

Received By Ashfield District Council

02.01.2025

# **DRAINAGE MAINTENANCE PLAN**

McDonald's Lane End, Kirkby (ST2120)



Prepared for: McDonald's Restaurants Ltd  
Ref: 005\_4230177\_FG\_DMP

## Document History

Issue	Date	Description	Prepared By	Checked By
1	15 May 2024	First Issue	G Marfell	F Giliberti
2	28 Nov 24	Site Layout updated	H Gell	F Giliberti

Hertfordshire | Oxfordshire | Cambridgeshire | Bristol  
 postbox@glanvillegroup.com | www.glanvillegroup.com



© Glanville Consultants Ltd. All rights reserved.

This report contains confidential information intended solely for the recipient. No part of this report may be copied, reproduced or stored electronically without prior written permission from Glanville Consultants Ltd. This report has been prepared in accordance with the commissioning brief and is for the client's exclusive use unless otherwise agreed in writing. Glanville Consultants Ltd does not accept liability for any use of this report, other than for the purposes for which it was originally prepared and provided. Third parties should not use or rely on the contents of this report without written permission from Glanville Consultants Ltd.

## Contents

1.0	Introduction.....	1
2.0	Drainage Maintenance Responsibility & Training.....	1
3.0	Drainage Inspection and Maintenance Requirements and Frequency.....	1
4.0	Drainage Inspection and Maintenance Records .....	4

## Tables

Table 1:            Operation and Maintenance Requirements for Attenuation Tanks

## Figures

Figure 1:           Proposed Drainage Maintenance

## Appendices

- Appendix A:    Surface Water Treatment & Flow Control
- Appendix B:    Cellular Attenuation Tank
- Appendix C:    Grease Trap
- Appendix D:    Maintenance Schedule

## 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 on Lane End, Kirkby in Ashfield, as shown in Figure 1. The site is surrounded by Lane End to the north, an unnamed road and residential property to the east, an industrial yard to the south and a car park for commercial property to the west.

## 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 and Gullies (Figure 1 - Ref A & C)

- 3.1 Catchpit manholes and gullies 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 cellular storage tank and adjacent to surface drainage channels. Gullies are located throughout the car park and drive through lane, adjacent to kerb-lines.
- 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 gully emptying vacuum truck or similar device which does not require man entry.

### Foul Water Manholes and Inspection Chambers (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 D)

- 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 E)

- 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 - F)

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

#### Cellular Attenuation Tank (Figure 1 - G)

- 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 3 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 - H)

- 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.

## **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



**NOTES**

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS, DOCUMENTS AND SPECIFICATIONS. ANY DISCREPANCIES BETWEEN INFORMATION SHOWN ON THIS AND ANY OTHER DRAWING SHALL BE REPORTED TO THE ENGINEER IMMEDIATELY.
2. DO NOT SCALE FROM THIS DRAWING. WORK TO FIGURED DIMENSIONS ONLY.
3. THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES UNLESS SPECIFICALLY STATED AS 'FOR CONSTRUCTION' IN THE DRAWING STATUS.
4. ALL DRAWING INFORMATION MUST BE READ FROM HARD COPY PDF FILES ONLY, MARKED CHECKED. BEFORE PROCEEDING PLEASE ENSURE THE ISSUE STATUS IS APPROPRIATE FOR THE INTENDED USE. ALL INFORMATION EXTRACTED DIRECTLY FROM DRAWING FILES (E.G. DWG'S) IS DONE SO ENTIRELY AT THE USER'S RISK.
5. ALL DRAINAGE TO BE INSTALLED TO BUILDING REGULATIONS PART H AND/OR SCOTTISH BUILDING REGULATIONS
6. ALL DRAINAGE TO BS8582
7. BUILDING INSPECTOR TO INSPECT ALL FOUL DRAINAGE INSTALLATION
8. ALL DRAINAGE ALARM SYSTEMS COVERING GREASE TRAPS AND TREATMENT UNITS MUST BE INSTALLED, CONNECTED AND COMMISSIONED BY THE GROUNDWORK CONTRACTOR PRIOR TO PRACTICAL HANDOVER OF THE STORE TO MCDONALD'S

