

NEW
SBR TECHNOLOGY

MARSH NUTRA-LITE™

Sequential Batch Reactor (SBR)



Advanced biological processing for off-mains wastewater

Overview

Marsh Industries proudly presents the Marsh Nutra-Lite, an advanced Sequential Batch Reactor (SBR) sewage treatment plant designed to significantly enhance effluent quality for off-mains wastewater systems.

The Nutra-Lite, available in capacities catering to sites for up to 50 people, combines the efficiency of activated sludge aeration to provide exceptional effluent quality even under extreme loadings.

With state-of-the-art technology and certified to BS EN 12566-3, the Nutra-Lite sets a new standard for sustainable wastewater management.

Market-leading performance

The Marsh Nutra-Lite excels in removal of key biological constituents:

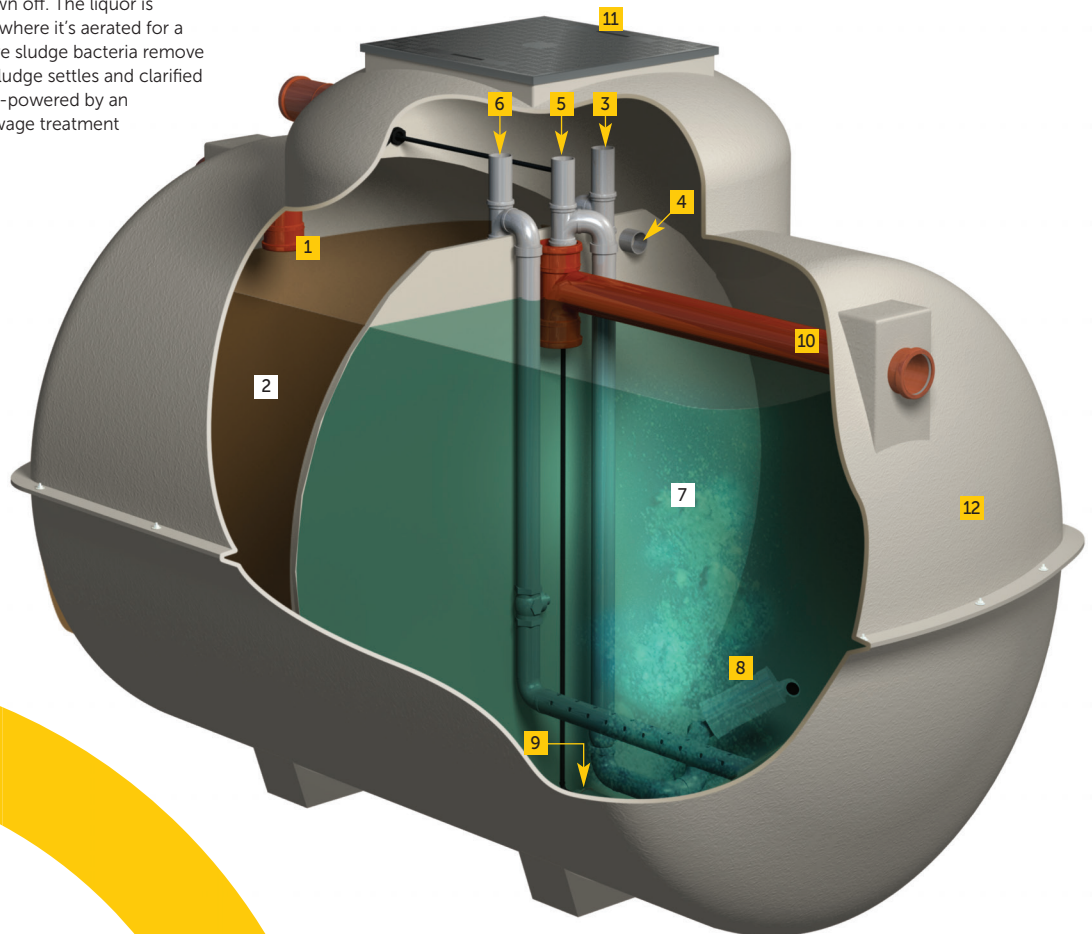
COD	95.8%	33 mg/l
BOD	98.7%	4 mg/l
TN_b	83.9%	11.1 mg/l
NH₄N	99.1%	0.5 mg/l
P_{tot}	34.3%	6 mg/l
SS	97.1%	11 mg/l

