OFF-MAINS DRAINAGE PRODUCTS

MARSH

SITE SERVICES

OFFMAINS SEWAGE SOLUTIONS

DOMESTIC
OFF-MAINS DRAINAGE PRODUCTS

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.

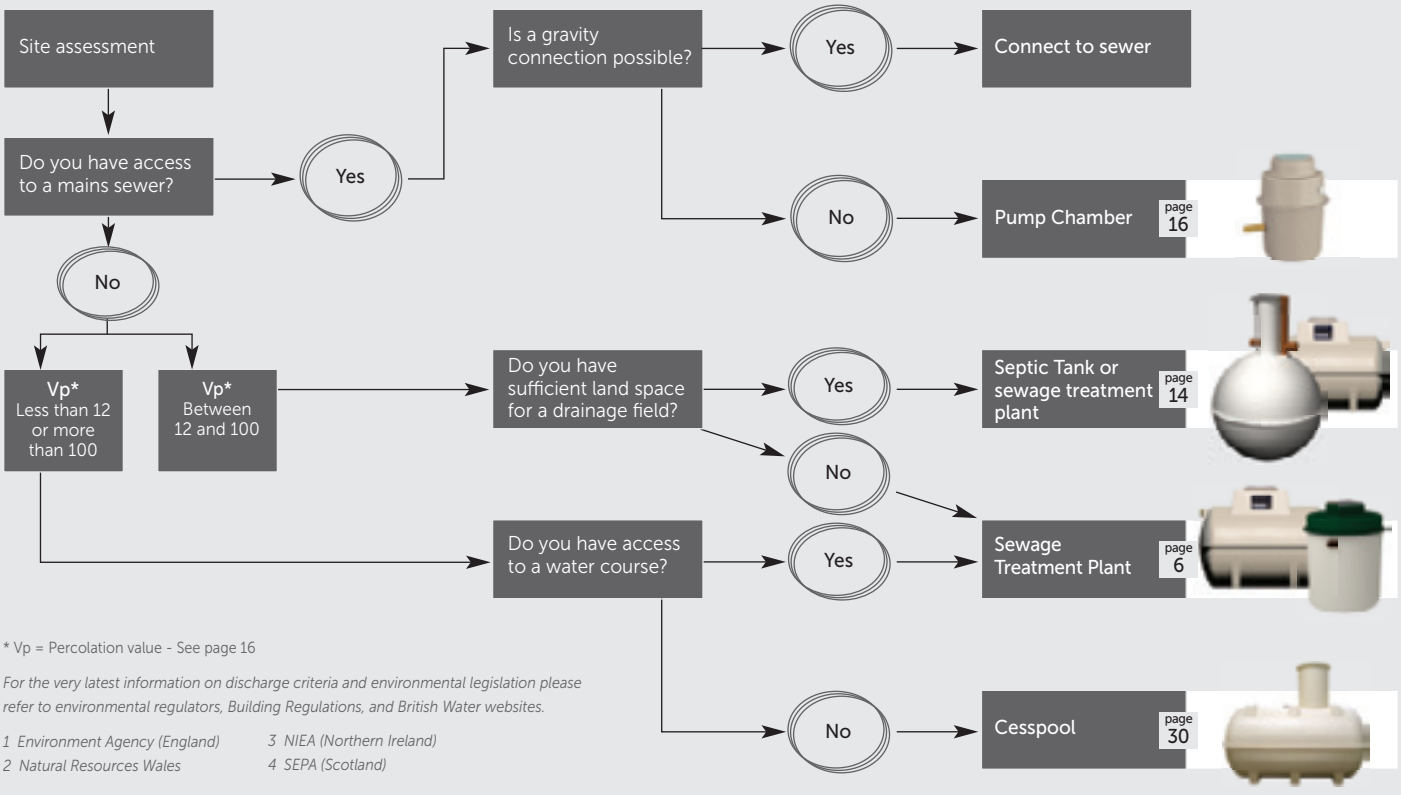
Before sewage effluent can be discharged to 'controlled waters' it must receive at least primary and secondary treatment:

- *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 16

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)
2 Natural Resources Wales
3 NIEA (Northern Ireland)
4 SEPA (Scotland)

Ensign®
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.

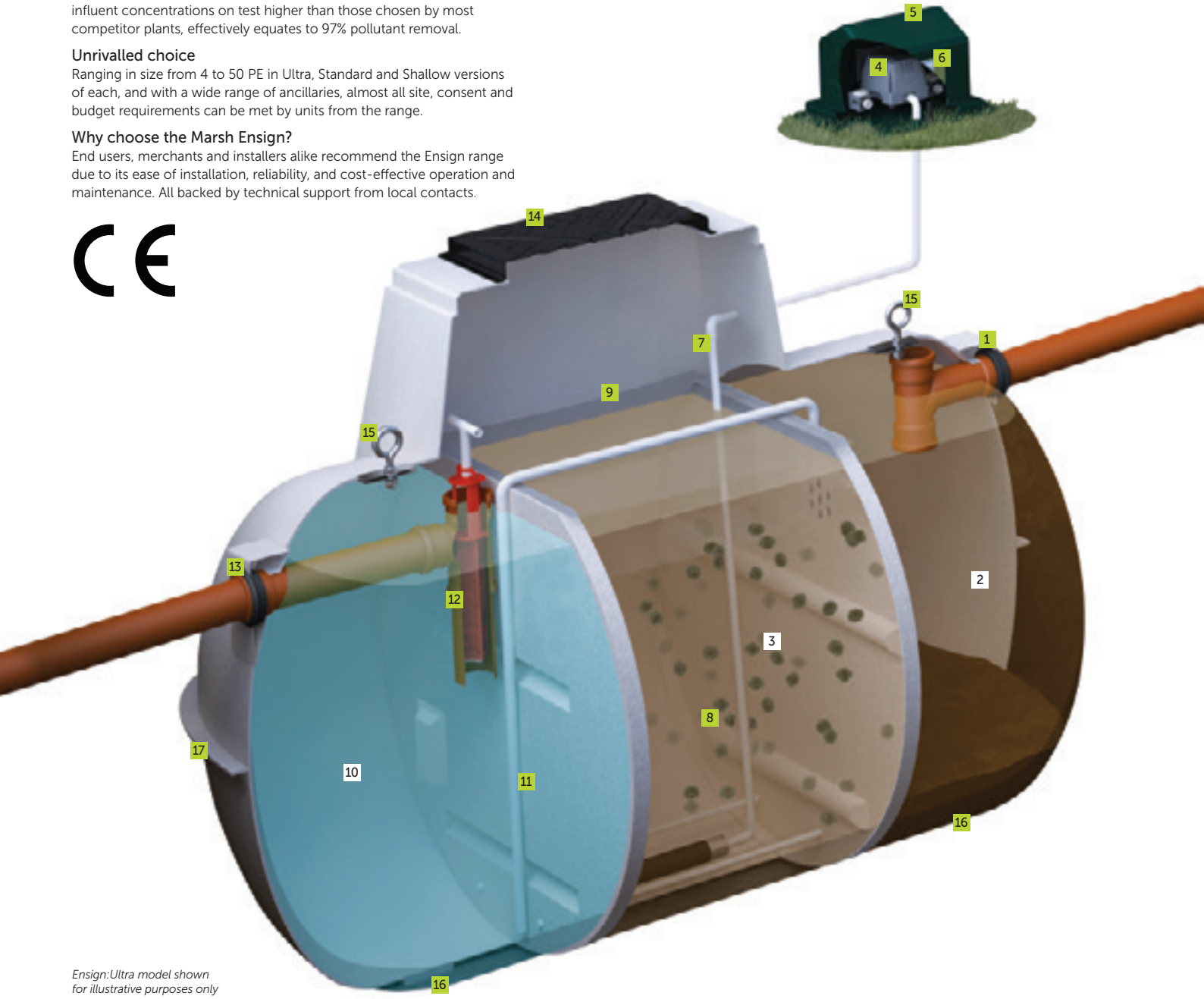
Unrivalled choice
Ranging in size from 4 to 50 PE in Ultra, Standard and Shallow versions of each, and with a wide range of ancillaries, almost all site, consent and budget requirements can be met by units from the range.

