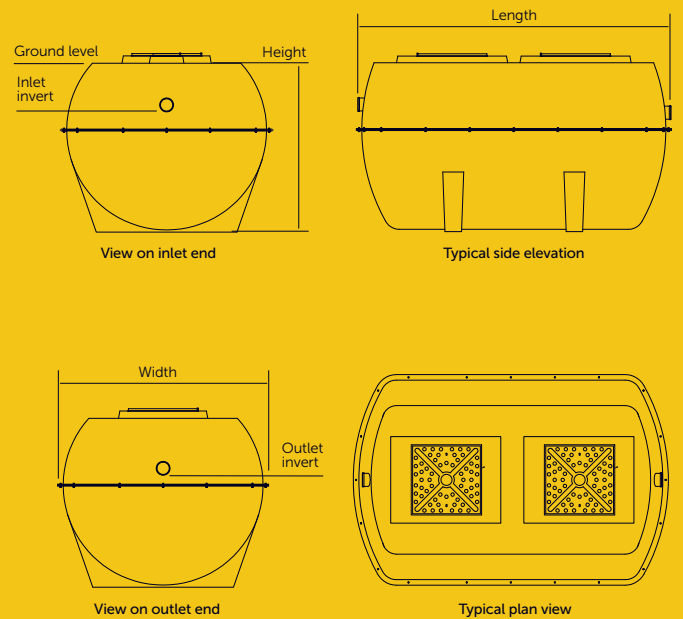


Specifications

Ensign:Ultra and Ensign:Standard



Shallow Ensign:Ultra and Shallow Ensign:Standard



Ensign:Ultra and Ensign:Standard

Model (Pop)	Length	Width +/-100mm	Height	Inlet		Outlet	
				Invert	Ø	Invert	Ø
4	1600	1332	1575	540	110	600	110
6	2602	1650	1935	550	110	625	110
8	2602	1650	1935	550	110	625	110
10	2602	1650	1935	550	110	625	110
12	2860	1912	2139	550	110	625	110
16	2860	1912	2284	720	110	800	110
20	3650	1912	2284	720	160	800	160
25	3650	1912	2284	770	160	850	160
30	4200	1912	2284	770	160	850	160
35	4200	1912	2284	770	160	850	160
40	5200	1912	2284	770	160	850	160
45	5200	1912	2284	770	160	850	160
50	5200	1912	2284	770	160	850	160

Shallow Ensign:Ultra and Shallow Ensign:Standard

Model (Pop)	Length	Width +/-100mm	Height	Inlet		Outlet	
				Invert	Ø	Invert	Ø
6	2860	1912	1600	500	110	575	110
8	2860	1912	1600	500	110	575	110
10	2860	1912	1600	500	110	575	110
12	2860	1912	1600	500	110	575	110
16	3400	1912	1600	500	110	575	110
20	4200	1912	1600	500	160	575	160
25	4200	1912	1600	500	160	575	160
30	5200	1912	1600	500	160	575	160
35	5200	1912	1600	500	160	575	160

- Notes:
- > Larger population sewage treatment plants may be supplied as multiple tank configurations.
 - > For precise tank sizes and configurations, please contact Marsh Industries
 - > All dimensions in mm

Optional extras

Carbon vents/covers



Elevated compressor housings



Distribution Boxes



Anti-flood valves

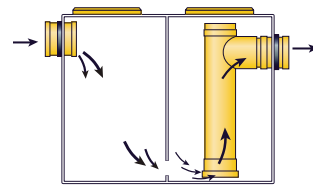


GRP kiosks



Ancillary products

To aid the performance of sewage treatment plants



Grease traps

Fats, oils and grease (FOG) prevention

Through a system of internal baffles and polylok filters, Marsh grease traps aid the performance of sewage treatment plants by preventing fats, oils and greases from entering the drainage channel.

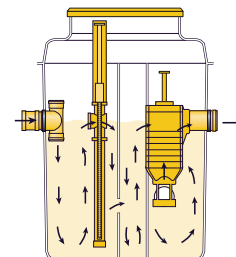


Phoslok

Tertiary phosphate treatment

Available for domestic or commercial sites the Marsh Phoslok is single piece plant which adds timed doses of a coagulant to treated effluent to further remove phosphates.

Easily installed downstream from a sewage treatment plant, this tertiary treatment option is the best available method to prevent eutrophication in sensitive discharge locations such as protected waters.