Operating principle

Crude sewage enters the primary settlement chamber [2], where solids settle and the supernatant is drawn off. The liquor is transferred to the reactor chamber [7] where it's aerated for a specific duration. During aeration, active sludge bacteria remove organic pollutants. After aeration, the sludge settles and clarified effluent is discharged. The system is air-powered by an electric compressor and 'intelligent sewage treatment management' unit.

Key

- 1 Inlet pipework
- 2 Primary settlement chamber
- 3 Inflow air-lift pipework
- 4 Overflow pipework
- 5 Outflow air-lift pipework
- 6 Recirculation air-lift pipework
- 7 Reactor chamber
- 8 Sediment reduction valve
- 9 Air diffuser
- 10 Outlet pipework
- 11 Heavy duty lid
- 12 Heavy duty GRP shell



Nutra-Lite model shown for illustrative purposes only

Total process quality

Market leading solution



Performance metrics and environmental implications

The Marsh Industries Nutra-Lite SBR delivers exceptional performance, achieving outstanding results in the final discharge as verified by the PIA Test Centre. Against the 20/30/20 targets set by the Environment Agency, the following levels are reached:

Biological Oxygen Demand (BOD): 4 mg/l

- **Significance:** A low BOD indicates the plant effectively removes organic matter, minimising oxygen depletion in receiving waterways
- **Environmental impact:** This protects aquatic ecosystems by ensuring sufficient dissolved oxygen for fish and invertebrates
- **Standard:** Far below UK and EU regulatory limits (<20 mg/l), making it highly compliant

Total Suspended Solids (TSS): 11 mg/l

- **Significance:** A low level of suspended solids ensures high water clarity and reduces sedimentation risks
- **Environmental impact:** Protects aquatic habitats, particularly fish spawning grounds, from having elevated levels of sediment
- **Standard:** Excellent performance compared to general discharge limits (25-30 mg/l)

Ammonia (NH₄-N): 0.5 mg/l

- **Significance:** Exceptionally low ammonia levels highlight efficient nitrification, critical for protecting aquatic organisms, as ammonia is toxic at higher concentrations
- **Environmental impact:** Helps maintain water quality and prevents acute toxicity to fish
- **Standard:** Outstanding compared to most regulations, which often set limits at 5 mg/l or higher

In addition, the unit also delivers impressive nitrate reduction:

Total Nitrate (NO₃-N): 11.1 mg/l

- **Significance:** This controlled nitrate level reflects effective nitrogen management, though nitrate remains present as a byproduct of ammonia removal.
- **Environmental impact:** Helps limit nutrient loading, though further reductions might be desirable in nitrate-sensitive areas
- **Standard:** Meets UK and EU requirements, often set around 10-15 mg/l

Ecosystem protection

- The Nutra-Lite's exceptional results for BOD, ammonia and phosphate make it particularly suited for deployment in environmentally sensitive areas such as rivers and streams

Future proof

- In an ever more environmentally conscious world, the Nutra-Lite SBR offers the client the ability to demonstrate adoption of the most advanced technology that far exceeds existing regulatory targets

Why these results are outstanding

- **Low BOD and Ammonia:** Demonstrate efficient organic matter breakdown and nitrogen conversion
- **Low Suspended Solids:** Protects water clarity and aquatic habitats
- **Verified by PIA:** Testing at the Prüfinstitut für Abwassertechnik (PIA) ensures credible, rigorous and internationally recognised results
- **Compliance:** The results exceed typical UK and EU discharge standards, making the Nutra-Lite plant a robust choice for meeting stringent environmental regulations

Conclusion

The Marsh SBR Nutra-Lite is an innovative sewage treatment plant, providing exceptional discharge quality with industry-leading results. Its performance makes it the most dependable and environmentally friendly solution for protecting waterways and other sensitive sites.