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.

CE

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 proveds 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 (310m^3 per m^2) 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 (Ensign:Ultra units only)**
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.

Whisspurr
Acoustic Vibration Reduction (AVR) unit
Suitable for all types of diaphragm compressors.
See page 14.

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 water course or surface water sewer is the prefered discharge method.

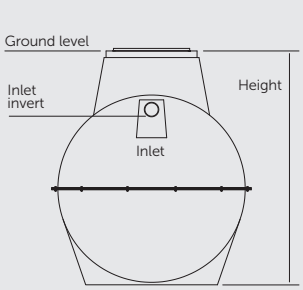
- *PSTP's should be sized using the latest version of British Water Flows & Loads which provides detailed information on sewage production figures and sizing calculations*
- *Regulatory authorities for the control of pollution in the UK normally require treatment plants conforming to BSEN12566:3 to be 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*

Many domestic sewage treatment plants offered by "internet resellers" claim to hold EN12566-3 compliance. This does not necessarily mean compliance with the UK National Forward, May 2007.

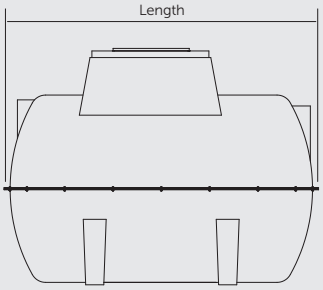
These plants may have been tested in their country of origin but not tested to the same criteria as Marsh Industries, where we strictly adhere to the UK National Forward. Contact contracts@marshindustries.co.uk for more information.

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

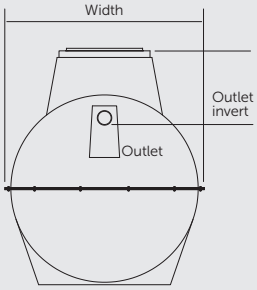
Specifications



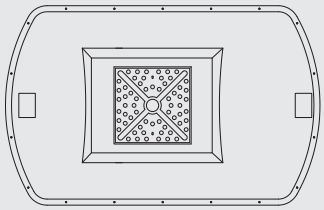
View on inlet end



Typical side elevation



View on outlet end



Typical plan view

Ensign:Ultra and Ensign:Standard

Model	Plant sizing examples (Approximate)		Length	Width	Height	Inlet		Outlet	
	Residential	Workplace (no canteen)	+/-50mm	+/-50mm	+/-50mm	Invert	Ø	Invert	Ø
4	2-bed / 4 people	6 people	1332	1575	540	110	600	110	
6	4-bed / 6 people	9 people	2602	1650	1935	550	110	625	110
8	5-bed / 8 people	12 people	2602	1650	1935	550	110	625	110
10	2 x 3-bed / 10 people	15 people	2602	1650	1935	550	110	625	110
12	2 x 4-bed / 12 people	18 people	2860	1912	2139	550	110	625	110
16	2 x 4-bed & 1 x 3-bed / 16 people	25 people	2860	1912	2284	720	110	800	110
20	3 x 4-bed / 18 people	32 people	3650	1912	2284	720	160	800	160
25	4 x 4-bed & 1 x 3-bed / 24 people	38 people	3650	1912	2284	770	160	850	160
30	5 x 4-bed or 6 x 3-bed / 30 people	48 people	4200	1912	2284	770	160	850	160
35	7 x 3-bed / 35 people	56 people	4200	1912	2284	770	160	850	160
40	8 x 3-bed / 40 people	72 people	5200	1912	2284	770	160	850	160
45	9 x 3-bed / 45 people	80 people	5200	1912	2284	770	160	850	160
50	9 x 3-bed / 45-50 people	80-90 people	5200	1912	2284	770	160	850	160

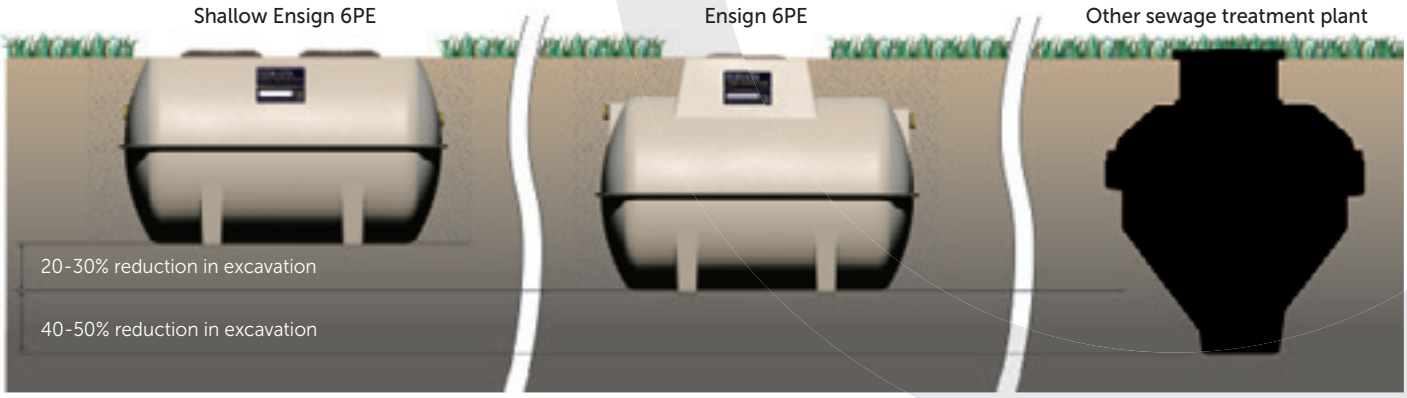
Notes:

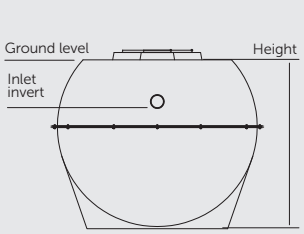
> *Larger population sewage treatment plants may be supplied as multiple tank configurations.*
> *For plant sizing, precise tank sizes and configurations, please contact Marsh Industries*
> *All dimensions in mm*

Shallow units

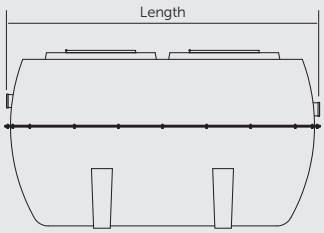
Common sewage treatment plants on the market often exceed 2.3m high. Marsh Industries offer a range of shallow plants from 4-35PE that are only 1.6m in height, meaning installation is not only possible*, but easier and safer too.