**KEY**

- PROPOSED SITE LAYOUT
- PROPOSED GULLY WITH 1500 PIPE
- PROPOSED SURFACE WATER DRAINAGE PIPEWORK SHOWING LENGTH, PIPE DIAMETER AND GRADE
- PROPOSED BUILDING SURFACE WATER P/P/C CATCHPIT MANHOLE WITH 300mm SUMP
- PROPOSED RAINWATER DOWN PIPE INVERT 500mm BELOW PROPOSED EXTERNAL LEVEL ( ALL OUTLETS 1000 & TO HAVE RODDING ACCESS UNLESS OTHERWISE INDICATED)
- ACO KERBRDRAIN 305 DRAINAGE KERB WITH ACCESS POINT AND OUTLETS
- ACO MONO DRAIN PD1000 U.N.O 10.0 DRAINAGE CHANNEL (BLACK)
- PROPOSED FOUL WATER DRAINAGE PIPEWORK SHOWING LENGTH, PIPE DIAMETER AND GRADE
- PROPOSED BUILDING FOUL WATER DRAINAGE INSPECTION CHAMBER. DOUBLE SEALED COVER AND FRAME
- PROPOSED GREASE WATER DRAINAGE PIPEWORK SHOWING LENGTH, PIPE DIAMETER AND GRADE
- PROPOSED BUILDING GREASE WATER DRAINAGE INSPECTION CHAMBER. DOUBLE SEALED COVER AND FRAME
- ALARMED 2000 SPEL GREASE TRAP WITH HARD WIRE TO MANAGERS OFFICE DOUBLE SEALED COVER AND FRAME
- 1100 DUCTS FOR GREASE TRAP/ CABLES TO INCOMING ELECTRICS CLIPBOARD (MUST BE INSTALLED, CONNECTED AND COMMISSIONED BY THE GROUNDWORK CONTRACTOR PRIOR TO PRACTICAL HANDOVER)
- LINED IMPERMEABLE HEAVY DUTY CELLULAR STORAGE
- SPEL ESR TREATMENT UNIT 320 C1 ORIENTATION A
- CONTROL CHAMBER - HYDROBRAKE FLOW CONTROL
- EXISTING COMBINED SEWER (LINE AND LEVEL TBC)
- EXISTING CULVERT (LINE AND LEVEL TBC)

P5	UPDATED TO SUIT LATEST LAYOUT	28.11.24	GM	FG
P4	UPDATED TO SUIT LATEST LAYOUT	22.11.24	GM	FG
P3	UPDATED TO SUIT LATEST LAYOUT	13.05.24	GM	FG
P2	UPDATED TO SUIT LATEST LAYOUT	24.04.24	FC	FG
P1	PRELIMINARY	19.04.24	FC	FG

**Glanville**  
Survey > Plan > Engineer

- Civil Engineering
- Structural Engineering
- Transport Planning
- Highways Engineering
- Building Surveying
- Geomatics

Hertfordshire | Oxfordshire | Cambridgeshire | Bristol

Client: **McDonald's RESTAURANT**

Project: **MCDONALD'S RESTAURANT LANE END, KIRKBY ST2120**

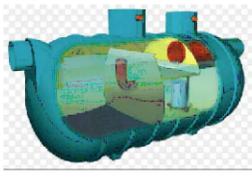
Title: **PROPOSED DRAINAGE MAINTENANCE PLAN**

Engineer: FG Date: APR 2024

Director: FG Scale: 1:200@A1

Status: PRELIMINARY

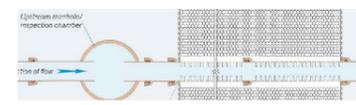
Drawing No. 4230177-1250 Rev P5



**ITEM E. SPEL ESR PETROL INTERCEPTOR**  
A VISUAL INSPECTION IS REQUIRED AS PART OF GENERAL MAINTENANCE (1 PERSON). TASK IS ONCE A MONTH AND A PHYSICAL CLEAN OUT SHOULD BE DONE ONE EVERY 6 MONTHS OR WHEN THE ALARM IS ACTIVATED IN THE MANAGER'S OFFICE. CLEAN AND ALARM RE-SET IS TO BE BY APPROVED MAINTENANCE CONTRACTOR



**ITEM F. HYDROBRAKE.**  
A VISUAL INSPECTION IS REQUIRED AS PART OF GENERAL MAINTENANCE (1 PERSON). THIS CHAMBER SHOULD BE INSPECTED MONTHLY TO LOOK FOR DEBRIS BLOCKING THE OUTLET.

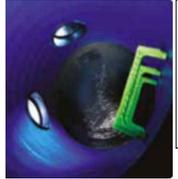


**ITEM G. THE ADJACENT CATCHPIT MANHOLES** ALLOW INSPECTION OF THE PERFORATED PIPE WITHIN THE TANK. ACCESS COVER IS LIGHT WEIGHT, CAN BE LIFTED BY GENERAL MAINTENANCE (1 PERSON). THE TASK IS ONCE A MONTH OR AFTER A MAJOR STORM AND IS A VISUAL INSPECTION TO SEE IF EXCESSIVE SILT HAS BUILT UP. IF THERE IS EVIDENCE OF SILT WITHIN THE PERFORATED PIPE JETTING IS REQUIRED BY A SPECIALIST CONTRACTOR. PROVIDED THE CATCHPIT MANHOLE ARE EMPTIED REGULARLY, JETTING SHOULD NOT BE REQUIRED.

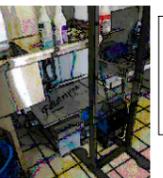
EXTG MH  
CL=146.54  
IL=144.14 (TBC)  
ØEXTG



**ITEM D OUTLET. ACCESS COVER IS HINGED, CAN BE LIFTED BY GENERAL MAINTENANCE (1 PERSON). THE TASK IS ONCE A MONTH AND IS A VISUAL INSPECTION TO SEE IF EXCESSIVE SILT, LEAVES OR LITTER HAS BUILT UP.**



**ITEM A. ACCESS COVER IS LIGHT WEIGHT, CAN BE LIFTED BY GENERAL MAINTENANCE (1 PERSON). THE TASK IS ONCE A MONTH AND IS A VISUAL INSPECTION TO SEE IF EXCESSIVE SILT, LEAVES OR LITTER HAS BUILT UP. GENERALLY SPEAKING A SPOT CHECK ON A FEW WILL SUFFICE.**



