

DRAINAGE MAINTENANCE PLAN

McDonald's, Heads of Valleys Road, Merthyr Tydfil (ST2685)



Prepared for: McDonald's Restaurants Ltd

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Document History

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1.0 Introduction

- 1.1 This Sustainable Drainage Maintenance Plan has been prepared by Glanville Consultants Ltd on behalf of McDonald's Restaurants Limited.
- 1.2 The site is located 4.5km NE from Merthyr Tydfil's retail park, within Pengarnddu Industrial Estate, as shown in Figure 1. The site is rectangular in shape covering an area of 0.373 hectares. At the time of the site walkover, access to the site is through a gated entrance at the northeast of the site with boundaries generally marked with retaining and brick walls. Three major bunds are found within the site with housing to the southeast. There are some trees located to the south and southeast of the site. A large supermarket building extends adjacent to the site's northern boundary.

2.0 Drainage Maintenance Responsibility & Training

- 2.1 The McDonald's site and all of its drainage is privately owned and maintained by McDonald's. It is the store manager's responsibility to ensure that the drainage system is regularly inspected and maintained, in accordance with this plan. Figure 1 shows the layout of the drainage system including the location of each of the items requiring maintenance, listed in this plan and a summary of the maintenance requirements.
- 2.2 The majority of tasks can be completed by McDonald's staff trained for each specific task. Training should include manual handling, for lifting manhole covers. Manholes & chambers can be dangerous due to trapped harmful gases and should not be entered unless staff are confined space trained and issued with appropriate equipment. Entering confined spaces should not normally be required and should be controlled by a permit to enter system administered by the store manager. It may be appropriate to rely on non-store based, specialist staff, on the rare occasions when confined space entry is required.

3.0 Drainage Inspection and Maintenance Requirements and Frequency

Catchpit Manholes (Figure 1 - Ref A)

- 3.1 Catchpit manholes are designed to trap silt, leaves and other debris before it reaches more sensitive parts of the drainage system where it could reduce drainage efficiency. Catchpit manholes are located prior to the permeable paving and the overflow basin.
- 3.2 Catchpit manholes and gullies need to be inspected on a monthly basis except during the autumn leaf fall when they may require inspections to be increased to fortnightly.
- 3.3 Equipment required for inspection includes moveable barriers and cones to guard openings, manhole keys, gloves, and a torch. A minimum of two people is required.
- 3.4 Catchpit manholes and gullies need to be emptied once the sump becomes half full. Emptying should be performed using a gulley emptying vacuum truck or similar device which does not require man entry.

Foul Water Manholes (Figure 1 - Ref B)

- 3.5 Foul water manholes and inspection chambers need to be inspected on a monthly basis or immediately if foul odours are present or there is a suspected blockage.
- 3.6 Equipment required for inspection includes moveable barriers and cones to guard openings, manhole keys, gloves, and a torch. A minimum of two people is required.

- 3.7 If manholes show any signs of blockage, specialist contractors should be called for clearance work, without delay.

Drainage Channel Outlets (Figure 1 - Ref C)

- 3.8 Drainage channel outlets need to be inspected on a monthly basis except during the autumn when leaf fall, may require inspections to be increased to fortnightly.
- 3.9 Equipment required for inspection includes moveable barriers and cones to guard openings, lifting tools, gloves, and a torch. A minimum of two people is required.
- 3.10 Silt leaves and debris should be cleared from the channel outlets during each inspection.

Surface Water Treatment (Figure 1 - Ref D)

- 3.11 Catchpit manholes and trapped gullies and kerb drain trapped outlets are located upstream of the petrol interceptor to prolong its life and optimise maintenance visits.
- 3.12 Equipment required for inspection includes moveable barriers and cones to guard openings, manhole keys, gloves, wire ties and cutters and a torch. A minimum of two people are required.
- 3.13 Staff should have appropriate training for these inspections as they involve specialist products. It is recommended that initial training is provided by manufacturers of this equipment.
- 3.14 The Petrol Interceptor is alarmed and has a silt trap and a treatment Coalescer. It is a SPEL ESR 25-C1 unit and shall be maintained and re commissioned strictly as required by the supplier, refer to Appendix A for details. Maintenance is required when the alarm is activated.

Flow Control (Figure 1 – Ref E)

- 3.15 A flow control manhole is present at position E, incorporating a flow control using a Hydrobrake. This chamber should be inspected monthly to look for debris blocking the outlet. Details are shown in Appendix A.

Cellular Attenuation Tank (Figure 1 – Ref F)

- 3.16 The cellular crates are protected by the upstream catchpit manholes. The catchpit manholes adjacent to the crates will allow inspection of the perforated pipe within the attenuation tank. The perforated pipe should be examined when the catchpits are inspected, on a monthly basis. The perforated pipe should also be inspected after every major storm. If there is any evidence of silt within the perforated pipe, jetting can be performed and any silt should be washed into the catchpit manhole, where it can be emptied. See Table 1 for maintenance requirements and frequencies.
- 3.17 Jetting requires specialist equipment and should be carried out by specialist contractors to ensure that damage to the crate storage is avoided. Provided the catchpit manholes are emptied appropriately, jetting should not be required. See also the manufacturer's guidelines in Appendix B and guidance in Table 1.

Table 1 - Operation and Maintenance Requirements for Attenuation Tanks

Maintenance Schedule	Required action	Typical Frequency
Regular maintenance	Inspect & identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months then annually
	Remove debris from the catchment surface.	Weekly or as required
	Remove sediment from pre-treatment structures (catchpits) and, or internal forebays.	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlets, overflows and vents.	As required
Monitoring	Inspect all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment build up and remove if necessary.	Every 5 years or as required.

Grease Traps (Figure 1 – Ref G)

- 3.18 The Grease Traps should be inspected on a monthly basis, by lifting the inspection cover. Any signs of a malfunction or blockage should be reported immediately to the external specialist maintenance company.
- 3.19 The Grease Trap has an alarm hard wired into the Store Manager's office with a visual and audible warning system. If the alarm is triggered the external specialist maintenance company should be called out immediately. See also the manufacturer's guidelines in Appendix C.

Permeable Paving (Figure 1 – Ref H)

- 3.20 The permeable paving should be examined when the catchpits are inspected, on a monthly basis. The permeable paving should also be inspected after every major storm. If there is any evidence of silt within the permeable surface it should be removed. See Table 1 for maintenance requirements and frequencies.

Filter Drains (Figure 1 – I)

- 3.21 The filter drain behind the drive-thru drainage kerb should be inspected and maintained regularly to ensure that it works efficiently during its lifetime. The operation and maintenance requirements for the proposed filter drain can be seen in Table 2.

Table 2 - Operation and Maintenance Requirements for Filter Drains

Maintenance Schedule	Required action	Typical Frequency
Regular maintenance	Remove litter (inc. leaves) & debris from filter drain surface, access chamber & pre-treatment devices.	Weekly or as required.
	Inspect filter drain surface, inlet & outlet pipework & control systems for blockages, clogging, standing water & structural damage.	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies.	Six Monthly
	Remove sediment from pre-treatment devices.	Six Monthly or as required.
Occasional Maintenance	Remove or control tree roots where encroaching filter drain.	As required
	At locations with high pollutant loads, remove surface geotextile and replace. Wash or replace overlaying filter medium.	Every 5 years or as required
	Clear perforated pipework.	As required

Rain Garden (Figure 1 - J)

3.22 Inspect and maintain in accordance with Table 3.

Table 3 - Operation and Maintenance Requirements for Rain Garden

Maintenance Schedule	Required action	Typical Frequency
Regular inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility to determine if maintenance is necessary	Quarterly
	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	Quarterly
Regular maintenance	Remove litter and surface debris and weeds	Daily / weekly
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
Occasional maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
Remedial actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years

Pump Chamber (Figure 1 - K)

- 3.22 The foul and surface water pump stations should be inspected on a monthly basis, by lifting the inspection covers. Any signs of a malfunction or blockage should be reported immediately to the external specialist maintenance company.
- 3.23 Any necessary remedial actions, such as pump repairs or the repair of erosion damage or damage to the chamber, should be carried out promptly to prevent further issues.
- 3.2.4 The pumps will be fitted with remote monitoring and they will be covered by a specialist maintenance agreement.

4.0 Drainage Inspection and Maintenance Records

- 4.1 Appendix D includes the annual drainage record log sheet. Copies should be taken of the log sheet for use for each year's records. Each inspection should be recorded on the log sheet for that year by the store manager. The log sheet shall be kept with this manual.

Figures

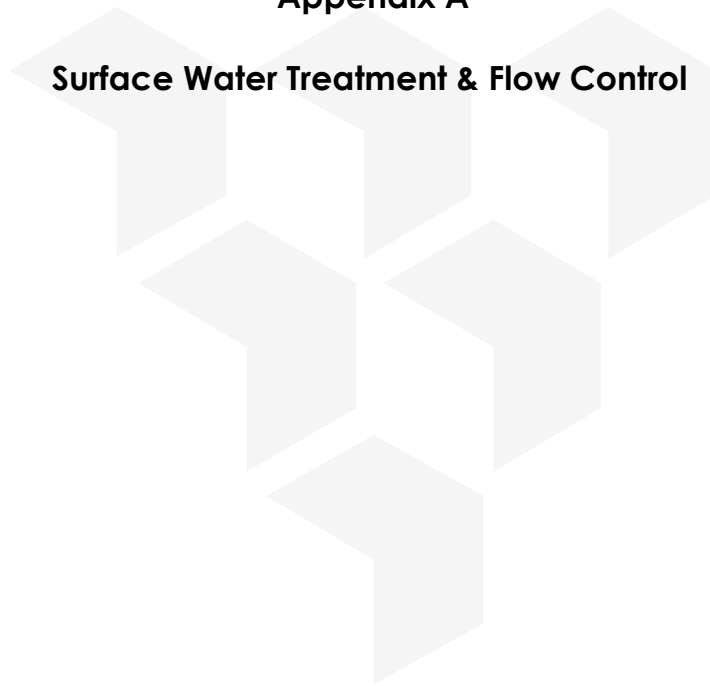


Appendices



Appendix A

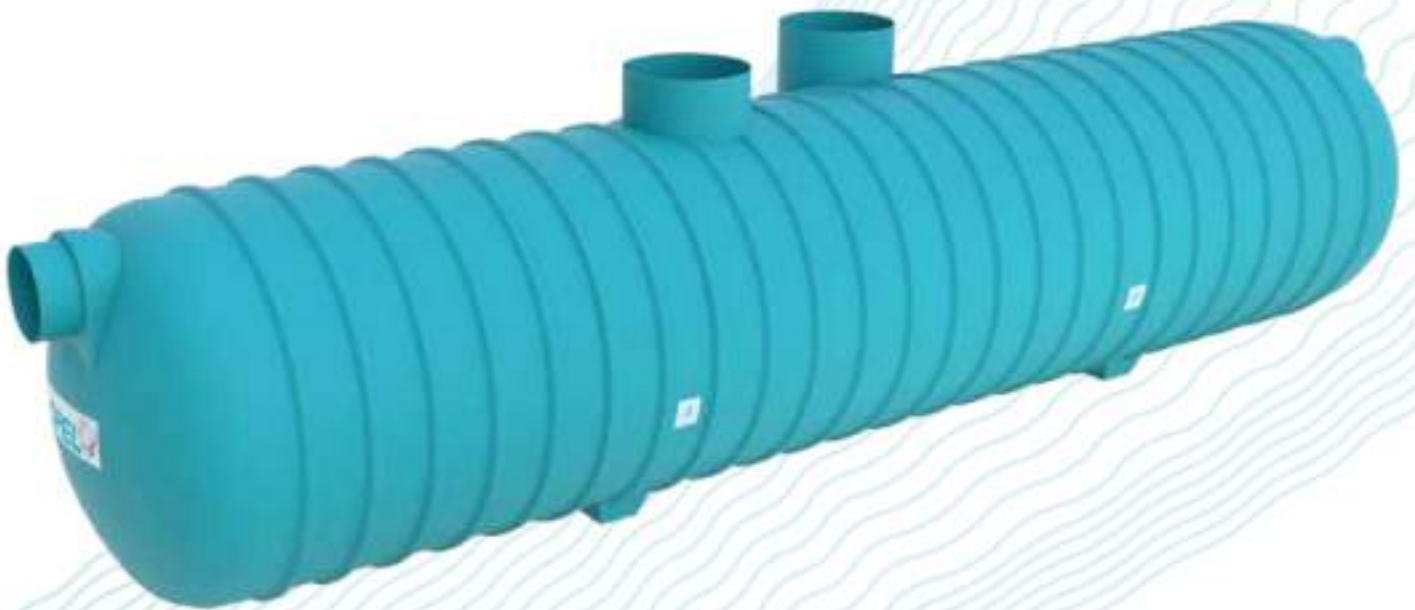
Surface Water Treatment & Flow Control





Quality solutions protecting our global environment

*The **safest answer** for **pollution control** and our **environment***



SPEL Stormceptor

ESR (Enhanced Silt Retention)

SuDS Compliant ESR Range

spelproducts.co.uk

SPEL Stormceptor ESR Range

By-Pass System

The **total** treatment solution for SuDS

The new SPEL ESR System is fully certified to meet the CIRIA SuDS Mitigation Index. It has been tested by WRc (for TSS and Metals) to the British Water Code of Practice for Manufactured Treatment Devices. This unit is also compliant to the British and European Standard BS EN 858.

SPEL's ESR range is a total treatment system removing Hydrocarbons, Total Suspended Solids (TSS) and Metals (particulate). It's a highly efficient, single unit, water quality SuDS component.

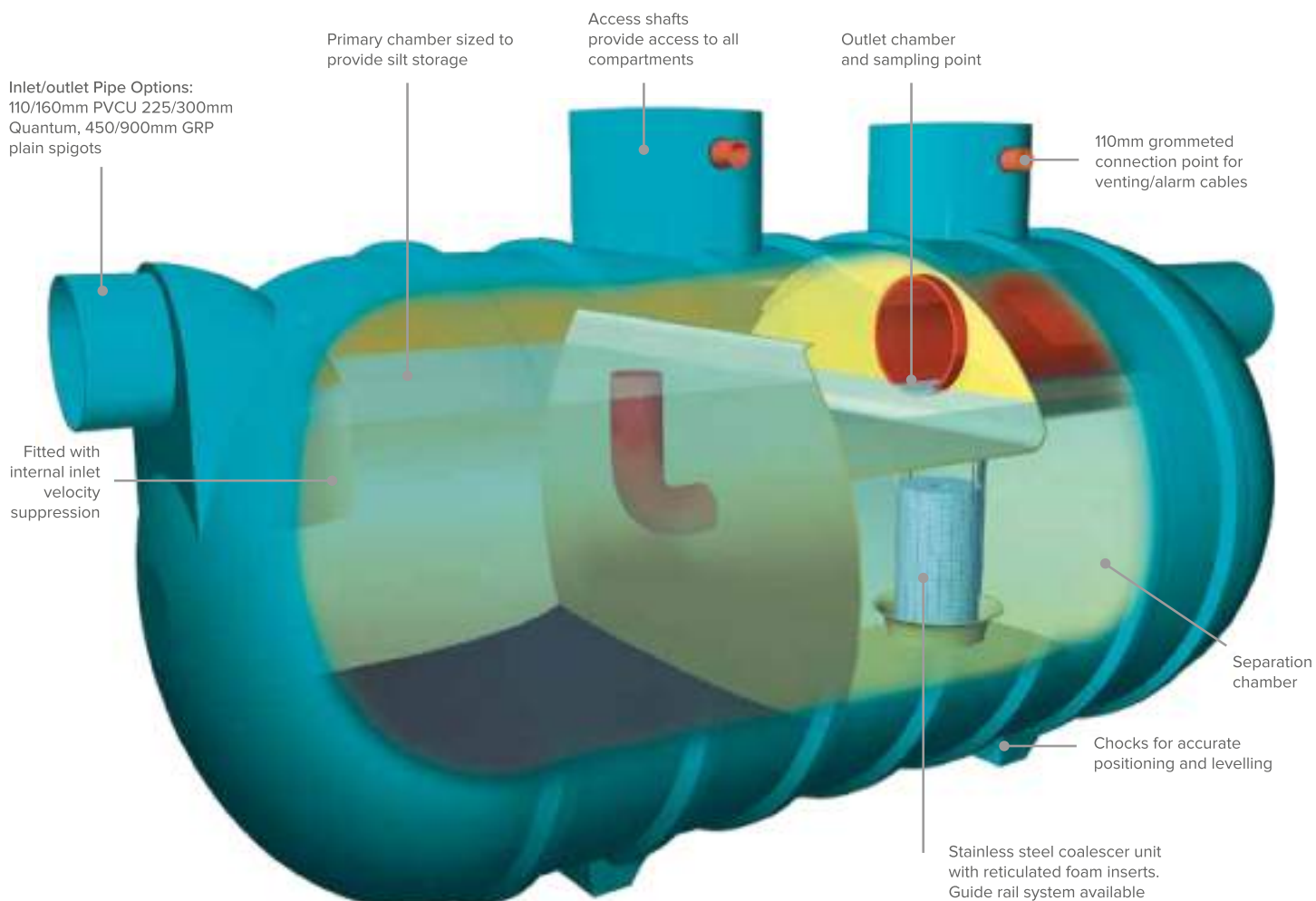
SPEL ESR Stormceptor Certified Mitigation Index