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

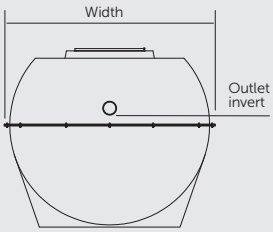




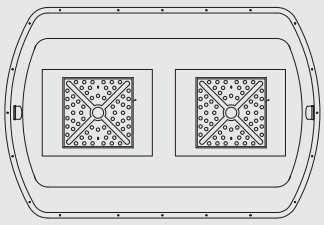
View on inlet end



Typical side elevation



View on outlet end


Typical plan view

Shallow Ensign:Ultra and Shallow Ensign:Standard

Model	Plant sizing examples (Approximate)		Length	Width	Height	Inlet		Outlet	
	Residential	Workplace (no canteen)	+/-50mm	+/-50mm	+/-50mm	Invert	Ø	Invert	Ø
6	4-bed / 6 people	9 people	2860	1912	1600	500	110	575	110
8	5-bed / 8 people	12 people	2860	1912	1600	500	110	575	110
10	2 x 3-bed / 10 people	15 people	2860	1912	1600	500	110	575	110
12	2 x 4-bed / 12 people	18 people	2860	1912	1600	500	110	575	110
16	2 x 4-bed & 1 x 3-bed / 16 people	25 people	3400	1912	1600	500	110	575	110
20	3 x 4-bed / 18 people	32 people	4200	1912	1600	500	160	575	160
25	4 x 4-bed & 1 x 3-bed / 24 people	38 people	4200	1912	1600	500	160	575	160
30	5 x 4-bed or 6 x 3-bed / 30 people	48 people	5200	1912	1600	500	160	575	160
35	7 x 3-bed / 35 people	56 people	5200	1912	1600	500	160	575	160

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

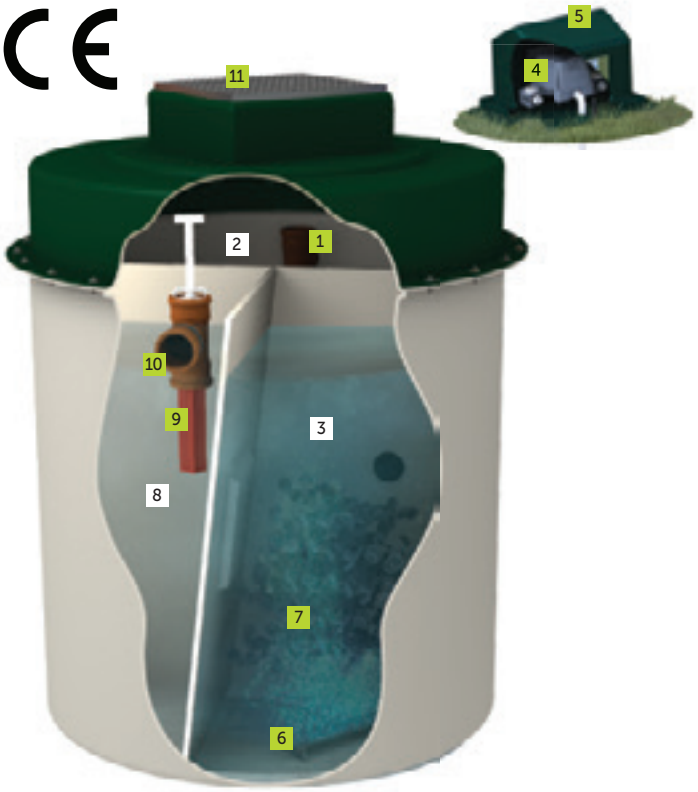
Ultra:Polylok L™
Sewage treatment plants
Intensive biological processing for off-mains wastewater

Overview

The Marsh Ultra:Polylok L (UPL) draws upon Marsh Industries' extensive experience in the industrial and commercial sewage treatment sectors bringing its outstanding performance and high-quality engineering to the domestic sector.

The UPL is available in 6PE and 12PE models, is approved to BS EN12566-3 and carries an impressive effluent quality of 20:30:20, within national consent standards.

Both models are compact and easy to install, meeting the needs of installers and specifiers alike.



Benefits

- Tested and approved to the most stringent European Standards: EN12566-3: 2005+A1:2009
- Small footprint and shallow dig for easy installation provides enhanced health and safety benefits
- Heavy duty shell as standard enables installation in all ground conditions. Unique 'keying-in' lip assists anchoring into granular or concrete surrounds
- Near silent, energy efficient compressor (located externally) with integral alarm (approximate annual running costs of £35 p/annum)
- High specification bio-media (310m^3 per m^2) and membrane diffuser ensures even circulation and maximum treatment efficiency
- Unique Polylok tertiary filter reduces suspended solids and BOD by a further 40% helping to extend drainage field life
- Sludge return pipe improves system circulation
- Variable inverts for ease of installation at various depths – 250, 500 and 750mm risers available
- Pumped outlets available

Operating principle

The UPL uses a similar operating principle as the Marsh:Ensign.

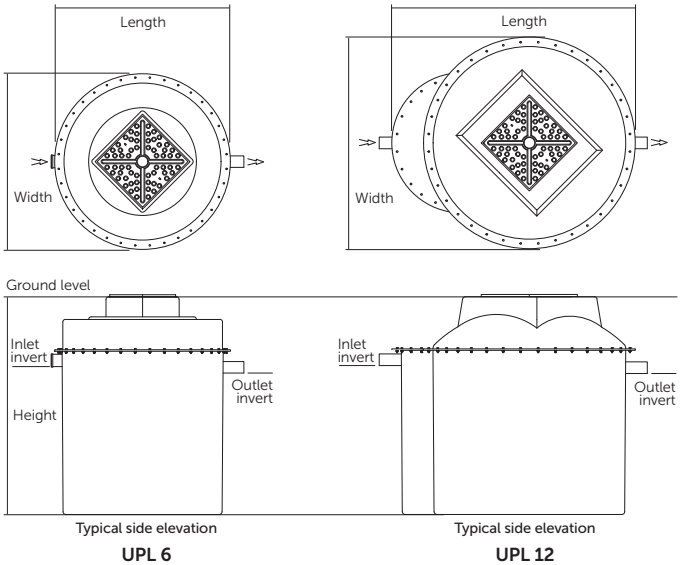
In addition to anaerobic digestion taking place in the primary settlement chamber [2] the UPL unit allows the clarified water to pass into a second 'aeration' chamber [3] where it is treated to remove the dissolved constituents. Here aerobic bacteria, supported by diffused air and mobile media, ensures full treatment is achieved before the treated effluent and 'sloughed off' bacteria flows to a final settlement chamber [8]. The final effluent is then discharged to the drainage field or watercourse via a Polylok filter.

Key

1 Inlet
2 Primary settlement chamber
3 Aeration chamber
4 Compressor with alarm
5 Compressor housing
6 Air diffuser
7 Bio-media
8 Final settlement chamber
9 Polylok tertiary filter
10 Outlet
11 Heavy duty lid

Whisspurr
Acoustic Vibration Reduction (AVR) unit
Suitable for all types of diaphragm compressors.
See page 14.

