

New Arun Crematorium

Drainage Schedule of Maintenance

For

Crematoria Management Ltd

Project Number:

13591

December 2021

Campbell Reith Hill LLP
Raven House
29 Linkfield Lane
Redhill
Surrey
RH1 1SS

1.0 SCHEDULE OF MAINTENANCE

1.1. Brief

- 1.1.1. This schedule of maintenance has been prepared to support the surface water drainage strategy for the proposed crematorium development at Central Arun.
- 1.1.2. This document should be read alongside the approved Flood Risk Assessment and Drainage Strategy (Ref: *13062-CRH-ZZ-XX-RP-C-0001_FRA*).

1.2. Introduction

- 1.2.1. The maintenance of SuDS features is vital ensuring that they work as efficiently as they set out to do. Maintenance activities can be broadly defined as:
- Regular maintenance – basic tasks carried out regularly
 - Occasional maintenance – tasks that are required periodically but on a much less frequent basis
 - Remedial maintenance – tasks required when a fault needs rectifying and often includes unforeseen events
- 1.2.2. The following sections highlight indicative maintenance requirements of the proposed SuDS features that should be considered in the masterplan. A brief summary of the intended function for each drainage device is prefixed to the maintenance requirements for clarity.

1.3. Maintenance Responsibility

- 1.3.1. Responsibility for ongoing maintenance and upkeep for the site including the drainage system will rest with the occupier/tenant of the site.
- 1.3.2. The site will be maintained by Crematoria Management Ltd, the maintenance body used by Westerleigh Ltd. The management company address and details are:

Crematoria Management Ltd
Westerleigh Head Office Westerleigh Crematorium
Westerleigh,
Bristol,
BS37 8QP

1.4. Swales and existing ditches/watercourses

- 1.4.1. There are a series of four short swales on the site which run broadly from west to east through the centre of the site. The swales primarily serve to convey water from the building, main access roads and car parking areas to the primary basin in the south via intermediate pipes and headwalls. The swales will also provide water quality improvement to runoff and an element of attenuation (storage) in large storm events. There is an existing watercourse to the east of site into which the site discharges at controlled rate.

Construction

- 1.4.2. Construction vehicles and equipment not directly involved in the construction of the rills and swales should be kept away from these areas. Excavations for the swales should aim to be undertaken in times of dry weather, when possible, to prevent mobilisation of sediments from exposed surfaces. Exposed surfaces after rill or swale excavations should be stabilised as soon as possible with grass seed and straw mulch. Perimeter controls should be installed prior to construction to protect watercourses.

Maintenance Schedule

- 1.4.3. Table 1 below shows the operation and maintenance requirements for the swale, taken from the CIRIA C753 SuDS Manual.

Table 1: Operation and maintenance requirements for swales (CIRIA C753, 2015)

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass - to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets for silt accumulation, establish appropriate silt removal frequencies	Half yearly
	Inspect check dams for blockages and failure.	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseedling	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

1.5. Permeable Paving

- 1.5.1. The main visitor car park is to be surfaced with a combination of traditional impermeable tarmac in the main aisles and permeable block paving in the parking bays. The parking bays are designed to allow water to permeate between the individual blocks where treatment of suspended solids, hydrocarbons and petrols will occur before it reaches the voided sub-base for storage and disposal. Fin drains within the sub-base along the rear edge of the car parking bays will serve to remove water and route to the main drainage network.

Construction

- 1.5.2. Construction vehicles and equipment not directly involved in the construction of the pervious pavements will be kept away from these areas. Silt fences, staged excavation works and temporary drainage swales/bunds to divert runoff away from exposed areas will be utilised, as appropriate, to manage the risks associated with, and to intercept the discharge of sediment laden runoff. Landscaping activities will be carefully designed and carried out to prevent deposition of topsoil, turf and other materials on the surface of the pavement. Infiltration surfaces will not be compacted and will be protected at all times. Excavations for the pervious pavement installation should aim to be undertaken in times of dry weather, when possible, to prevent mobilisation of sediments from exposed surfaces during rainfall events. Surfaces exposed as part of the pervious paving installation works should be stabilised as soon as possible. Perimeter controls should be installed prior to construction to protect watercourses.

Maintenance Schedule

- 1.5.3. The table below shows the operation and maintenance requirements for the pervious pavements which are in accordance with the CIRIA C753 SuDS Manual.

Table 2: Operation and maintenance requirements for pervious pavements (CIRIA C753, 2015)

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations - pay particular attention to areas where water runs onto pervious surfaces from adjacent impervious areas as these areas are most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using Glyphosate applied directly onto the weeds by an applicator rather than spraying	As required - once per year on less frequently used pavements

Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required. (Note that jointing material can be removed if jetting or suction are used, and will therefore require replacing or reinstating).
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth - if required, take remedial action	Three-monthly, 48 hrs after large storms in first six months
	Assess silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

1.6. Detention Basins

There is a primary basin in the south-east corner of the site to which all the runoff in the site is routed. This basin is in an area subject to high groundwater and hence is unlined at the base to allow free movement of water in and out of the basin and/or partial infiltration in times where the groundwater is low. The outfall from the basin is via a high-level overflow with hydrobrake flow control into the local watercourse.

Construction

- 1.6.1. Construction vehicles and equipment not directly involved in the construction of the detention basin will be kept away from these areas. Silt fences, staged excavation works and temporary drainage swales/bunds to divert runoff away from exposed areas will be utilised, as appropriate, to manage the risks associated with, and to intercept the discharge of, sediment laden runoff prior to its discharge to nearby watercourses. Excavations for the detention basin should aim to be undertaken in times of dry weather when possible, to prevent mobilisation of sediments, during rainfall events. Surfaces exposed as part of the detention basin construction should be stabilised as soon as possible, by the use of hydroseeding or an alternative approved approach. Perimeter controls should be installed prior to construction to protect watercourses. Perimeter controls should be installed prior to construction to protect watercourses.

Maintenance Schedule

- 1.6.2. Table 3 shows the operation and maintenance requirements for the detention basins, taken from the CIRIA C753 SuDS Manual.

Table 3: Operation and maintenance requirements for detention basins (CIRIA C753, 2015)

Maintenance Schedule	Required Action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass - public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc. for evidence of blockage and/or physical damage	Monthly
	Inspect silt accumulation rates in the detention basin and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options. All silt removed from drainage features should be responsibly disposed of.	Half yearly
	Check any mechanical devices, e.g. flow controls	Half yearly
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any inlets and outfalls.	Every 1-5 years, or as required
	Remove sediment and planting from one quadrant of the main body of detention basin.	Every 5 years, or as required
Occasional maintenance	Remove sediment from the main body of detention basin when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, e.g. every 25-50 years
Remedial actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate detention basin when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair/rehabilitate inlets, outlets and overflows.	As required

1.7. Proprietary Treatment Systems

- 1.7.1. The proprietary treatment systems include conventional pipework, gullies, catchpits, manholes, channels and headwalls.

Construction

- 1.7.2. During construction the principal contractor must ensure that preventative measures have been put in place as to not allow the construction runoff drain into the system. Measures must be taken to ensure debris from the construction site does not block the components. Routine inspections should be undertaken ensuring that the drainage is functioning properly. Outfalls must be constructed to the correct level and all joints must be correctly sealed. During construction backfill should be correctly installed as specified as per the manufactures' recommendations.

Maintenance Schedule

- 1.7.3. The maintenance schedule for the aforementioned SuDS has been adopted from the SuDS Manual C753 and are summarised in Table 4.

Table 4: Maintenance and Operation of Proprietary Treatment Systems (CIRIA C753, 2015)

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Monitoring	Inspect monthly
Occasional maintenance	Sediment management	Annually or as required when buildup of sediment is noticeable. All silt removed from drainage features should be responsibly disposed of.
Remedial maintenance	Structure rehabilitation/repair	As required

- 1.7.4. Headwalls should be checked regularly and any build-up of silt removed along with litter and other obstructions. Stones and gabion basket should be checked to ensure that they are secure. Should access to the pipe be required, then the basket should be opened up and stones removed temporarily to enable the pipe and covering membrane to be inspected. Upon completion, the stones should be relaid, and the basket locked with suitable pins.

1.8. Foul Water Pump and Package Treatment Plant

- 1.8.1. The pumping station and package treatment plant is to be installed and maintained in line with manufacturer's requirements. General pumping station maintenance is summarised in Table 5, however, the supplier's specific maintenance recommendations should be followed.

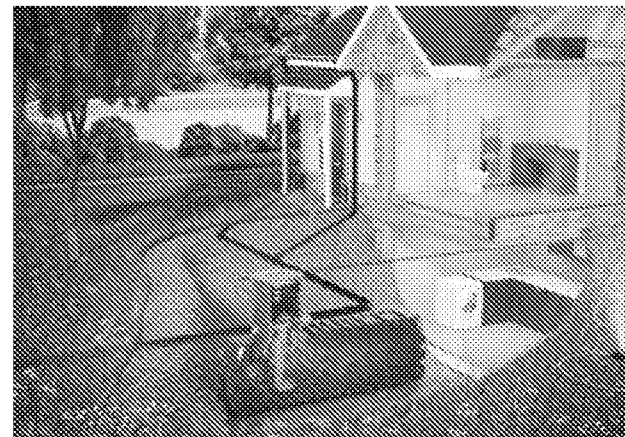
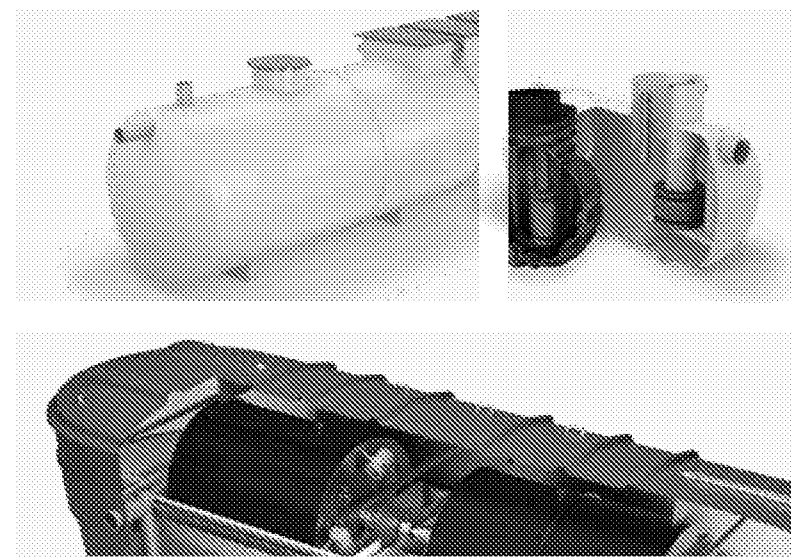
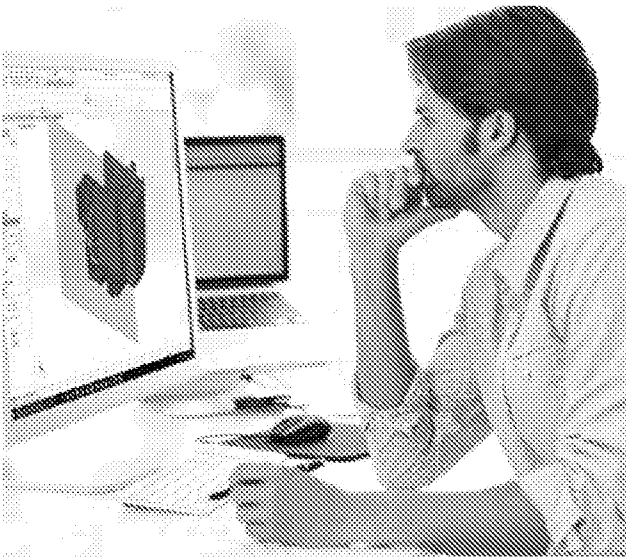
- 1.8.2. Please refer to the appendix for details.