TSS	0.8
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Metals	0.6
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Hydrocarbons	0.9*
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**H R Wallingford test results to BS EN 858*



SPEL Stormceptor ESR Range

By-Pass System

wrc



Surface Water Treatment Device Performance Declaration

Testing carried out according to British Water Code of Practice

Product Details	Description
Manufacturer	SPEL Products
Treatment Device Name/Model	Stormceptor Type 210 C/MSG
General description	Class 1 By-pass Separator with 8lit Capacity
Envisaged application	Treatment of Surface Water Run-off
Pollutant(s) captured	Suspended Solids

Test	Value	Unit
Treatment device capacity	3200	litres
Sediment Storage capacity	1000	litres
Treatment Flow rate	10	l/s
Connected Area	1,333	m ²
Pollution retention flow rate	10	l/s

Parameter	Value	Unit
Maximum capacity flow rate	100	l/s
Device head loss (at treatment flowrate)	0.15	m
Device head loss (at maximum capacity treatment flowrate)	-	m
TSS capture and retention efficiency (Milisil V4 test sediment)	82	%
Zinc capture efficiency (if tested)	Not tested for dissolved metals	%
Zinc retention efficiency (if tested)	Not tested for dissolved metals	%
Copper capture efficiency (if tested)	Not tested for dissolved metals	%
Copper retention efficiency (if tested)	Not tested for dissolved metals	%
Dissolved Metals reduction	0.0	%
Particulate metals reduction*	61.5*	%
Total Metals reduction*	61.5*	%
Total Metals Mitigation Index	0.615*	-

* Extrapolated value in accordance with British Water How to Guide: Applying the CIRIA The SuDS Manual (C753) Simple Index Approach to Proprietary / Manufactured Stormwater Treatment Devices. Version 7, Section 4.3, (2021- under pre-publication review).

Certificates of compliance from WRc and HR Wallingford for the SPEL Stormceptor ESR Range



SPEL's Head of Technical Development alongside the WRc testing officer.

Research and Development

Research and development is at the heart of what we do at SPEL, our passion as Zero Pollution Ambassadors is to be at the cutting edge of clean surface water technology.

Months of rigorous testing has resulted in the new SPEL Stormceptor ESR Range.

Protecting our Environment for Over 45 Years

The SuDS Manual is leading good practise in drainage design, SPEL are endorsing this with the release of the new SPEL Stormceptor ESR range.

Total Suspended Solids (TSS)	Metals	Hydrocarbons
0.8	0.6	0.9*

*H R Wallingford test results to BS EN 858

Added to these class-leading Mitigation Indices, the ESR range benefits from:

- British/European Standard BS EN 858-1 2002 certification.
- The SPEL 25 year shell Warranty.
- 50 year+ life expectancy.
- ISO9001 quality assurance.
- ISO14001 committed to environmental improvement

26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

26.3 Indicative SuDS mitigation indices for discharges to surface waters

Type of SuDS component	Mitigation Indices		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ²	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond ⁴	0.7 ³	0.7	0.5
Wetland	0.8 ³	0.8	0.8
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Tables from The SuDS Manual (C753), p568-569

For reference notes, please see the full manual: https://www.ciria.org/Memberships/The_SuDs_Manual_C753_Chapters.aspx

SPEL Stormceptor ESR Range By-Pass System

ESR Specification Chart

Model	Series	Treated Flow Rate - l/s	Maximum Flow	Catchment area (m²)*	Oil storage (litres)	Silt capacity (litres)	Overall length* (mm) L	Overall diameter (mm)	Inlet Invert (mm) A	Base to Inlet (mm) B	Base to outlet (mm) C	Max in/ out pipe diameter** (mm)	Number of access shafts (dia. mm)			
													600	750	900	1200
210C1/ESR	200	10	100	1,333	150	1,000	2,920	1,225	560	1,350	1,300	300	-	1	-	-
212C1/ESR	200	12	120	1,600	180	1200	3,570	1,225	560	1,350	1,300	300	-	1	-	-
215C1/ESR	200	15	150	2,000	225	1,500	4,237	1,225	560	1,350	1,300	300	-	1	-	-
320C1/ESR	300	20	200	2,665	300	2,000	3,200	1,875	700	1,450	1,350	450	2	-	-	-
325C1/ESR	300	25	250	3,333	375	2,500	3,540	1,875	700	1,450	1,350	450	2	-	-	-
330C1/ESR	300	30	300	4,000	450	3,000	4,420	1,875	700	1,450	1,350	450	-	1	1	-
340C1/ESR	300	40	400	5,333	600	4,000	5,760	1,875	740	1,410	1,310	450	1	1	-	-
345C1/ESR	300	45	450	6,000	675	4,500	6,570	1,875	740	1,410	1,310	450	1	1	-	-
350/C1/ESR	300	50	500	6,665	750	5,000	7,060	1,875	740	1,410	1,310	450	1	1	-	-
460C1/ESR	400	60	600	8,000	900	6,000	4,400	2,700	950	2,100	2,000	600	1	-	1	-
470C1/ESR	400	70	700	9,333	1,050	7,000	5,250	2,700	950	2,100	2,000	600	1	-	1	-
480C1/ESR	400	80	800	10,665	1,200	8,000	6,170	2,700	950	2,100	2,000	600	1	-	1	-
4100C1/ESR	400	100	1000	13,333	1,500	10,000	7,400	2,700	1,100	1,950	1,850	750	1	-	1	-
4125C1/ESR	400	125	1250	16,665	1,875	12,500	9,050	2,700	1,100	1,950	1,850	750	1	-	1	-
4150C1/ESR	400	150	1500	20,000	2,250	15,000	9,950	2,700	1,100	1,950	1,850	750	-	-	2	-
4160C1/ESR	400	160	1600	21,333	2,400	16,000	11,830	2,700	1,250	1,800	1,700	750	1	1	1	-
5180C1/ESR	500	180	1800	24,000	2,700	18,000	7,470	3,650	1,185	2,690	2,550	900	Access shafts dependent on orientation of pipework (see page 7 for orientation options).			
5200C1/ESR	500	200	2000	26,665	3,000	20,000	8,530	3,650	1,185	2,690	2,355	1,200				
5250C1/ESR	500	250	2500	33,333	3,750	25,000	10,040	3,650	1,185	2,690	2,355	1,200				
6300C1/ESR	600	300	3000	40,000	4,500	30,000	10,310	4,150	1,325	2,850	2,675	1,200				
6350C1/ESR	600	350	3500	46,665	5,250	35,000	11,470	4,150	1,325	2,850	2,675	1,200				
6400C1/ESR	600	400	4000	53,333	6,000	40,000	12,690	4,150	1,325	2,850	2,675	1,200				
6500C1/ESR	600	500	5000	66,665	7,500	50,000	15,870	4,150	1,325	2,850	2,675	1,200				
6600C1/ESR	600	600	6000	80,000	9,000	60,000	18,260	4,150	1,325	2,850	2,675	1,200				
6700C1/ESR	600	700	7000	93,333	10,500	70,000	22,250	4,150	2,850	2,850	2,675	1,200				

*These catchment areas are based on the SuDS Manual requirement for By-Pass devices to treat the 1 in 1 year storm event (27mm).

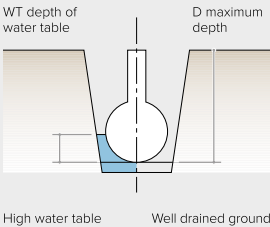
**This dimension is for A-C inlet/outlet options, larger pipe sizes are available for D-I inlet/outlet options.

Tank Shell Specifications

The ‘standard’ specification is normally adequate for most installations but Heavy, Extra Heavy and Special specifications are available depending upon the burial depth and water table level, in winter. The concern is when the system is emptied completely and remains empty for a period of time.

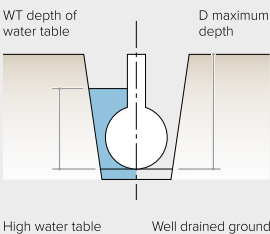
Standard tanks

Series	WT (m)	D (m)
200	1.0	4.0
300	0.9	4.0
400	1.3	5.0
500	1.9	5.7
600	2.4	6.2



Heavy tanks

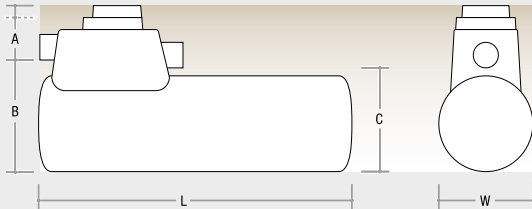
Series	WT (m)	D (m)
200	2.0	6.0
300	2.8	5.6
400	3.5	6.0
500	4.5	7.25
600	4.7	7.3



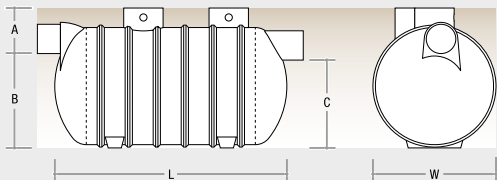
Based on installation in concrete with concrete surround.
For pea gravel surround, see SPEL Data Manual p13.5

- 200 Series ESR** – Inside diameter 1200mm, outside diameter 1225mm.
- 300 series ESR** – Inside diameter 1800mm, outside diameter 1875mm.
- 400 series ESR** – Inside diameter 2600mm, outside diameter 2700mm.
- 500 series ESR** – Inside diameter 3500mm, outside diameter 3650mm.
- 600 series ESR** – Inside diameter 4000mm, outside diameter 4150mm.

200 series



300/400/500 & 600 series



Commissioning, Installation & Maintenance

Installation

SPEL Separators can be installed with a concrete or pea gravel surround, dependent upon ground conditions and water table level. Detailed installation instructions are provided with each unit, see Installation TSII or SPEL Data Manual Section 13.

Site access and conditions

It is the responsibility of the contractor to ensure suitable access to good hard ground that is safe and suitable for off-loading.

Off-loading/handling

The contractor is responsible for off-loading. The tank must be handled with care to prevent accidental damage from impact or contact with sharp objects.

Tanks should be lifted using slings, not chains or wire ropes. Do not drag tanks along the ground for any distance and avoid jarring or bumps. Do not lift with water in the tank.

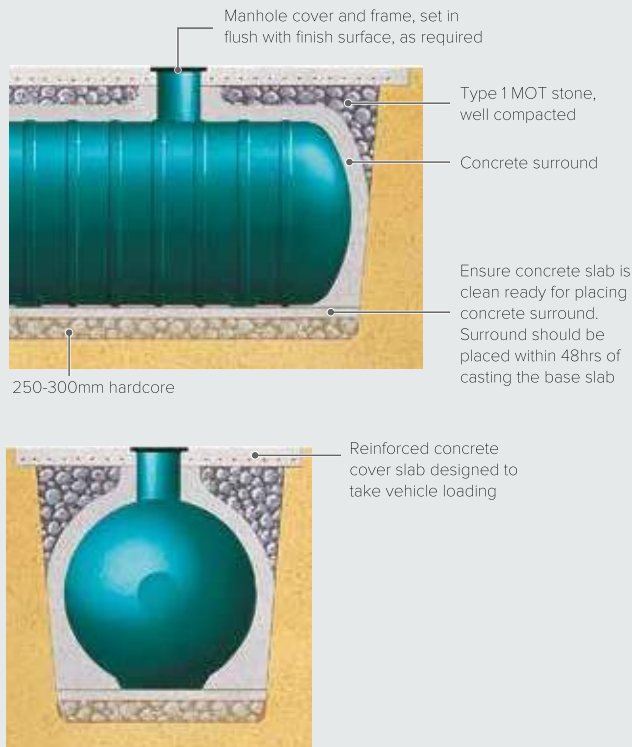
Health and safety

Installation should be carried out by a competent contractor in accordance with Health & Safety at Work legislation and good building practice.

A warning notice should be visible at the top of each access shaft – ‘danger, harmful fumes’ and ‘respirators must be worn in this tank’. Before entering persons must be qualified in accordance with ‘confined space’ requirements.

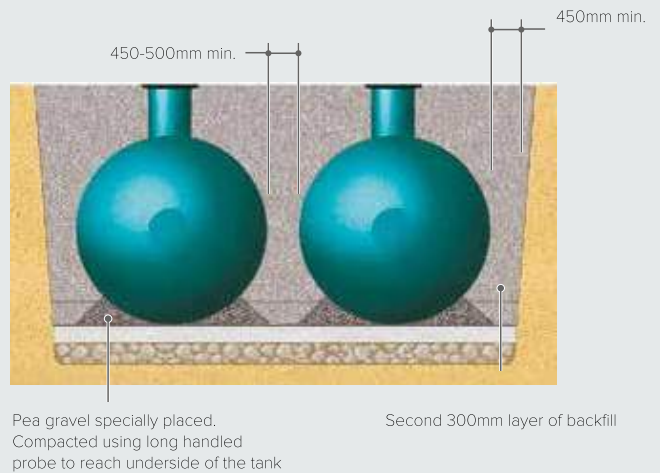
Installation – Concrete

Installation of SPEL Separator tank with chocks and a load bearing cover slab.



Installation – Pea gravel

Installation of SPEL Separator tank where ground over installation is not required to be vehicle load bearing.



Tanks surrounded with pea gravel or similar

Where it is economical to do so, SPEL Separator tanks can be surrounded in pea gravel or with similar free flowing clean rounded aggregate. Details of the installation procedure, approved backfill materials and the need for mechanical anchoring in specific circumstances are contained in the SPEL Data Manual and SPEL Separator Installation Instructions.

Maintenance Requirements

We recommend the SPEL Separator is checked at 3, 6 or 12 monthly intervals to determine the depth of silt in the primary chamber.

The SPEL automatic alarm/monitoring system will automatically warn you when the SPEL Separator requires emptying of light liquids. See ref. 3.10 – 3.19. However, silt will accumulate and require removing at intervals depending on the site conditions.

SPELGuard contracts available.

For more information contact us:

info@spelproducts.co.uk | 01743 445 200



SPELGuard Commissioning & Maintenance

Optional extras

SPEL coalescer unit guide rail systems

To facilitate easy insertion of coalescer units, the SPEL guide rail system manufactured in stainless steel can be incorporated into SPEL Puraceptors and class 1 Stormceptors.

Brackets fixed to the top and bottom of the coalescer unit simply engage the stainless steel guide rail fixed to the top of the stub access shaft. The coalescer unit is then lowered in the normal way, being guided at the correct angle into the conical base.

Lifting chains are available for the larger coalescer units and where extension shafts are fitted.

Extension guide rails can be incorporated into SPEL extension shafts to suit.

