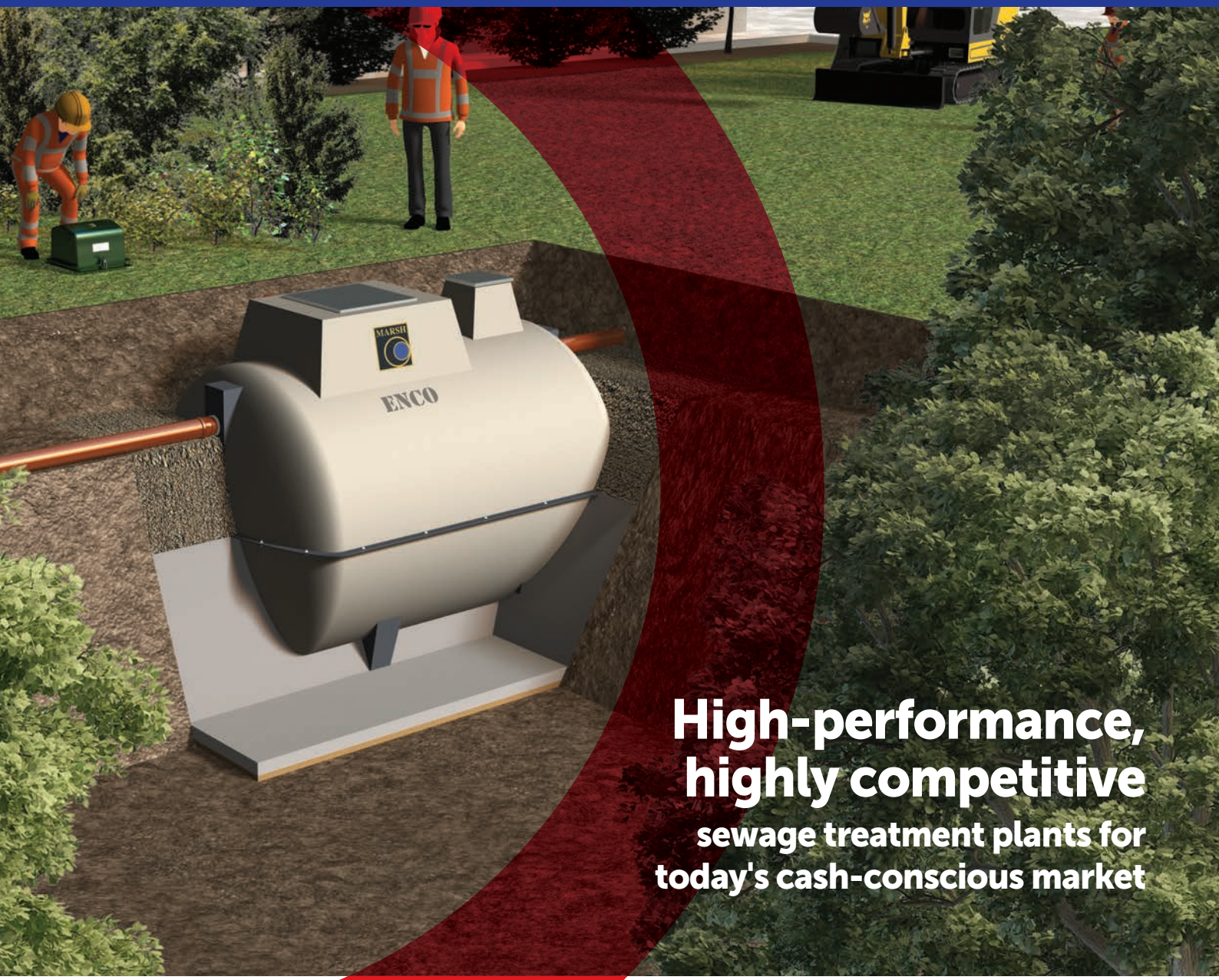
Marsh:ENCO

Package sewage treatment plants



High-performance, highly competitive

sewage treatment plants for today's cash-conscious market

Whisspurr®
Acoustic Vibration Reduction (AVR) unit
See back page for details

MARSH

Marsh:**ENCO**

High-performance, reliable and cost-effective sewage treatment

Overview

Marsh sewage treatment plants are widely regarded as the most efficient, reliable and economical systems on the market.