Ultra Polylok UV filter

Ultraviolet disinfection

Specifically designed for disinfecting the effluent from residential and commercial aerobic treatment plants by destroying viruses, parasites and pathogenic bacteria.

The Ultra Polylok UV chambers can be installed as part of a Marsh Ultra Polylok sewage treatment plant or as a stand-alone plant to further improve the effluent from an existing sewage treatment plant.

Euro:Septic™ / Septic Tanks

Basic treatment to off-mains wastewater

Overview

The Euro:Septic offers significant technical improvements and cost-savings over current market options.

The range, available in capacities from 2800-4500 litres, is CE marked to comply with Construction Product Regulations and compliments the company's existing range of horizontal septic tanks.

The Euro:Septic is tested and certified to EN12566-1 Annex B and benefits from an outstanding hydraulic efficiency of 99.63%. Horizontal septic tanks are also tested and certified to EN12566-1.



Operating principle

Normally the simplest and most economical means of treating wastewater from small developments, a septic tank holds sewage and allows solids to settle into sludge at the bottom of the tank. Here it is naturally broken down by a process known as anaerobic digestion, which provides settlement and some biological treatment. The effluent is not fully treated and must receive additional treatment before discharge to the water environment – the most common method being to spread the effluent to land via an underground drainage field.



Euro:Septic

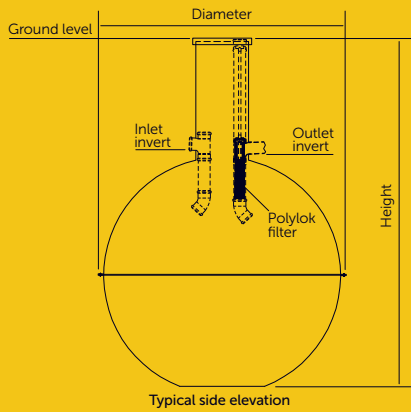
- 1 Inlet
- 2 Settlement chamber
- 3 Polylok filter
- 4 Outlet
- 5 Access cover

Benefits

- Tested to BSEN12566:1 and CE-marked to ensure compliance with latest environmental and Building Regulations requirements
- Traditional 'onion-style' tanks for standard installations
- Low profile versions for high water table or hard rock site conditions
- Unique Polylok filter improves effluent quality and prolongs drainage field life (Euro:Septic units only)
- Heavy duty shell as standard to enable installation in all ground conditions
- Integral lifting eyes for improved on-site handling
- 'Keying-in' assists anchoring into granular or concrete surround
- Pedestrian cover included as standard

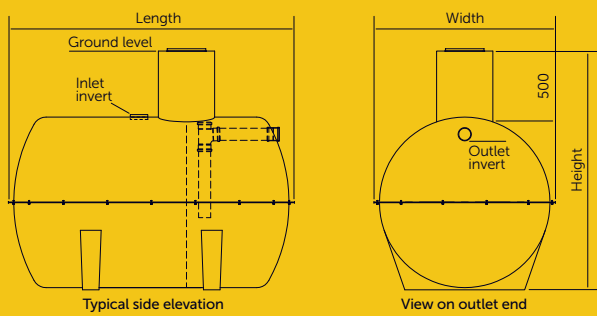
Specifications

Euro:Septic



Size	Dia	Height	Inlet		Outlet	
			Invert	Ø	Invert	Ø
2800L	1870	2780	1000	110	1040	110
3800L	2075	3000	1000	110	1040	110
4500L	2196	3100	1000	110	1040	110

Horizontal septic tanks



Size	Length	Width	Height	Inlet		Outlet	
				Invert	Ø	Invert	Ø
2800L	3000	1250	1750	500	110	800	110
3800L	4000	1250	1750	500	110	800	110
4500L	2650	1600	2100	500	110	800	110
6000L	2950	1900	2400	500	160	800	160
8000L	3640	1900	2400	500	160	800	160
10000L	4200	1900	2400	500	160	800	160
12000L	5200	1900	2400	500	160	800	160
14000L	5840	1900	2400	500	160	800	160
16000L	6700	1900	2400	500	160	800	160
18000L	7500	1900	2400	500	160	800	160
20000L	8100	1900	2400	500	160	800	160

> For precise tank sizes and configurations, please contact Marsh Industries
 > All dimensions in mm

Guidance notes

- For domestic dwellings the capacity of a septic tank should be a minimum of 2700ltrs for up to four users, with the size increased by 150ltrs for each additional user
- Sewage treatment is an ongoing process. For the micro-organisms to stay healthy the system should be desludged regularly to prevent the build-up of sludge and to allow sewage to flow freely through the unit

Uni:Gem™

Septic conversion unit

Overview

The Uni:Gem is an efficient, economical solution for sites where a new or replacement septic treatment plant is unfeasible.