SPEL coalescer unit lifting, locating and locking system

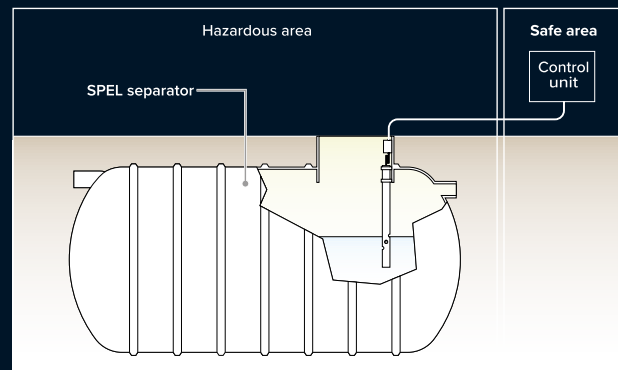
The SPEL lifting, locating and locking system is manufactured in stainless steel and replaces the standard coalescer unit handle.

The locating/locking handle ensures the coalescer unit is seated and locked in its correct position after maintenance.



Above left: Lifting, locating and locking system with guide rail system.

Above right: The SPEL coalescer unit with lifting chain.



SPEL offer a range of alarms, for full details refer to the *SPEL Data Manual Section 3*. Kiosks with beacons and provision for BMS and remote information via browser user interface.

SPEL Model Alarm-DY14400

Oil alarm only – not BMS compatible

SPEL Model IdOil-20

Oil, silt and/or high level alarm with volt free terminal for beacon and BMS capability

SPEL Model IdOil-30

For oil, silt and/or high level as required. This alarm provides a range of options for BMS and remote information to on or off-site monitoring facilities.

SPEL Model IdOil Solar Oil Separator Alarm

for remote off-grid areas.

SPEL extension access shafts

Extension access shafts are available for deep invert applications.



Socket joint stub access shaft with extension shaft.

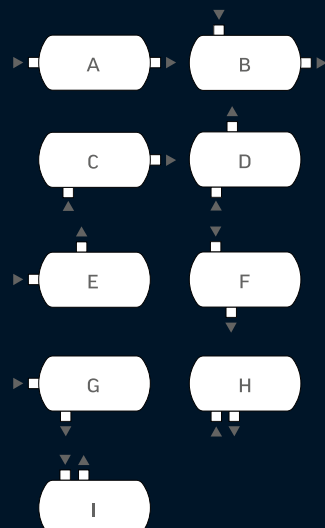
600mm, 750mm, 900mm and 1200mm diameter.

See tripod drawing below for other extension adjustments

Double seal if required

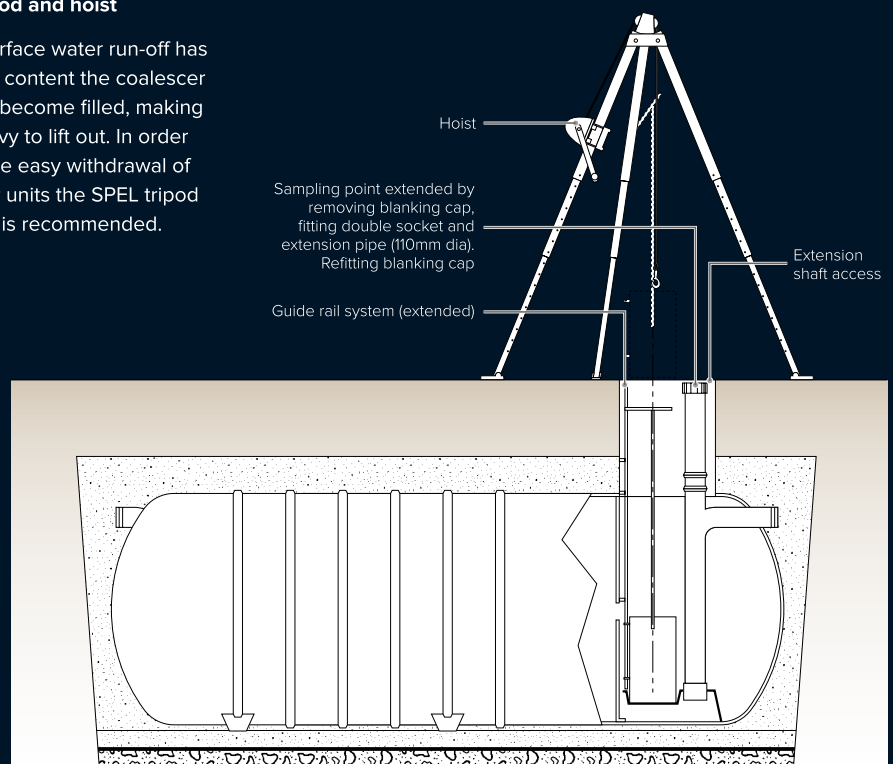
SPEL ESR Range – Inlet/outlet orientation

Dependent upon model and diameter of connections, these nine different orientations are available. However on the larger models it is important to check with our technical department.



SPEL tripod and hoist

Where surface water run-off has a high silt content the coalescer units can become filled, making them heavy to lift out. In order to facilitate easy withdrawal of coalescer units the SPEL tripod and hoist is recommended.



Stormceptor ESR

Enhanced Silt Retention

SPEL's ESR range is a total treatment system removing Hydrocarbons, Total Suspended Solids (TSS) and Metals (particulate). It's a highly efficient, single unit, water quality SuDS component.



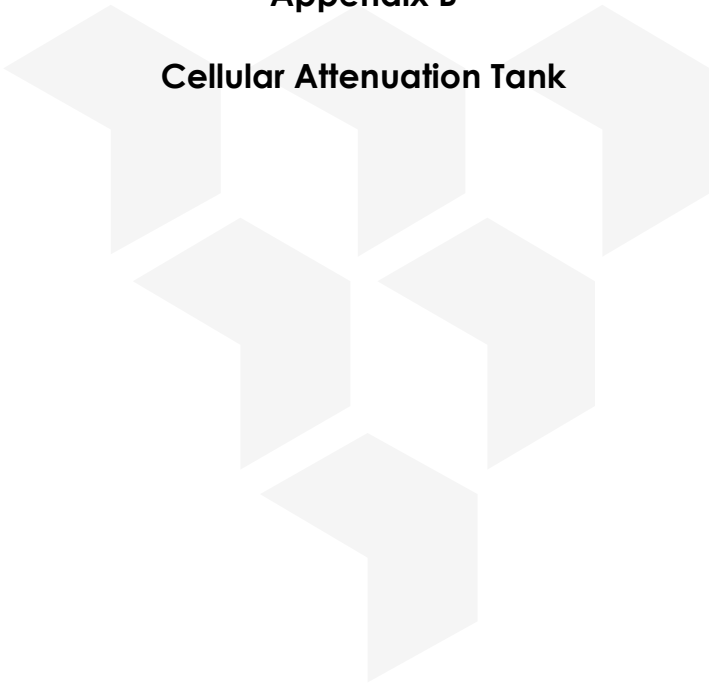
Lancaster Road, Shrewsbury, Shropshire SY1 3NQ

Phone: +44 (0)1743 445200

Email: info@spelproducts.co.uk / sales@spelproducts.co.uk



spelproducts.co.uk



Appendix B

Cellular Attenuation Tank

Wavin UK (Holdings) Ltd

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South Yorkshire S36 4HG
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Agrément Certificate
03/4018
Product Sheet 3

INTESIO ATTENUATION AND INFILTRATION SYSTEMS

AQUACELL PLUS ATTENUATION AND INFILTRATION SYSTEM

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to the AquaCell Plus Attenuation and Infiltration System, which can be used either for sub-surface water storage or as a soakaway to manage run-off from impermeable surfaces.

AGRÉMENT CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.



KEY FACTORS ASSESSED

System design — data is provided in the Certificate to assist in the design of a stormwater management system (see section 5).

Structural performance — the system has adequate strength and stiffness to resist long- and short-term loads when used in accordance with this Certificate (see section 6).

Durability — the system will have a service life in excess of 50 years when installed in accordance with this Certificate (see section 11).

The BBA has awarded this Agrément Certificate to the company named above for the system described herein. The system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Brian Chamberlain
Head of Approvals — Engineering

Greg Cooper
Chief Executive

Date of First issue: 9 June 2010

Certificate amended on 22 July 2010 to clarify annotation in Figure 5.

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Regulations

In the opinion of the BBA, the Aquacell Plus Attenuation and Infiltration System, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



The Building Regulations 2000 (as amended) (England and Wales)

Requirement:	H3(3)	Rainwater drainage
Comment:		The units can be used in a construction to meet this Requirement. See sections 5.1 to 5.10 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The system is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The use of the system satisfies the requirements of this Regulation. See sections 10.1 to 10.6, 11 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards – construction
Standard:	3.6(a)	Surface water drainage
Comment:		The units can be used in a construction to satisfy this Standard, with reference to clauses 3.6.1 ⁽¹⁾ to 3.6.5 ⁽¹⁾⁽²⁾ . See sections 5.1 to 5.10 of this Certificate. (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2000 (as amended)

Regulation:	B2	Fitness of materials and workmanship
Comment:		The system is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	B3(2)	Suitability of certain materials
Comment:		The system is acceptable. See sections 10.1 to 10.6 of this Certificate.
Regulation:	N5	Rain-water drainage
Comment:		The system can be used in a construction to satisfy this Regulation. See sections 5.1 to 5.10 of this Certificate.

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See sections: 2 *Delivery and site handling* (2.3) and 13 *Installation — Procedure* of this Certificate.

Non-regulatory Information

NHBC Standards 2008

In the opinion of the BBA, the use of the AquaCell Plus Attenuation and Infiltration System, in relation to this Certificate, is not subject to the requirements of these standards.

General

This Certificate relates to the AquaCell Plus Attenuation and Infiltration System, consisting of polypropylene units, shear connectors and clips.

The system assembles to form an underground structure which can be used either for sub-surface water storage or as a soakaway to manage run-off from impermeable surfaces.

This Certificate does not cover the collection or disposal of the surface water. Information relating to this can be obtained from the Certificate holder.

Technical Specification

1 Description

1.1 The AquaCell Plus Attenuation and Infiltration System consists of individual, light blue polypropylene modular units (see Table 1), light blue polypropylene end caps, black polypropylene shear connectors and black polypropylene clips (see Figure 1).

Table 1 Characteristics of modular unit

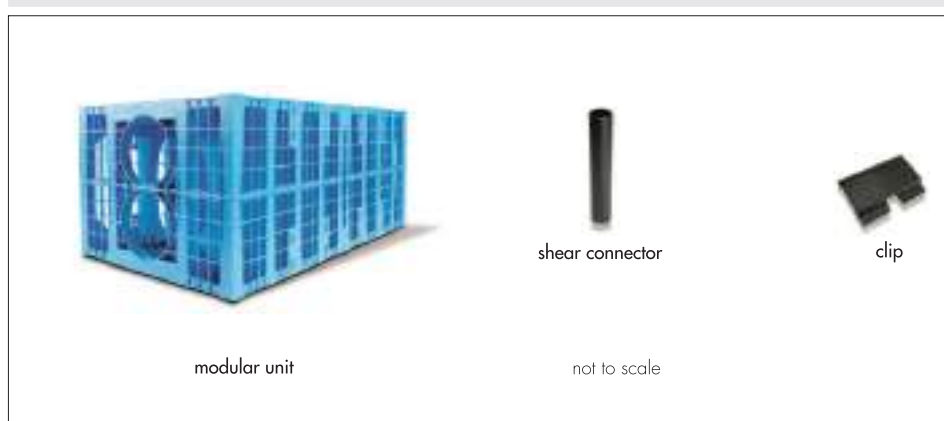
Element (Unit)	Value
Dimensions (nominal) (l x w x h) (mm)	1000 x 500 x 400
Volume (nominal) (m ³)	0.20
Storage volume (nominal) (m ³)	0.19
Porosity (void ratio) (%)	95
Ultimate compressive strength at yield (kN·m ⁻²)	
– vertical loading on top face	650
– lateral loading on side face	85
Short-term deflection (mm per kN·m ⁻²) ⁽¹⁾	
– vertical loading on side face	1 per 74
– lateral loading on side face	1 per 9
Estimated long-term deflection ⁽²⁾ (Ln) ⁽³⁾ (mm)	0.4755

(1) Applied load.

(2) At up to 20 years at 20°C at 232 kN·m⁻² load.

(3) Time in hours.

Figure 1 Components



1.2 The system manages stormwater run-off from impermeable surfaces by:

- infiltration, ie as a soakaway to infiltrate water back into the ground
- attenuation, ie as temporary storage for excess flows and to control outflow to streams and rivers
- a combination of the above methods.

1.3 The polypropylene modular units incorporate a central, open channel which facilitates inspection of the structure by camera, provided a suitable inspection chamber is installed at the end of the channel. They also have pre-formed sockets which enable direct coupling with 160 mm diameter pipework or 150 mm pipework via an adaptor. Connection can also be made at points other than to the pre-formed socket to suitable 150 mm pipework using a flange adaptor. Adaptors and connecting pipework for use with this system are outside the scope of this Certificate.

1.4 Each assembly is wrapped in either a permeable geotextile when used for infiltration or an impermeable geomembrane when used for attenuation. Geotextiles and geomembranes for use with the system are outside the scope of this Certificate. Information on their required specification may be obtained from the Certificate holder.

1.5 Adequate venting must be provided to the structure using an air vent. One 110 mm diameter air vent is required per 7500 m² of impermeable catchment area to be drained. Air vent connections and pipework for use with this system are outside the scope of this Certificate.

2 Delivery and site handling

2.1 The system is supplied to site in packs of 15 units, secured with straps with plastic feet attached to the underside to enable placing and movement by a fork-lift. Each pack of units carries a label bearing the Aquacell type, part number, operator's initials, individual pallet sequential number and date of manufacture.

2.2 Each unit is supplied with two shear connectors and three clips.

2.3 The packs of the units should be carefully placed on level ground and should not be stacked on site. Loose individual modules should not be stored more than two units high.

2.4 The units contain an inhibitor to resist the effects of ultraviolet light for up to six months. However, prolonged exposure to direct sunlight should be avoided.

2.5 Units should not be stored near fuel bowsers, fuel tanks or areas where solvents may be kept.

2.6 The units are resistant to damage that could occur with normal handling. They should be stored away from the possibility of impacts by vehicles and other construction plant.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Aquacell Plus Attenuation and Infiltration System.

Design Considerations

3 General

3.1 The AquaCell Plus Attenuation and Infiltration System design must be in accordance with the Certificate holder's *Stormwater Solutions — Design Manual*. Guidance on the application of sustainable drainage systems (SUDS) for new developments, such as the AquaCell Plus Attenuation and Infiltration System, can also be found in the Communities and Local Government Planning Policy Statement PPS25 *Development and Flood Risk* and *The SUDS Manual C697* published by the Construction Industry Research and Information Association (CIRIA).

3.2 The system can be used for the control of stormwater run-off from impermeable surfaces in three main ways:

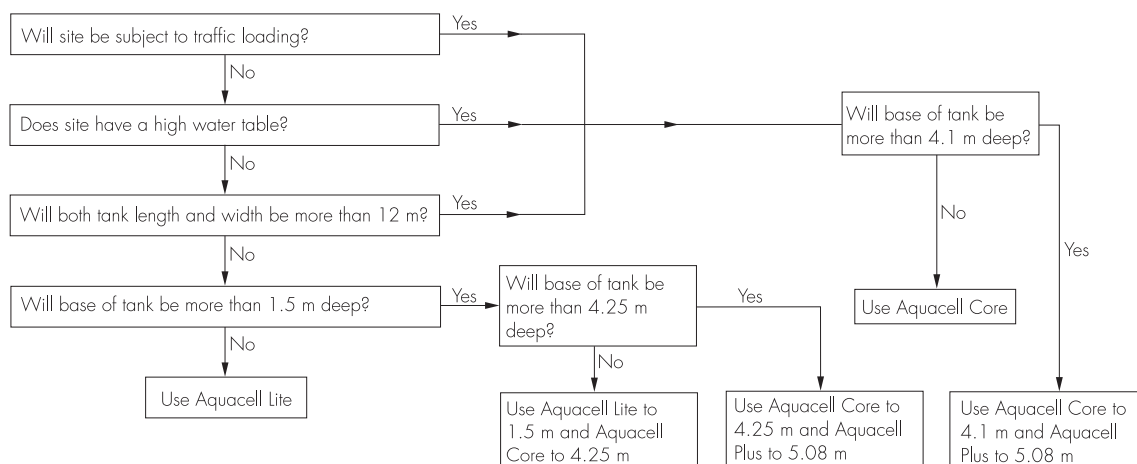
- Infiltration — water is collected in the units during rainfall and allowed to drain away by soaking into the surrounding ground over a period of time
- Attenuation — water is collected in the units during rainfall and released at a reduced flow rate through a flow control device into an appropriate outfall. This reduces peak flows in the watercourse, thereby minimising the risk of flooding
- Combined — a combination of the above two systems.