Building upon the outstanding reputation of the Marsh:Ensign® range of sewage treatment plants, the Marsh:ENCO is a cost-effective alternative where competitive pricing is required.

Outstanding performance

Tested and approved to BSEN12566-3/A1:2009 all ENCO units provide treatment well within national consent requirements.

Unrivalled choice

Ranging in size from 6 to 16PE and with a wide range of ancillaries, almost all site, consent and budget requirements can be met by units from the ENCO range.

Why choose the Marsh:ENCO?

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

Operating principle

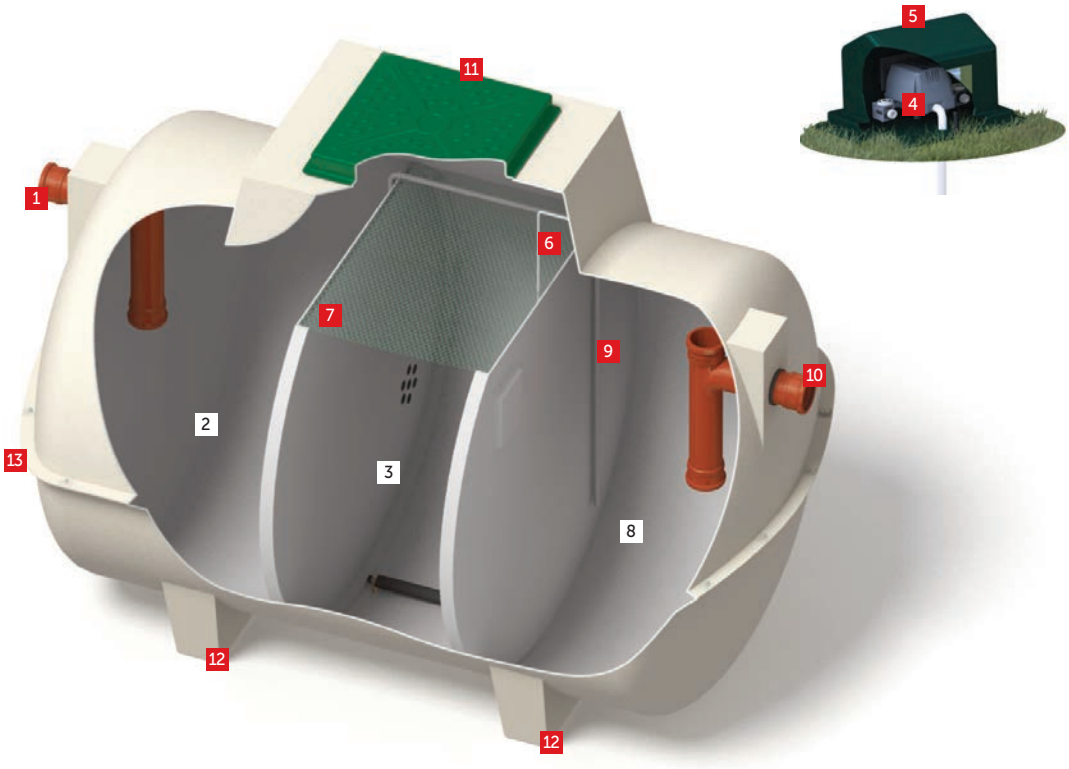
In addition to anaerobic digestion taking place in the primary settlement chamber [2] the Ensign:Ultra unit allows the clarified water to pass into a second 'aeration' chamber [3] where it is treated to remove the dissolved constituents. Here aerobic bacteria, supported by diffused air and mobile media, ensures full treatment is achieved before the treated effluent and 'sloughed off' bacteria 10flows to a final settlement chamber [8]. The final effluent is then discharged to the drainage field or watercourse.