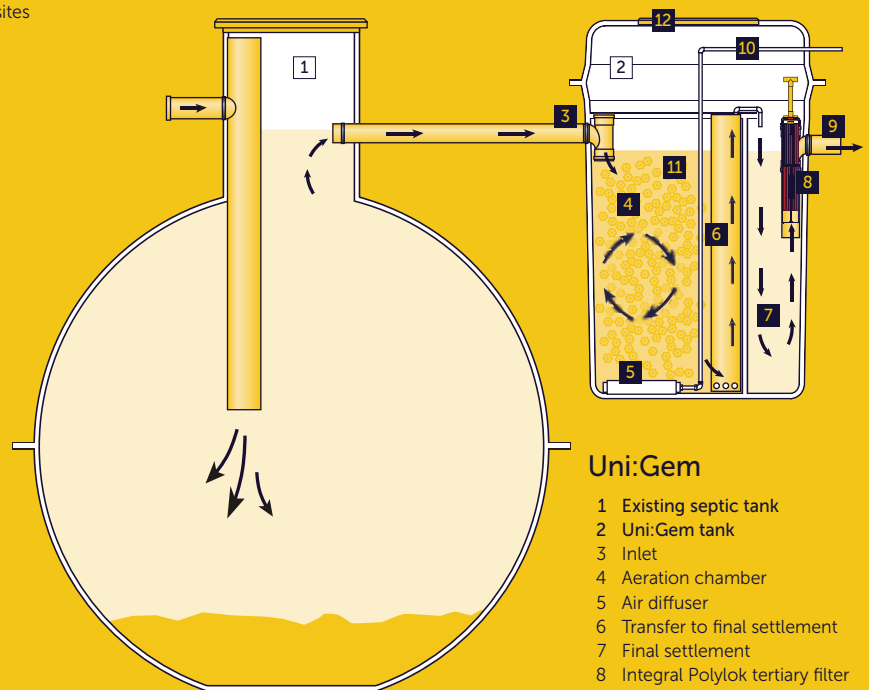
Available for sites up to 40+ persons, the Uni:Gem is a septic conversion unit which uses aerobic extended aeration, combined with biomass actuation to treat effluent from existing septic tanks or sewage treatment plants.

Uni:Gem units are suitable for domestic, commercial and agricultural applications. Hundreds of units have been successfully installed on sites throughout the UK and Europe.



Operating principle

Effluent from the existing septic tank or sewage treatment plant is transferred to the Uni:Gem unit and enters the aeration chamber where it is treated to remove dissolved constituents. Here aerobic bacteria, supported by diffused air and mobile media, ensures full treatment is achieved before the treated effluent (and 'sloughed off' bacteria) flows to a final settlement chamber prior to discharge via Polylok filter.



Uni:Gem

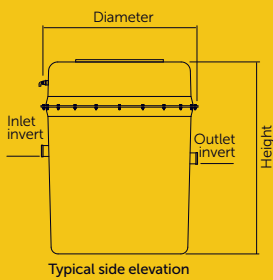
- 1 Existing septic tank
- 2 Uni:Gem tank
- 3 Inlet
- 4 Aeration chamber
- 5 Air diffuser
- 6 Transfer to final settlement
- 7 Final settlement
- 8 Integral Polylok tertiary filter
- 9 Outlet
- 10 Air diffuser feed
- 11 Bio media
- 12 Manway access

Benefits

- Minimum effluent quality of 20:30:20 (BOD:SS:NH⁴) can be achieved to ensure discharges are within national consent standards (As long as the system is operating and maintained within its design criteria)
- Designed to meet BSEN12566-6 standards
- Compact design for ease of handling, access and installation enables suitability for all site conditions including bedrock or high water table
- Variable inverts and easy access for desludging
- Media bed surface area 310m² per m³
- Low energy compressor ensures minimal running, maintenance and servicing costs
- Unique 'keying-in' lip to assist anchoring into granular or concrete surround
- Optional extras include extensions for deep installations; pumped outlets for sites with adverse levels; and many more