3.3 Design of the appropriate system (see Figure 2 and Table 2) for a specific project must always be preceded by a detailed audit of the proposed site to establish:

- existing factors and considerations applicable to the site
- predicted factors relating to the site's use following the planned development, and the parameters within which the installation is required to function
- the type of function of application suggested by this audit.

3.4 Once the project criteria have been established from the site audit, there are two main parts to the design procedure: hydraulic design and structural design.

Figure 2 Aquacell unit selection flowchart^{(1) (2)}



(1) This Certificate covers Aquacell Core units only — the validity of Certificates covering other Aquacell units can be checked on the BBA website: www.bbacerts.co.uk.

(2) Maximum burial depths assume ideal soil conditions and should be verified by site investigations (see section 6 of this Certificate for information relating to structural design). Maximum burial depths for a variety of soil types are given in Table 9.

Table 2 Design information checklist

Description	Information source
A Existing factors	
Topography	Site survey or inspection
Area of catchment ⁽¹⁾	Site survey
Hydrology of catchment	Site inspection and observations
Soil type ⁽¹⁾	Site investigation
Structural properties of soil – CBR, stiffness	Site investigation and laboratory testing
Infiltration potential of soil	Site investigation
Contamination ⁽¹⁾	Site investigation and desk research
Details of receiving water, watercourse/ aquifer	Environment Agency, Scottish Environment Protection Agency or water and sewerage company
Environmental sensitivity of site	Environment Agency, Scottish Environment Protection Agency or water and sewerage company
Groundwater vulnerability and source protection status	Environment Agency, Scottish Environment Protection Agency or water and sewerage company
B Predicted factors	
Development type and land use	Proposed development plans
Traffic loads	Proposed development plans
Rainfall data ⁽¹⁾	Meteorological Office or Wallingford procedure
Discharge design criteria – quantity	Environment Agency, Scottish Environment Protection Agency or water and sewerage company
– quality	Environment Agency, Scottish Environment
Health and safety	Protection Agency or water and sewerage company All affected parties.
C Planned function	
Infiltration	Conclusions from A and B audit/review
Attenuation	Conclusions from A and B audit/review.

(1) For individual house soakaways, only the items referenced for this footnote are required.

4 Practicability of installation

The system is designed to be installed by a competent general builder or contractor with experience of this type of system.

5 System design

Infiltration

Calculation principles

 5.1 There are two approaches, either of which may be adopted, ie the Construction Industry Research and Information Association (CIRIA) Report 156 *Infiltration Drainage — Manual of Good Practice* or BRE Digest 365 *Soakaway Design*.

5.2 A simplified approximate approach can be used on a very small site (ie a single-house development) where detailed site infiltration rate information may not be required nor available (see Table 3). From Approved Document H of the England and Wales Building Regulations, for areas up to 25 m², a storage volume equal to the area to be drained multiplied by 10 mm may be used. Beyond this size, design should be carried out in accordance with BS EN 752 : 2008 or BRE Digest 365. It is suggested in BS EN 752 : 2008 that a storage volume equal to 20 mm multiplied by the area to be drained may be used. In Scotland, guidance for the design of single-house soakaways is given in Mandatory Standard 3.6, clause 3.6.5⁽¹⁾.

(1) Technical Handbook (Domestic).

Table 3 Design parameters for single-house roof soakaway

Number of units	Storage volume (m ³)	Maximum area to be drained (m ²)
1	0.19	19 ⁽¹⁾
2	0.38	25 ⁽¹⁾
3	0.57	28.5 ⁽²⁾
4	0.76	38 ⁽²⁾
5	0.95	47.5 ⁽²⁾
10	1.90	95 ⁽²⁾

(1) In accordance with Approved Document H.

(2) In accordance with BS EN 752 : 2008, clause NA 4.4.8.

5.3 When the BRE or CIRIA approach is used, the design volumes and areas for trench or cuboid type installations can be found in Tables 4 and 5.

Table 4 Volumetric data per linear metre for a one-unit (0.5 m) wide trench configuration

Number of units high	Volume (m ³)	Side area (m ²)	Base area (m ²)
1	0.19	0.8	0.5
2	0.38	1.6	0.5
3	0.57	2.4	0.5

Table 5 Volumetric data for 3D usage two units high

No of units long (1 m side)	2 wide (0.5 m side)			4 wide (0.5 m side)			8 wide (0.5 m side)		
	Vol (m ³)	Side (m ²)	Base (m ²)	Vol (m ³)	Side (m ²)	Base (m ²)	Vol (m ³)	Side (m ²)	Base (m ²)
1	0.76	3.20	1.00	1.52	4.80	2.00	3.04	8.00	4.00
2	1.52	4.80	2.00	3.04	6.40	4.00	6.08	9.60	8.00
4	3.04	8.00	4.00	6.08	9.60	8.00	12.16	12.80	16.00
8	6.08	14.40	8.00	12.16	16.00	16.00	24.32	19.20	32.00
10	7.60	17.60	10.00	15.20	19.20	20.00	30.40	22.40	40.00
100	76.00	161.60	100.00	152.00	163.20	200.00	304.00	166.40	400.00

5.4 For calculations, the size and volume of the units are given in Table 1. The total areas of the base and sides are required as water is absorbed through the geotextile soil interface. Storage volume is 95% of the total volume. As an example, using Table 4, for a typical linear trench 40 m long and two units deep, the volume is 0.38 by 40 = 15.2 m³ and the side area 1.6 by 40 = 64 m².

Attenuation

Calculation principles

5.5 The anticipated run-off volume (A) from the site must be estimated. The most commonly used method for evaluating storm rainfall events in the UK is the Wallingford Procedure by which the total rainfall level of storms over defined time periods ranging from five minutes up to 48 hours are assessed. The depth of water (mm) found can be multiplied by the catchment area to assess the size of attenuation systems and is normally based upon a two-hour storm of a return period appropriate for the catchment. The allowable discharge rate from the site to an appropriate outfall is established but will normally be set by the Environment Agency or Planning Authorities. The outflow volume (B) to be discharged at this rate over the two-hour period is calculated and subtracted from the run-off volume (A – B). This defines the excess volume (C) to be stored in AquaCell Plus units constructed as an underground tank. The number of AquaCell Plus units needed to contain this excess is calculated on the basis that the storage volume is equal to 95% of the total volume of the tank.

Connection

5.6 Connection is made to AquaCell Plus units using a pre-formed socket and adaptor or a flange adaptor. These items are outside the scope of this Certificate. Information can be found in the Certificate holder's *Stormwater Solutions – Design Manual*.

5.7 It is recommended that all connections into storage applications (using a geomembrane) are made using a flange adaptor. Adhesive or double-sided tape should be used between the geomembrane and flange adaptor to ensure a watertight seal.

Manifold design

5.8 The capacity of this input pipe is limited and may be insufficient for the anticipated flow load. Therefore, the flow load may be split between a number of 150 mm diameter flow pipes or other connection arrangements used (see Figure 3). The maximum areas that can be drained according to the number of input pipes provided is given in Table 6. The calculations are based on:

- paved surfaces — two-year, three- to five-minute event
- eaves drained roofs — one-year, two-minute event
- internal gutters — 500-year, two-minute event.

Figure 3 Typical inlet connection designs

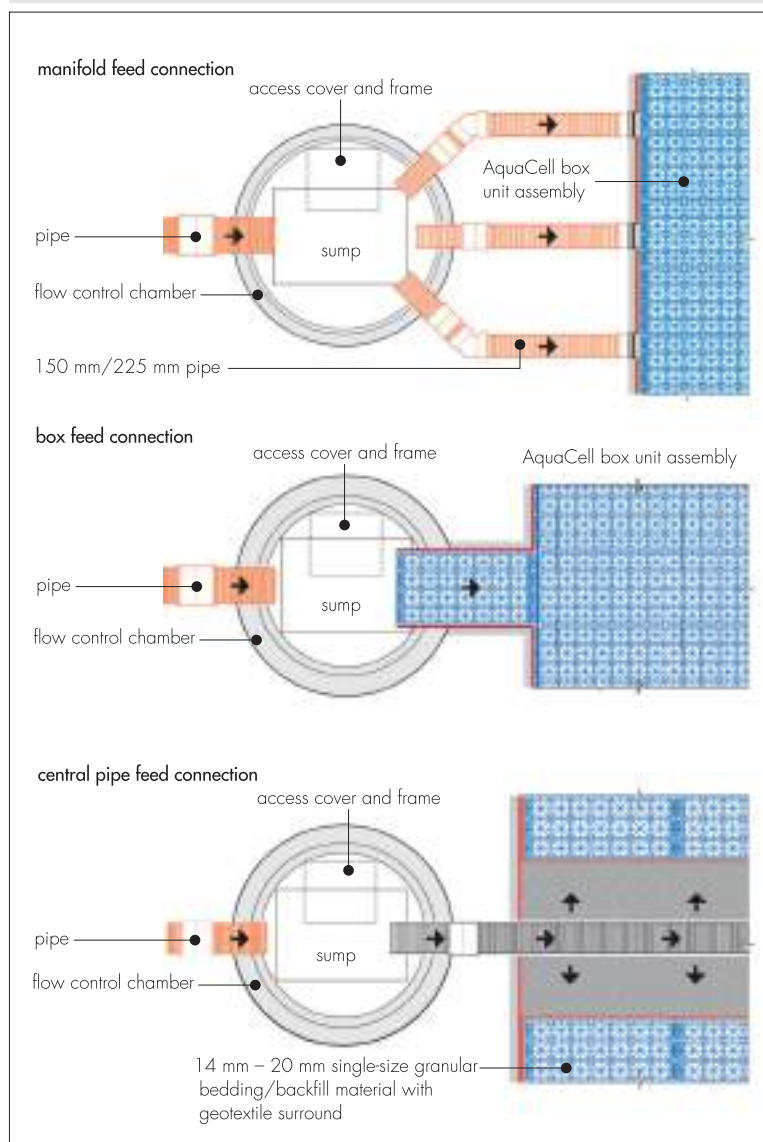


Table 6 Multiple manifolds

Surface type	Drainage area (m ²)					
	Number of inlet pipes					
	1	2	3	4	5	6
Paved area	1110	2220	3330	4440	5550	6660
Roof area ⁽¹⁾	841	1682	2523	3364	4205	5046
Roof area ⁽²⁾	210	420	630	840	1050	1260

(1) Roofs drained by eaves gutters, close to the attenuation site (within 25 m).

(2) Roofs drained by internal gutters, close to the attenuation site (within 25 m) (especially siphonic roof drainage).

Flow control

5.9 The outflow from the tank must be controlled to comply with the discharge rate consent of the site. There are four main methods to achieve outflow control, ie orifice plate, Garastor, vortex control or small pipe. Comparative features and benefits of these various flow control devices should be considered prior to selection. These devices are outside the scope of this Certificate.

Outflow positioning and head calculations

5.10 The invert level of the outflow pipe should be flush with, or lower than, the bottom of the lowest unit to allow the tank to drain. As the tank fills, a depth of water develops on the upstream side of the outflow control. For a tank with two layers of AquaCell Plus units, this depth is 0.8 m when the units are full, creating a driving head to push the flow through the control device. For design purposes, the head used in calculations is taken as that at the centre line of the outflow device.

6 Structural performance

6.1 AquaCell Plus units can be placed under a wide variety of landscaped or lightly-trafficked areas. Design procedures for heavily-trafficked applications are outside the scope of this Certificate. If the proposed application is in areas subject to high-intensity traffic, commercial vehicles or other heavy loads, the advice of the Certificate holder should be sought.

6.2 The short-term ultimate compressive strength at yield for the AquaCell Plus units, as derived from independent test data, is $650 \text{ kN}\cdot\text{m}^{-2}$ for vertical loading on the top face and $85 \text{ kN}\cdot\text{m}^{-2}$ for lateral loading on the side face. A partial safety factor for materials (f_m) of 2.75 for ultimate limit state and 1.5 for serviceability limit state should be applied to these values for a design life of 20 years. The short- and long-term deflections are given in Table 1.

6.3 Creep tests indicate that the long-term deflection may be estimated from the following expression. This is valid for loads up to $232 \text{ kN}\cdot\text{m}^{-2}$ for durations of up to 20 years at 20°C . In locations where settlement is not a concern, designs of up to 50 years can be considered:

$$\text{deflection (mm)} = 0.4755 \ln(\text{time in hours}) + 2.0477$$

6.4 For a small-scale application such as soakaways for individual house roof drainage, the AquaCell Plus system is typically located below a garden a minimum of 5 m from the building (see Table 7). In this case there are no traffic loads.

Table 7 Design criteria for use of AquaCell Plus system as soakaway for individual house

Criterion	Value
Maximum depth to base of units ⁽¹⁾ (m)	3.55
Minimum depth of cover required over units to prevent accidental damage (m)	0.50

(1) Assumes a minimum value for the angle of shearing resistance of the surrounding soil of 29° . This should be confirmed from the results of the site investigation. Groundwater must be at least one metre below base of units.

6.5 AquaCell Plus units used for large-scale storage or infiltration must be designed to carry all loads that will be applied, including dead and imposed loads. Design parameters and estimated loads should be used to determine the maximum depth of installation and the maximum and minimum cover depths.

6.6 The criteria provided in Tables 8 and 9 can be used to design the AquaCell Plus units for installation below lightly- and non-trafficked areas. These design tables are only applicable in temperate climate conditions such as those in the UK. The partial safety factors for loads that have been applied are given in Table 10. Partial safety factors for materials (f_m) of 2.75 for ultimate limit state and 1.5 for serviceability limit state have been applied. The AquaCell Plus system can be used for areas where greater loads are anticipated but these applications are outside the scope of this Certificate and specific advice should be sought from the Certificate holder.

Table 8 Maximum installation depths (to base of units)

ϕ ⁽¹⁾⁽²⁾	Maximum depth of installation (to base of unit) (m)		
	Non-trafficked area	Trafficked area	
		Cars ⁽³⁾	HGV
24	2.96	2.65	2.35
26	3.18	2.88	2.57
28	3.42	3.12	2.82
30	3.69	3.39	3.08
32	3.98	3.68	3.38
34	4.31	4.01	3.71
36	4.68	4.38	4.07
38	5.08	4.78	4.48

(1) Loosening of dense sand or softening of clay by water can occur during installation. The designer should allow for any such likely effects when choosing an appropriate value of ϕ .

(2) The design is very sensitive to small changes in the assumed value of ϕ , therefore, it should be confirmed by a chartered geotechnical engineer. In clay soils, it may be possible to utilise cohesion in some cases.

(3) Applicable for car parks or similar areas trafficked only by slow moving vehicles. Assumptions made are:

- ground surface is horizontal
- shear planes or other weaknesses are not present within the structure of the soil.

Table 9 Minimum cover depths over top of AquaCell Plus units⁽¹⁾

Design load case	Minimum cover depth ⁽¹⁾ (m)
DIN 3/3 loading (cars up to 3000 kg GVW)	0.50
DIN 9/9 loading (vehicles up to 9000 kg GVW)	0.75
DIN 60/30 loading (vehicles up to 60000 kg GVW)	1.10 ⁽²⁾

(1) The minimum cover depths have been assessed using the characteristic parameters for the AquaCell Plus and the guidance in CIRIA Report C680.

(2) This is less than the limiting value in CIRIA C680, but is acceptable based on the calculations.

Table 10 Partial safety factors for loads used for design

Description	Symbol	Ultimate limit state	Serviceability limit state
Vertical dead load	f_{dl}	1.40	1.00
Earth pressure (horizontal) dead load	f_{ep}	1.40	1.00
Imposed live load	f_{ll}	1.60	1.00

6.7 For lightly-loaded applications, the bearing capacity of the underlying soils, typically, should not be exceeded by the AquaCell Plus System. Therefore, settlement of the underlying soils should be negligible. On weak or compressible soils, the bearing capacity and settlement characteristics should be confirmed by a geotechnical engineer.