10-YEAR STRUCTURAL GUARANTEE

ADJUSTABLE INVERTS AVAILABLE

PUMPED OUTLETS AVAILABLE

CE



Marsh:ENCO model shown for illustrative purposes only

> Marsh sewage treatment plants are widely regarded as the most efficient, reliable and economical systems on the market

Benefits

1 **Inlet**
Optional risers to increase invert depth are available.

2 **Primary settlement chamber**

3 **Aeration chamber**

4 **Low-energy compressor**
Near silent compressor ensures minimal running, maintenance and servicing costs.

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 **PVC pressure pipe/diffuser(s)**
Provides a protective conduit for the air diffuser line. Can be easily removed for maintenance and cleaning.

7 **Securing mesh**
Retains media in aeration chamber during transportation and handling, and in the event of flooding.

8 **Final settlement chamber**

9 **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.

10 **Outlet**
Optional pumped outlets are available.

11 **Standard impermeable lid**
Impermeable lid improves strength and durability whilst blending into the surrounding environment.

12 **Stabilising feet**
Stabilising feet prevents the tank from rolling and allows safe and steady transportation and installation.

13 **Unique 'keying-in' lip**
Assists anchoring into granular or concrete surrounds.

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 securing mesh to ensure no migration during handling or potential flooding.

Integral lifting eyes
For safe and secure handling onsite.

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.

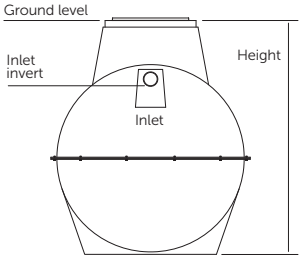
These plants may have been tested in their country of origin but not tested to the same criteria as Marsh Industries, where we strictly adhere to the UK National Forward. Contact contracts@marshindustries.co.uk for more information.

Marsh:**ENCO**

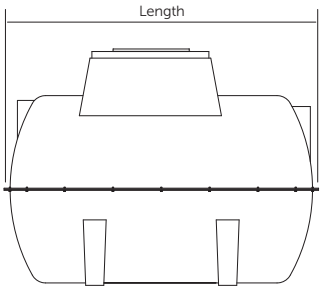
Specifications

Gravity outlet - Standard invert
No Rebates - No Fuss

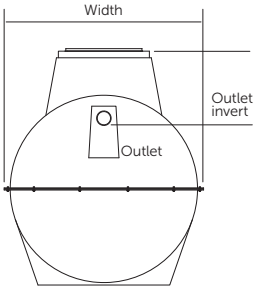
	Model (Pop)	Length +/-50mm	Width +/-50mm	Height +/-50mm	Inlet		Outlet	
					Invert	Ø	Invert	Ø
	**ENCO 6**	2602	1650	1935	550	110	625	110
	**ENCO 8**	2602	1650	1935	550	110	625	110
	**ENCO 10**	2602	1650	1935	550	110	625	110
	**ENCO 12**	2860	1912	2139	550	110	625	110
	**ENCO 16**	2860	1912	2284	720	110	800	110



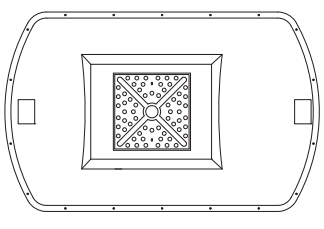
View on inlet end



Typical side elevation



View on outlet end


Typical plan view

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

Domestic off-mains drainage
General information

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.