Specifications



UPL 6 **UPL 12**

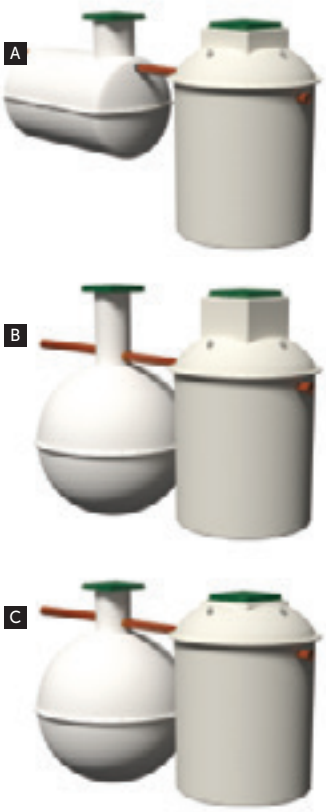
Model	Length	Width	Height	Inlet		Outlet	
(Pop)	+/-50mm	+/-50mm	+/-50mm	Invert	Ø	Invert	Ø
UPL 6	1700	1700	2050	650	110	725	110
UPL 12	2300	2000	2050	650	110	725	110

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

Specifications

Model	Width Ø +/-50mm	Height +/-50mm	Inlet Invert	Inlet Ø	Outlet Invert	Outlet Ø
A **UG-SCS** **Uni:Gem★ up to 6PE** *For shallow cylindrical septic tanks*	1512 1652 over flanges	2300	800	110	900	110
B **UG-SPH** **Uni:Gem★ up to 6PE** *For spherical 'onion-shaped' septic tanks*	1512 1652 over flanges	2540	1040	110	1140	110
C **UG-STP6** **2800L septic tank** **Uni:Gem★ up to 6PE** *EN12566-6 complete package sewage treatment plant*	1870 1512 1652 over flanges	2330 2090	550 590	110 110	590 690	110 110

> Uni:Gem★ supplied with external compressor and compressor housing
> Check your septic tank outlet invert (ground level to the bottom of the pipe)
> Other sizes of Uni:Gem★ are available. Contact Marsh Industries for more information
> *For precise tank sizes and configurations, please contact Marsh Industries*
> *All dimensions in mm*



2020 General Binding Rules

For decades, millions of septic tanks have been installed throughout the UK in rural and urban areas. Septic tanks are known to be ineffective at processing sewage to modern environmental standards, causing long-term damage to the country's natural water infrastructure and wildlife.

It was therefore inevitable that new rules and a code of conduct would be introduced to prevent the effects of wastewater pollution once and for all; The Environmental Permitting (England and Wales) (Amendment) (England) Regulations 2014 came into force on 1 January 2015 creating the General Binding Rules (GBRs) for septic tanks or small sewage treatment plants for domestic use. These rules are designed to reduce the level of pollution from sewage in the nation's watercourses.

The rules state that any existing septic tank discharging to surface water, ie, to a water ditch, stream or river, etc, must either be upgraded or replaced with a new package sewage treatment plant by 1st January 2020.

Marsh Industries, the leading UK manufacturer of package sewage treatment plants, produces over 3000 units per year. However the company's range of Uni:Gem★ septic conversion units is the only product available on the market which can treat wastewater from an existing septic tank without the need for a complete replacement product or drainage field upgrade.

To comply with the GBRs and current EN standards, the entire Uni:Gem range was redeveloped from the ground up and tested, not only to meet, but to exceed UK and International standards. The Uni:Gem★ was born – creating an **'industry first' 2020 compliant septic conversion unit** with outstanding processing performance.

The Uni:Gem★ range was tested in accordance with BSEN12566-3/A1:2009 and EN12566-6 standards at the PIA GmbH test facility in Aachen, Germany, over the course of 38 weeks with a daily loading of:

Flow: 900 litres/day **BOD: 360g** **NH^4: 48g**

Testing occurred between November 2018 and August 2019 to ensure all seasons were covered whilst minimum/maximum temperatures were tested to assure Ammonia and BOD process reduction for the UK climate. Holiday periods were also simulated during the test procedure.

Final test results yielded an output of 12.5:16:4mg/ltr (BOD:Suspended solids:Ammonia) that is well within national discharge consent requirements.

The Uni:Gem★ is an extremely cost effective solution for converting any polluting septic tank into a fully compliant sewage treatment plant ensuring homeowners, estate managers, water companies/amenities have an effective way to keep the environment clean whilst providing a quick and efficient installation process.

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.

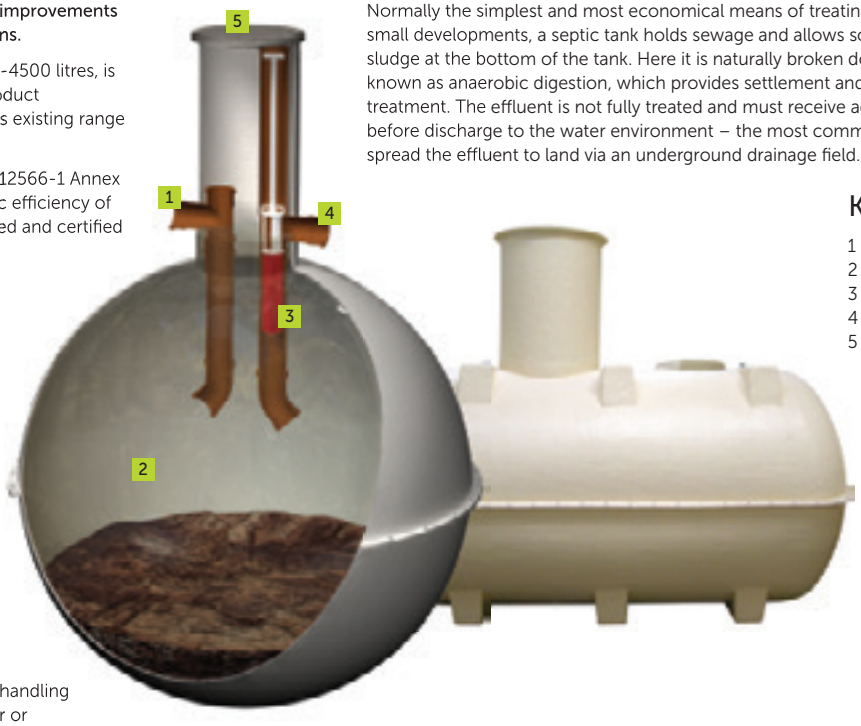
The range, available in capacities from 2800-4500 litres, is CE marked to comply with Construction Product Regulations and compliments the company's existing range of horizontal septic tanks.

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.

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

- 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



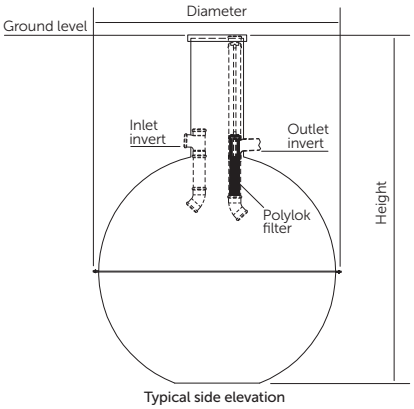
Operating principle

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.