Phosphate targets

The Marsh Nutra-Lite and Phos-Lite combined can achieve ultra-low phosphate levels (0.28 mg/l), far exceeding standards. This prevents nutrient enrichment, combats algal blooms and protects sensitive ecosystems and waterways, making it the ideal solution for sustainable water management in nutrient-sensitive areas.

Specifications

Model	Population served	Width +/-50mm	Length +/-50mm	Height +/-50mm	Inlet		Outlet	
					Invert	Ø	Invert	Ø
NL6	4-6PE	2602	1680	1865	550	110	625	110
NL10	7-10PE	2862	1952	2139	550	110	625	110
NL16	11-16PE	4252	1952	2284	600	110	675	110
NL25	17-25PE	5240	1952	2284	600	160	675	160

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

Marsh Nutra-Lite features and benefits

Key benefits

- Delivers industry-leading discharge quality with exceptional removal of biological and chemical pollutants
- Adaptive, remotely configurable system ensures optimal performance and efficient wastewater treatment
- Cost-effective, reliable and energy-efficient design with durable, fire-safe materials and certified long-term performance.

Outstanding discharge quality

The Nutra-Lite boasts the highest overall discharge quality of any plant available today. A unique self-cleaning, self-sealing sediment reduction valve ensures total control over suspended solids. No mechanical parts provide further reliability and treatment efficiency.

Adaptive remote configuration

Nutra-Lite adjusts to seasonal changes for optimal performance. Remote configuration also supports ongoing nitrate reduction research.

Secure telemetry monitoring

Bi-directional communication enables remote maintenance via mobile connectivity or Wi-Fi.

Energy efficiency and cost savings

A single compressor optimises power use, with economy mode reducing costs during process changes.

Certified performance

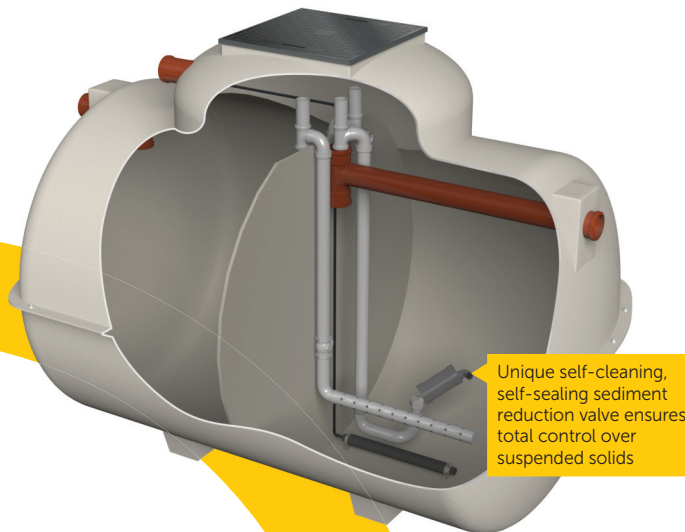
Tested at PIA GmbH, Nutra-Lite is BS EN 12566-3 certified, meeting UK and EU standards for systems up to 50 PE.

Durability and fire safety

GRP material meets EN ISO 11925-2:2010 fire standards with a 25-year structural guarantee.

Proudly manufactured in the UK

Our products reflect the highest standards of quality and craftsmanship, supporting local industries while ensuring sustainable, reliable solutions for both domestic and international markets.



The Marsh Nutra-Lite boasts the highest overall discharge quality of any sewage treatment plant



The Marsh Nutra-Lite is fully certified to BS EN 12566-3

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 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

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.

Intelligent SBR system management



Marsh Nutra-Lite SBR controller

The Marsh Nutra-Lite SBR controller is an intelligent sewage treatment control system, uniquely designed by Marsh Industries for optimal performance in SBR plants.