Table 5: Maintenance and Operation for pumps

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Monitoring	Inspect monthly
	Pump service	Half yearly or as specified by supplier
Occasional maintenance	Check floats, alarms, vents and telemetry	As specified by supplier
	Remove sediment from pumping chamber	Half yearly or as required
	Empty/flush settled water/settlement and tanker away	As required
Remedial maintenance	Structure rehabilitation/repair	As required
	Replacement of components/pump elements	As required

Klargester Product Guide

The Klargester range of fully integrated wastewater management, surface water and rainwater harvesting solutions



kingspan.co.uk/klargester


Kingspan.

Klargester BioDisc®

Domestic Sewage Treatment Plant

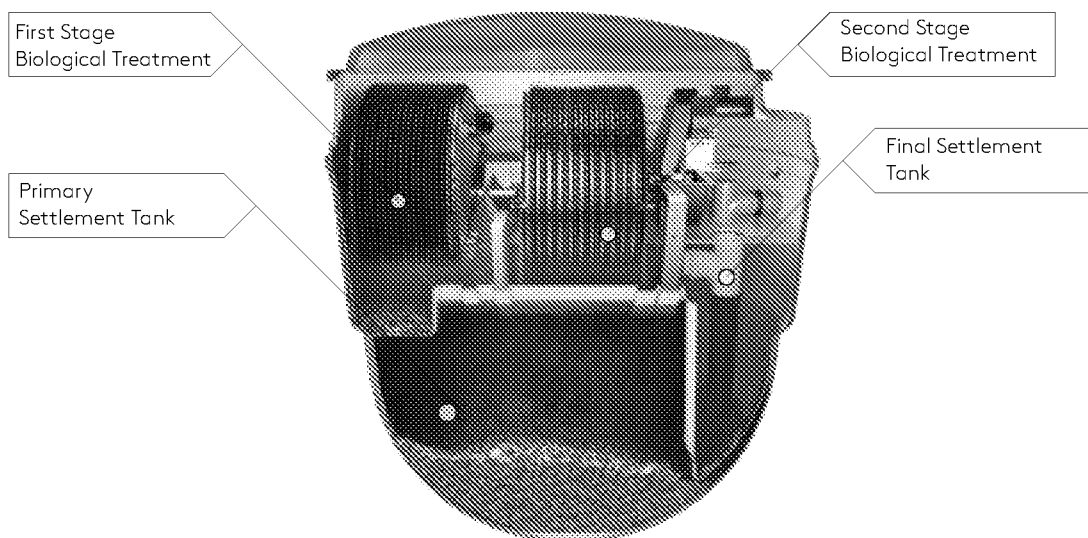
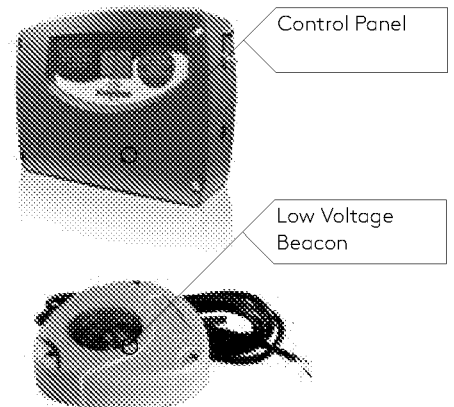
The Klargester Domestic BioDisc® is engineered to treat wastewater to the highest level of standards and offers one of the lowest lifetime costs compared to other treatment processes.

Product Benefits

- Utilises Rotating Biological Contactor technology.
- Low running costs.
- Low level visibility with a lockable child-proof cover – safe for children and pets.
- Delivers better than 95% pollution removal.
- 10 year warranty options available when purchased with a service and maintenance plan.
- Supplied with a control panel and alarm.
- Managed Flow System.
- Totally silent in operation.
- The most stable process in the market.
- Controls the discharge volume.

The Rotational Biological Contactor

The RBC is central to the operation of each Klargester BioDisc®. It supports a biologically active film or biomass onto which aerobic micro-organisms, naturally found in sewage, become established. Natural breakdown of sewage can then occur as described below.



01

Primary Settlement Tank

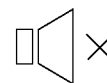
Wastewater and sewage flows into the primary settlement tank where the large solids are retained for future removal.

02

First Stage Biological Treatment

The liquor and fine solids then flow into the Biological Treatment Zone 1 where the first stage of treatment occurs.

Noise Free



Technical Specifications

Model Reference	BA	BA-X	BB	BC
Population Equivalent (Std Flow)	6	9	12	18
Maximum Daily BOD (kg)	0.36	0.54	0.72	1.08
Maximum Daily Flow (m ³)	1.2	1.8	2.4	3.6
Ø/Width (mm)	Ø1995	Ø1995	Ø1995	Ø2450
Length (mm)	-	-	-	-
Inlet Invert depth (mm)	450/750/1250	450/750/1250	450/750/1250	600/1100
Depth Below Inlet Invert (mm)	1400	1400	1400	1820
Outlet Invert Depth (mm)	1315	1315	1315	1735
Overall Height (mm)	2160/2460/2960	2160/2460/2960	2160/2460/2960	2825/3325
Height to Rim of Cover (mm)	1945/2245/2745	1945/2245/2745	1945/2245/2745	2485/2985
Empty Weight (kg)	310/325/380	310/325/380	335/350/405	650/750
Standard Power Supply	1 phase	1 phase	1 phase	1 phase
Motor Rating - 1 Phase (Watts)	50	50	50	75
Full Load Current 1 Phase (amps)	0.51	0.51	0.51	1.1
Optional Power Supply	N/A	N/A	N/A	3 phase
Motor Rating - 3 Phase (Watts)	N/A	N/A	N/A	90
Full Load Current 3 Phase (amps)	N/A	N/A	N/A	0.38
Sludge Return Pump Rating (watts)	250	250	250	250

Pumped Outlet Available on BA, BA-X, BB models.

Performance and Compliance

- > Certified to European Standard BS EN 12566 Part 3.
- > Performance certified to achieve 10mg/l BOD, 15mg/l SS and 3.8mg/l ammonia.
- > Fully marked in line with the CPR 2013.

Applications:

The Klargester Domestic BioDisc® BA-BC range is suitable for a range of applications including:



Single & Multiple Homes



Barn Conversions



Small Offices



Light Industrial Premises



Farms

03

Second Stage Biological Treatment

The liquor is then fed forward at a controlled rate into Biological Treatment Zone 2 for further cleaning.

04

Final Settlement Tank

The clean liquid passes into the final settlement tank where it can be discharged to ground or water course.

After Sales Service and Support

We recognise the importance of after sales service and support and are proud of our nationwide Kingspan Service network, which comprises our Kingspan in-house Service team and Accredited Installer network in support of the Klargester Product Range.

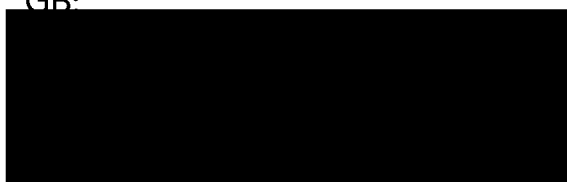
Together we are working to provide first class service across a range of sectors, including domestic, commercial, industrial, leisure, hospitality and many more.

With expertise across the Klargester range of waste water and drainage solutions, pumping stations, separators and rainwater harvesting, our dedicated support network offers the following offers the after sales service and support you would expect from a global organisation.

- First class technical engineering expertise across a range of off-mains sewage and wastewater applications.
- Day to day technical support.
- 24 hour breakdown repair.
- Preventative maintenance plans.
- Installation and commissioning.
- Asset monitoring.
- Consultancy and advice.

To speak with us about any aspect of installation, commissioning or service simply contact:

GB:



UK

Kingspan Environmental Ltd

College Road North,
Aston Clinton, Aylesbury,
Buckinghamshire, HP22 5EW



W: kingspan.co.uk/water

Ireland

Kingspan Environmental Ltd

Unit 1a, Derryboy Road
Carnbane Business Park
Newry, BT35 6QH



W: kingspan.ie/water

Norway

Kingspan Miljø AS

Skiveien 42, 1410 Kolbotn,
Norway



W: kingspan.com/avlopslosninger

Germany

Kingspan Environmental GmbH

Siemensstr. 12a, D-63263
Neu-Isenburg, Deutschland

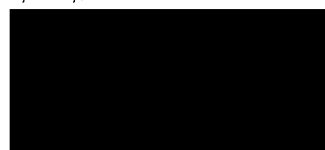


W: kingspan.de/wasser

Australia

Kingspan Environmental Pty Ltd

8 Bessemer St, Blacktown
Sydney, NSW 2148



W: kingspan.com.au/water

Poland

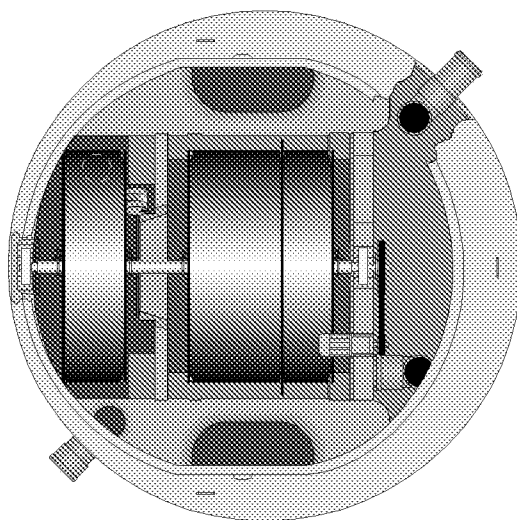
Kingspan Environmental Sp. z o.o.

ul. Topolowa 5
62-090 Rokietnica
Polska



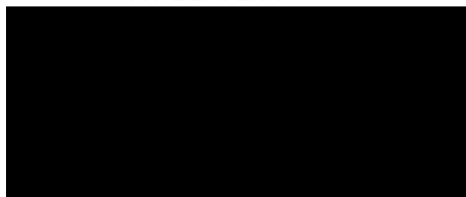
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OWNERS HANDBOOK



MANAGED FLOW BIODISC® BA BB BC NB NC

Klargester Environmental.
College Road North, Aston Clinton
Aylesbury, Bucks
HP22 5EW



BioDisc is the registered trademark of Klargester Environmental

HEALTH AND SAFETY

These warnings are provided in the interest of safety. You must read them carefully before installing or using the equipment.