6.8 Care should be taken when the AquaCell Plus system is used for infiltration below trafficked areas and close to structures. It is important to ensure that the infiltrating water will not soften the soils or cause loss of fines and settlement.

6.9 When the units are wrapped in an impermeable geomembrane and placed below the groundwater table, flotation may occur. To prevent this, the weight of the soil over the top of the units must be greater than the uplift force caused by the unit's buoyancy in the water. This can be achieved with most types of fill if the depth of cover fill is equal to, or greater than, the depth of penetration of the units below groundwater level.

7 Geotextiles and geomembranes

7.1 In infiltration applications, the geotextile wrapped around the AquaCell Plus system prevents soil entering the units and stops the soil which surrounds the unit becoming clogged with silt present in run-off. In attenuation/storage applications, the geotextile serves to protect the geomembrane.

7.2 The selection of an appropriate geotextile for a specific AquaCell Plus infiltration installation should be considered carefully, with particular reference to the surrounding soil properties and required performance. Points to consider are:

- the pore size should be designed and specified to assist infiltration and prevent migration of fine soil particles
- the permeability and breakthrough head should not limit the flow of water in the system, and should be similar to or greater than the surrounding materials
- the material must be able to resist the punching stresses caused by loading on sharp points of contact
- its strength should be sufficient to resist the imposed forces (eg from traffic).

7.3 The geotextile should be selected according to specific site conditions. However, typically, a 300 g non-woven material will be suitable for most situations. Specialist advice should be sought if surrounding soil characteristics exhibit a high degree of fines/low infiltration capacity and/or there is risk of damage from ground contaminants.

7.4 In attenuation/storage applications where infiltration is not possible or permitted, an impermeable geomembrane is wrapped around the AquaCell Plus system to prevent release of attenuated/stored water into surrounding ground and to prevent inflow of pollutants from contaminated subsoil into the storage reservoir.

7.5 The specification and selection of the impermeable geomembrane must be correct for the installation envisaged, to ensure it performs to the level required. It is essential that the specified material:

- withstands the rigours of installation
- resists puncture
- resists multi-axial elongation stress and strains associated with settlement
- resists environmental stress cracking
- resists damage from ground contaminants
- remains intact for the full design life.

7.6 Geomembranes less than 1 mm thick are unlikely to meet these criteria⁽¹⁾, and are not recommended for use with the AquaCell Plus system⁽²⁾. A specification for a typical polypropylene geomembrane is shown in Table 11.

(1) Except in shallow, domestic installations.

(2) Further details can be obtained from the Certificate holder.

Table 11 Typical specification for a polypropylene geomembrane

Property	Value	Test method
Thickness $\pm 10\%$ (mm)	1.0	ASTM D 751
Density (minimum) ($\text{g}\cdot\text{cm}^{-3}$)	0.9	ASTM D 792
Tensile stress at break (min) ($\text{N}\cdot\text{mm}^{-2}$)	18	ASTM D 638
Elongation at break (%)	>700	ASTM D 638
Puncture resistance (min) (N)	150	FTMS 101C, Method 2065
Tear resistance (min) (N)	60	ASTM D 1004
Dimensional stability (max) (% change)	± 2.0	ASTM D 1204, 1 h at 100°C
Stress crack resistance (%)	100	ASTM D 5397
Volatile loss, 5% loss (max)	0.2	ASTM D 1203
Ozone resistance	No cracks	ASTM D 1149
Carbon black content (%)	2 to 3	ASTM D 1603
Moisture vapour ($\text{g}\cdot\text{m}^{-2}\cdot\text{day}^{-1}$)	<0.1	ASTM E 96
Friction angle (non-woven geotextile)	21°	Shear box
Methane permeability ($\text{g}\cdot\text{m}^{-2}\cdot\text{day}^{-1}\cdot\text{atm}^{-1}$)	0.11	European Standard
Methane transmission rate ($\text{m}^3\cdot\text{m}^{-2}\cdot\text{s}^{-1}\cdot\text{atm}^{-1}$)	0.8×10^{-9}	BRE
Permeability coefficient	1.8×10^{-12}	
Application temperature ($^\circ\text{C}$)	>4	

7.7 To ensure total impermeability, joints between adjacent sheets of impermeable geomembranes should be sealed correctly using proprietary welding techniques. The integrity of joints should be demonstrated by non-destructive testing⁽¹⁾.

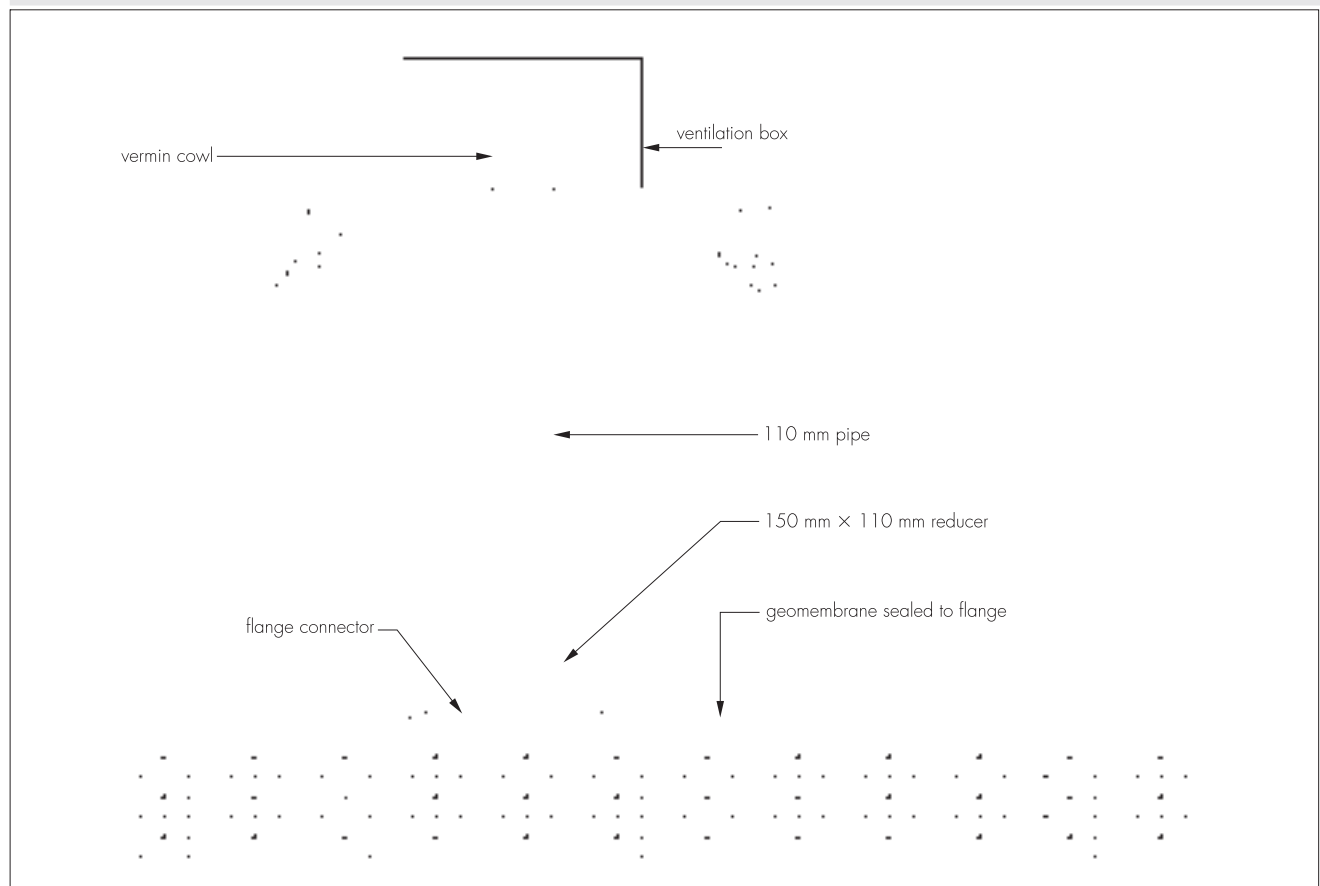
(1) Advice on seam testing is given in CIRIA SP124 *Barriers, liners and cover systems for containment and control of land contamination*.

8 Venting

8.1 Adequate venting must be provided to the AquaCell Plus structure. One 110 mm diameter air vent is required per 7500 m² of impermeable catchment area to be drained (see Figure 4).

8.2 Typical air vent connectors and pipework can be seen in the Certificate holder's *Intesio Stormwater Solutions – Design Manual*. It is recommended that all air vent installations in attenuation/storage applications (using an impermeable geomembrane) are made using a flange adaptor. Adhesive or double-sided tape should be used between the geomembrane and flange adaptor to ensure a watertight seal.

Figure 4 Typical air vent system



9 Resistance to chemicals

9.1 An assessment by the BBA indicates that the components of the system are suitable for use in contact with the chemicals likely to be found in rainwater.

9.2 An assessment of the suitability for use of AquaCell Plus units on brownfield sites should be made only after a suitable site investigation to determine the possibility for chemical attack. Particular care must be taken where acids and organic solvents are present at high concentrations. Further information can be obtained from the Certificate holder.

10 Maintenance

10.1 The customer is responsible for maintenance. Recommendations for maintenance of SUDS systems are given in CIRIA C697.

10.2 For soakaways to individual houses, the only necessary maintenance is to keep gullies clear of debris such as leaves.

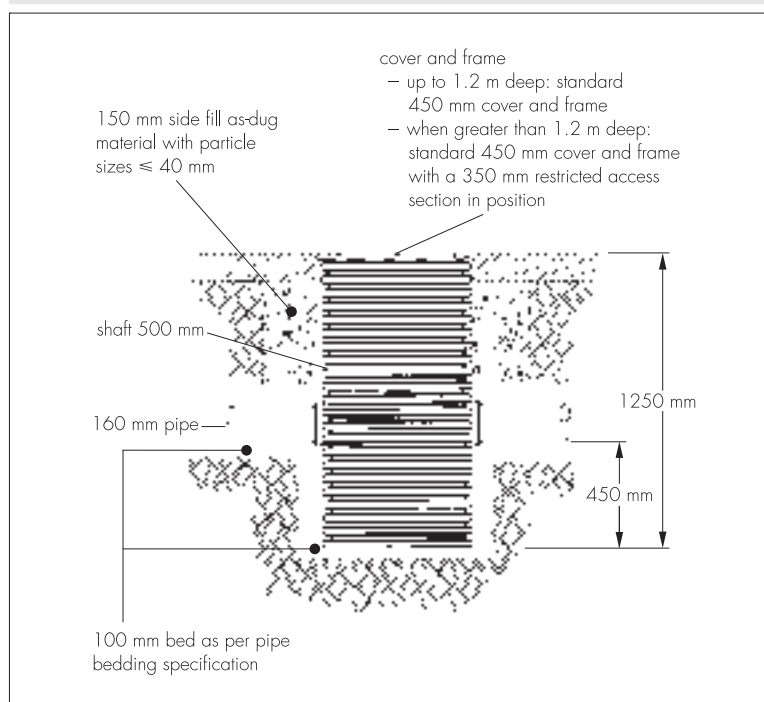
10.3 For large installations or where the receiving waters are environmentally sensitive, a system of regular inspections should be established to prevent the accumulation of silt in the system which, if allowed to develop, would reduce effectiveness. They should also be inspected after every major storm event. It is recommended that a minimum of three inspection tunnels are included, positioned at the inlet or centre line of the tank and at the edges of the structure.

10.4 It is recommended that a silt trap is incorporated into the pipework at the inlet to the tank (see Figure 5). There must be a maintenance plan that ensures regular cleaning of the trap to ensure correct performance. Silt traps for use with this system are outside the scope of this Certificate.

10.5 For all flow control devices it is sensible to incorporate access (via a manhole or similar) to the location of the pipe entry, orifice or vortex control. This will enable easy removal of any blockage. The orifice itself may be protected by a debris screen.

10.6 Paved surface areas above an installation should be inspected at the same time to ensure the units continue to provide the required structural support.

Figure 5 Typical silt trap



11 Durability

The structural properties of polypropylene used in the components of the system will deteriorate with time and should be taken into account at the design stage by the application of suitable safety factors. In the opinion of the BBA, the AquaCell Plus Attenuation and Infiltration System, when used in accordance with this Certificate, will have a life in excess of 50 years.

12 General

The system should be installed in accordance with the Certificate holder's *Stormwater Solutions — Design Manual*.

13 Procedure

13.1 The hole or trench is excavated to the required depth, dimensions and levels. It must be ensured that the plan area is sufficient to allow plant access around sides to compact backfill material (300 mm minimum). The base must be smooth and level without sharp drops or humps. Slopes must be cut to a safe angle or adequately supported and safe access must be provided to allow personnel to enter the excavation.

13.2 The base must be inspected for soft spots in the formation – any present must be excavated and replaced with compacted granular fill material.

13.3 A 100 mm thick, bedding layer of coarse sand is laid on the base and sides of the excavation. If required in attenuation systems, a layer of geotextile is laid to protect the impermeable geomembrane.

13.4 The impermeable geomembrane (or geotextile, if in an infiltration system) is laid over the sand bedding layer and up the sides of the excavation. The impermeable geomembrane is inspected for damage and all welds are tested as required. Joints between adjacent sheets of impermeable membrane should be sealed correctly using proprietary techniques with a minimum lap of 50 mm. Jointing with tape is not recommended as the system then becomes reliant on the mechanical properties of the tape to maintain its integrity.

13.5 The AquaCell Plus units are installed in accordance with the installation schedule for correct orientation. Wherever possible, continuous vertical joints should be avoided. The units are arranged so that pre-formed sockets are in the correct alignment for inlet and outlet pipes. For single-layer applications, Wavin clips are used and, for multi-layers, Wavin clips and shear connectors are used. Units at the end of the structure should be fitted with end caps unless positioned in a row that will be used for inspection.

13.6 The geotextile or impermeable geomembrane encapsulation to base, sides and top of installation, including protective geotextile (if required to protect the geomembrane) is completed. Impermeable geomembranes should be welded with double seams. All welds should be tested as required and the membrane inspected for damage.

13.7 Drainage connections are made to the installation using proprietary adaptors. Pre-formed socket positions for pipe connections must be located at the correct position for receiving pipework. Alternatively, flange adaptors are used attached to AquaCell Plus units with adhesive tape and self-tapping screws (flange adaptors cannot be used at the invert of AquaCell Plus units into the pre-formed socket). It is recommended that all connections and air vent installations, in attenuation/storage applications, are made with a flange adaptor, using adhesive or double-sided tape to form a seal. Alternatively, drainage connections are sealed into a pre-formed socket using proprietary seals approved by the geomembrane manufacturer.

13.8 The installation is backfilled with Type 1 or 2 sub-base or Class 6P (side fill only) selected granular material in accordance with the *Manual of Contract Documents for Highway Works (MCHW)*, Volume 1. The backfill is compacted in 150 mm thick layers.

13.9 A coarse sand protection layer, 100 mm thick, should be placed over the top of the units that have been wrapped. Backfilling is continued with:

- trafficked areas (eg car parks) — Type 1 or 2 sub-base material compacted in 150 mm layers in accordance with the MCHW, Volume 1. Compaction plant over the top of the system must not exceed 2300 kg per metre width
- landscaped and non-trafficked areas — selected as-dug material, with size of pieces less than 75 mm, compacted to 90% maximum dry density. Compaction plant over the top of the system must not exceed 2300 kg per metre width.

13.10 Pavement construction or landscaping over the AquaCell Plus system is completed.

Technical Investigations

14 Tests

Tests were carried out on the system to determine:

- long- and short-term resistance to loading
- performance and durability of geosynthetics
- volumetric capacity and discharge rate.

15 Investigations

15.1 The manufacturing process was examined, including the method adopted for quality control, and details obtained on the quality and composition of the material used.