Engineered with forward-thinking features and future-proof capabilities, the Marsh controller is unmatched in functionality and innovation, offering a suite of controls unavailable in other systems.

Effortless installation and power-efficient design

Designed with simplicity in mind, the Marsh Nutra-Lite SBR Controller comes pre-configured and ready for seamless integration with the plant. Requiring only a standard electrical socket and a compressor connection, installation is swift and user-friendly.

- o **Minimal air connections:** Just one air connection links the compressor to the controller, and only four additional connections to the plant's aeration and air-lift systems are needed
- o **Motorised valve protection:** These valves require power only during operation changes and will automatically close in case of a power failure, preventing the compressor from flooding
- o **Single compressor operation:** The controller is designed to operate the entire plant with a single compressor, enhancing energy efficiency

Smart connectivity and user-friendly access

As an IoT-enabled controller (Internet of Things), the Marsh Nutra-Lite SBR Controller offers convenience through internet and mobile access, allowing users to configure and monitor the system remotely. The intuitive design includes:

- o **Simple interface:** Essential operations are accessible via three buttons on the controller itself
- o **Mobile browsing:** Installation settings and advanced features are accessible through a mobile phone or tablet, with an easy-to-use interface
- o **Flexible connectivity options:** Connect to the internet using built-in WiFi or an optional GSM module for remote management, monitoring, and upgrades

Comprehensive monitoring and remote operations

Remote management is at the heart of the Marsh Nutra-Lite SBR Controller, providing insights and control. Key monitoring and remote operation capabilities include:

- o **Alerts and notifications:** Customisable email alerts for multiple users keep end-users informed of plant status
- o **Remote operations:** Effortlessly monitor and adjust operations from anywhere, including:
 - Checking water levels and detecting blockages
 - Updating software and setting operational parameters
 - Configuring WiFi and GSM connectivity
 - Viewing operational hours, ECO cycles, internet status, and calibration settings
 - Accessing manual and calibration controls, telemetry, and high-level alarms

Built-in future-proofing and advanced capabilities

The Marsh Nutra-Lite SBR Controller is engineered with long-term adaptability, ensuring it evolves alongside advancements in wastewater technology. Future-proof features include:

- o **Software version control:** Keep your controller up-to-date with the latest performance improvements
- o **Effluent volume calculations:** Track the volume of processed effluent for effective management
- o **Natural coagulant integration:** As natural coagulants become viable, the controller can accommodate these eco-friendly options
- o **Remote upgrades for enhanced performance:** Incorporate the latest SBR research innovations without on-site updates
- o **Seasonal maintenance adjustments:** Adapt the controller's performance to seasonal needs
- o **Multi-user and plant administration:** Perfect for contractors, installers, maintenance teams, as well as end-users, the controller allows for centralised management across multiple sites
- o **Remote assistance:** Installers, maintenance teams and end-users benefit from Marsh's remote support for smooth operations and troubleshooting

Certified excellence and exclusive availability

The Marsh Nutra-Lite SBR Controller is crafted to meet the highest industry standards, boasting the 2024 PIA Certification and exclusively available with the Marsh Nutra-Lite plant, it is the most advanced and feature-rich controller on the market, with advanced technology that is entirely unique to Marsh Industries.

For contractors, installers, and end-users, the Marsh Nutra-Lite SBR Controller offers unrivalled control, automation and efficiency. With this controller, you're investing in a solution that not only meets today's needs but is equipped to grow and evolve with future advancements in SBR technology.