It is important that this document is retained with the equipment for future reference. Should the equipment be transferred to a new owner, always ensure that all relevant documents are supplied in order that the new owner can be acquainted with the functioning of the equipment and the relevant warnings.

Installation should only be carried out by a suitably experienced contractor, following the guidelines supplied with the equipment.

We recommend the use of a dust mask and gloves when cutting GRP components.

A qualified electrician should carry out electrical work.

Sewage and sewage effluent can carry micro-organisms harmful to human health. Any person carrying out maintenance on the equipment should wear suitable protective clothing, including gloves. Good hygiene practice should also be observed.

Covers must be kept locked.

Observe all hazard labels and take appropriate action to avoid exposure to the risks indicated.

The correct ongoing maintenance is essential for the proper operation of the equipment. Service contracts are available and recommended. Please contact Klargestor for details of your local service provider.

Should you wish to inspect the operation of the equipment, please observe all necessary precautions, including those listed below, which apply to maintenance procedures.

BioDisc units contain rotating machinery and associated drive belts.

Ensure that you are familiar with the safe working areas and accesses.

Ensure that the working area is adequately lit.

The power supply to the equipment must be isolated at the control panel(s) before lifting the covers. Where a specific maintenance procedure requires the equipment to be running with the covers off, all care must be taken to avoid contact with moving parts and electrical components or conductors. Drive guards must be replaced and secured if removed during maintenance.

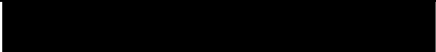
Once power has been isolated, the control panel must be kept locked shut to avoid accidental re-connection whilst work or inspection is being carried out.

Use only the designated access walkways. Do not walk on the cover or deep well safety mesh(es).

Take care to maintain correct posture, particularly when lifting. Use appropriate lifting equipment when necessary. Keep proper footing and balance at all times. Avoid any sharp edges.

Desludging should be carried out by a licensed waste disposal contractor holding the relevant permits to transport and dispose of sewage sludge. The contractor must refer to the desludge instructions in this Handbook, a copy of the instructions are fastened under the covers.

There are separate installation guidelines available to provide full instructions for installations.

DECLARATION OF CONFORMITY		
Description of Machine Model	B Range BioDisc Sewage Treatment Plant	
Serial Number (see cover label)		
Year of Manufacture		
Name of Manufacturer	Klargester Environmental, College Road North, Aston Clinton, Aylesbury, Bucks, HP22 5EW.	
<u>EUROPEAN DIRECTIVES:</u>	Machinery Directive 89/392/EEC Low Voltage Directive 73/23/EEC Electromagnetic Compatible Directive 89/336/EEC	
We declare that the equipment covered in this manual conforms with the essential Health and Safety requirements.		
		PRODUCT MANAGER WASTE WATER 1 JUNE 1997
		

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Wiring Diagrams

These are included in the BioDisc® Installation Instructions, supplied with the unit. A copy of the standard single phase BA/BB wiring diagram (510100) is provided at the back of this Handbook.

INTRODUCTION

Thank you for choosing a Klargester product. This manual will help you to keep it operating efficiently over a long service life. Please read this manual thoroughly, preferably before installation.

This manual should be referred to by:

- The installer
- The electrician
- The commissioning engineer
- The maintenance engineer
- The desludge contractor
- The owner/user

Service contracts are recommended. Details on request.

SECTION 1

TECHNICAL DATA

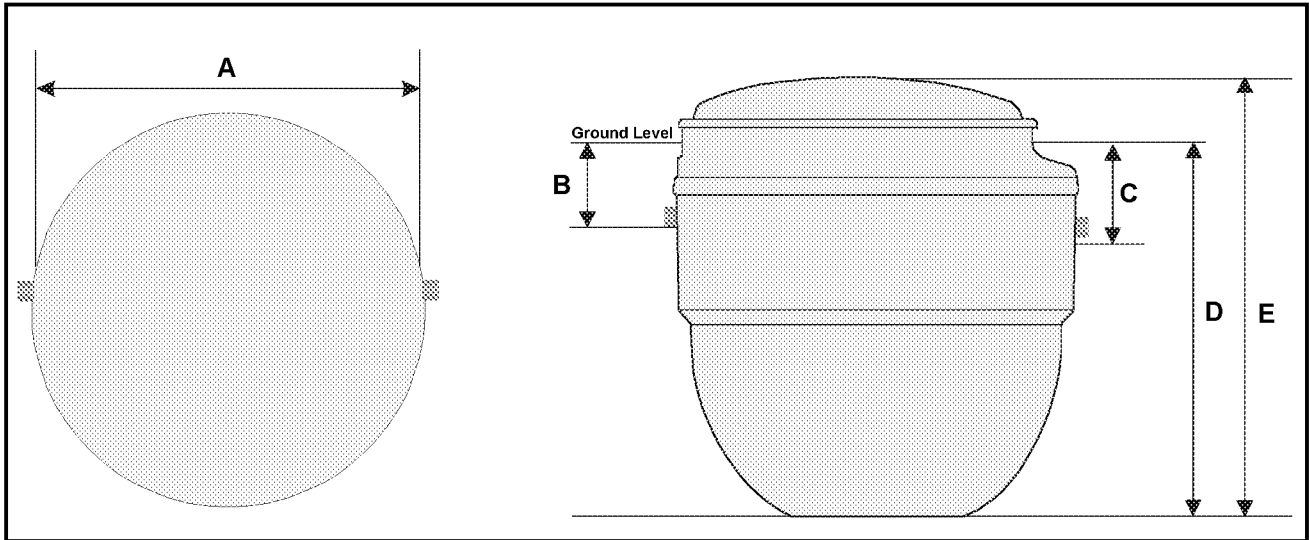


Fig. 1 General Dimensions

UNIT		BA/BB/NB			BC/NC	
Diameter	A mm	1995			2450	
Inlet Invert depth	B mm	450	750	1250	600	1100
Outlet Invert Depth C mm	Gravity discharge	535	835	1335	685	1185
	Pumped discharge	425	425	425	N/A	N/A
Depth Below Ground	D mm	1850	2150	2650	2420	2920
O/A Height	E mm	2160	2460	2960	2825	3325
Standard Power Supply		1 phase				
Optional Power Supply		3 phase				
Drive Motor Rating 1ph/3ph		60/60 watts			75/60 watts	
Sludge Return Pump Rating 1ph		480 watts (NB only)			480 watts (NC only)	
Integral Discharge Pump* Rating		480 watts (Not NB)			N/A	

*Optional

UNIT	BA	BB	BC
Maximum number of properties	1	2	Consult Klargester
Maximum Daily BOD kg	0.36	0.72	1.08
Maximum Daily Flow m ³	1.2	2.4	3.6
Peak Flow Rate * m ³ /hr	0.15	0.3	0.45

(*) For ½ hour max. in any 2 hour period

All surface water must be excluded. These units should be used exclusively for the treatment of sewage from domestic properties. Contact Klargester if your sewage results, wholly or partly, from any commercial function.

In keeping with the Company policy of continuing research and development Klargester reserve the right to alter specifications and dimensions without notice

SECTION 2

DESCRIPTION AND PROCESS

1. Introduction

BioDisc systems are designed to accept crude domestic sewage and produce an effluent of suitable quality for discharge to a watercourse or soakaway system, subject to the approval of the appropriate regulatory authority. These BioDiscs are self-contained single piece units.

The main casing and cover of the BioDisc are constructed of Glass Reinforced Plastic (GRP). All steel parts are stainless, galvanised or surface coated to protect against corrosion. The discs are vacuum formed polyethylene.

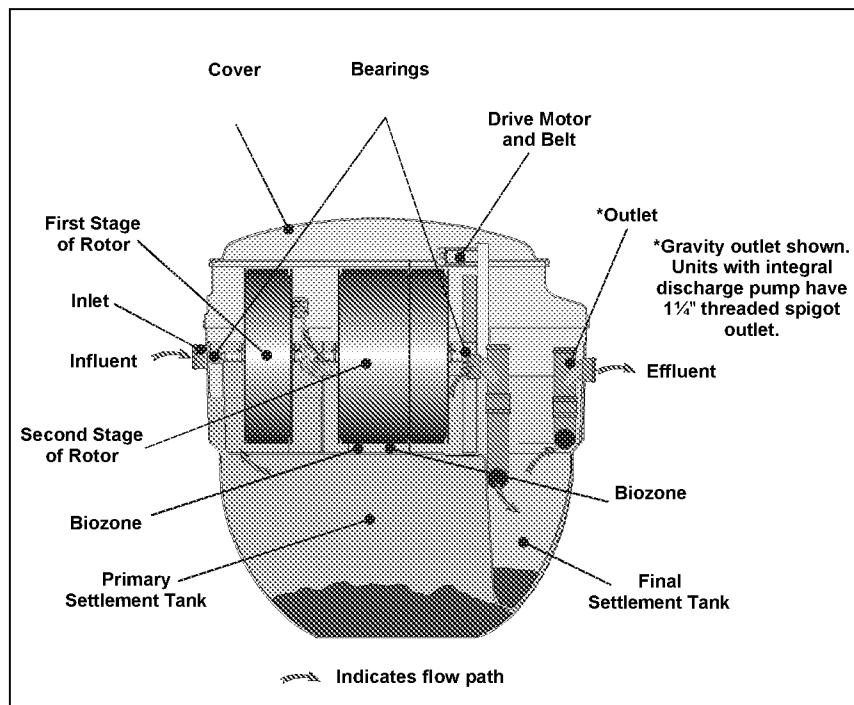


Fig. 2 - General Arrangement of BioDisc System

2. Primary Settlement Tank

Crude sewage enters the Primary Settlement Tank (PST), through an inlet pipe in the side of the BioDisc. Solids are settled out and retained for periodic desludging.

The PST is designed to have sufficient capacity to accept high flows over a short period and the patented Managed Flow System allows the liquid level to fluctuate to accommodate such surges.

3. Biozone

The Biozone contains the Rotor, which consists of corrugated polyethylene discs mounted on a horizontal shaft, supported by a bearing at each end. The rotor is slowly rotated by an electric motor and reduction gearbox with a belt drive.

A flat GRP walkway along either side of the Biozone contains a number of ports which give desludge access to the Primary Settlement Tank.