15.2 An assessment of the system was made in relation to material properties and design procedures.

15.3 A site visit was made to assess the practicability and ease of installation and connection.

Bibliography

- BS EN 752 : 2008 *Drain and sewer systems outside buildings*
- ASTM D 638 : 2002 *Test Method for Tensile Properties of Plastics*
- ASTM D 751 : 2000 *Standard Test Methods for Coated Fabrics*
- ASTM D 792 : 2000 *Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement*
- ASTM D 1004 : 1994 *Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting*
- ASTM D 1149 : 1999 *Standard Test Method for Rubber Deterioration — Surface Ozone Cracking in a Chamber*
- ASTM D 1203 : 1994 *Standard Test Methods for Volatile Loss From Plastics Using Activated Carbon Methods*
- ASTM D 1204 : 1994 *Standard Test Methods for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperatures*
- ASTM D 1603 : 2001 *Test Method for Carbon Black in Olefin Plastics*
- ASTM D 5397 : 1999 *Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test*
- ASTM E 96 : 2000 *Standard Test Methods for Water Vapor Transmission of Materials*
- Manual of Contract Documents for Highway Works, Volume 1 *Specification for Highway Works*, August 1998 (as amended)

16 Conditions

16.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English law.

16.2 Publications and documents referred to in this Certificate are those that the BBA deems to be relevant at the date of issue or re-issue of this Certificate and include any: Act of Parliament; Statutory Instrument; Directive; Regulation; British, European or International Standard; Code of Practice; manufacturers' instructions; or any other publication or document similar or related to the aforementioned.

16.3 This Certificate will remain valid for an unlimited period provided that the product/system and the manufacture and/or fabrication including all related and relevant processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

16.4 In granting this Certificate, the BBA is not responsible for:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

16.5 Any information relating to the manufacture, supply, installation, use and maintenance of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.

Appendix C

Grease Trap



GA-1

Grease Separator Alarm Device

Installation and Operating Instructions



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SYMBOLS



Warning / Attention



Device is protected by double or reinforced insulation

1 GENERAL

GA-1 is an alarm device for monitoring the thickness of the grease layer accumulating in a grease separator.

The system consists of GA-1 control unit, GA-SG1 sensor and a cable joint.



Figure 1. Grease separator supervision with GA-1 alarm device

GA-SG1 sensor is installed into the grease separator and it supervises thickness of grease layer.

The LED indicators, push button and interfaces of the GA-1 control unit are described in figure 2.

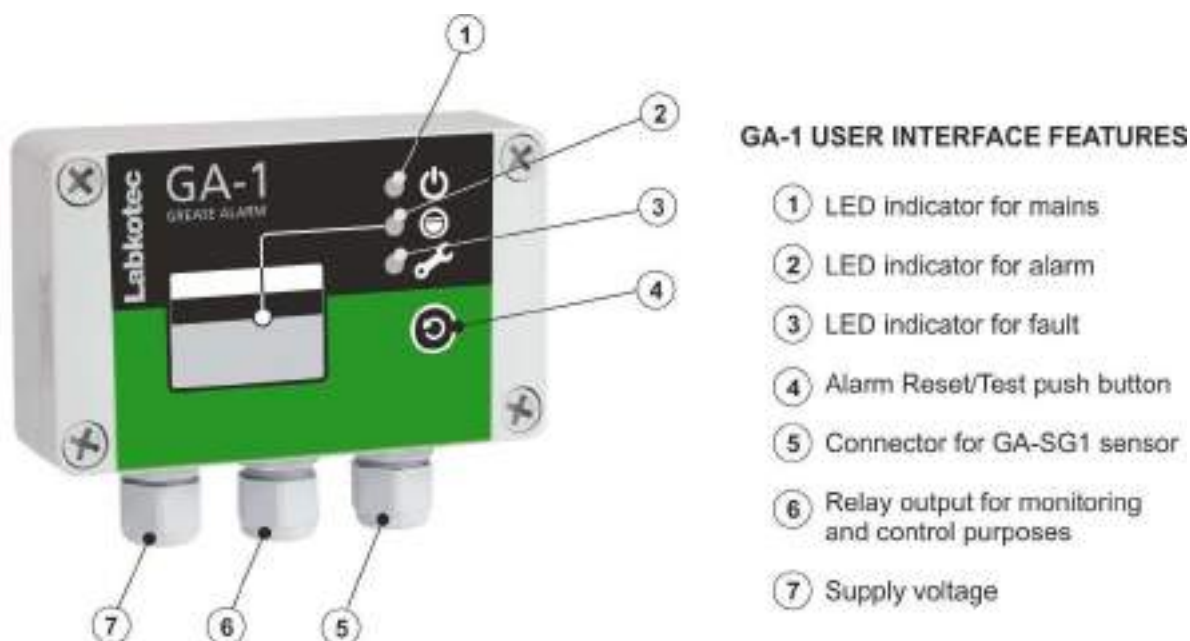


Figure 2. GA-1 control unit – features

2 INSTALLATION

2.1 GA-1 control unit

GA-1 control unit can be wall-mounted. The mounting holes are located in the base plate of the enclosure, beneath the mounting holes of the front cover.

The cover of the enclosure must be tightened so, that the edges touch the base frame. Only then does the push button function properly and the enclosure is tight.

Before installation, please read the safety instructions in chapter 6!

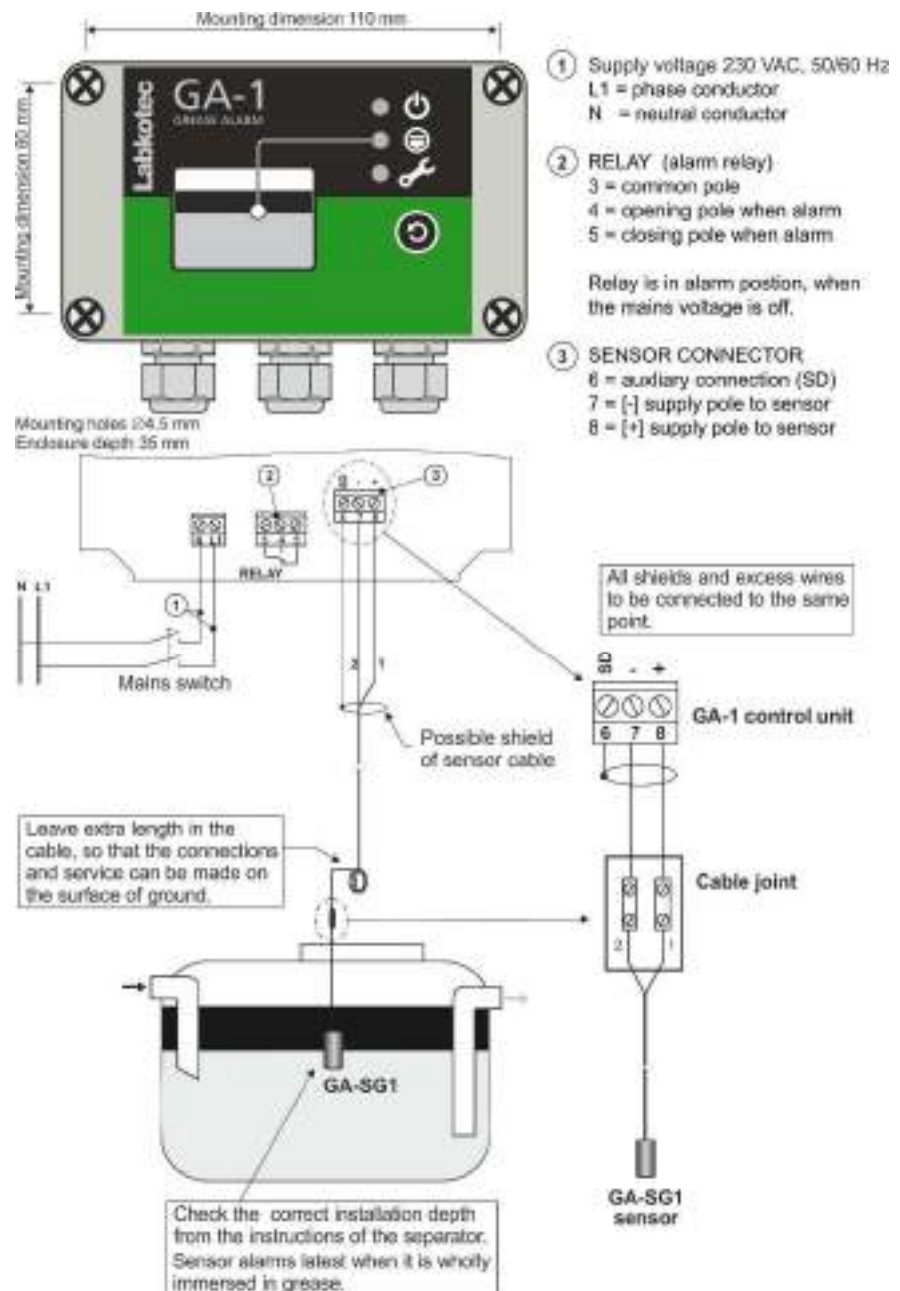


Figure 3. GA-1 alarm device installation.

2.2 GA-SG1 sensor

GA-SG1 sensor should be installed as described in figure 3.

The sensor gives an alarm latest when it is wholly immersed in grease.

Please check the correct installation depth also from the instructions of the grease separator.

2.3 Installation Accessories

The delivery includes a cable joint (figure 4), fixing accessories (figure 5) for installation of the control unit and the sensor. In figure 6 is an installation example of cable with suspension hook.

Connections of the sensor cable inside the cable joint are explained in figure 3. If shielded cable is used cable shields and possible excess wires need to be connected to the same point in galvanic contact.

IP rating of the cable joint is IP68. Make sure, that the cable joint is closed properly.



Figure 4 Cable joint



Figure 5. Fixing accessories



Figure 6. Cable installation example

3 OPERATION

The operation of the alarm device should be checked always after the installation. Also check the operation always when emptying the separator or at least once every six months.

Functionality test

1. Immerse the sensor into water. The device should be in normal mode.
2. Lift the sensor up in air or grease. A grease alarm should be generated (see chapter 3.1 for more detailed description).
3. Clean up the sensor.
4. Immerse the sensor back into water. The alarm should go off after a delay of 10 sec.

A more detailed description of the operation is provided in chapter 3.1. If the operation is not as described here, check connections and cabling. If necessary contact a representative of the manufacturer.

3.1 Modes of operation

Normal mode – no alarms

Sensor is totally immersed in water.
Mains LED indicator is on.
Other LED indicators are off.
Relay is energized.

Grease alarm

Sensor is immersed in grease. (the sensor gives an alarm latest when it is wholly immersed in grease).
Mains LED indicator is on.
Grease Alarm LED indicator is on.
Buzzer on after 10 sec delay.
Relay de-energize after 10 sec delay.
(Note. The same alarm takes place when GA-SG1 sensor is in the air.)

After removal of an alarm, the Grease Alarm LED indicator and buzzer will be off, and relay will be energized after 10 sec delay.

Fault alarm

Sensor cable break, short circuit or a broken sensor.
Mains LED indicator is on.
Sensor circuit Fault LED indicator is on after 10 sec delay.
Buzzer is on after 10 sec delay.
The relay de-energize after 10 sec delay.

Reset of an alarm

When pressing the Reset/Test push button.
Buzzer will go off.
Relay and LED indicator will not change their position until the alarm or fault situation is removed.
If the buzzer is not reset, it goes off automatically after three days.

TEST FUNCTION

Test function provides an artificial alarm, which can be used to test the function of the GA-1 alarm device and the function of other equipment, which are connected to GA-1 via its relay.



Attention! Before pressing the Reset/Test button, make sure that the change of relay status does not cause hazards elsewhere!

Normal situation

When pressing the Reset/Test push button:

Grease Alarm and Fault LED indicators are immediately on.

Buzzer is immediately on.

Relay de-energize after 2 sec of continuous pressing.

When the Reset/Test push button is released:

LED indicators and buzzer go immediately off.

Relay energize immediately.

Alarm on

When pressing the Reset/Test push button for the first time:

Buzzer will go off.

When pressing the Reset/Test push button after that:

Fault LED indicator is immediately on.

Grease Alarm LED indicator remains on.

Buzzer remains on. If it has been reset earlier, it will return to be on.

When the Reset/Test push button is released:

The device returns right away to the preceding status.

Fault alarm on

When pressing the Reset/Test push button:

The device does not react to the test at all.

4 TROUBLE-SHOOTING

Problem:	No alarm when sensor in grease or air, or the alarm will not go off
Possible reason:	Sensor is dirty.
To do:	1. Clean-up the sensor and check the operation again.



The following operations must be performed only by a qualified electrician!

Problem:	MAINS LED indicator is off
Possible reason:	Device doesn't get supply voltage.
To do:	1. Check that power separation switch is not switched off. 2. Measure the voltage between poles N and L1. It should be 230 VAC + 10 %.

Problem:	FAULT LED indicator is on
Possible reason:	Current in sensor circuit too low (cable break or out of connector) or too high (cable in short circuit). The sensor might also be broken.
To do:	1. Make sure, that the sensor cable has been connected correctly to the GA-1 control unit. 2. Measure the voltage separately between the poles 7 and 8. The voltages should be between 7,0 - 8,5 V. Note! The voltage alternates between the sensor connectors in 1 second intervals. 3. Measure sensor current when the sensor is in the air or in grease. The measured current should be 7,0 – 8,5 mA. 4. Measure current when the sensor is in the water. Measured current should be 2,5 – 3,5 mA

If the problem can not be solved with the above instructions, please contact Labkotec Oy's service.

5 REPAIR AND SERVICE

The sensor should be cleaned and the operation should also be tested when emptying or maintaining the grease separator or at least once every six months. The easiest way to check the operation is to lift the sensor up in the air and to put it back to the separator. The operation is described in chapter 3.

For cleaning, a mild detergent (e.g. washing-up liquid) and a scrubbing brush can be used.

In case of queries, please contact Labkotec Oy's service:

service@labkotec.fi.

6 SAFETY INSTRUCTIONS



The device does not include a mains switch. A two pole mains switch (250 VAC 1 A), which isolates both lines (L1, N) must be installed in the main power supply lines in the vicinity of the unit. This switch facilitates maintenance and service operations and it has to be marked to identify the unit.



If opening of housing's cover is needed, only a qualified electrician is allowed to install or to maintain the device.



If the device is used against the manufacturer's instructions, the protection provided by the device may be damaged.



The device is not allowed to install in hazardous areas.

7 TECHNICAL DATA

GA-1 control unit	
Dimensions	125 mm x 75 mm x 35 mm (L x H x D)
Weight	250 g Package 0,8 kg (control unit + sensor + cable joint)
Enclosure	IP 65, material polycarbonate Cable glands adjustment range is 6 – 10mm
Operation temperature	-30 °C...+50 °C
Supply voltage	230 VAC ± 10 %, 50/60 Hz The device is not equipped with a mains switch
Power consumption	5 VA
Sensors	GA-SG1 sensor
Relay output	Potential-free relay output 250 V, 5 A Operational delay 10 sec. Relay de-energize at trigger point.
Electrical safety	IEC/EN 61010-1, Class II  , CAT II
EMC	Emission IEC/EN 61000-6-3 Immunity IEC/EN 61000-6-1
Manufacturing year: Please see the serial number on the type plate	xxx x xxxxx xx YY x where YY = manufacturing year (e.g. 14 = 2014)

GA-SG1 sensor	
Principle of operation	Capacitive
Material	POM, PUR, AISI 316
Weight	350 g (sensor + fixed cable)
IP-classification	IP68
Operation temperature	0 °C...+90 °C
Cable	Fixed cable 2 x 0.75 mm ² . Standard length 5 m, other lengths optional. The max. length of the fixed cable is 15 m, can be extended. Maximum cable loop resistance is 75 Ω.
EMC	Emission IEC/EN 61000-6-3 Immunity IEC/EN 61000-6-1
Manufacturing year: Please see the serial number from the bottom of sensor	GAXxxxYY where YY = manufacturing year (e.g. 14 = 2014)

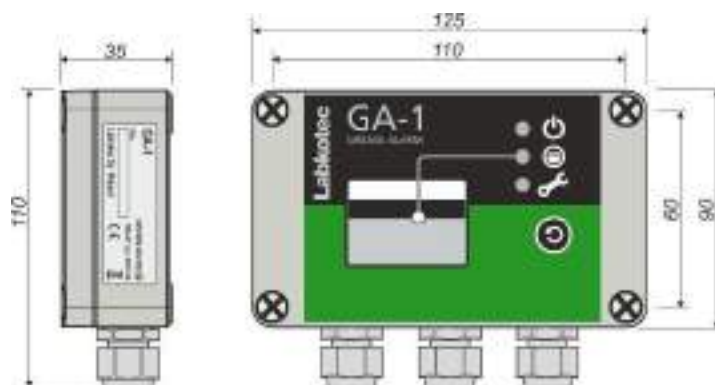


Figure 7. GA-1 control unit



Figure 8. GA-SG1 sensor

Declaration of Conformity

This declaration certifies that the below mentioned apparatus conforms to the essential requirements of the EMC directive 2004/108/EY and Low-Voltage directive (LVD) 2006/95/EC.