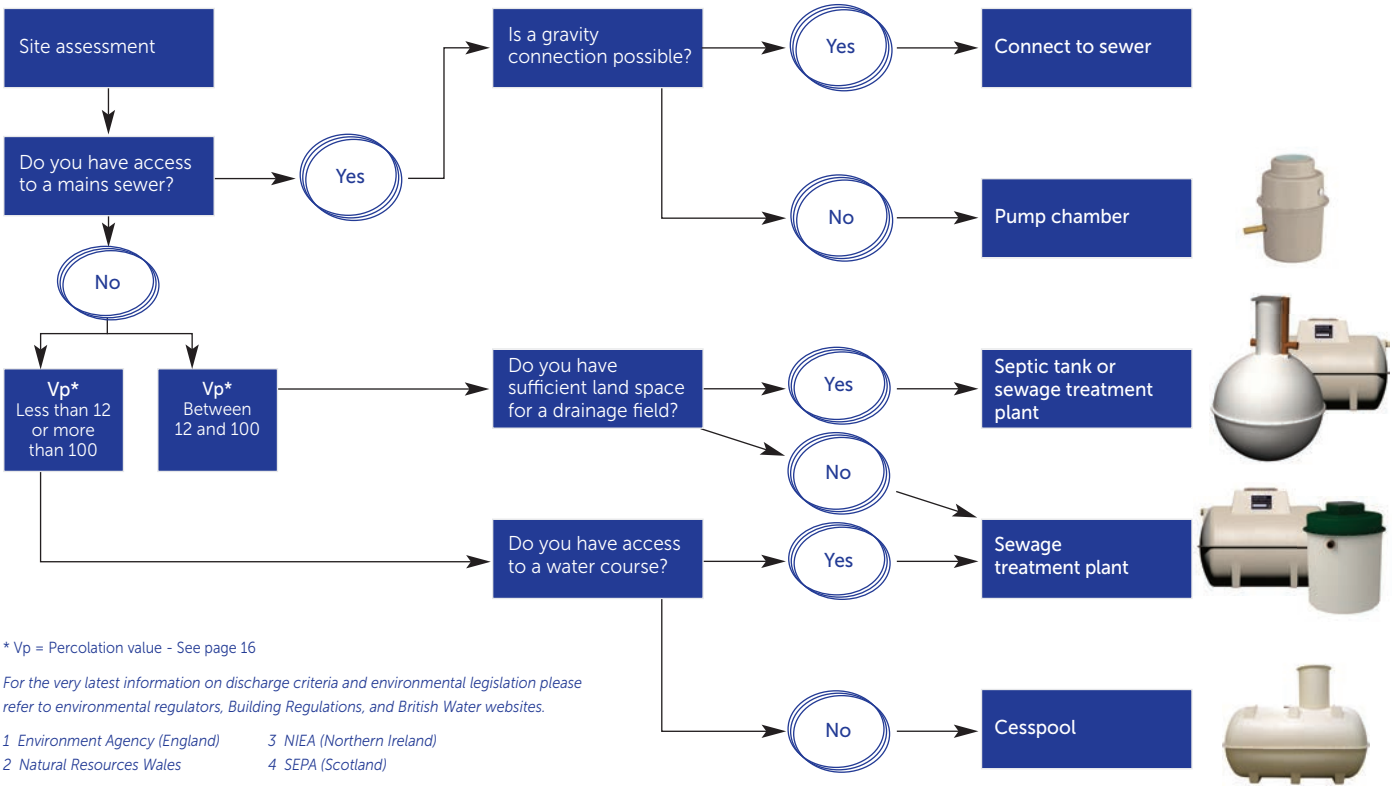
Before sewage effluent can be discharged to 'controlled waters' it must receive at least primary and secondary treatment:

- *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)

General guidance as provided by environmental regulators

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 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.