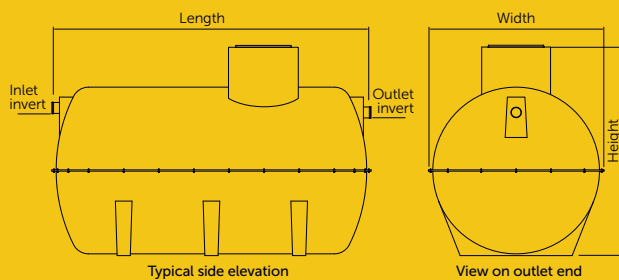
Specifications

Vertical Uni:Gem



Model	Dia	Height	Inlet		Outlet	
			Invert	Ø	Invert	Ø
Uni:Gem 6-10PE	1200	2200	1005	110	1000	110
Uni:Gem 12-18PE	1830	2100	700	110	775	110

Horizontal Uni:Gem



Model	Length	Width	Height	Inlet		Outlet	
				Invert	Ø	Invert	Ø
Uni:Gem 6PE shallow	1502	1295	1393	500	110	575	110
Uni:Gem 12PE shallow	2602	1650	1935	550	110	625	110
Uni:Gem 18PE shallow	2860	1930	2139	550	110	625	110
Uni:Gem 25PE	2860	1930	2300	700	110	875	160
Uni:Gem 30PE	3650	1930	2300	700	110	875	160
Uni:Gem 40PE	4200	1930	2300	700	110	875	160

Notes:

- > All dimensions in mm
- > Alternative tank sizes available
- > For precise tank sizes and configurations, please contact Marsh Industries
- > High Level Alarm systems and Polylok UV Chambers available
- > The compressor is housed externally with an RCD box and alarm supplied as standard
- > The Uni:Gem can be fitted with pumped outlets
- > Standard MDPE fittings are either 50mm or 63mm

Cesspools

Basic storage and disposal of off-mains wastewater

Structurally sound units

A cesspool is a covered, watertight tank used for storing sewage. It has no outlet and relies on road transport for the removal of raw sewage. No treatment is involved.



Specifications

Model	Length	Width	Height	Inlet	
				Invert	Ø
AT2800	3000	1250	1750	500	110
AT3800	4000	1250	1750	500	110
AT4500	2650	1600	2100	500	110
AT6000	2950	1900	2400	500	160
AT8000	3640	1900	2400	500	160
AT10000	4200	1900	2400	500	160
AT12000	5200	1900	2400	500	160
AT14000	5840	1900	2400	500	160
AT16000	6700	1900	2400	500	160
AT18000	7500	1900	2400	500	160
AT20000	8100	1900	2400	500	160

> All dimensions in mm

> For precise tank sizes and configurations, please contact Marsh Industries

Guidance notes

- For domestic applications cesspools should have a capacity below the level of the invert of at least 18,000ltrs for two users, and should be increased by 6800ltrs for each additional user. Cesspools for commercial premises have no such restrictions
- Installation of a high level alarm is recommended to indicate when it is nearly full
- Whoever empties your cesspool (or septic/PSTP) should be a registered Waste Carrier and hold a current discharge licence from the local water authority
- Use of cesspool is not permitted in Scotland

Sewage treatment

General guidance as provided by environmental regulators

As stated in this brochure, for development proposals in sewerred areas it is usually a legal requirement to connect to the public sewer, either by gravity or pumping, as the sewage is conveyed to a municipal sewage treatment works.

However, if it can be demonstrated that the proposed sewage disposal system offers a more sustainable solution to the overall water management of the site, then the regulators will consider the installation of a 'private' system.

For any such proposal you should:

- Check with your regulating body to confirm current status with regard to Registration/Consent, quality and volume limits, etc
- Take account of the requirements of Building Regulations and discuss with the local planning authority at an early stage - well before any planning application is made

Drainage fields

If you have access to a suitable area of land, discharge from your septic tank or treatment plant to a properly designed and sized drainage field is the best environmental option as the treated effluent recharges groundwater, nutrients are retained in the soil, and nutrient loads on surface waters are reduced.