The surface of the discs becomes colonised by naturally occurring micro-organisms, which form a visible coating known as the Biomass. As the discs rotate, the Biomass is alternately submerged in the settled sewage and aerated by exposure to the atmosphere. Under these conditions the Biomass can efficiently break down the pollutants in the sewage.

The Biozone and discs are divided into two stages, separated by a fixed baffle. Settled sewage enters the first stage of the Biozone through a submerged transfer slot. The liquid level in this stage will fluctuate in the same way as in the PST and the bacteria are exposed both to the fluctuating liquid level and to fluctuations in sewage strength and concentration of domestic chemicals such as washing powders. One of the functions of this stage is to minimise the effect of such shock loads, which could otherwise inhibit the process.

The second stage of the Biozone is hydraulically sealed from the first stage and maintains a constant liquid level. Liquid is transferred from the first to the second stage, at a steady rate, by a series of buckets attached to the rotor. This controlled flow of effluent is at the heart of the patented Managed Flow System, which promotes healthy and balanced growth of the micro-organisms essential for efficient treatment.

Excess Biomass (also referred to as humus) sloughs off the surface of the discs and passes with the flow, to the Final Settlement Tank.

4. Final Settlement Tank

The Final Settlement Tank (FST) is situated under the drive motor and receives a steady flow of treated effluent from the Biozone. The humus settles out and is retained for periodic desludging.

In NB and NC units the settled humus is periodically returned to the Primary Settlement Tank, for co-settlement, by a timer controlled pump system.

Final treated effluent discharges from the FST through a dip pipe (excepting units with an Integral Discharge Pump).

5. Optional Integral Discharge Pump (BA/BB only)

The discharge pump sits within a moulded chamber, positioned in the Final Settlement Tank. Treated effluent flows into the chamber, by gravity from the FST. When the liquid in the chamber reaches a pre-determined level, a float switches on the pump which then pumps effluent out of the chamber. The same float also switches off the pump when the liquid level has been sufficiently lowered, thus protecting the pump from running dry. We do recommend when this option is purchased, that a high level alarm is also fitted to warn against pump mal-operation or failure.

6. Control Panel

The weatherproof control panel should be mounted adjacent to the BioDisc. All Klargest control panels are year 2000 compliant. Panel options are :

- Standard Control Panel: (and all panels) include a 3 amp circuit breaker which protects the installation wiring should there be an electrical problem within the BioDisc.
- Loss of Rotation Alarm Control Panel: This replaces the Standard Control Panel and also includes a Loss of Rotation (LOR) Alarm, which will activate if the rotor stops turning after a delay of 2-3 minutes (other than a failure in the power supply.) It has stop and run lights on the door, and where specified an optional alarm beacon on top. An additional remote slave beacon may also be fitted. The loss of rotation of the rotor is sensed by a reed switch mounted near the BioDisc motor in conjunction with a magnet attached to the rotor.
- Integral Discharge Pump Panel also includes an isolation switch for the discharge pump.
- Nitrification Unit Panels contain a timer and relay to control the operation of the sludge return pump and current overload protection for the pump motor.

All units will restart following a power cut, unless there has been a power surge greater than the pre-set limit of 3 amps. See Section 5, paragraph 3.

7. Alarms

Optional independent alarms are available, suitable for placing in any indoor location, up to 100 metres from the BioDisc and would usually be connected to a power supply independent of the BioDisc. They have an audible alarm, with mute button and a warning light; some independent alarms are fitted with a flashing beacon.

- Independent Remote Loss of Rotation Alarm Panel: This is fitted in addition to the Standard Control Panel and gives warning if the rotor stops turning for any reason.
- Independent High level Alarm: This may be fitted to units with an Integral Discharge Pump and gives warning if the level in the FST rises abnormally, indicating a pump failure.

SECTION 3

INITIAL START UP PROCEDURE

1. Introduction

Every care is taken to ensure that all mechanical components are correctly fitted, adjusted and lubricated prior to leaving the factory. However, subsequent handling during transportation and installation may result in the movement of components and a subsequent need to re-adjust prior to starting the unit. Your installing contractor should have thoroughly checked the unit but if, on inspection, you consider that any components require adjustment, please contact Klargest. We do recommend you purchase a commissioning service from an approved engineer.

Once the unit has been installed it should be left filled with water. Please switch on the motor, following the procedure below and leave the unit running, even if there is no sewage being fed into the plant. **If the unit has been installed with no operational power supply, then remove the motor/gearbox unit and store it in a dry or heated environment until such time as the unit is ready for permanent operation. The**

motor gearbox unit and drive belt should then be replaced and tensioned by Klargester or an experienced contractor.

We recommend that the system should be commissioned. Please contact Klargester. Where an immediate start-up is necessary, the following basic procedures should be carried out. Ensure that all Health and Safety precautions are observed.

2. Water

Check that the BioDisc is full of water to the outlet level.

3. Electrical

Check that the power supply is connected to the control panel. Check that all electrical components and conductors are earthed.

4. BioDisc

Check that the BioDisc is in order, with no obvious damage or misalignment of parts. If any problems are discovered, contact Klargester.

Check that all electrical components: Drive Motor, Sludge Return Pump and LOR Alarm sensor, (where applicable) are connected to the Control Panel.

NB/NC units only: Check that the Sludge Return Timer in the BioDisc Control Panel is set correctly, as Indicated in the diagram

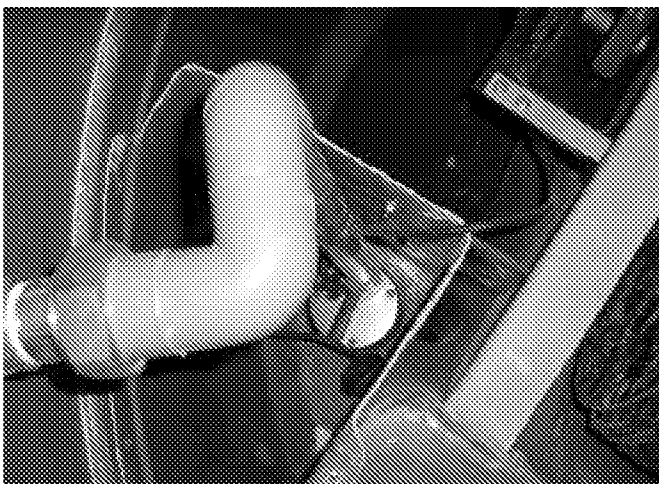


Fig. 3 - Pump Position

Units with optional discharge pump: Check that the pump float and associated pipework are positioned as shown and that the float can move freely.

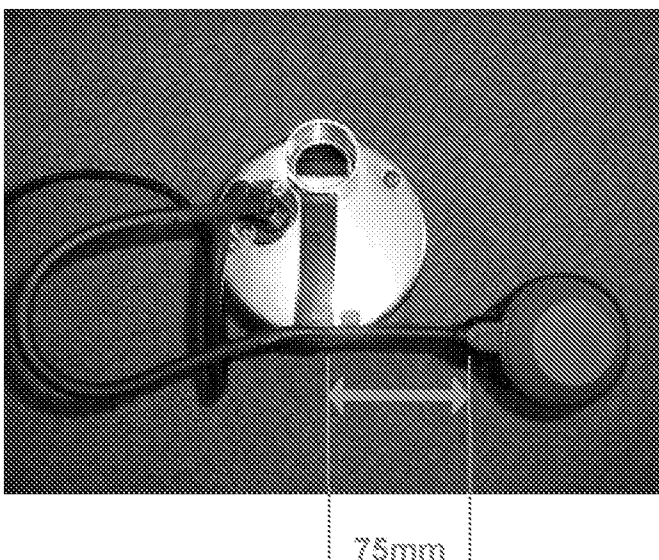


Fig. 4 - Float Setting

The float cable length is pre-set during assembly to a dimension of 75mm. Check that this dimension has not been altered. If for any reason the cable becomes disconnected from the retaining clip it should be replaced so that there is 75mm of cable between the clip and the float.

Note: Setting less free cable will cause the pump to operate more frequently and may shorten its working life.

Important: With the pump chamber empty of water the float must hang clear of the chamber floor. The correct float position and distance is essential. The float must not be able to either trap or tangle, as this will prevent its correct operation. The float must not jam.

5. Switch On

Open the Panel. Put the isolating switch and/or circuit breaker(s) into the "on" position. Close and lock the panel. Note: If the unit is fitted with a sludge return pump, this will start immediately and will run for the pre-set period.

6. Running Checks

Check that the rotor is running smoothly in the correct direction of rotation and is not contacting any part of the fixed structure.

Check that the forward feed buckets are discharging correctly from the first to the second stage of the Biozone.

Units with optional Discharge pump: Once the rotor is turning, a flow through the FST and into the pump chamber will be generated. Check that the pump switches on at high level and off at low level.

Note: The pump switch-on level must be below the pump chamber inlet.

7. Optional Loss of Rotation Alarm

The alarm sensor (reed switch) is mounted adjacent to the motor/gearbox assembly. The sensor may be supplied out of position, to allow for possible minor rotor movement during transport. Check the sensor position and if necessary adjust to provide a gap of 5 - 10 mm between the sensor and the actuator magnet.

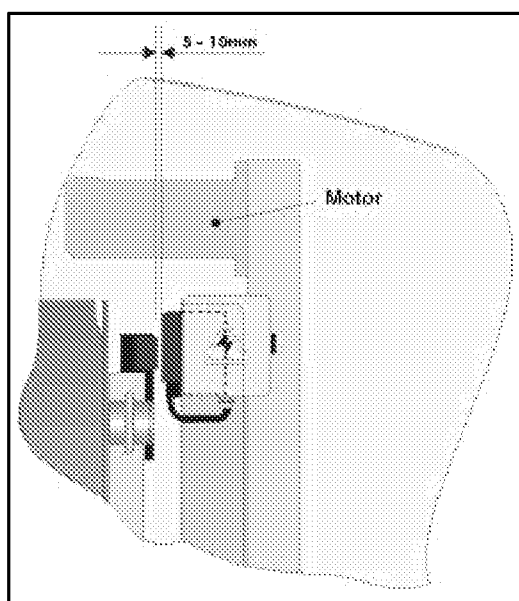


Fig. 5 - Alarm Sensor Adjustment
(position may vary)

Check operation of the Loss of Rotation (LOR) Alarm as follows:

- Open the Control Panel and isolate the drive motor whilst maintaining power supply to the alarm circuit. For units with a combined Alarm Control Panel this can be done either by removing the motor fuse or by operating the motor overload trip (refer to wiring diagram). Where a remote independent alarm is fitted, simply isolate power supply at the BioDisc control panel. After a delay of 2-3 minutes the alarm should activate.
- Push the reset button on the front of the Panel. The alarm beacon or sounder should cease and the red indicator light on the panel front should remain illuminated.
- Re-connect power to the drive motor and close the Control Panel. The alarm should cease after approximately one minute.
- Depress and release the "Beacon Off" button to reset it.