Key

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

Euro:Septic

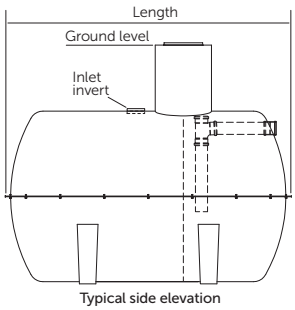


Typical side elevation

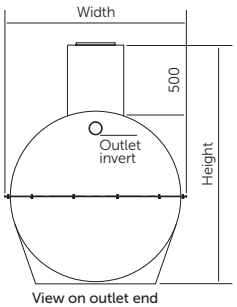
Size	Dia	Height	Inlet		Outlet	
	+/-50mm	+/-50mm	Invert	Ø	Invert	Ø
2800L	1870	2780	1000	110	1040	110
3800L	2075	3000	1000	110	1040	110
4500L	2196	3100	1000	110	1040	110

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

Horizontal septic tanks



Typical side elevation



View on outlet end

Size	Length	Width	Height	Inlet		Outlet	
	+/-50mm	+/-50mm	+/-50mm	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	110	800	110
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

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

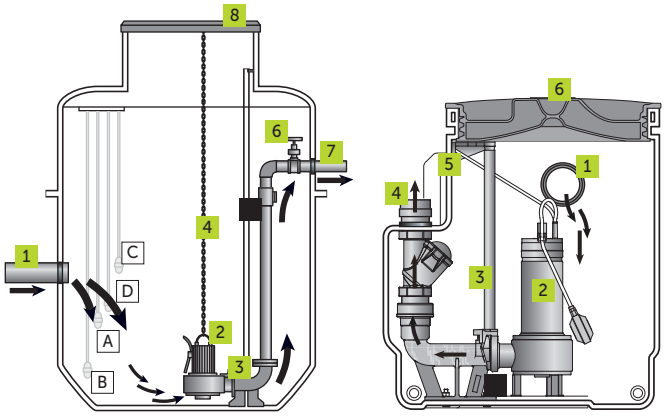
Each pump chamber contains a number of float switches linked to a control panel that automatically controls flow and levels.

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 Lowara (Xylem) 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

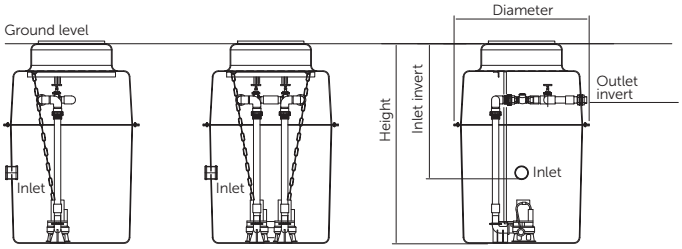
Guidance notes

- *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

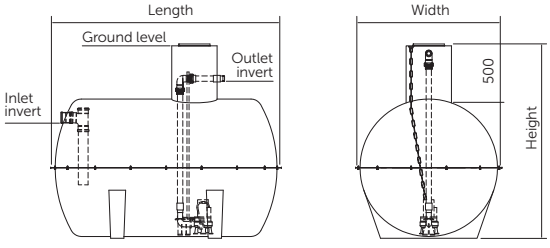


Single pump system | Twin pump system | Typical section

Model	Dia	Height	Inlet		Outlet		Storage below invert	Total Storage Litres
	+/-50mm	+/-50mm	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	1170	1100	500	110	300	63	470	867
CPS2	1170	1500	700	110	300	63	780	1183
CPS3	1170	2200	900	110	300	63	1025	1735
CPS4	1170	2600	900	110	300	63	1340	2050
CPS5	1958	2100	900	110	300	63	2440	3700
CPS6	1958	3400	900	110	300	63	4000	6000

Horizontal pump stations

For larger housing projects, and commercial/industrial developments



Typical side elevation | View on outlet end

Model	Length	Width	Height	Inlet		Outlet		Total Storage Litres
	+/-50mm	+/-50mm	+/-50mm	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

Notes:

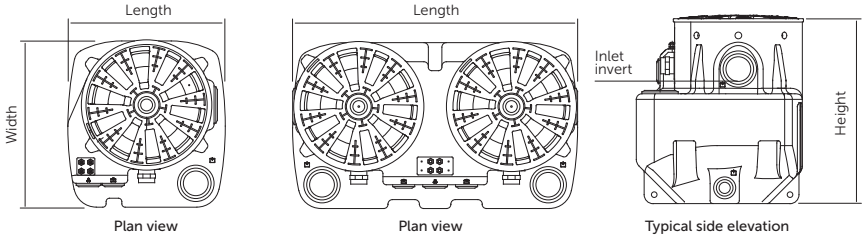
> *All pump chambers are available for dirty water (DW) or sewage (SW), in single pump (SP) and twin pump (TP) configurations.Pump chambers are usually bespoke. The dimensions given on this page are for guidance only*

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

> *All dimensions in mm*

Marmicro

For small flows from single developments



Plan view Marmicro Single | Plan view Marmicro Twin | Typical side elevation

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

All dimensions in mm

Sewage treatment

General guidance as provided by environmental regulators

As stated in this brochure, for development proposals in sewered 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 1m^2 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.

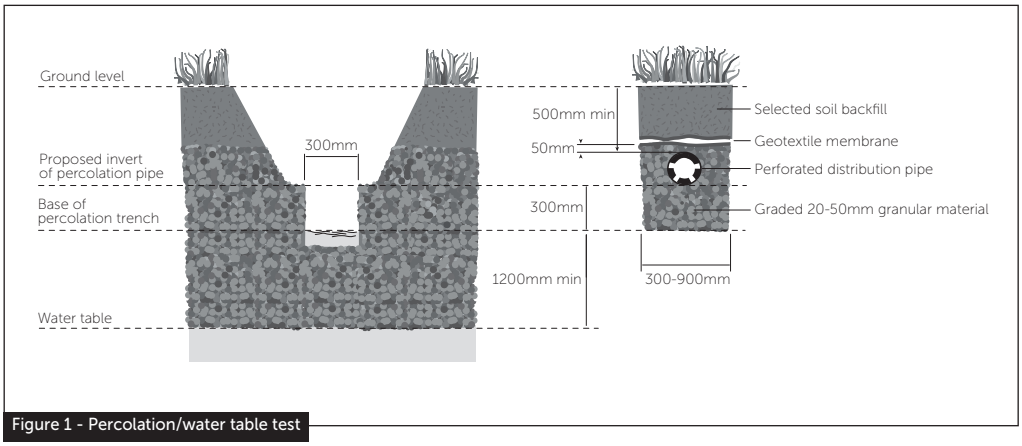


Figure 1 - Percolation/water table test

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:

For septic tanks: $A_t = p \times V_p \times 0.25$
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.