Operating and connectivity options



Operate controller via buttons on unit



Operate controller directly via WiFi access point



Operate controller remotely when controller is connected to household WiFi



Operate controller remotely with optional GSM module and IoT Sim



Status reporting by email at various intervals (ie, 4-hour, 12-hour, daily)



Error report by email, immediate

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)

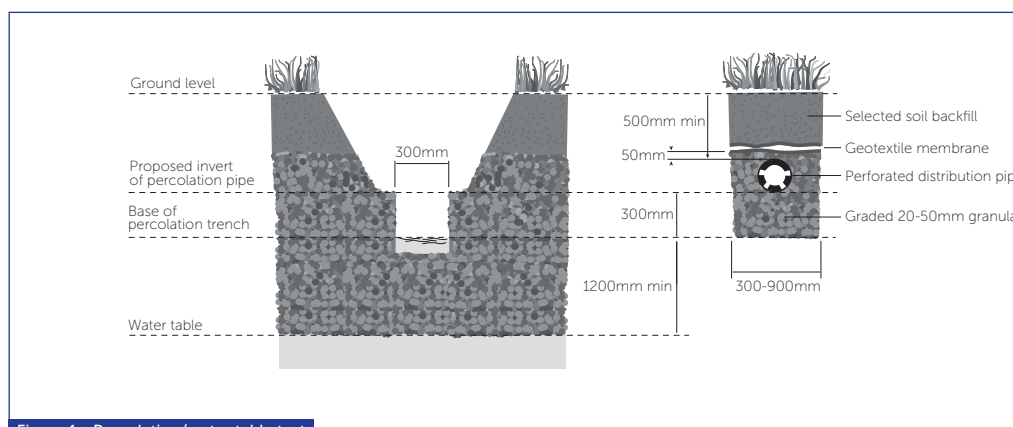


Figure 1 - Percolation/water table test

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 (V_p) 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 **V_p of between 12 and 100**. This minimum value ensures that untreated effluent cannot percolate too rapidly into groundwater. Where V_p is outside these limits effective treatment is unlikely to take place in a drainage field.

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.

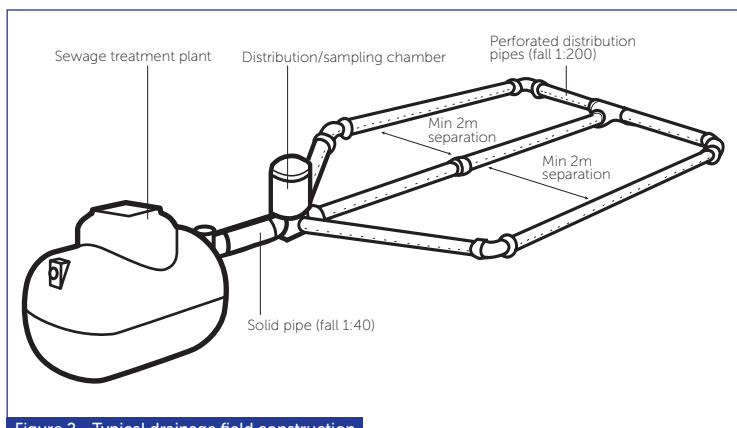


Figure 2 - Typical drainage field construction

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:

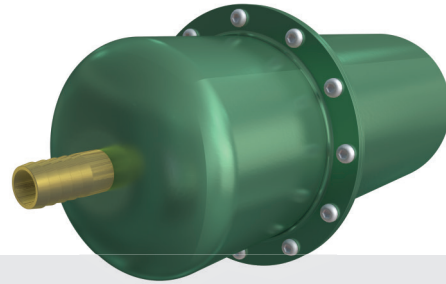
- > Septic tanks can only discharge to ground via a drainage field – discharge to a watercourse (stream, ditch, pond) is not allowed.
- > Drainage fields are not permitted in Zone 1 groundwater protection zones.
- > No underground services or access roads/driveways/paved areas should be located in the 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.

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

Other products from Marsh Industries

- Domestic and commercial sewage treatment plants up to 1500PE+
- Whisspurr – Acoustic Vibration Reduction (AVR) unit
- WellWater™ pump stations
- Septic tanks and cesspools
- Uni:Gem★ septic conversion
- Marsh GMS★ grease traps
- Degrilleur™ trash/debris barrier
- Agri-silage tanks
- Water attenuation systems
- Rainwater harvesting systems
- Oil separators and more...



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