The most common form of drainage field is a subsurface percolation area comprising perforated infiltration pipes laid in shingle-filled trenches – normally within 1m of ground level to allow the micro-organisms in the soil to break down the organic matter, and at least 1.2m above the winter water table.

The drainage field has two principal purposes:

- 1 To allow percolation of partially treated/treated effluent to ground at a controlled rate
- 2 To allow further treatment of partially treated effluent before it reaches the groundwater level

Before you can dispose of effluent via a drainage field you first need to assess whether such a route is appropriate, ie, you have a good depth of well-drained, well-aerated soil away from watercourses, wells/boreholes, dwellings, and avoiding sloping sites and areas prone to waterlogging.

Trial hole and percolation test method (See figure 1)

To calculate the exact area of land required for effective disposal an 'assessment' is required, usually by performing a percolation/water table test as outlined in BS6297 (Code of Practice for the Design and Installation of Drainage Fields for use in Wastewater Treatment) and the latest version of Building Regulations: H2.

A **trial hole** should be dug to determine the position of the standing groundwater table a minimum of 1m² in area and 2m deep, or a minimum of 1.5m below the invert of the proposed drainage field pipework. The groundwater table should not rise to within 1m of the invert level of the proposed effluent distribution pipes. If the test is carried out in summer, the likely winter groundwater levels should be considered.

A **percolation test** should then be carried out to assess the further suitability of the proposed area. A hole 300mm square should be excavated to a depth 300mm below the proposed invert level of the effluent distribution pipe. Where deep drains are necessary the hole should conform to this shape at the bottom, but may be enlarged above the 300mm level to enable safe excavation to be carried out.

Fill the 300mm square section of the hole to a depth of at least 300mm with water and allow it to seep away overnight.

Next day, refill the test section with water to a depth of at least 300mm and observe the time, in seconds, for the water to seep away from 75% full to 25% full level (ie, a depth of 150mm). Divide this time by 150. The answer gives the average time in seconds (Vp) required for the water to drop 1mm.

The test should be carried out at least three times with at least two trial holes and the average figure from the tests should be taken. The test should not be carried out during abnormal weather conditions such as heavy rain, severe frost or drought.

Drainage field disposal should only be used when percolation tests indicate average values of **Vp of between 12 and 100**. This minimum value ensures that untreated effluent cannot percolate too rapidly into groundwater. Where Vp is outside these limits effective treatment is unlikely to take place in a drainage field.

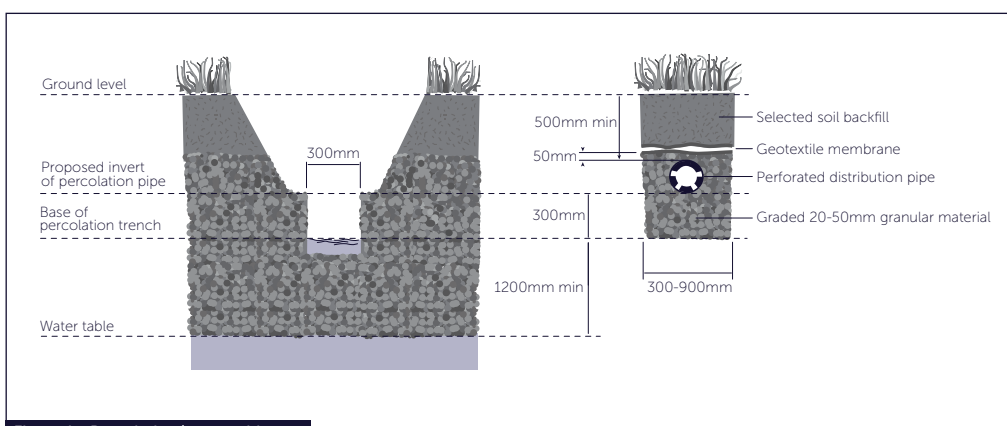


Figure 1 - Percolation/water table test

Note:

- > The phrase 'soakaway' is often used in relation to septic/treatment plant discharges. However, the purpose of a 'soakaway' is to distribute surface water to ground as quickly as possible and does not provide the required features of a drainage field.