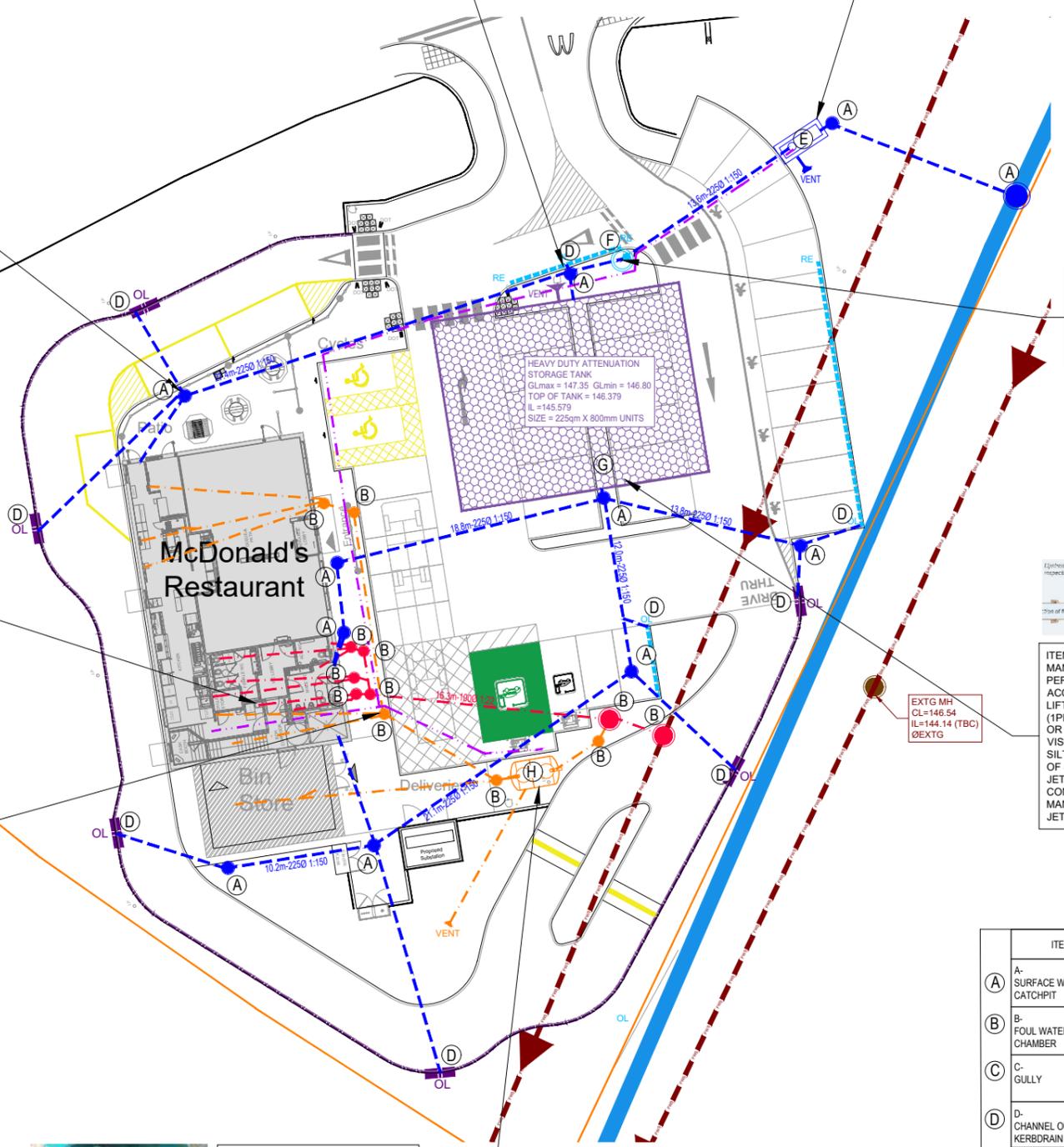
**ABOVE GROUND GREASE REMOVAL UNIT (CONNECTED TO THE DISHWASHER AND THREE SINK). TO BE CLEANED OUT MULTIPLE TIMES DAILY. DISHWASHER DISCHARGE TO COOL PRIOR TO WATER RELEASE TO THE GRU**



**ITEM B. ACCESS COVER IS LIGHT WEIGHT, CAN BE LIFTED BY GENERAL MAINTENANCE (1 PERSON). THE TASK IS ONCE A MONTH AND IS A VISUAL INSPECTION TO SEE IF EXCESSIVE SILT, LEAVES OR LITTER HAS BUILT UP. GENERALLY SPEAKING A SPOT CHECK ON A FEW WILL SUFFICE.**



**ITEM H GREASE TRAP VISUAL INSPECTION LIFTED BY GENERAL MAINTENANCE (1 PERSON). ONCE A MONTH. PHYSICAL CLEAN OUT SHOULD BE ONCE EVERY 6 MONTHS OR WHEN THE ALARM IS ACTIVATED IN THE MANAGERS OFFICE. 6 MONTHS IS VIABLE WHEN THE FATSTRIPPA IS WORKING OPTIMALLY WITHIN THE KITCHEN. CLEAN OUT AND RESET BY A MAINTENANCE COMPANY AND APPROVED TO RESET THE ALARM.**