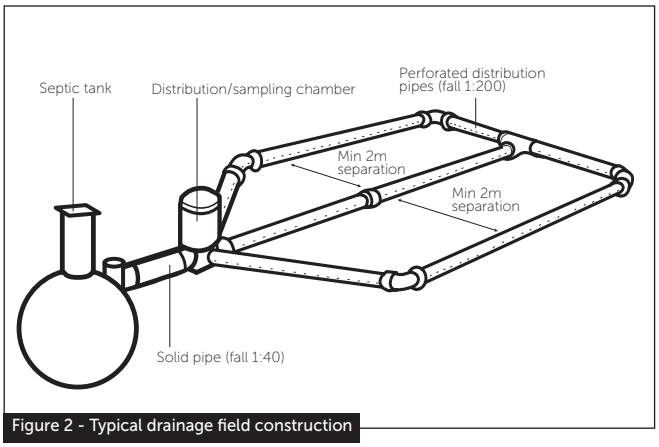


Figure 2 - Typical drainage field construction

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.*

CIVILS/COMMERCIAL
OFF-MAINS DRAINAGE PRODUCTS

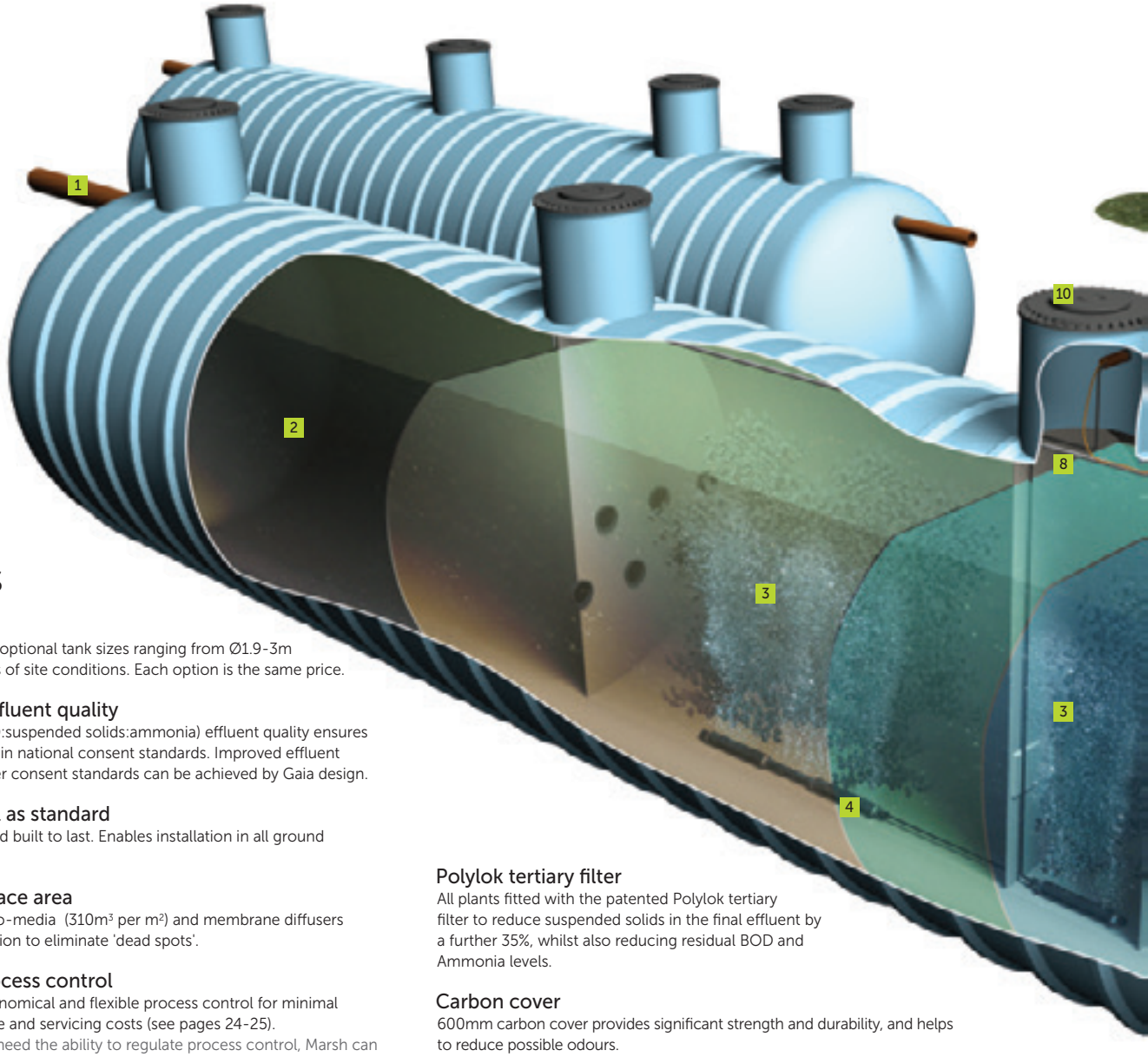
Ultra:Polylok™
Sewage treatment plants
Advanced biological processing for off-mains wastewater

Overview

Marsh Ultra Polylok sewage treatment systems provide advanced biological treatment to off-mains wastewater on sites ranging from 50-500PE.

The units are ideally suited for large residential, commercial, industrial and leisure sites - particularly where onerous consent standards preclude the use of standard 'off the shelf' units.

Proven reliability of the simple but effective Submerged Aeration Filtration (SAF-MBBR) system offers both operating and financial benefits when compared to more complex alternatives that require frequent servicing and maintenance to sustain performance.



Benefits

Plant sizing
Bespoke design with optional tank sizes ranging from Ø1.9-3m satisfies the demands of site conditions. Each option is the same price.

Class-leading effluent quality
20:30:20mg/ltr (BOD:suspended solids:ammonia) effluent quality ensures discharge is well within national consent standards. Improved effluent quality to meet tighter consent standards can be achieved by Gaia design.

Heavy duty shell as standard
Structurally sound and built to last. Enables installation in all ground conditions.

High media surface area
High specification bio-media (310m^3 per m^2) and membrane diffusers provide even circulation to eliminate 'dead spots'.

Eco-friendly process control
Energy-efficient, economical and flexible process control for minimal running, maintenance and servicing costs (see pages 24-25).
For sites that do not need the ability to regulate process control, Marsh can offer diaphragm compressors for sewage treatment plants up to 150PE

Internal recirculation
Continues the treatment process to provide higher effluent quality whilst balancing flow over 24 hour period or periods of intermittent use.

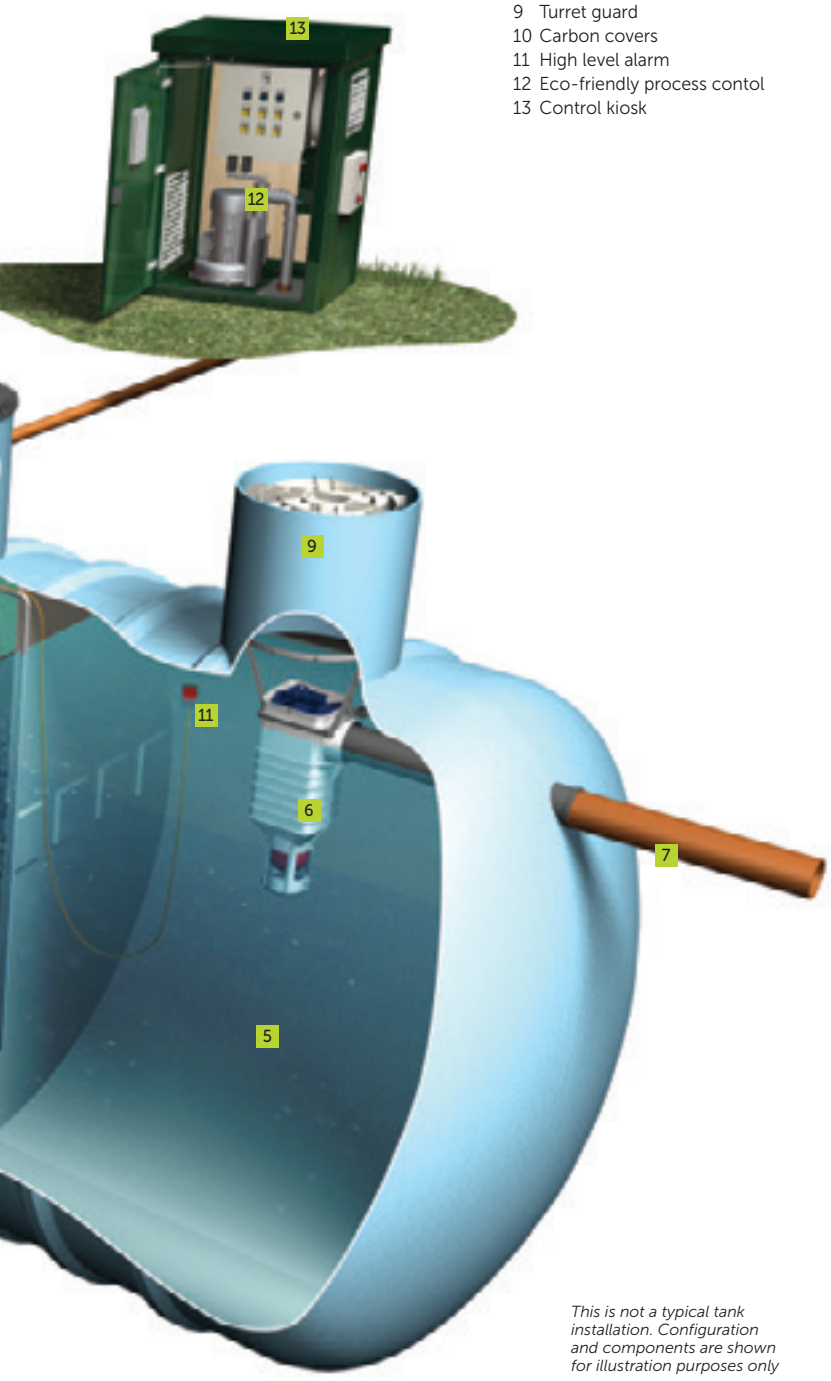
Polylok tertiary filter
All plants fitted with the patented Polylok tertiary filter to reduce suspended solids in the final effluent by a further 35%, whilst also reducing residual BOD and Ammonia levels.