Drainage field construction (See figures 1 and 2)

Drainage fields should be designed and constructed to ensure aerobic contact between the liquid effluent and the subsoil using perforated pipe laid in trenches:

- Pipes should be laid on a 300mm layer of clean shingle or broken stone (graded between 20mm and 50mm) at a minimum depth of 500mm and a uniform gradient not steeper than 1:200
- Trenches should be filled to a level 50mm above the pipe and covered with a layer of geotextile to prevent the entry of silt. The remainder of the trench can be filled with soil
- Trenches should be from 300mm to 900mm wide with areas of undisturbed ground 2m wide being maintained between parallel trenches.
- An inspection chamber should be installed between the septic tank and the drainage field
- Drainage fields should be set out as a continuous loop fed from the inspection chamber

To calculate the floor area of the drainage field (A_t in m^2), the following formulas should be used:

$$\text{For septic tanks: } A_t = p \times V_p \times 0.25$$

$$\text{For treatment plants: } A_t = p \times V_p \times 0.20$$

Where p is the number of persons served by the tank and V_p is the percolation value (secs/mm) obtained.

If it is not possible to discharge to a drainage field but you can discharge to a watercourse, coastal water or surface water sewer you should consider installing a package sewage treatment plant to treat sewage to a sufficient standard as to allow direct discharge to the receiving waters.

Tank sizing

The size of sewage treatment system you will require depends on the number of people that occupy the site and their activities, and it is at this stage you should re-contact Marsh.

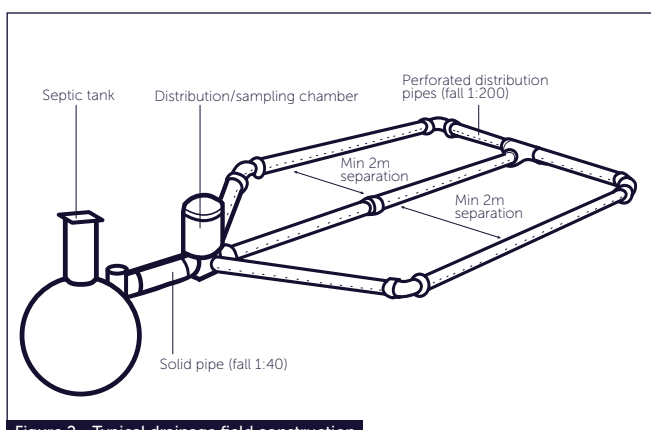


Figure 2 - Typical drainage field construction

You will need to provide detailed information about the sewage to be treated and its disposal method to enable calculation of the size of plant you will need. It is essential that you give accurate information as incorrect specification may result in the system you are provided with being inadequate and not treating the sewage effectively, leading to foul smells and possible pollution.

Distance from properties

Guidance collated from several sources recommends the following:

Distance from	Dwelling	Watercourse	Borehole/well
Pump chamber:			
1-5 dwellings	5m	-	-
6-20 dwellings	10m	-	-
20+ dwellings	15m	-	-
Septic tank	7m	10m	50m
Treatment plant	7m	10m	50m
Cesspool	7m	10m	50m
Drainage field	15m	10m	50m

Desludging

Sewage treatment is an ongoing process and the micro-organisms must stay healthy for the system to work. You should desludge the system regularly (usually annually or in line with manufacturer instructions) to prevent the build-up of sludge and solids to ensure sewage flows freely through the unit. It is recommended that not all sludge is removed as it can act as an anaerobic seed.

Tanks should be inspected monthly to check they are working correctly – the inlet chamber should be free-flowing and the effluent from the outlet should be free-flowing and clear.

Where emptying is by tanker, siting within 30m of suitable vehicle access point is recommended.

Notes:

- > Septic tanks can only discharge to ground via a drainage field – discharge to a watercourse (stream, ditch, pond) is not allowed.
- > Drainage fields are not permitted in Zone 1 groundwater protection zones.
- > No underground services or access roads/driveways/paved areas should be located in the disposal area.
- > Discharge from a sewage treatment plant requires a smaller (20% less) drainage field than a septic tank for effective treatment.
- > Elevated drainage mounds can provide an alternative to drainage fields in certain circumstances as they provide an aerated layer of soil where a conventional drainage field is inappropriate due to occasional waterlogging.

Commercial/industrial products from the Marsh range

- o Sewage treatment plants
- o Pump chambers
- o Septic tanks
- o Cesspools
- o Silage tanks
- o Grease traps
- o Oil separators
- o Domestic and commercial rainwater harvesting systems

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