**FIGURE 1**  
**PRELIMINARY**

**MAINTENANCE TABLE**

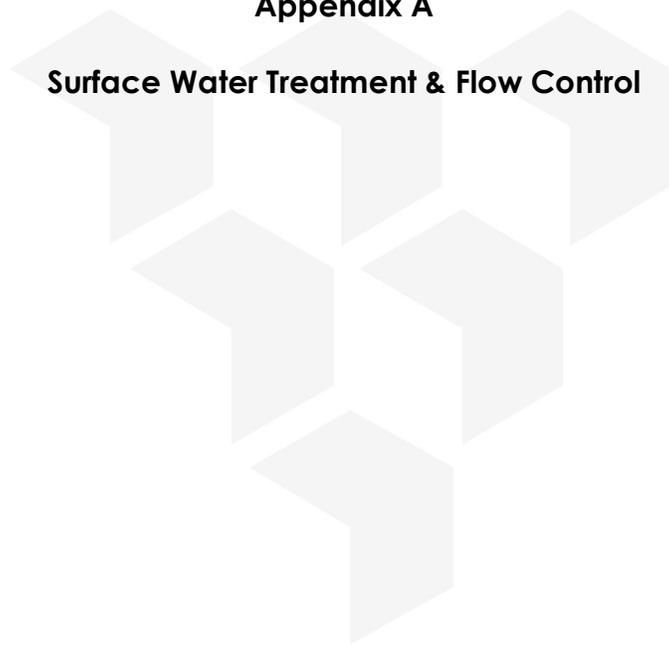
ITEM	REQUIREMENT	FREQUENCY	MAINTAINED BY
(A) SURFACE WATER CATCHPIT	INSPECT SW MH / CATCHPIT AND REMOVE SILT IF FULL.	MONTHLY	SPECIALIST CONTRACTOR APPOINTED BY MCDONALDS
(B) FOUL WATER CHAMBER	VISUALLY ACCESS TO LOOK FOR BLOCKAGES.	MONTHLY	SPECIALIST CONTRACTOR APPOINTED BY MCDONALDS
(C) GULLY	INSPECT GULLY, REMOVE DEBRIS.	MONTHLY	SPECIALIST CONTRACTOR APPOINTED BY MCDONALDS
(D) CHANNEL OUTLETS / KERBRDRAIN OUTLETS	INSPECT DRAINAGE OUTLETS, REMOVE DEBRIS.	MONTHLY	SPECIALIST CONTRACTOR APPOINTED BY MCDONALDS
(E) SPEL TREATMENT UNIT	INSPECT AND IF FULL MAINTENANCE BY MANUFACTURER REQUIREMENTS.	MONTHLY	SPECIALIST CONTRACTOR APPOINTED BY MCDONALDS
(F) HYDROBRAKE	VISUALLY ACCESS TO LOOK FOR BLOCKAGES. MAINTENANCE BY MANUFACTURER REQUIREMENTS.	MONTHLY	SPECIALIST CONTRACTOR APPOINTED BY MCDONALDS
(G) ATTENUATION	INSPECT INLET AT ADJACENT CATCHPIT MANHOLE	MONTHLY	SPECIALIST CONTRACTOR APPOINTED BY MCDONALDS
(H) GREASE TRAP	INSPECT AND IF FULL MAINTENANCE BY MANUFACTURER REQUIREMENTS.	MONTHLY	SPECIALIST CONTRACTOR APPOINTED BY MCDONALDS

## Appendices



## Appendix A

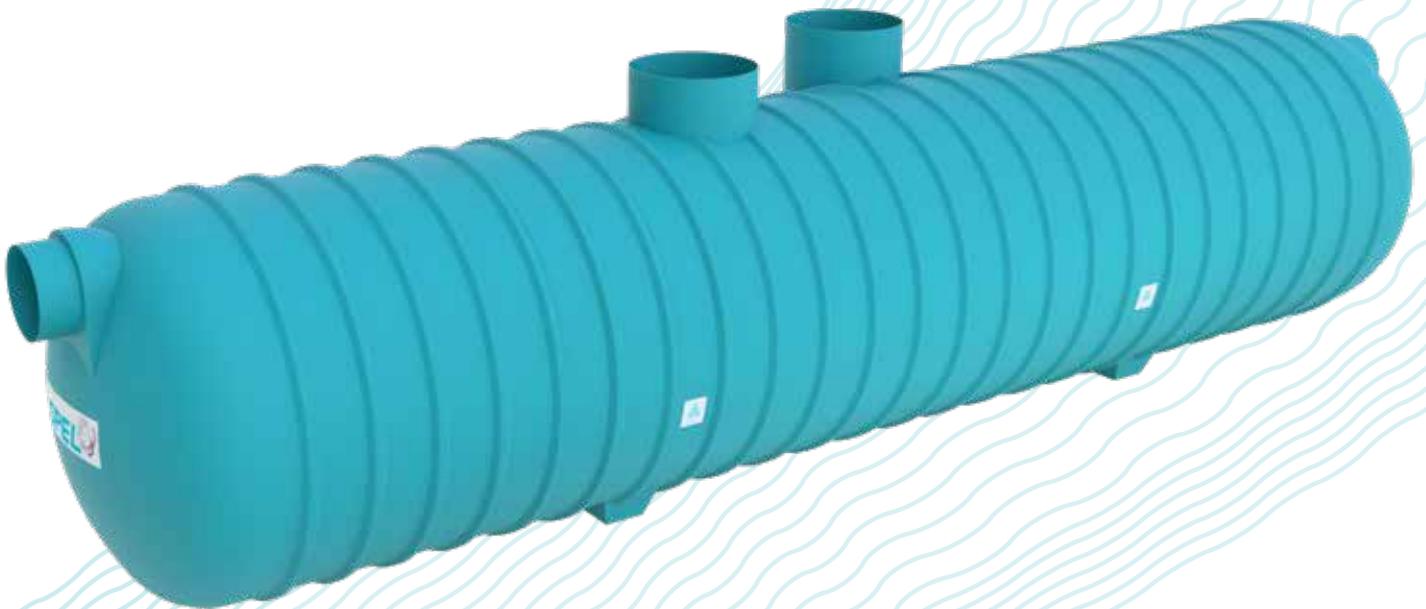
### Surface Water Treatment & Flow Control