Malfunctioning of the LOR Alarm does not prevent operation of the BioDisc System, but it should be reported to your maintenance engineer for early rectification.

8. Process Initiation

During installation, the unit will have been filled with water. Allow sewage to enter the unit, this will gradually displace the clean water used during installation.

Colonisation by micro-organisms will commence naturally and an operating biomass will develop on the discs after approx. 3-6 weeks, depending on individual site conditions and season.

SECTION 4

OPERATION

1. Introduction

The biological treatment process of your BioDisc is self regulating and it requires no specialised operational knowledge, but it is important that you are aware of the following:

Your BioDisc system uses colonies of live natural micro-organisms (biomass), to break down the pollutants in the sewage. Many chemicals used in households and commercial establishments can inhibit or kill these micro-organisms; particularly if used in excessive amounts.

Bear in mind that treatment plants serving small populations do not have the benefit of dilution that occurs at a large sewage works. A bottle of bleach tipped down the toilet in Birmingham would be virtually lost amongst the millions of gallons of sewage arriving at the city's treatment works; a bottle of bleach in a plant serving one or two houses could be a lethal dose for the biomass.

If the biomass is damaged, it will usually recover in time. But in the meanwhile one of the more obvious symptoms may be an unpleasant smell, so it is in the operators interest to avoid this.

Generally speaking all common household cleaning fluids are acceptable, provided they are used in accordance with the makers instructions and stipulated concentrations. The following "Do's and Don'ts" includes the most common household chemicals, but it is not an exhaustive list and the golden rule is "If in doubt - leave it out."

Bear in mind too that it isn't only the toilet that is connected to the treatment plant; anything that goes down the sink, bath etc., also ends up there.

2. Do's and Don't's

Washing machine and dishwasher detergents, washing up liquids:

These are generally all right to use in the normal concentrations and usage found in domestic housing applications. Problems can occur if, for instance, you are washing the jerseys of the local rugby club's five teams!

BioDisc incorporates a unique flow management system which enhances its ability to handle shock loads of detergent waste, but there are limits even to this, so if you have to do unusual amounts of clothes washing it would be a good idea to spread it over a few days.

Excessive use of Biological washing powders can cause degradation of the biomass. Non-biological detergents, without enzymes, may be substituted.

Floor cleaners, disinfectants and bleaches:

These are safe to use in accordance with the makers recommendations and in the minimum necessary concentration. Do not pour neat disinfectant or bleach down sinks or outside gullies. If these are smelly it usually indicates a build up of decaying material or a plumbing problem and should be dealt with accordingly.

Nappy disinfectants and bottle sterilising fluids e.g. Milton

When disposing of the used fluid, ensure that it is well diluted with water. The easiest way of doing this is usually to flush it away down the toilet.

Waste disposal units:

These do not inhibit the biomass, but, depending on use, they can present the treatment plant with considerable extra load. This can result in the treatment process becoming unbalanced, leading to problems. Much better to compost your vegetable peelings etc - it's cheaper and environmentally friendly.

Home beer and wine making.

This presents a similar problem to waste disposal units. The BioDisc has to work as hard to treat one pint of beer tipped down the drain as it does to treat all the normal waste produced by one person in 24 hours. See also the notes above regarding sterilising fluids.

THE FOLLOWING MUST NOT BE DISCHARGED INTO THE DRAINS

Motor oil, grease, anti-freeze, brake fluid etc.

Cooking oil and fat.

Weed-killers, insecticides, fungicides and other gardening chemicals.

Paint, thinners, white spirit, turpentine, creosote etc.

Chemical drain cleaners.

Acid based brick/stone floor cleaners.

Medicines

Take unused medicines to a pharmacist for safe disposal.

Photographic developing fluids.

Nappies, sanitary towels, rags, soft toys, tennis balls etc.

This may seem obvious, but it is amazing what gets flushed down the loo from time to time. Although such items are not directly damaging to the biomass they can cause problems, not the least of which is simple blockage of the drains.

Even so-called disposable nappies and sanitary towels often do not degrade fully in the treatment plant and can lead to malfunction, so it is best to dispose of them by other means.

3. Desludging and Maintenance

These are vital to the plant's ongoing operation and should be carried out in accordance with the guidelines in the maintenance section of this manual.

Maintenance contracts are available. Please contact Klargester for your local service provider.

SECTION 5

MAINTENANCE

1. Introduction

Klargester BioDisc units are designed and engineered for the minimum possible maintenance requirements, consistent with proper performance. Nevertheless, it is important that routine preventive electro/mechanical maintenance and de-sludging are carried out at the appropriate intervals by suitably qualified persons.

Please contact Klargester for your local service provider.

2. Customer Checks

As a back-up to routine servicing and to assist trouble-free operation, we recommend that you familiarise yourself with the operation of your BioDisc and make the following checks from time to time: (Refer to Fig. 6 for positions of parts mentioned.)

Your attention is specifically drawn to the Health and Safety section of this manual.

- Review the appearance of the Biomass. It may be light grey to grey at the first bank, gradually changing to brown in the second stage and dark brown at the drive end of the rotor. If the growth is excessively thick and the colour predominantly grey throughout, an overload condition is indicated.
- Visually check the general condition of the BioDisc.
- Check that the inlet and outlet pipes (C) are clear. Remove any debris if necessary.
- Check that the dosing bucket(s) (D) are transferring liquid consistently from the first to second biozone section.
- Units with an Integral Discharge Pump: Check that the pump float can move freely and switches the pump on and off as the level in the pump chamber rises and falls. If a high level alarm is fitted check that the alarm float can move freely.
- Units with Loss of Rotation Warning Device: Check for correct operation (see Initial Start Up Section).
- Familiarise yourself with the normal operating sound of your BioDisc. Report any unusual noises to your maintenance engineer.

If any malfunction is discovered, contact your maintenance engineer.

3. Failure of Power Supply or of Discharge Pump

BioDiscs with gravity discharge: In the event of a power failure, flow through the BioDisc will continue by gravity, although the quality of the discharge will gradually deteriorate. When power is re-established, check that the rotor has re-started and is turning correctly (see Section 3.0 paragraphs (5) and (6)). If the BioDisc has not been working for some time, the rotor may become unbalanced. This can cause the rotor to turn unevenly or prevent the unit restarting. In the event of any difficulties, contact your local service provider.

4 Low Voltage Power Supply

Motors may burn out if this condition is experienced. Consult electrician.

IMPORTANT - READ THIS. TAKE IMMEDIATE ACTION IF A PROBLEM ARISES

BioDiscs with pumped discharge (Integral or external pumps): During power cuts, or in the event of pump failure, the level of sewage in the BioDisc will rise and if unchecked will lead to overflowing and/or possible damage to the motor/gearbox. At normal flow rates, sewage will reach the level of the motor in about 40 hours (6 people) or 20 hours (12 people). If pump operation cannot be re-established within this time the sewage level in the BioDisc must be carefully monitored and incoming flow restricted. If necessary the BioDisc should be emptied by a licensed waste contractor to avoid sewage overflowing the internal baffles or damaging the motor. **Do not allow the motor/gearbox to come into contact with sewage.**

When normal operation is resumed, check for solids in the Biozone and FST and de-sludge if necessary. Check rotor rotation as above.

4. Sludge Removal from BioDiscs BA, BB, NB, BC AND NC.

Refer to the illustration below for recommended desludge positions.
(Note: Illustration is typical; individual units may vary).

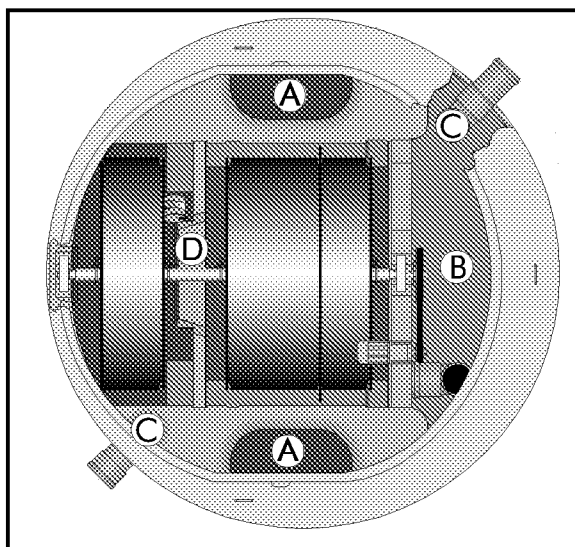


Fig. 6 - Desludge Positions

- a) Isolate power to the BioDisc.
- b) Undo the BioDisc cover latches and remove the cover. Hinged covers should be folded before removal.
- c) Remove surface scum and about half the contents of the Primary Settlement Tank through the desludge ports [A] on either side of the rotor. Use the ports alternately. If port covers are fitted, keep the port not in use covered.
- d) Empty the Final Settlement Tank [B]. **DO NOT** attempt to remove liquid from the discharge pump chamber (if fitted).
- e) Remove remaining matter from the Primary Settlement tank.
- f) **DO NOT** attempt to remove any liquid from the rotor section.
- g) **DO NOT** attempt to clean off the gelatinous biomass growth on the rotor.
- h) Ensure that the BioDisc inlet and outlet pipes [C] and the forward feed buckets [D] are free of debris. Ensure that the desludge port covers, if fitted, are replaced, then close and lock the BioDisc covers.
- i) Re-connect the power supply. Ensure that the control panel door is locked shut.
- j) Units with Loss of Rotation Alarms only: Wait for two minutes. If the alarm on the control panel does not activate, this indicates that the rotor has successfully re-started. If the alarm activates, switch off the power at the control panel and immediately switch on again. If the alarm continues to activate, isolate the power supply and notify the plant owner so that the problem can be investigated.

5. Desludge Volumes

Model	BA	BB/NB	BC/NC
Primary Settlement Tank	2200 litres (485 galls)	2200 litres (485 galls)	4580 litres (1009 galls)
Final Settlement Tank	400 litres (88 galls)	400 litres (88 galls)	850 litres (187 galls)
Desludge Period	12 months Maximum	6 months Maximum	7 months Maximum
You should not exceed the maximum desludge periods given above.			