Carbon cover
600mm carbon cover provides significant strength and durability, and helps to reduce possible odours.

Optional extras
Optional extras include extensions for deep installations, pumped outlets for sites with adverse levels, sample chambers, Degrilleur trash barriers, phosphate reduction and UV treatment chambers.

Key

1 Inlet
2 Primary chamber
3 Aeration chambers
4 Air diffusers
5 Final (or 'humus') chamber
6 Polylok filter
7 Outlet
8 Recirculation to primary chamber
9 Turret guard
10 Carbon covers
11 High level alarm
12 Eco-friendly process contol
13 Control kiosk



This is not a typical tank installation. Configuration and components are shown for illustration purposes only

Tank sizing

Developed by Marsh Industries, the unique Gaia Sege process design software uses core information to accurately calculate and tailor key variables ensuring total system optimisation for individual applications.

These precise calculations provide assurance to consultants, engineers, specifiers and contractors that the system is specifically designed to meet the appropriate standards of regulatory bodies.

For Ultra:Polylok sewage treatment plants, the software uses established core process equations to accurately calculate and tailor key variables ensuring total processing optimisation for Biological Oxygen Demand (BOD), Total Suspended Solids (TSS) and Ammonia (NH_4) reduction and removal.

Gaia Sege software also uses 'British Water Flows & Loads' data to calculate initial flows and loadings whilst also calculating peak flows and levels.

The programme can also calculate accurate sludge generation and storage on a daily basis, dependent upon final effluent standards required, ensuring the optimisation of primary chambers, individual clarifiers, diffused oxygen feed and final settlement chamber.

GRP kiosks

Marsh GRP kiosks provide safe and secure storage of electrical control panels and other tank monitoring equipment.

The kiosks are typically fitted with one or two doors, depending on kiosk size, with stainless steel vents and yale locks.

Energy-efficient, **economical** and **flexible** process control for Ultra:Polylok™ sewage treatment plants

Efficiency

Air blower speed/output is controlled using a variable speed 'drive' which supplies the precise amount of air required to enable the sewage treatment plant to function efficiently.

Optimisation of the air blower output results in improved running costs, meaning the end-user can be assured they have the most economical solution for their wastewater system.

This is a unique feature when it comes to overall energy-efficiency as most process control kiosks currently available within the industry have a one size fits all approach.

Flexibility

These next-generation process control kiosks are built with flexibility in mind. Additional control options can be programmed into the 'drive' to regulate the volume of air delivered to the sewage treatment plant for different periods. This can be particularly beneficial for seasonal applications such as campsites, caravan parks, lodges or hotels where they may operate at peak capacity for short periods of the year. This functionality permits the volume of air to be increased or reduced, depending on the amount of people to be accommodated, thereby offering the end-user the ability to further reduce energy and running costs..

In addition, the process control kiosk allows for system expansion in the case of business/site growth (subject to design), thus eliminating the need to install extra tanks, pipework, air blowers, etc.

Noise reduction

We believe these kiosks to be the quietest on the market today. They are fitted with a number of noise reduction measures as standard, making them ideal for caravan parks, campsites, etc, subject to kiosk placement/location. This can reduce the need for creating barriers or planting to restrict noise.

Further noise reduction measures can be added through the use of acoustic PUNF foam linings and various acoustic noise absorbing baffles. This not only reduces noise but enables the kiosk to be placed in a more convenient location on sites where space is at a premium (the recommended distance from the sewage treatment plant should be 10m).

Specification/costs of noise reduction options, including measured decibel levels at a given distance from the kiosk, can be supplied on request.

Features

- Powder coated, mild steel or GRP kiosk (Green - RAL6005)
  The kiosk protects the motor and controls from the elements
- Forced ventilation, including ambient temperature control
  A ventilation fan/thermostat maintains the optimal ambient temperature in accordance with the air blower manufacturer's specifications
- Thermal protection on motors
  Protects the motor windings from overheating, increasing the reliability and lifespan of the motor
- Electrical overload and short circuit protection
  As required by electrical regulations
- Air intake filter maintenance alarm
  Alerts the end-user when the intake filter needs cleaning/replacing
- High pressure alarm
  Alerts the end user if the system design pressure has been exceeded, typically suggesting a blockage or restriction in the pipework
- Low pressure alarm
  Alerts the end user if the system design pressure is low, typically suggesting a leakage in the pipework
- Standard acoustic attenuation including air intake silencer and external acoustic hood
  Reduces noise from the blower motor and air intake

Key

1 Electrical control panel
2 Kiosk lighting and power DB
3 230v RCD sockets
4 Kiosk ventilation fans/thermostat control box
5 Electrical panel drawings and documents
6 Test equipment (for use when commissioning)
7 Aeration blowers
8 Pipe manifold including 50mm outlets and return valves
9 Air intake silencer
10 Aeration blower intake filter
11 Blower power and control outlets
12 Kiosk lighting

Specifications

Ultra:Polylok		Kiosk					
Model	**People served**	**Height**	**Width**	**Depth**	**Power rating** Kw	**Recommended electrical supply 230v**	**Recommended electrical supply 400v**
UP55	55	1350	850	500	0.8	230v SP&N 16A type C/D MCB	400v TP&N 10A type C/D MCB
UP75	75	1350	850	500	0.8	230v SP&N 16A type C/D MCB	400v TP&N 10A type C/D MCB
UP100	100	1350	850	500	1.1	230v SP&N 20A type C/D MCB	400v TP&N 16A type C/D MCB
UP125	125	1350	850	500	1.1	230v SP&N 20A type C/D MCB	400v TP&N 16A type C/D MCB
UP150	150	1350	850	500	1.1	230v SP&N 20A type C/D MCB	400v TP&N 16A type C/D MCB
UP175	175	1350	850	500	1.1	230v SP&N 16A type C/D MCB	400v TP&N 16A type C/D MCB
UP200	200	1350	850	500	1.5	230v SP&N 25A type C/D MCB	400v TP&N 20A type C/D MCB
UP225	225	1350	850	500	1.5	230v SP&N 25A type C/D MCB	400v TP&N 20A type C/D MCB
UP250	250	1350	850	500	2.2	230v SP&N 40A type C/D MCB	400v TP&N 32A type C/D MCB
UP275	275	1350	850	500	2.2	230v SP&N 40A type C/D MCB	400v TP&N 32A type C/D MCB
UP300	300	1350	850	500	3.0	230v SP&N 50A type C/D MCB	400v TP&N 40A type C/D MCB
UP325	325	1450	950	500	3.0	230v SP&N 50A type C/D MCB	400v TP&N 40A type C/D MCB
UP350	350	1450	950	500	3.0	230v SP&N 50A type C/D MCB	400v TP&N 40A type C/D MCB
UP375	375	1450	950	500	3.0	230v SP&N 50A type C/D MCB	400v TP&N 40A type C/D MCB

Notes:
> *The dimensions given on this page are for guidance only*
> *For precise kiosk and Ultra:Polylok sewage treatment plant sizes and configurations, please contact Marsh Industries*
> *All dimensions in mm*

Maintenance

Our engineers will advise of the appropriate maintenance plan once the site installation has been completed, however the process controls installed within the kiosk are designed to alert you to any imminent maintenance required on the system.