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](http://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.

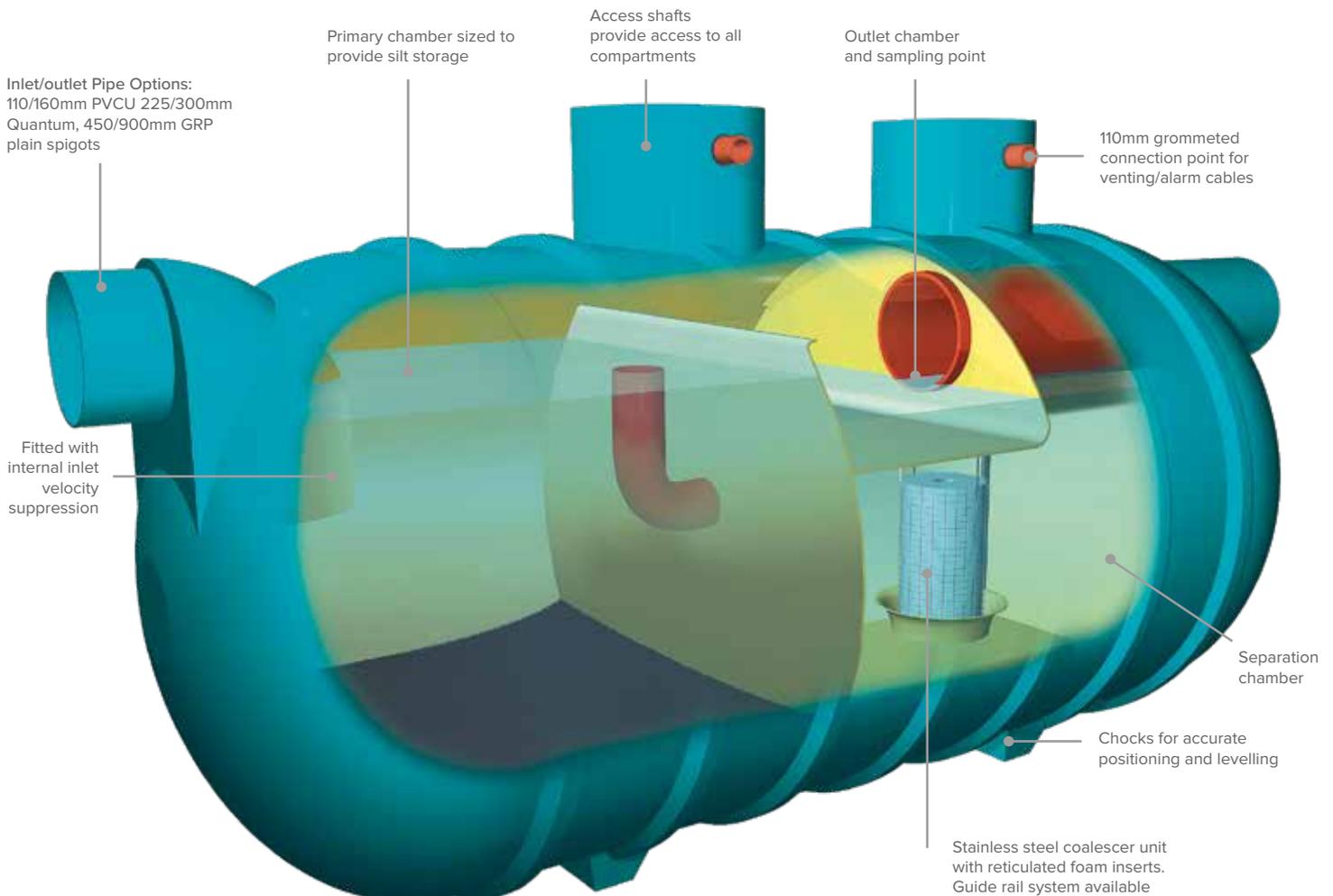
#### SPEL ESR Stormceptor Certified Mitigation Index