TROUBLE SHOOTING GUIDE FOR BIODISC UNITS BA/BB/NB/BC/NC

SYMPTOM	CAUSE	ACTION
Strong odour	Excessive build up of sludge and scum	Desludge the unit.
	Grease (white/cream crust in primary tank and/or thick, smooth biomass ¹)	De-sludge unit. If necessary hose off discs. Avoid excessive use of fats and oils. Please note removal of Biomass will reduce treatment until new Biomass establishes.
	Chemicals in the system (very sparse or no biomass ¹)	In most instances, units will recover naturally from toxic inhibition events. Refer to section 4 of the Owners Handbook for general guidance on use of domestic chemicals.
	Excessive laundry use (thick, stringy whitish biomass ¹ on first section)	Spread out laundry operations. Avoid biological powders where possible and use the minimum possible amounts of detergent. Refer to section 4.
	Unit overloaded (thick/grey biomass ¹) over most of rotor	Check section 1 of the Owners Handbook for the process capability of the unit. If in doubt, contact Klargester.
	Rotor stopped	See rotor stopped section below.
	Drains inadequately ventilated	Check that there is an open high level vent at the head of the drains (not "Durgo" valve or tile vent).
Rotor stopped	Switched off	Check that the motor switch on the panel is in the "on" position. Re-set if necessary.
	Power failure	Check the fuse/trip at the supply board. Replace/re-set as necessary. If the problem persists, contact Klargester.
	Wiring fault	Have the wiring to control panel checked by a competent electrician. If the supply wiring is OK contact Klargester.
	Drive belt broken	Contact Klargester.
	Drive motor faulty	Contact Klargester.
	Loose pulleys on rotor or gearbox output shaft	Contact Klargester.
Rotor fails to re-start after a stoppage	Rotor unbalanced	Hose off excess Biomass on the heavy side of the rotor. Note removal reduces treatment.
Rotor turns intermittently	Drive motor overheating	Contact Klargester.
Effluent discharge not to required standard	See strong odour and rotor stopped sections.	
	Managed flow system in-operative.	Check that bucket(s) are in place and discharging correctly into the biozone second stage.
	Sludge return pump inoperative (NB/NC only)	Contact Klargester.
Unit flooded (units with integral discharge pump)	Discharge pump not working.	Check that the pump switch on the panel is in the "on" position. Re-set if necessary. Check that pump control float is clear of obstructions and set at the correct length. If the problem persists consider emptying unit to protect motor and gearbox and contact Klargester or service provider. (See Section 5).

1. Refer to Section 5 of this manual for guidance on the appearance of a healthy Biomass.

How to get the best from your Sewage Treatment Plant



Did you know?



You need to have your sewage treatment plant emptied and serviced regularly



A sewage treatment plant uses natural microorganisms (Biomass) to break down pollutants, many household chemicals kill these micro organisms



You can have a Smart Monitor fitted to your system to alert you to any changes

How to keep your sewage treatment plant in the best possible condition



Do's

- Service regularly in accordance with guidelines.
- Look out for bad odours. This can be a sign of overloaded biomass.
- Get the system emptied and de-sludged regularly.



Do not

- Put nappies, wet wipes, sanitary towels & ear buds down the toilet
- Pour cooking oil & fat down the sink.
- Pour weed killer, insecticide & fungicide into the system
- Put food waste down the sink.
- Pour neat floor cleaner, disinfectant or bleaches down sinks or outdoor gullies.
- Excess use of biological washing powder.
- Put paint thinner, white spirit, turpentine, creosote etc. into drains.



For a FREE health check, please call

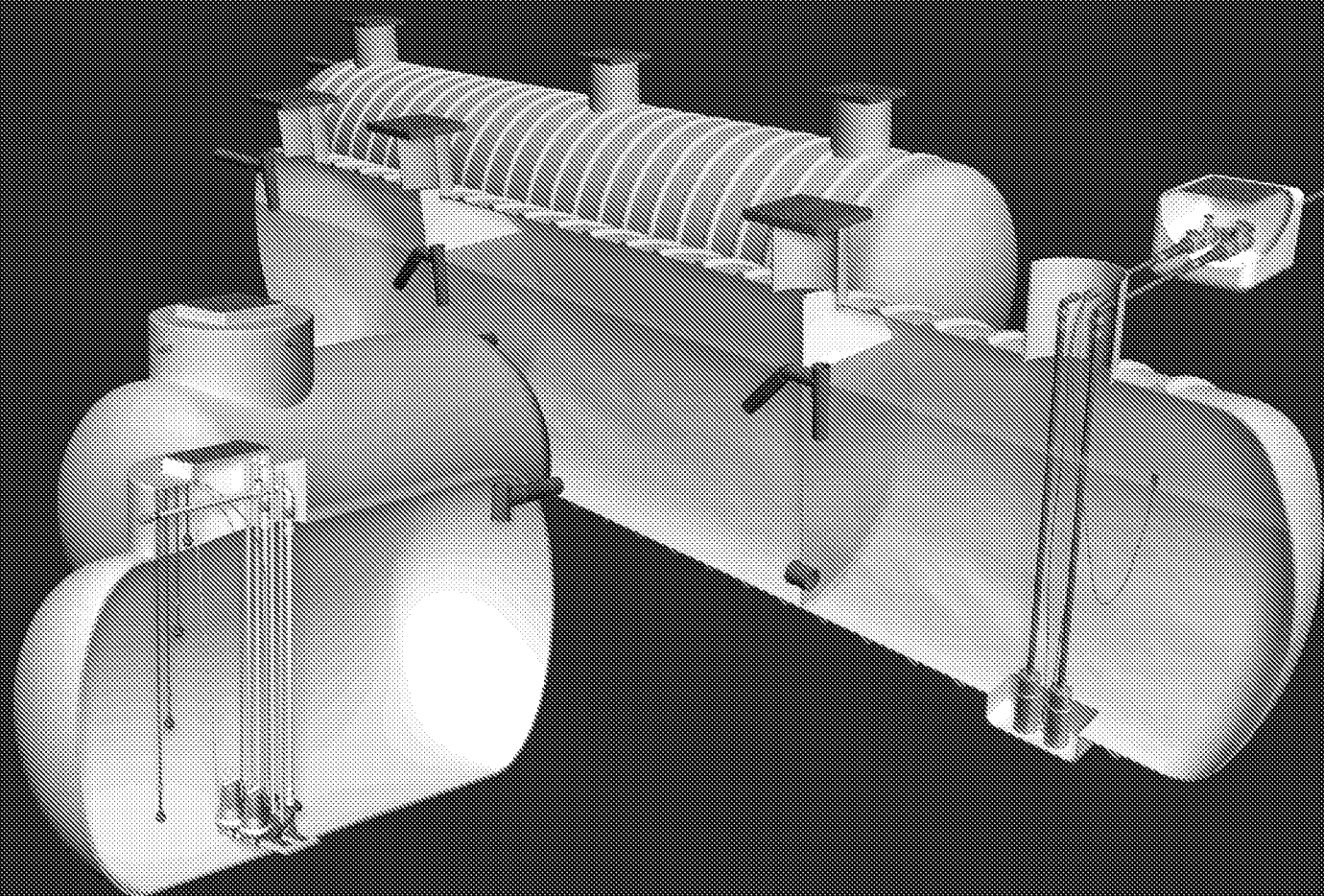


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Pump stations

Installation and operation manual



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Based in Northamptonshire and with extended facilities in Bridgwater, Somerset, Marsh Industries is a leading manufacturer of off-mains drainage products and rainwater harvesting systems for both UK and overseas markets.

Marsh supplies pump stations and off-mains drainage products for domestic, commercial and industrial applications as well as offering engineering design and technical support.

With one of the largest merchant distributor networks available in Europe, clients ask for Marsh products and services because they know the company delivers from a solid foundation of knowledge, customer support, product quality and proven performance.

Architects, specifiers and installers within the construction sectors seek alliances and partnership with Marsh because its core products and services bring further added value to their own brands.

Note: Marsh Industries accepts no liability for any damage or loss, including consequential loss caused by the failure of any drainage equipment.

It is the responsibility of the installer/contractor to undertake installation of the pump station as per the manufacturer's instructions.

Marsh Industries believe that the information printed in this manual is accurate, and published for information only. No warrants, express or implied, are contained therein, nor does any legal liability attach to Marsh Industries for any reason whatsoever. The company's policy is one of continuous product improvement and we reserve the right to make alterations to our range and specification without prior notice.



1 Pre-installation checklist

Prior to installation please check or take note of the following:

- ✓ Ensure that the information contained in this manual is adhered to at all times.
- ✓ When the pump station arrives on site it is recommended to fully inspect for damage (ie, fractures to the shell or ribs, delamination, scratches or abrasions deeper than 1.5mm or stress cracks). If any damage is seen or suspected please notify Marsh Industries immediately as problems cannot be rectified easily after installation.
- ✓ It is the responsibility of the installer/contractor to undertake installation of the pump station as per Marsh Industries' instructions.
- ✓ All electrical work must be undertaken by fully qualified personnel under the guidance of The Health & Safety at Work Act.
- ✓ Ensure the tank is properly ventilated.
- ✓ The end-user of the pump station is responsible for the operation and maintenance of the system.
- ✓ It is important that the product is operated under the conditions for which it is designed. Any variation in these conditions could prevent the unit from performing to its full potential.
- ✓ Maintain the system in accordance with this handbook.
- ✓ Do not open access covers without isolating the mains power first (panel isolator must be turned fully to the OFF position).
- ✓ The end-user/installer must provide cable ducts to the control panel and between the control panel and the pump station. See 'Electrical installation'.
- ✓ Incorporate a suitable protective device in the power supply to the unit. If the circuit breaker trips, the unit will stop running -- a dedicated protective device is recommended.

To maintain optimum system performance the end-user must be aware of certain precautions, including the following:

- ✗ Do not alter in any way, any part of the system or internal parts supplied with the system.
- ✗ The design loading of the pump station should not be exceeded.



2 Introduction

This manual is supplied with your pump station for the provision of installation, operating and maintenance instructions. It is the responsibility of the operator to read and fully understand these instructions before commissioning or operating the pump station. In the event of problems occurring with your pump station you may either refer to this manual, your equipment supplier, service company or Marsh Industries.

The pump station will provide long and trouble free operation provided the maintenance procedures laid out in this manual are regularly carried out.

Your attention is drawn to the Health and Safety section. It is imperative that you read these instructions before working on the system.

3 Health and Safety

Section 6(a) of United Kingdom Health and Safety At Work Act 1974 requires manufacturers to advise their customers on the safety and the handling precautions to be observed when installing, operating, maintaining and servicing their products.

- Before carrying out any maintenance work, the equipment must be electrically isolated.
- DO NOT leave covers/manways open for any longer than is necessary.
- Temporary barriers and warning signs should be erected around any open covers/manways as appropriate.
- On completion of works to the pump station all access covers must be replaced.
- For sewage pumping stations, sewage gases are potentially hazardous. DO NOT enter the unit without proper training and undertaking a confined spaces risk assessment process, with all required equipment and personnel being present.

The user's attention is therefore drawn to the following:

- The appropriate sections of this manual must be read before working on the installation.
- Installation and servicing must only be carried out by suitably trained or qualified personnel.
- Normal safety precautions must be taken and appropriate procedures observed to avoid accidents.
- All works associated with the installation must be adequately risk assessed and all appropriate control measures in place prior to starting any work.