Installation

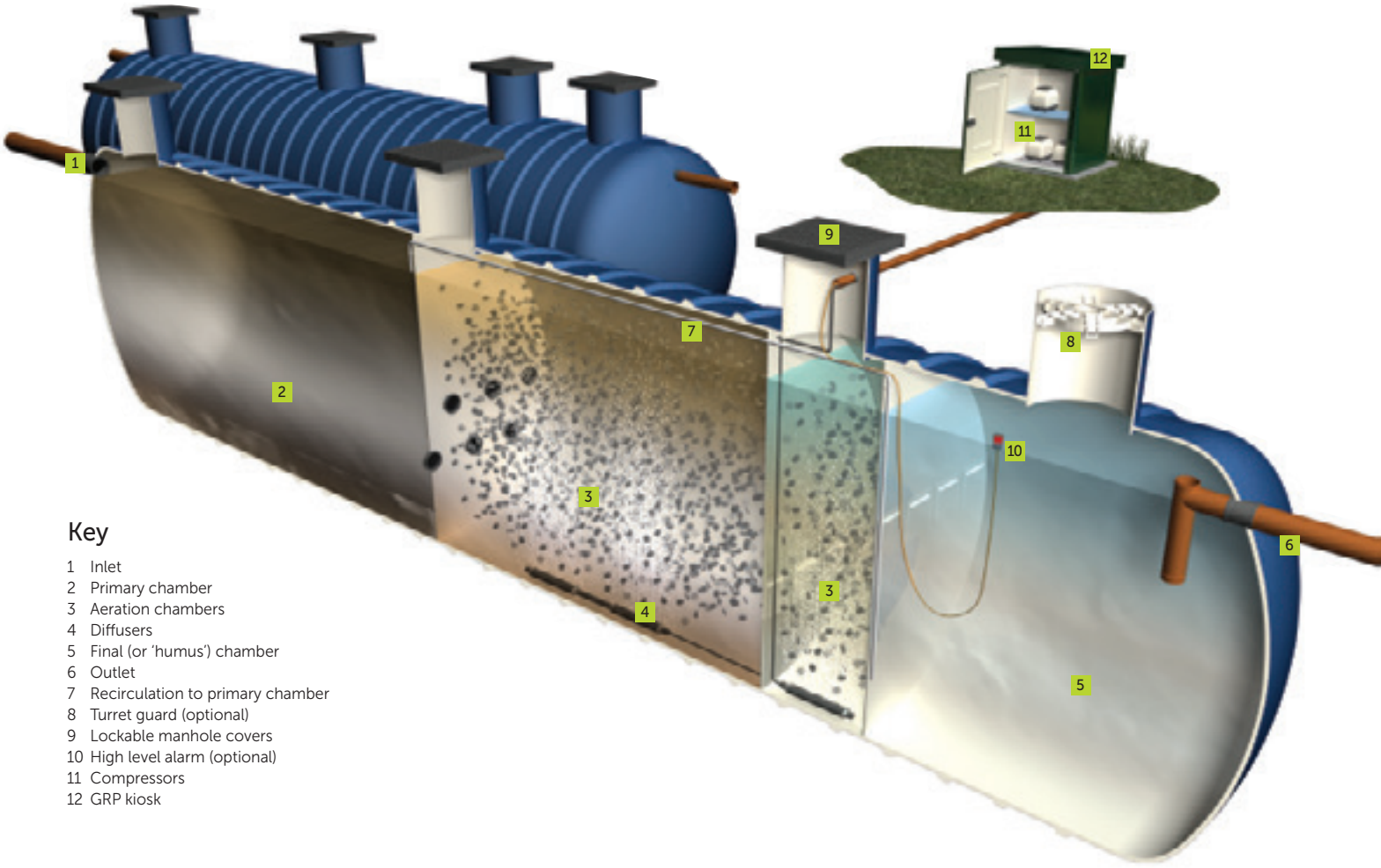
All kiosks are supplied fully assembled, tested and ready for installation. An electrical supply/connection to the kiosk should be all that is required on site (electrical supply requirements will be supplied upon kiosk specification).

Marsh:Standard
Cost-effective sewage treatment
Biological processing for off-mains wastewater

Overview

Marsh:Standard cost-effective sewage treatment systems provide biological treatment to off-mains wastewater on large residential, commercial, industrial and leisure sites ranging from 50-300+PE.

Proven reliability of the simple but effective Submerged Aeration Filtration (SAF-MBBR) system offers both operating and financial benefits when compared to more complex and expensive alternatives that require frequent servicing and maintenance to sustain performance.



Key

1 Inlet
2 Primary chamber
3 Aeration chambers
4 Diffusers
5 Final (or 'humus') chamber
6 Outlet
7 Recirculation to primary chamber
8 Turret guard (optional)
9 Lockable manhole covers
10 High level alarm (optional)
11 Compressors
12 GRP kiosk

This is not a typical tank installation. Configuration and components are shown for illustration purposes only

Alarm systems

Alarms monitor the level of liquid inside sewage treatment plants, pump stations and oil separators units. An alarm signal is generated when there is an excessive level of liquid, or if the unit requires emptying.

Marsh Industries can supply various types of alarm, as well as bespoke options as required.

- Beacon alarms
- Micro SMS battery alarms
- Klaxon and beacon alarms
- Micro SMS solar panel alarms
- SMS Alarms

GRP kiosks

Marsh GRP kiosks provide safe and secure storage of electrical control panels and other tank monitoring equipment. The kiosks are typically fitted with one or two doors, depending on kiosk size, with stainless steel vents and yale locks.

Mild steel kiosks

Mild steel kiosks provide safe and secure storage of electrical control panels and other tank monitoring equipment. The kiosks are typically fitted with one or two doors, depending on kiosk size, with vents and yale locks.

Commissioning and servicing

Marsh Industries offers a nationwide service to cover all aspects of commissioning and servicing on the Marsh WellWater pump station range.

Commissioning and servicing packages can be tailored to customer requirements from basic comissioning contracts to commisioning and full service contracts, including on-going support and advice..

Advice and guidance

For advice and guidance on choosing the right products for your site please contact Marsh Industries on +44 (0)1933 654582 or email contracts@marshindustries.co.uk

SITE SERVICES

OFFMAINS SEWAGE SOLUTIONS

S & S Site Services Ltd, Unit 1D, Canteen Mill Industrial Estate
Burnley Road, Todmorden, Lancs OL14 7DR

Tel: 01706 813733 | Email: info@siteservices.co.uk

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