**TSS** 0.8

**Metals** 0.6

**Hydrocarbons** 0.9\*

\*H R Wallingford test results to BS EN 858



# SPEL Stormceptor ESR Range By-Pass System



## Surface Water Treatment Device Performance Declaration

Testing carried out according to British Water Code of Practice

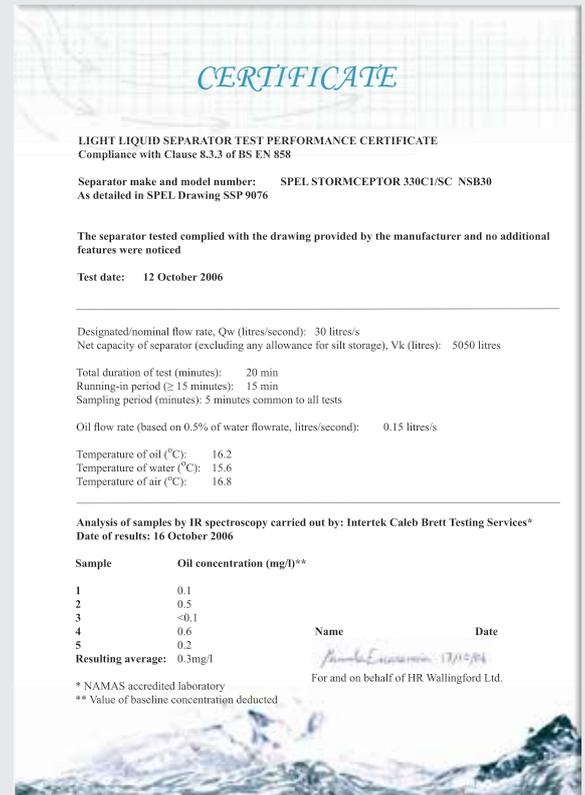
Product Details	Description
Manufacturer	SPEL Products
Treatment Device Name/Model	Stormceptor Type 210 C1/SC
General description	Class 1 By-pass Separator with Silt Capacity
Envisaged application	Treatment of Surface Water Run-off
Pollutant(s) captured	Suspended Solids

Test	Value	Unit
Treatment device capacity	3200	litres
Sediment Storage capacity	1000	litres
Treatment Flow rate	10	l/s
Connected Area	1,333	m <sup>2</sup>
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
<b>TSS capture and retention efficiency</b> (Milisil W4 test sediment)	<b>82</b>	<b>%</b>
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*

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

\*H R Wallingford test results to BS EN 858

## 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 <sup>1</sup>	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 <sup>1</sup>	High	0.8 <sup>2</sup>	0.8 <sup>2</sup>	0.9 <sup>2</sup>

## 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 <sup>2</sup>	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 <sup>4</sup>	0.7 <sup>3</sup>	0.7	0.5
Wetland	0.8 <sup>3</sup>	0.8	0.8
Proprietary treatment systems <sup>5,6</sup>	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](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 (m <sup>2</sup> )*	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	1,200	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	-	-
350C1/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	-	-	-	-
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	-	-	-	-

Access shafts dependent on orientation of pipework (see page 7 for orientation options).

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

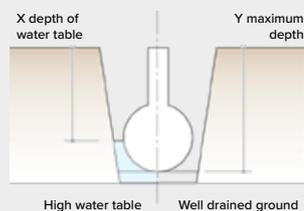
\*\*This dimension is for A-C inlet/outlet options, larger pipe sizes are available for D-I inlet/outlet options.

## 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.

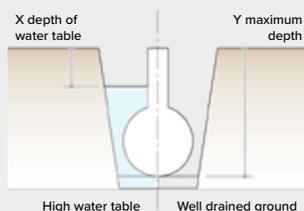
### Standard tanks

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

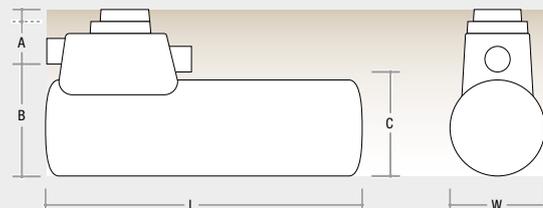
Series	WT (m)	D (m)
200	2.0	6.0
300	2.8	5.6
400	3.5	6.0
500	4.5	7.25
600	4.7	7.3



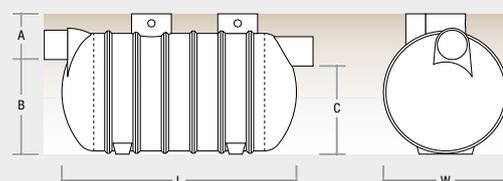
Based on installation in concrete with concrete surround.  
For pea gravel surround, see SPEL Data Manual p13.5

- 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.

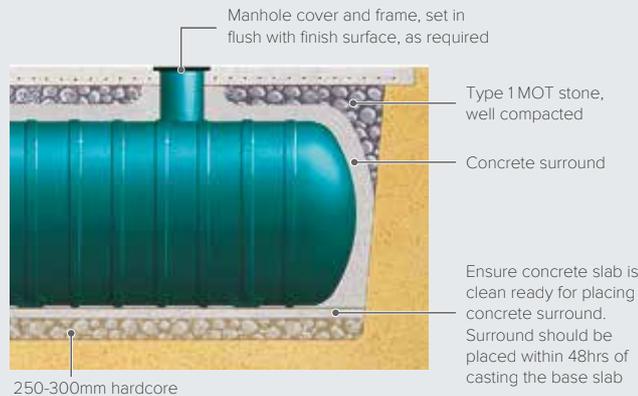
### Health and safety

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.