General non site specific significant hazards that are associated with the operation of the pump station include but are not limited to:

- Explosive atmospheres
- Falls from working at height
- Confined space working
- Electrical Shock
- Asphyxiation
- Working near, in, or over water
- Exposure to dangerous substances, chemical and biological
- Being struck by falling objects
- Moving heavy loads

- Slips and trips
- Entrapment or crushing by a workplace vehicle
- Bad working positions, often in confined spaces
- Receiving injuries from hand tools
- Inhalation of contaminants
- Handling of rough materials
- Loud noise
- Vibration from tools or vibrating machinery

If further technical advice or product information is required refer to your service company, local supplier or Marsh Industries.

Confined space

- Generally it should not be necessary to enter the pump station under normal working and operating conditions. Adjusting the gate valves and maintenance of the non-return valves requires entry into the tank and for deep tank installations the operative may need to be suspended within the tank. Dangers can arise in the confined space because of the following issues:
- A lack of oxygen where heavier gasses or vapours displace breathable air.
- Poisonous gas, fume or vapour that can remain in the tank even after the system is emptied.
- A sudden filling of the tank where there is a failure of the inlet bung during maintenance that occurs in periods of high rainfall.
- Fire and explosion hazards from flammable vapours and liquids.
- Residues on the inner surface of the tank that can give off fumes/vapours and could also result in poor footing conditions.
- Hot conditions leading to a dangerous increase in body temperature due to poor ventilation.
- Injuries resulting in falls from a height; the access to the pump station is at ground level but they can be in excess of 4 meters deep.

You must carry out a suitable and sufficient assessment of the risks for all work activities to decide what measures are necessary for safety. All those involved in the works must be adequately trained in confined space and ensure that permit to work and safe systems of work are in place for works within the tank and operations around the tank. The following checklist includes essential elements that must be considered when preparing a safe system of work, it is generic, not site specific and must not be considered as an exhaustive list:

- Appoint a supervisor with the responsibility to make sure that the necessary precautions are taken.
- Ensure that individuals involved with the works are competent and in adequate physical condition to complete the works. It may be necessary to seek medical advice on an individual's suitability.
- Isolate all mechanical and electrical equipment serving the tank ensuring that shut off valves are locked off and probes removed from the tank or disconnected as necessary.
- To minimise the build-up of gas, vapours and fumes the tank may be cleaned before commencement of the works.
- Ensure that equipment used by operatives is suitable and does not impact on the individual's ability to enter and exit the tank safely.
- Mechanical assist equipment should be considered for access and egress into the tank.
- Ensure that all openings to the tank are open and if possible increase ventilation using forced air/mechanical means to assist in preventing the build-up of toxic gas, vapours and fumes.
- Testing the air may be necessary to check that it is free from both toxic and flammable vapours and that it is fit to breathe with testing being performed by a competent individual.
- Non-sparking tools and specially protected lighting are essential where flammable or potentially explosive atmospheres are likely.



- Breathing apparatus is essential if the air inside the space cannot be made fit to breathe because of gas, fume or vapour present, or lack of oxygen.
- Prepare emergency plans where emergency arrangements will need to cover the necessary equipment, training and rescue operations.
- Rescue harnesses should be provided with lifeline where the lifeline is run back to a point outside the confined space to assist in rescue operations.
- An adequate communications system is needed to enable communication between people inside and outside the confined space and to summon help in an emergency. A suitable competent individual may be required to communicate with anyone inside, raise the alarm quickly in an emergency, and take charge of the rescue procedures

Health

It is the customer's responsibility to ensure that all necessary personal protective clothing/equipment (PPE) is available. As a minimum it is recommended that the following PPE is used:

- Overalls
- Gloves (waterproof, cut, tear and abrasive resistant)
- Waterproof safety boots
- Hard hat
- Breathing apparatus (where entry to the sump is required)

After operating and maintaining the system, it is imperative that a high level of personnel hygiene (hand washing, etc) is immediately undertaken. Leptospirosis is a disease which can, in rare cases, be contracted from contact with sewage.

There are two types of Leptospirosis infection which affect people in the UK. Only one of these types is associated with sewage. Weil's disease is a serious and sometimes fatal infection that is transmitted to humans by contact with soil, water or sewage contaminated with urine from infected rats.

Responsibility

The owner of the pumping station is entirely responsible for ensuring correct operation. The offloading, correct installation and commissioning of the pumping station is the responsibility of the system owner. We strongly recommend that a contractor that understands packaged pumping stations and drainage systems installs the unit.

The location and form of the discharge from the pump station is the responsibility of the station owner. Responsibility for the installation and maintenance of the pump station remains with the owner.

Marsh Industries recommend a professional service company, employing service engineer's familiar with pumping equipment, is used to service the unit. Marsh Industries accepts no liability for any damage, loss (including consequential loss), third party costs caused by the failure of any equipment supplied.

4 Unit description

The pump station system is comprised of the following items:

- 1 GRP pump chamber
- 2 Pumps, discharge pipework and float switches within the pump chamber (note: pumps are not installed in the pump chamber at time of delivery unless the pumps are free-standing)
- 3 Control panel (may not be included if pump chamber houses a single pump)
- 4 Kiosk (optional)
- 5 An external beacon (optional)

1 GRP pump chamber

Typically the GRP pump chamber will have the following connections (pumps are housed in a sump within the GRP tank):

- 1 x inlet socket
- 1 x outlet (pumped) connection
- 1 x cable duct socket (110mm minimum size)
- 1 x vent socket (to enable the station to be connected to a vent system – by others)

2 Pumps, discharge pipework and float switches

The pumps have been carefully selected to give the optimum forward flow rate at the lowest running cost. The pump station is supplied with two pumps controlled by a float switch system. A duty/standby or duty assist configuration may be used whereby two pumps are employed. A non-return valve is fitted at the outlet of each pump with a common gate valve.

3 Control panel

The control panel has an interlocked incoming supply isolator, making it difficult to remove the cover without first electrically isolating the control panel. Installation of the pump control panel will need to be located in a building or kiosk unless specified otherwise. Ensure when working on the pump control panel that power to the panel is isolated to avoid electrical shock.

The electronic control panel incorporates the mains isolator, alarm contacts, and terminals for pumps and float switches. Please note that the installer is required to provide a dedicated mains supply to the control panel with D-rated Fuses.

When a control panel is supplied a beacon will also be supplied as standard and is powered by the control panel. When an alarm condition occurs the beacon is energised to indicate externally that a high level condition exists in the pumping station.

In a dual pump system the control panel energises the duty pump using control floats. The pump is called to run when start float is activated and allowed to run until stop float deactivates pump.

The control panel allows for alternate duty on energising pumps so that both pumps are run evenly preventing excess wear on any individual pump.

If a pump overload condition exists then the control panel overload will trip. When this occurs the other pump is automatically energised.



5 Installation

Please read health and safety instructions before commencing installation work.

Pump stations are suitable for installation with concrete backfill only.

The following instructions are offered for guidance only. Marsh Industries accepts no responsibility for incorrect off-loading or installation.

General

- These guidance notes refer only to the installation of Marsh Industries' underground GRP tanks suitable for concrete surround.
- These guidance notes do not provide specific, site-related installation instructions.
- If in any doubt about any aspect of the installation please contact Marsh Industries on 01933 654582.
- Generally the depth from finished ground level to the top crown of the main tank shell should be no more than 1.3m meters.

Transportation, unloading and storage of tanks

- Tanks must be held down during transportation using nylon straps, do not use chains, cables or wire ropes to hold tanks.
- Do not over tighten straps, causing deformation of the tank shell.
- Tanks are best lifted by a crane utilising webbing lifting straps – do not allow chain, cable or wire rope to be in contact with the tank.
- It is recommended that a lifting beam is used for tanks longer than 8 meters.
- Smaller tanks may be lifted with other suitable site equipment, but greater care is needed to control the lift and to ensure the tank is not damaged.
- Not all tanks will have their centre of gravity at the centre of the tank. Therefore, the lifting straps need to be arranged to ensure the tank is stable during lifting.
- Move tanks only by lifting and setting, do not drag or roll.
- Do not drop or roll tanks from the delivery vehicle.
- Place tanks carefully onto a smooth, level and even surface that is free from rocks, large stones or other debris that could cause point loads on the tank shell.
- In high wind conditions, consideration should be given to strapping down the tanks to prevent damage.

Pre-installation inspection

- Tanks should be subject to a visual inspection prior to installation. Special consideration should be given to strap positions. Check for fractures to the tank shell or ribs, delamination, scratches or abrasions deeper than 1.5mm, stress cracks or star crazing.
- Any damage should be notified to the delivery driver and to Marsh Industries.
- Do not undertake any unauthorised repairs, as this will invalidate the tank warranty.
- Check the invert depth is correct, the tank is correct grade for concrete surround and that the inlet and outlet pipe orientations are correct.
- Where present, all fixings (nuts, bolts, screw fixings etc) should be checked and retightened to correct any movement during transport.

Excavation

- Excavations should be planned with due regard to Health and Safety requirements, and should be either shored or battered back to a "safe" angle.

- Ground instability at formation level, eg, running sand, may necessitate over-excavation and stabilisation with hardcore or blinding concrete.

Concrete specification

The specification for the concrete mix to surround the tank should be selected by the tank installer taking into account the site conditions and application requirements.

For a typical non-structural application in good ground conditions, with non-aggressive soils, a concrete with a 28 day compressive strength of 20 to 30N/mm² with a 25 to 50mm slump, complying with the relevant BS EN standards, is generally suitable. For non-typical applications, aggressive soils or structural applications specialist advice should be obtained.

Lift height (rate of rise)

Determine the lift height (m), or rate of rise (m/h) for the specific concrete type used, to ensure that a design pressure (P max) of 15kN/m² on the tank is not exceeded.

Vibration

The design of the tank assumes minimal compaction of the surrounding concrete. Where necessary, this may be extended to include light internal vibration. Do not use deep reverberation which will substantially increase the pressure on the tank, possibly causing failure.

Impact of concrete on discharge

The effects of concrete discharge impact are considerable. These effects must be considered to ensure the maximum pressure of 15kN/m² on the tank is not exceeded. Under no circumstances should concrete be discharged directly onto the tank.

Live load

If the tank is installed in an area where traffic, or other superimposed loadings can be applied, a structural engineer should be consulted, to design a reinforced concrete slab spanning over the access hatch of the tank. This is to prevent the load being transmitted to the tank. If this slab is constructed immediately above the tank, it should be separated from the concrete surrounding the tank by compressible material.