Description of the apparatus: Measuring and control unit with sensor

Type: GA-1 Grease Alarm control unit with GA-SG1 sensor
GA-2 Grease Alarm control unit with two GA-SG1 sensors

Manufacturer: Labkotec Oy
Myllyhaantie 6
FI-33960 Pirkkala
FINLAND

The construction of the appliance is in accordance with the following standards:

EMC:

EN 61000-6-1 (2007)	Electromagnetic compatibility, Generic standards – Immunity for residential, commercial and light-industrial environments.
EN 61000-6-3 (2007) +A1 (2011)	Electromagnetic compatibility, Generic standards – Emission standard for residential, commercial and light-industrial environments.
EN 61000-3-2 (2006) +A1+A2 (2009)	Electromagnetic compatibility, Product family standard: Harmonic current emissions.
EN 61000-3-3 (2008)	Electromagnetic compatibility, Product family standard: Voltage changes, fluctuations and flicker sensation.

LVD:

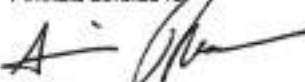
EN 61010-1 (2010)	Safety requirements for electrical equipment for measurement, control and laboratory use. Part 1: General requirements.
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This product is CE-marked since 2013.

Signature

The authorized signatory to this declaration, on behalf of the manufacturer, and the Responsible Person based within the EU, is identified below.

Pirkkala 20.5.2013



Ari Tolonen
CEO
Labkotec Oy

SPEL Grease/Fat Separators

Introduction

Grease separators are used to remove fat and grease from waste water. This is often essential to eliminate incidents of drain blockages caused by the waste from catering establishments. The operation of septic tanks, pumps, and sewage treatment systems will also be improved by removing the fat and grease from the effluent.

Siting and Installing the Tank

The tank should not be installed near a road or driveway, where it could be subjected to high external loads, unless the installation is designed to withstand such loadings so they are not transferred to the tank shell.

Where the tank is to be emptied using a tanker, it should be sited within 30m of a vehicle access provided that the invert level of the septic tank is no more than 3m below the level of the vehicle access. This distance may need to be reduced where the depth to the invert of the tank is more than 3m. There should also be a clear route for the hose such that the tank can be emptied and cleaned without the contents being taken through a dwelling or place of work.

Adequate ventilation of the tank and the inlet pipework must be provided to prevent the accumulation of fermentation gases.

For full installation instructions concerning tank specification handling and burial please consider our supplied installation guidelines, Sec4.

Operation

Please refer to a supplied drawing. Contaminated water flows into the tank through the inlet pipe. Heavy deposits will settle on the bottom of the chamber and light contaminants will mostly float on top of the water. Cleaner water flows through to the second chamber where water is allowed to pass out of the tank taken from the cleanest part of the chamber.

Maintenance

Grease, sludge and other fatty effluents remain in the tank until removed by a specialist cleansing or waste disposal contractor. The tank must be emptied periodically of retained grease, sludge and other fatty effluents. Other than this action SPEL Grease separators are essentially maintenance free, however, it is not possible to predict site specific maintenance requirements. SPEL tank shells usually carry a 25-year warranty.

Alarm Options

SPEL can provide a range of alarms to suit your needs.

Access

SPEL Grease separators have good access to both chambers for period emptying of retained grease, sludge and similar fatty effluents. Access is made in each case through a circular access shaft of 600mm diameter at the crown of the chamber.

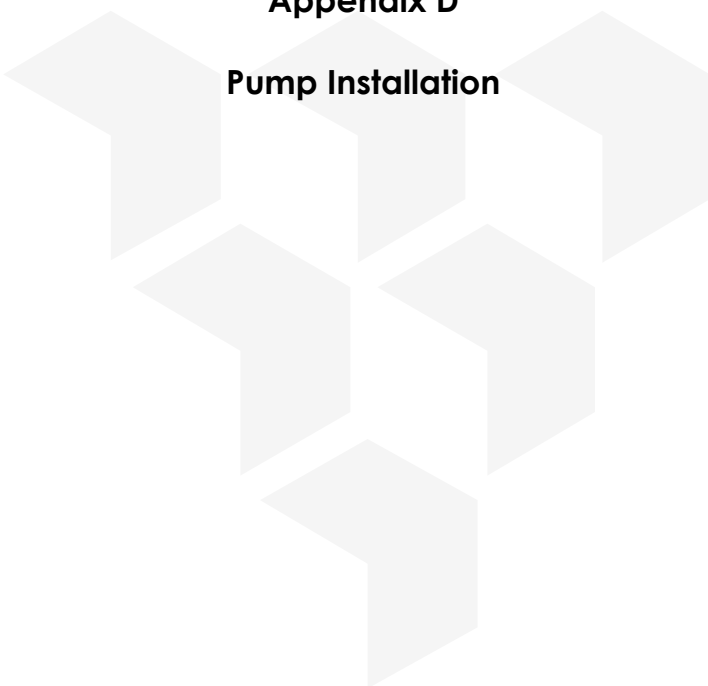
Emptying Period

Periods between emptying will have to be determined depending on site conditions but normally at least twice a year.

Emptying Procedure

Typically the contents of the chambers will be sucked out by a specialist cleansing or waste disposal contractor. Both light and heavy deposits should be removed at this time. A Large hose is usually lowered down into the chamber through the access shaft. As the contents are sucked out care should be taken to ensure that both chambers contents are reduced equally. If one chamber is allowed to contain too great a quantity of fluid in comparison with the other chamber damage to the dividing baffle wall may result. Following removal the tank should be re-charged with clean water. The removed contents should be disposed of by the specialist contractor.

The contents of this document are supplied for general guidance only. SPEL Products can accept no liability for harmful incidents that arise as a result of the contents of this document. It is not possible for SPEL Products to predict site specific operational or maintenance requirements.



Appendix D

Pump Installation

013540

INSTALLATION, OPERATING & MAINTENANCE GUIDELINES FOR PACKAGE PUMPSTATIONS EFFLUENT / SEWAGE & GRINDER APPLICATIONS



Kingspan Environmental Service Contact Numbers:

GB: 0844 846 0500

NI: 028 3025 4077

IRL: 048 3025 4077

Enclosed Documents

		Ø1.0	Ø1.2	Ø1.8	Ø2.6
EFFLUENT APPLICATIONS					
DS1065P DS1062P	Single Effluent Pump Chamber Sales Drawing Twin Effluent Pump Chamber Sales Drawing	♦			
DS1059P DS1056P	Single Effluent Pump Chamber Sales Drawing Twin Effluent Pump Chamber Sales Drawing		♦		
DS1022 DS1017	Single Effluent Pump Chamber Sales Drawing Twin Effluent Pump Chamber Sales Drawing			♦	♦
SEWAGE APPLICATIONS					
DS1063P DS1060P	Single Sewage Pump Chamber Sales Drawing Twin Sewage Pump Chamber Sales Drawing	♦			
DS1057P DS1054P	Single Sewage Pump Chamber Sales Drawing Twin Sewage Pump Chamber Sales Drawing		♦		
DS1020P DS1015	Single Sewage Pump Chamber Sales Drawing Twin Sewage Pump Chamber Sales Drawing			♦	♦
GRINDER APPLICATIONS					
DS1064P DS1061P	Single Grinder Pump Chamber Sales Drawing Twin Grinder Pump Chamber Sales Drawing	♦			
DS1058P DS1055P	Single Grinder Pump Chamber Sales Drawing Twin Grinder Pump Chamber Sales Drawing		♦		
DS1021P DS1016	Single Grinder Pump Chamber Sales Drawing Twin Grinder Pump Chamber Sales Drawing			♦	♦
FLOATS					
DS0778P	Float Information Sales Drawing	♦	♦	♦	♦

Issue	Description	Date
08	CC1538	November 2020

HEALTH & 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 THESE GUIDELINES. ELECTRICAL WORK SHOULD BE CARRIED OUT BY A QUALIFIED ELECTRICIAN.

Sewage and sewage effluent can contain substances 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.

When covers are removed precautions must be taken against personnel falling into the unit.

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

Ensure that you are familiar with the safe working areas and accesses & that the working area is adequately lit.

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.

The removal of sediment should be carried out by a contractor holding the relevant permits to transport and dispose of such waste. The contractor must refer to the guidelines in this document.

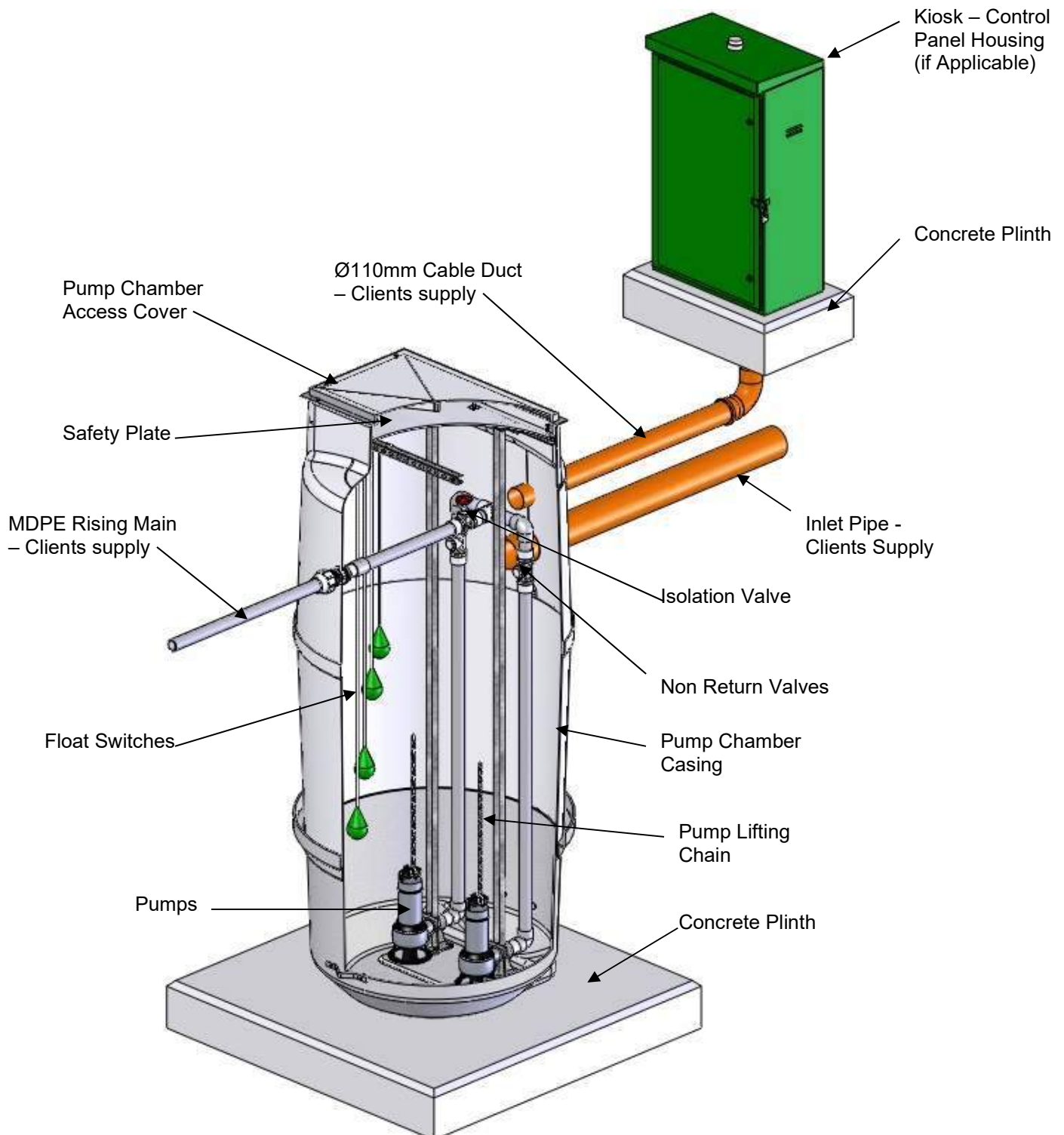
AS WITH ALL SITE WORK, THE DANGERS OF WORKING WITH WATER AND ELECTRICITY POSE SEVERE THREATS TO HEALTH, IF OBVIOUS AND FUNDAMENTAL PRECAUTIONS ARE NOT TAKEN. THEREFORE, IF YOU ARE IN ANY DOUBT REGARDING ANY OF THE FOLLOWING, PLEASE DO NOT HESITATE TO CONTACT US.

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1 System Overview.

Pictorial representation below indicates basic requirements for a standard system, please note not all of the items required are supplied from us as standard.



1.1 Site Delivery Check List.

The delivery ticket will have 4 no. items listed that will need to be checked against items actually delivered. Each item will be clearly identified as per list below.

<u>Pump Chamber Casing.</u> 1. Unit will be fitted with suitable rated cover. 2. Ø110mm Cable Duct pipe fitted 3. Inlet fitted. 4. Lifting Eyes for off loading 5. Internal pipe work fitted including rising main connection fitting. 6. Guide rails and pedestals fitted on sewage and grinder applications.	
<u>Pumps</u> 1. Pumps will be supplied palletised on Sewage and Grinder applications. 2. Pumps will be fitted in the pump chamber casing on Effluent applications. 3. Pumps will be supplied with pump claw on sewage and grinder applications. 4. Number and type of pumps supplied will be detailed on delivery note.	
<u>Control Panel</u> 1. Control panel will be supplied palletised along with pumps. 2. Specifications of Panel will be detailed on delivery note.	
<u>Floats</u> 1. Floats will be supplied palletised along with pumps and control panel. 2. Floats are not pre-fitted in pump chamber casing to avoid damage during transit. 3. Number and type of floats supplied will be detailed on delivery note.	

2 Operating Guidelines

2.1 Introduction

- 2.1.1 These Guidelines represent Best Practice for the installation of the above packaged pump stations (waste water application). It must be noted, however, that these Guidelines are of a general nature. It is the responsibility of others to verify that they are appropriate for the specific ground conditions and in-service loads of each installation. Similarly, any information or advice given by employees or agents of the company regarding the design of an installation must be verified by a qualified specialist (e.g. Civil engineering consultant).

2.2 Handling & Storage

- 2.2.1 Care must be taken to ensure that units are not damaged during delivery and handling on site. Please take care and place unit so that it cannot fall and become damaged.
- 2.2.2 The design requirements of the product will frequently mean that the centre of gravity of the unit is “offset”. Care must therefore be taken to ensure that the unit is stable when lifting and that loads are evenly distributed during lifting.
- 2.2.3 Lifting equipment should be selected by taking into account the unit weight, length and the distance of lift required on site.
- 2.2.4 We accept no responsibility for the selection of lifting equipment.

3 Chamber Installation

- 3.1.1 Select a suitable location for the chamber. This will normally be at the lowest ground level on the site so that the facilities can be drained into the chamber.
- 3.1.2 Check that no other structure - or special access - is required over the selected position. Provision can be made, if necessary, to place the chamber in a roadway, provided that the backfill, cover slab and access cover are designed in accordance with the anticipated loads.
- 3.1.3 Check that no underground cable, pipe or service duct lies beneath the selected position.
- 3.1.4 Excavate the minimum opening in the ground to receive the pump chamber and pipework to be used. This opening must allow for a minimum of 250mm of concrete around the chamber.
- 3.1.5 The depth of the excavation needs to be at least 150mm deeper than the overall tank depth.
- 3.1.6 If a machine is used to remove the soil, then the sides of the excavation should be battered for stability and a sump left should it be necessary to dewater.
- 3.1.7 If it is dug by hand, the sides will need shoring up for safety, to prevent earth slippage.
- 3.1.8 A de-watering pump may be required to control any ground water present.
- 3.1.9 Place in position the concrete base, minimum thickness 150mm of concrete and allow to set.
- 3.1.10 Lower the pump chamber onto the dried concrete, ensuring that the inlet and outlet pipes are correctly aligned.
- 3.1.11 The unit then should be backfilled with either mass concrete, or a lean mix in areas where ground conditions are wet or unstable. The minimum surround thickness for this backfill should be 250mm.
- 3.1.12 In all instances the pumpchamber must be filled with clean water to keep pace with the backfilling process, this is in order to equalize the pressures exerted onto the unit and prevent the possibility of chamber deformation or flotation during installation.