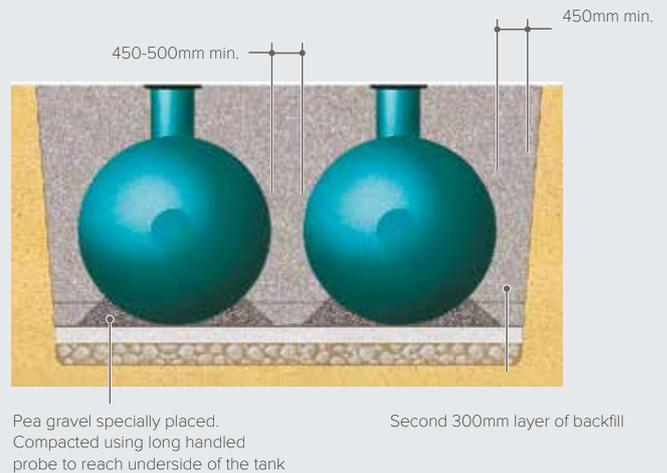
## Installation – Concrete

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](mailto: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

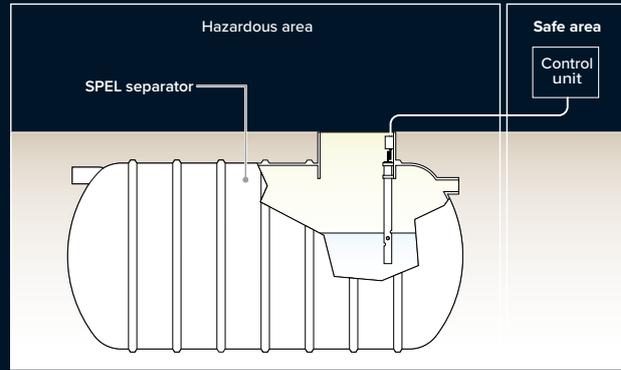
The SPEL lifting, locating and locking system is manufactured in stainless steel and replaces the standard coalescer unit handle.

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.

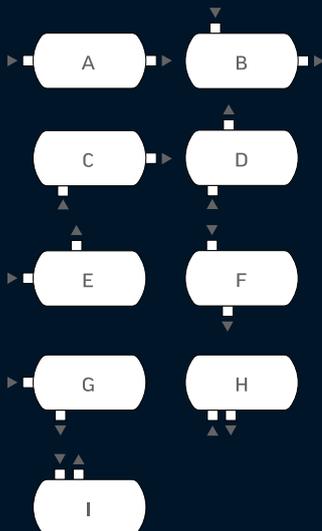


See tripod drawing below for other extension adjustments

Double seal if required

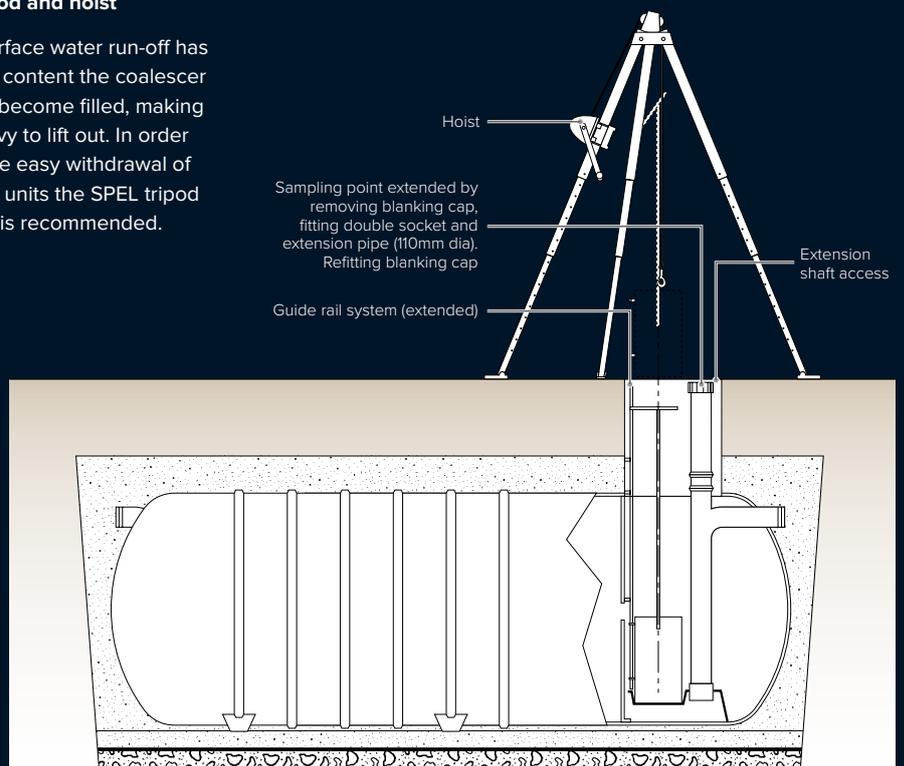
## SPEL ESR Range – Inlet/outlet orientation

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

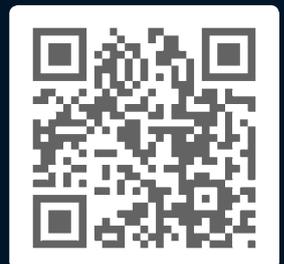
SPEL's ESR range is a total treatment system removing Hydrocarbons, Total Suspended Solids (TSS) and Metals (particulate). It's a highly efficient, single unit, water quality SuDS component.