Tank burial depth

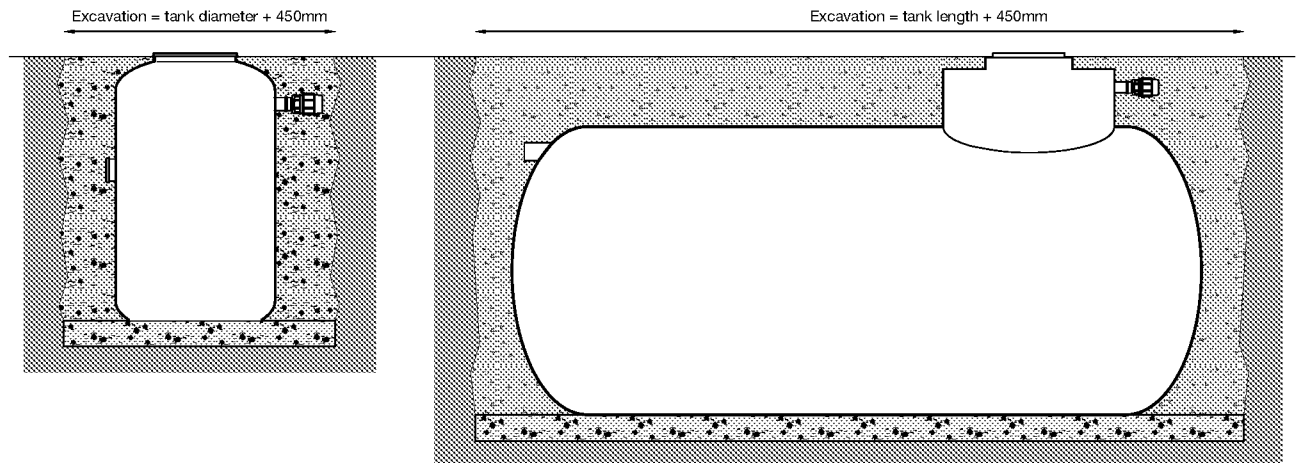
The grade of tank is designed to be installed below ground and completely surrounded with concrete.

Generally, the depth from finished ground level to the top crown of the main shell should be no more than 1.3 metres. This may vary dependent upon ground water conditions. Deeper inverts may be accommodated on a standard shell providing the water table level does not exceed two metres above the top crown of the main shell. For deeper burial with high water table conditions heavy duty shells are available. If the tank is installed outside these parameters it may suffer irreparable damage.

Control of groundwater

Tanks must not be subjected to buoyant forces during installation, taking account of ground water levels and surface water run-off, and their accumulation in the tank excavation. This applies even if the tanks are mechanically anchored.





Installation procedure

- Maintain a completely dry excavation until the final pour of concrete has set. Failure to do this may result in voids beneath the tank and subsequent tank failure.
- Place the concrete in the base of the excavation to form a level and smooth base onto which the tank can be placed. The base concrete thickness should be no less than 200mm.
- Place the tank onto the concrete base, while the concrete is still wet, and determine the correct orientation for the tank pipework. Connect the pipework to the tank, ensuring correct alignment.
- Fill the tank with clean water to a depth of 300mm and recheck the pipework levels and connections. Commence backfilling evenly around the tank with concrete ensuring there are no voids, particularly at the bottom of the tank shell. Continue filling the tank chamber(s) with water whilst evenly backfilling with concrete around the tank ensuring that the progressive water level is no more than 300mm above the concrete level.
- Connect and seal turret extensions prior to completing the concrete encasement of the main tank (if turret extensions have been included). Allow the concrete to cure.
- Using appropriate formwork continue pouring concrete around the tank superstructure, i.e. access turrets, in lift heights not exceeding 500mm, allowing the concrete to set between each lift. The lift height, rate of concrete rise, or concrete compaction must not be to an extent which causes any part of the tank superstructure to distort, as this will damage the tank.
- Complete the backfill to ground level using free flowing granular material. Trim all access turrets and prepare suitable footings for each manhole frame ensuring any loads on the covers are not transmitted to the tank access turrets or access extensions, if fitted.

Access shaft extensions

Access extensions should be surrounded with concrete poured in 500mm lifts, allowing an initial set between each lift. The pressure from concrete placed in higher lifts may cause access extensions to distort or collapse.

Loose shafts should be sealed using silicon sealant, butyl tape or similar prior to installation to prevent ingress of groundwater under high water table conditions. It is the installation contractor's responsibility to ensure a watertight seal.

Electrical installation

It is not possible to state a specific installation configuration that would suit all sites. To ensure a safe and cost effective installation, the selection of current protection devices and the power cable feeding the control panel is the responsibility of the installer as the person best qualified to assess site conditions and supply configuration.

It is imperative that electrical installation of this equipment is entrusted to a fully qualified electrician. When installing the electrical supply to the pumping station, the following points should be considered:

- Pumps and float switches are provided with 10 metres of cable as standard unless specified otherwise. For longer cable runs between pumps/floats and control panel the installer will need to fit junction boxes and additional cables. Interconnecting cables between the junction box and control panel must be terminated with weatherproof glands.
- The supply to the pumping station control panel should be provided by a dedicated circuit via isolation and protection devices consistent with the requirements for fixed equipment and in accordance with the latest regulations of the Institute of Electrical Engineers.

Pump installation

The pumps should be installed ensuring that they do not hinder the operation of the float switches. The pumps should be lowered into the tank using the chain provided and located onto the auto coupling fitted in the base of the tank.

The assist float should be installed such that the second pump is started before the effluent backs into the incoming pipe invert level.

The high level float should be installed such that the alarm operates to indicate that the inlet pipe is full and now will be backing up flows in the upstream drainage.

All float switches should be installed such that they can move freely, and operate without becoming caught in any one position.

Failure to comply with the following could result in the invalidation of warranty:

- All connections made to the control panel should be via correctly sized and rated glands;
- Check all power terminations for tightness prior to commissioning. Loose connections will cause localised overheating with the possibility of fire.
- The control panel should ideally be sited within the 10 meter cable run of the unit. Suitably sized cable, protected in a cable duct or suitably sized steel-armoured cable should be used to run between the control panel and the electrical supply point. All glands used in the kiosk (optional), must be weatherproof.
- Correct installation of the pump station is required for optimum system operation and is a requirement for the pump station warranty to be valid.

Pump station start-up procedure

Start-up and commissioning

Note: The unit should be commissioned before flow is allowed to enter the system. Electrical connections and cabling should be undertaken and checked by a qualified electrician.

- Check the correct installation of the outlet pipework, and ensure that the delivery isolating valve is open.
- Ensure the pump station, incoming and discharge pipes are free from rubble and building debris.
- Fill the chamber with clean water, up to the level of the high level float switch.
- Turn the control panel isolator to the ON position.
- Check operation of the pump, ensuring that the level in the chamber drops until the float switch stops the pump. Allow the level to rise, and observe a second 'start' / 'stop' cycle.



- Turn the isolator to the OFF position.
- Fill the chamber with clean water, until the assist control float switch (optional) and the high level alarm are covered.
- Turn the isolator to the ON position.
- Check the high level alarm condition is indicated on the control panel.
- If configured for duty/assist operation check both pumps are in operation.
- As the water level drops and the high level alarm float tips such that the float indicates empty, check the high level alarm condition on the control panel is cancelled.
- As the water level drops and the assist level alarm float tips such that the float indicates empty, the second pump is de-energised.
- The first pump runs until the chamber is at low level.
- Allow drainage to enter the pumping chamber.
- Replace the tank cover and the pumping station is now operational

Pump station shut-down procedure

- Switch the control panel isolator to the "OFF" position and padlock.
- The pump(s) should be raised above the level of the residual liquid or removed completely.

6 Maintenance

Please read health and safety instructions before commencing maintenance work.

General

Correct and timely maintenance is a key requirement to ensure that the pump station operates correctly.

Marsh Industries recommend a professional service company that understands pump stations and drainage systems is used to service the pump station.

The maintenance activities can be summarised as follows:

- Ensuring debris does not accumulate in the pump station
- Ensuring correct Float Switch operation
- Ensuring correct pump operation

The following must not be discharged into the drains:

- Cleaning rags
- Cloths
- Syringes and hypodermic needles
- Medicines and medical equipment. Take unused medicines to a pharmacist for safe disposal.
- Grease and fat. These products tend to cool down, separate from the water and coagulate within the pump chamber. Fat & grease encase the pump and floats, causing blockages and failure of pumps.
- Nappies, sanitary towels, incontinence materials, soft toys, tennis balls etc.
- Even disposable nappies and sanitary towels often do not degrade fully and can lead to malfunction, so it is best to dispose of them by other means. Fabric cleansing wipes & nappy liners can block pipework. They should not be flushed into the drainage system.

Monthly

- Check the operation of the pump station.
- With the unit running, remove the access cover and confirm that the level of liquid in the pumping chamber is below the inlet pipe.
- Confirm operation of the duty pump by waiting for it to start when the float switch becomes vertical, ensuring that all float switches are free to operate, ie, not trapped or covered in sludge.

6 monthly

- As monthly
- Check the condition of the pump(s).
- Switch the power supply OFF at the Control Panel and padlock the mains isolator.
- Remove each pump in turn. Remove the impellor guard. Care-fully remove any accumulations of debris with the assistance of a hose if available / required.
- Replace any damaged components, eg, Impellor, guard etc.
- Check correct operation of the non-return valves on the discharge pipework from each pump.
- Remove any extraneous debris from the chamber – normally achieved by tankering away the contents of the pump chamber below the pump stop float level
- Re-assembly is reverse order to the above. On completion, remove the padlock and switch the isolator to the "ON" position checking for the correct operation of the pump station.

Notice: Please ensure to keep the manufacturer's warranty valid, this equipment is required to be regularly serviced and maintained by a competent Service Company. Failure to do so will invalidate the warranty on this equipment.



Marsh Industries

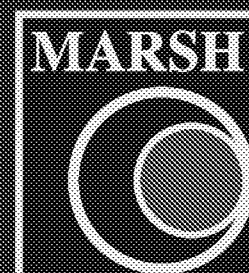
Marsh Industries delivers world-class wastewater treatment products and solutions to the domestic, commercial and agricultural sectors from its UK manufacturing plants in Kettering and Bridgwater.

The company is recognised as a collaborative and trusted partner to its customers, with a reputation for providing quality products that really do add value.

- o Sewage treatment plants 4-500+ PE
- o WellWater™ pump stations 234-20,000+ litres
- o Septic tanks and cesspools 2800-100,000+ litres
- o UniGem™ septic conversion units 4-60+ PE
- o Marsh GMS grease traps 234-20,000+ litres
- o Degritteur™ trash/debris barrier
- o StormDammer™ stormwater attenuation Up to 130,000 litres
- o RainCell™ rainwater harvesting systems 1500-20,000+ litres
- o Marator™ and Hydroil™ high performance oil separators

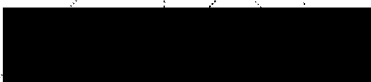
All products are fully type-tested and certified to ensure compliance with relevant environmental permitting programmes and building regulations.

In addition, the company's state-of-the-art computer software, GAIA, can generate precise, bespoke commercial sewage treatment plants and pump chamber systems to the finest specification.



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