- 3.1.13 Connect up the site pipework (supplied by others) to the inlet and outlet connections of the pump chamber.
- 3.1.14 Finish off the surface of the excavation to the required level, depending on the final surface finish required.
- 3.1.15 The Concrete Specification is not a site-specific installation design.

GENERAL CONCRETE SPECIFICATION IN ACCORDANCE WITH BS EN 206-1 (BS 8500-1)		
TYPE OF MIX		(DC) DESIGN
PERMITTED TYPE OF CEMENT		BS 12 (OPC): BS 12 (RHPC): BS 4027 (SRPC)
PERMITTED TYPE OF AGGREGATE (coarse & fine)		BS 882
NOMINAL MAXIMUM SIZE OF AGGREGATE		20 mm
GRADES: C25 /30 C25 /30 C16 /20		REINFORCED & ABOVE GROUND WITH HOLDING DOWN BOLTS REINFORCED (EG. FOR HIGH WATER TABLE) UNREINFORCED (NORMAL CONDITIONS)
MINIMUM CEMENT CONTENT	C30	270 - 280 Kg/M ³
	C20	220 - 230 Kg/M ³
SLUMP CLASS		S1 (25mm)
RATE OF SAMPLING		READY MIX CONCRETE SHOULD BE SUPPLIED COMPLETE WITH APPROPRIATE DELIVERY TICKET IN ACCORDANCE WITH BS EN 12350-1
NOTE: STANDARD MIXES SHOULD NOT BE USED WHERE SULPHATES OR OTHER AGGRESSIVE CHEMICALS EXIST IN GROUND WATER		

4 Important Notes

- 4.1.1 When positioning the chamber please check that your electrician has provided sufficient cable to allow the control panel to be placed in the required position.
- 4.1.2 It is most important that once the chamber is in position, with all the inlet connections made and before installing the pumps, that the drainage system is flushed through and all sand, debris etc. is removed from the chamber.
- 4.1.3 FAILURE TO DO THIS MAY INVALIDATE THE WARRANTY ON THE PUMPSETS**
- 4.1.4 A cable duct is required, free from sharp bends, minimum diameter 75mm.

Additional Notes

- 4.1.5 If the chamber is going to be subjected to traffic & or vehicle loads, it is essential that a cover slab is constructed so there is no direct load onto the chamber. Also a suitably rated access frame and cover must be obtained, and installed in such a manor that no loads bear directly onto the neck of the chamber.
- 4.1.6 When using a concrete backfill it is important to ensure that the mix is not too wet as this may exert floatation pressure on the pumpchamber.
- 4.1.7 In all instances the pumpchamber must be filled with clean water to keep pace with the backfilling process, this is in order to equalize the pressures exerted onto the unit and prevent the possibility of chamber deformation or flotation during installation.

IF IN DOUBT PLEASE CONTACT US FOR ADVICE.

IT SHOULD BE NOTED THAT THIS INFORMATION IS FOR GUIDANCE PURPOSES ONLY. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT THE INSTALLATION IS CARRIED OUT TO THE SATISFACTION OF YOUR REGULATING LOCAL WATER AUTHORITY, IN ACCORDANCE WITH THE PREVAILING GROUND CONDITIONS.

5 Operational Description

5.1 Pump Control Panels

- 5.1.1 Twin Pump Panels are designed to operate from 4 float switches i.e. stop / start / high-level alarm & duty– standby (assist). Single Pump Panel installations are designed to operate on 3 float switches start / stop & high-level alarm.
- 5.1.2 Each pump may be run on its own by operating the respective “manual” switch mounted on the door.
- 5.1.3 In “auto” the pumps will run under float switch control.
- 5.1.4 As the level rises the stop float contacts will close. When the start float switch contact closes, the duty pump will start. This pump will continue to run until the level falls below the stop float switch.
- 5.1.5 After each pump cycle the duty pump is alternate so that the other pump becomes the duty pump the next time the level reaches the duty pump start float.
- 5.1.6 If the level continues to rise to the high-level float, the high-level alarm light will illuminate. This alarm may be reset once the level is below the high-level float switch. Under high level conditions this lamp will be illuminated to indicate that there is either a pump failure or that the volume of influent is exceeding the discharge capability of the pump. The high-level alarm / beacon will need to be manually reset by the site operator once the cause of the high-level condition has been identified and resolved.
- 5.1.7 Should the duty pump have failed or is running and the level continues to rise to the duty /standby pump start float, the second standby pump will start and continue to run until the level falls below the stop float switch.
- 5.1.8 Cable access is available from both the top & bottom end of the panel. Additional access can be gain from the sides but must be suitably glanded. The control panel has an IP54 rating. The cabling work and glanding to the panel needs to meet the same standard to maintain this rating.
- 5.1.9 Please ensure that the overload(s) within the panel are adjusted to match the Full Load Current of the pump(s) to ensure nuisance tripping is not encountered. Please contact our technical office for further advice if required.

PLEASE REFER TO WIRING DIAGRAMS SUPPLIED INSIDE THE CONTROL PANEL.

6 General Maintenance

The best way to achieve this is to arrange a contract with an approved Service provider. Please contact us on the phone number given for service contact details.

There will always be situations when a little self help may be sufficient to avoid call out and we describe here some basic checks which may prove useful: Before opening the unit, please see Health and Safety Notes.

We recommend the unit is checked every 6 months to ensure there are no blockages or obstructions in the inlet and out let pipes, also check that there is not excessive sludge build up in the bottom of the tank.

If in any doubt whatsoever please contact your service provider.

7 How to Keep your Pump Station Running Sweetly.

If a Pump Station serves your property, the likelihood is that the property is not connected directly to the mains sewer system.

Sewage pump systems are designed to handle foul water, natural human waste and biodegradable products. Other household waste and non-biodegradable products should never be disposed of through the drainage system.

Disposal of non bio-degradable products will affect the reliability of all pumping stations, causing pumps to block and storage chambers to become congested with non-pumpable waste.

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

THE FOLLOWING MUST NOT BE DISCHARGED INTO THE DRAINS

- **Cleaning Rags**
- **Cloths**
- **Syringes & Hypodermic Needles**
- **Medicines & Medical Equipment.** Take unused medicines to a pharmacist for safe disposal.
- **Grease & 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.** It may seem a bit obvious to say this, but it is amazing what gets flushed down the loo from time to time. Causing blockages of the drains and pumps
- Even so-called **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.

ROUTINE DE-SLUDGING AND SERVICING

Pump Stations over time accumulate settled solids. It is good practice to check and if necessary empty/desludge these at the same time as any treatment unit.

It is vital to the systems ongoing operation and should be carried out regularly.

Mechanical and electrical servicing, particularly, must be performed by properly trained personnel suitably qualified and experienced in this type of work

8 Warranty

Taken from 'Kingspan's Terms & Conditions of Sale'

- 8.1 The company will replace or, at its option, properly repair without charge any goods which are found to be defective and which cause failure in normal circumstances of use **within a period of twelve months from the date of delivery.**
- 8.2 This warranty is conditional upon:
- 8.3 (a) the Buyer notifying the Company of any claim within Seven days of the failure becoming discernible.
(b) the Company being allowed a reasonable opportunity to inspect the goods so as to confirm that they are defective.
(c) the goods not having been modified, mishandled or misused and being used strictly in accordance with any relevant instructions issued by the Company.
- 8.4 The Company's liability under this Clause is limited to the repair or replacement of the defective goods, and does not cover costs of transport, installation or associated site costs, if applicable.
- 8.5 The Company's liability to replace or repair the goods is in lieu of and excludes all other warranties and conditions, and in particular (but without limitation) the Company shall have no liability of any kind for consequential loss or damage.
- 8.6 For any further advice, please contact us.
- 8.7 A warranty form is included in this package, to register your unit for warranty. Please complete ALL sections of the form, and return it at your earliest convenience.

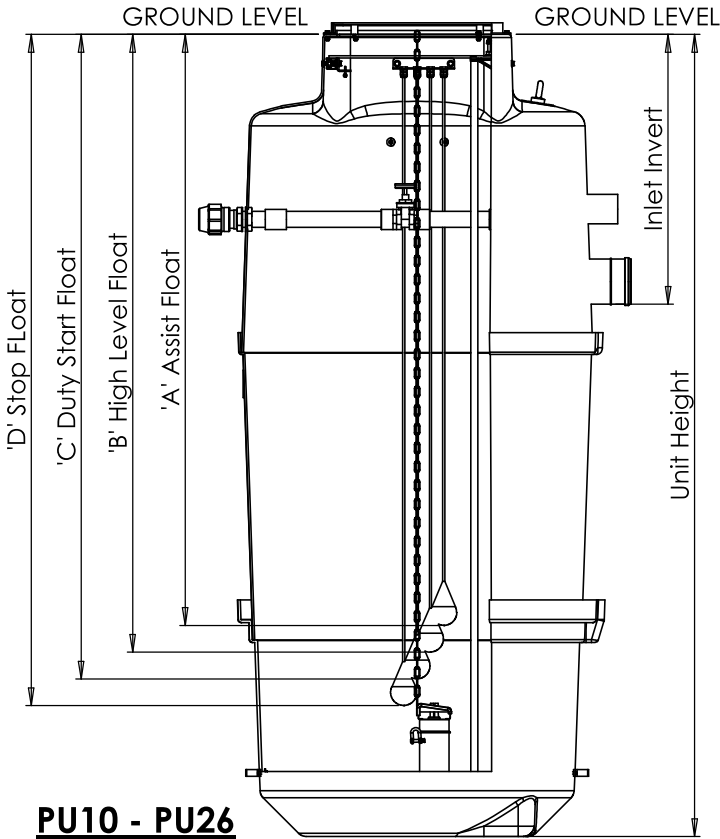
PU10					
Unit height	Inlet invert	'A'	'B'	'C'	'D'
2.0m	1.0m	1250	1350	1450	1550
2.5m	1.5m	1750	1850	1950	2050

PU12					
Unit height	Inlet invert	'A'	'B'	'C'	'D'
2.0m	1.0m	1200	1300	1400	1500
2.5m	1.0m	1700	1800	1900	2000
	1.5m				
3.0m	1.0m	2200	2300	2400	2500
	1.5m				
	2.0m				
3.5m	1.0m	2700	2800	2900	3000
	1.5m				
	2.0m				
	2.5m				
4.0m	1.0m	3200	3300	3400	3500
	1.5m				
	2.0m				
	2.5m				
	3.0m				

PU18					
Unit height	Inlet invert	'A'	'B'	'C'	'D'
2.0m	1.0m	1200	1300	1400	1500
2.5m	1.0m	1700	1800	1900	2000
	1.5m				
3.0m	1.0m	2200	2300	2400	2500
	1.5m				
	2.0m				
3.5m	1.0m	2700	2800	2900	3000
	1.5m				
	2.0m				
	3.0m				
4.0m	1.0m	3200	3300	3400	3500
	1.5m				
	2.0m				
	2.5m				
	3.0m				
4.5m	1.0m	3700	3800	3900	4000
	1.5m				
	2.0m				
	2.5m				
	3.0m				
	3.5m				

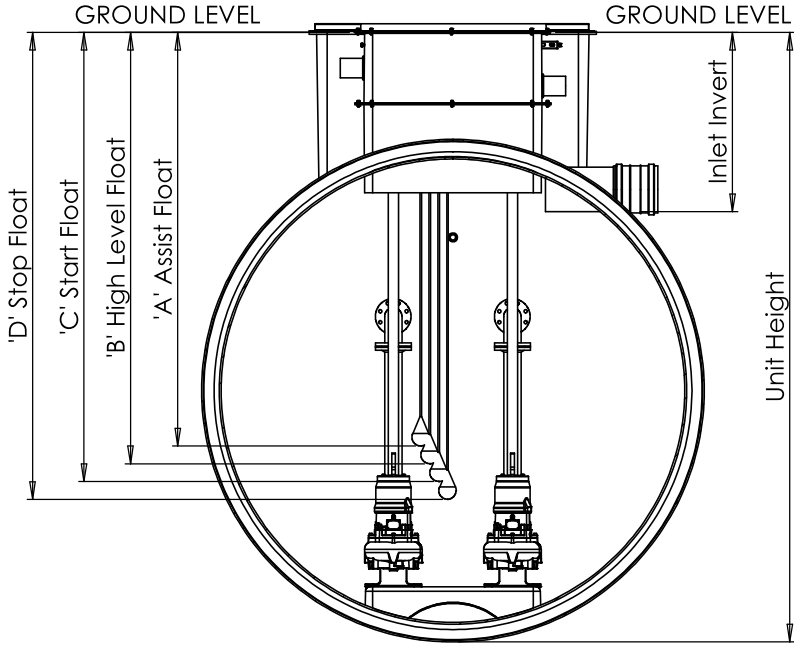
TYPICAL FOUL PUMP SUMP FLOAT ARRANGEMENT

PU26					
Unit height	Inlet invert	'A'	'B'	'C'	'D'
3.3m	1.0m	2500	2600	2700	2800
	1.5m				
	2.0m				
4.0m	1.0m	3200	3300	3400	3500
	1.5m				
	2.0m				
	2.5m				
	3.0m				
4.5m	1.0m	3700	3800	3900	4000
	1.5m				
	2.0m				
	2.5m				
	3.0m				
	3.5m				



PU10 - PU26

PC28					
Unit Height	Inlet invert	'A'	'B'	'C'	'D'
3420mm	1.0m	2320	2420	2520	2620
3920mm	1.5m	2820	2920	3020	3120
4420mm	2.0m	3320	3420	3520	3620
4420mm	2.5m				
4420mm	3.0m				



PC28

TYPICAL FOUL PUMP SUMP FLOAT ARRANGEMENT

Please check with Environmental Treatment Services Ltd that this drawing is the latest issue			
Issue	Date	Drawn by	Description
04	05.06.18	WMD	CC1434 - Float positions updated, chamber depths added
03	28.04.10	JMcM	CC770 - General Document Update

Material : Various
Finish : n/a
Weight : n/a

Tolerance : +/-10 mm
Thickness : n/a
Surface Area : n/a

Drawing :DS0778P Page 1 of 1

PU Pump chamber Float Information

All dimensions in mm

Scale: Not to scale

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Appendix E

Maintenance Schedule

Inspection Log - Year sheet 1 of 2

Inspection Date	A – Surface Water Catchpit Manholes	B – Foul Water Manholes	C - Channel Outlets	D - Petrol Interceptor	E – Flow Control Chamber	F – Attenuation Tank	G – Grease Trap	H - Permeable Paving	I – Bio-Retention Strip	J – Rain Garden	K – Pump Chamber	Comments
January												
February												
March												
April												
May												
June												
July												
August												

How to complete this Log:

- 1.0 Write date in LH column.
- 2.0 Tick which items have been inspected for that date.
- 3.0 Add to notes and maintenance completed e.g. gullies / catchpit's emptied

Inspection Log - Year sheet 2 of 2

Inspection Date	A – Surface Water Catchpit Manholes and Gullies	B – Foul Water Manholes	C - Channel Outlets	D - Petrol Interceptor	E – Flow Control Chamber	F – Attenuation Tank	G – Grease Trap	H - Permeable Paving	I – Bio-Retention Strip	J – Rain Garden		Comments
September												
October												
November												
December												

How to complete this Log:

- 1.0 Write date in LH column.
- 2.0 Tick which items have been inspected for that date.
- 3.0 Add to notes and maintenance completed e.g. gullies / catchpit's emptied

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|

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