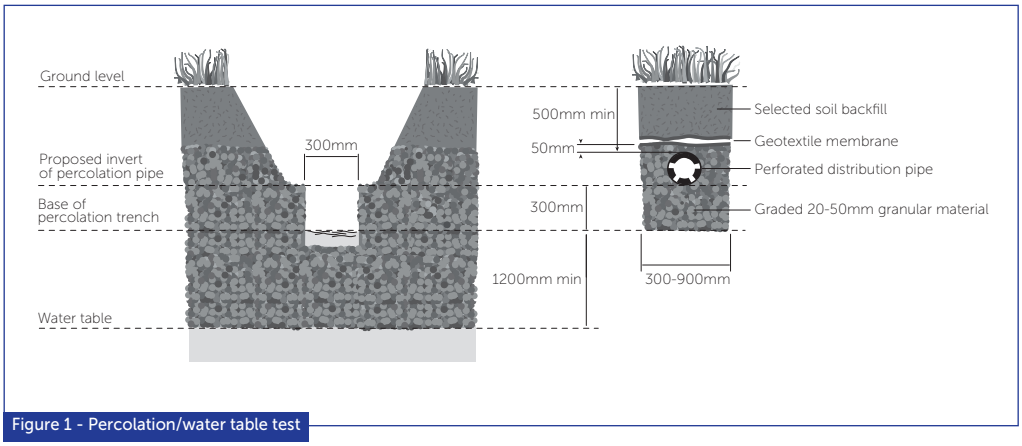


Figure 1 - Percolation/water table test

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:

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.

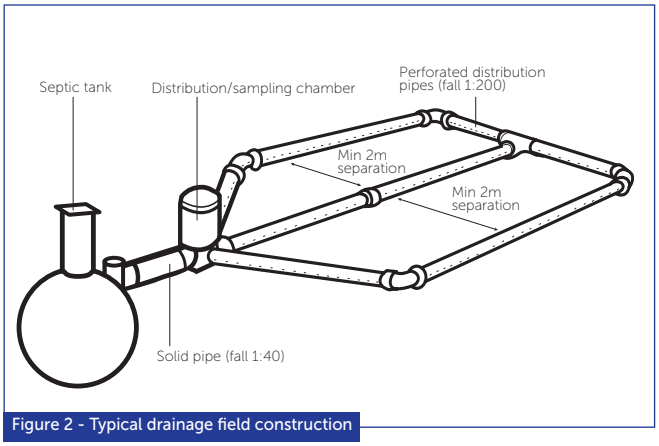


Figure 2 - Typical drainage field construction

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.*

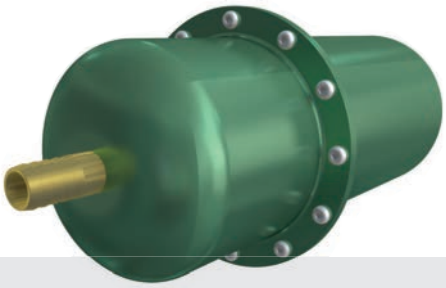
> *Elevated drainage mounds can provide an alternative to drainage fields in certain circumstances as they provide an aerated layer of soil where a conventional drainage field is inappropriate due to occasional waterlogging.*

Whisspurr®
Acoustic Vibration Reduction (AVR) unit

The Whisspurr AVR unit is designed to reduce noise and vibration from diaphragm compressors used in the water and wastewater treatment sectors.

Fitted inline between the compressor and air diffuser, the Whisspurr significantly reduces noise and vibration generated from the pulsation of the diaphragm compressor whilst enabling a consistent, unrestricted flow to the air diffuser.

The unit is suitable for all types of compressor; Bibus Secoh, Charles Austen, Nitto, etc.



Product safety

Structural integrity testing

Structural integrity tests, performed in accordance with EN ISO 179-1/1eA: 2010-11, were undertaken to evaluate the strength of Marsh Industries' GRP materials against similar GRP materials used by other manufacturers.

Three separate material samples were submitted for impact testing; Marsh GRP material (virgin unfilled resin), a GRP material containing calcium fillers and a GRP material containing sand filler.

The tests involved 12 samples of each material at a size of 80x10x5mm. The nominal pendulum energy was 15J at an impact velocity of 3.8m/s.

Results proved Marsh GRP material to be 40% stronger than the other materials tested.

Fire resistance testing

Fire resistance testing was performed to assess ignitability of products subjected to direct impingement of flame. Marsh Industries' GRP material passed all practical testing to achieve EN ISO 11925-2:2010 standard.

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 commissioning contracts to commissioning 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 sales@marshindustries.co.uk