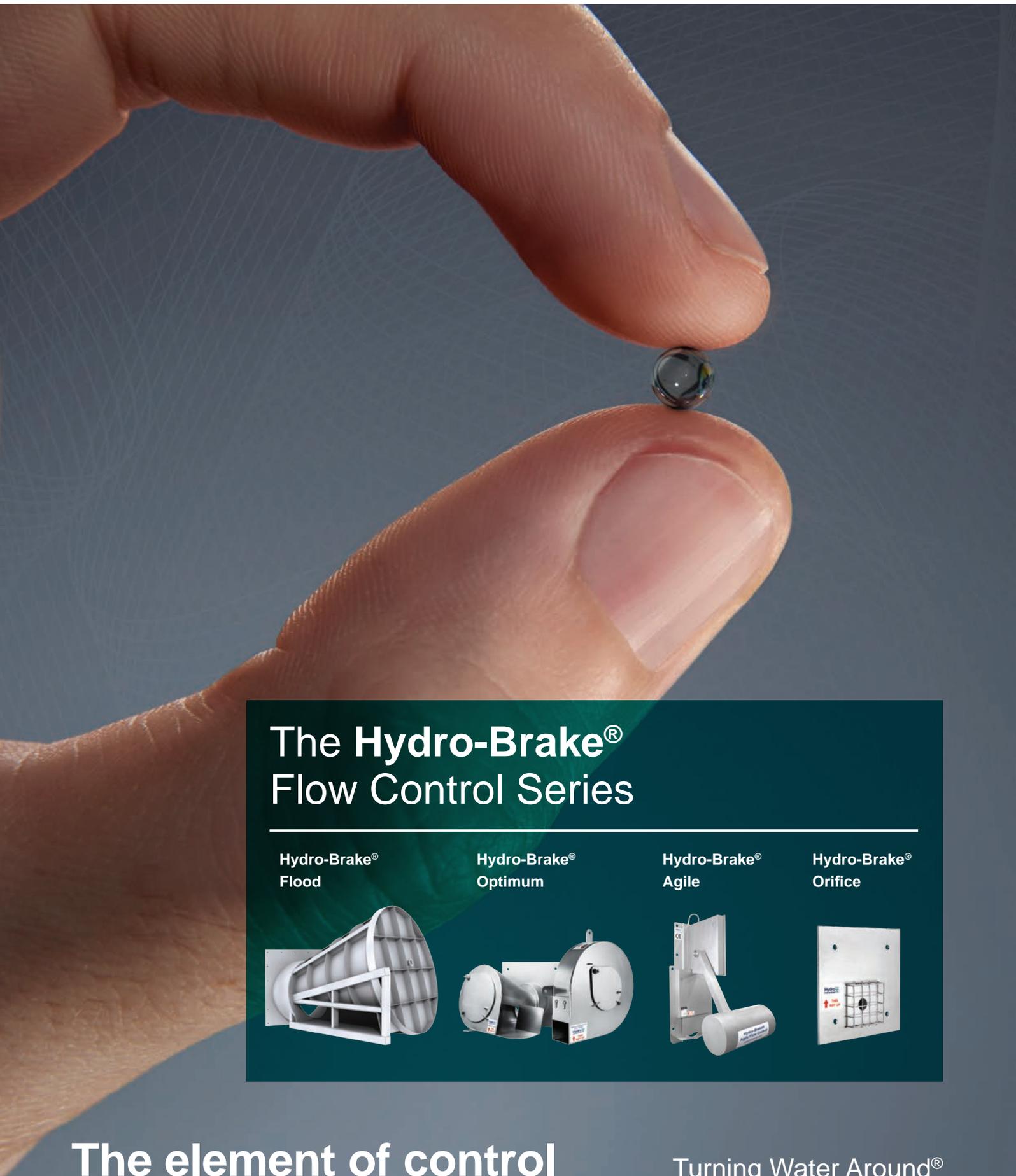
Lancaster Road, Shrewsbury, Shropshire SY1 3NQ

Phone: +44 (0)1743 445200

Email: [info@spelproducts.co.uk](mailto:info@spelproducts.co.uk) / [sales@spelproducts.co.uk](mailto:sales@spelproducts.co.uk)

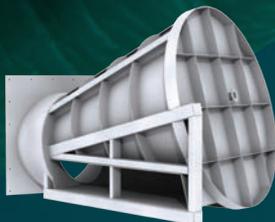


[spelproducts.co.uk](https://www.spelproducts.co.uk)



## The Hydro-Brake® Flow Control Series

Hydro-Brake®  
Flood



Hydro-Brake®  
Optimum



Hydro-Brake®  
Agile

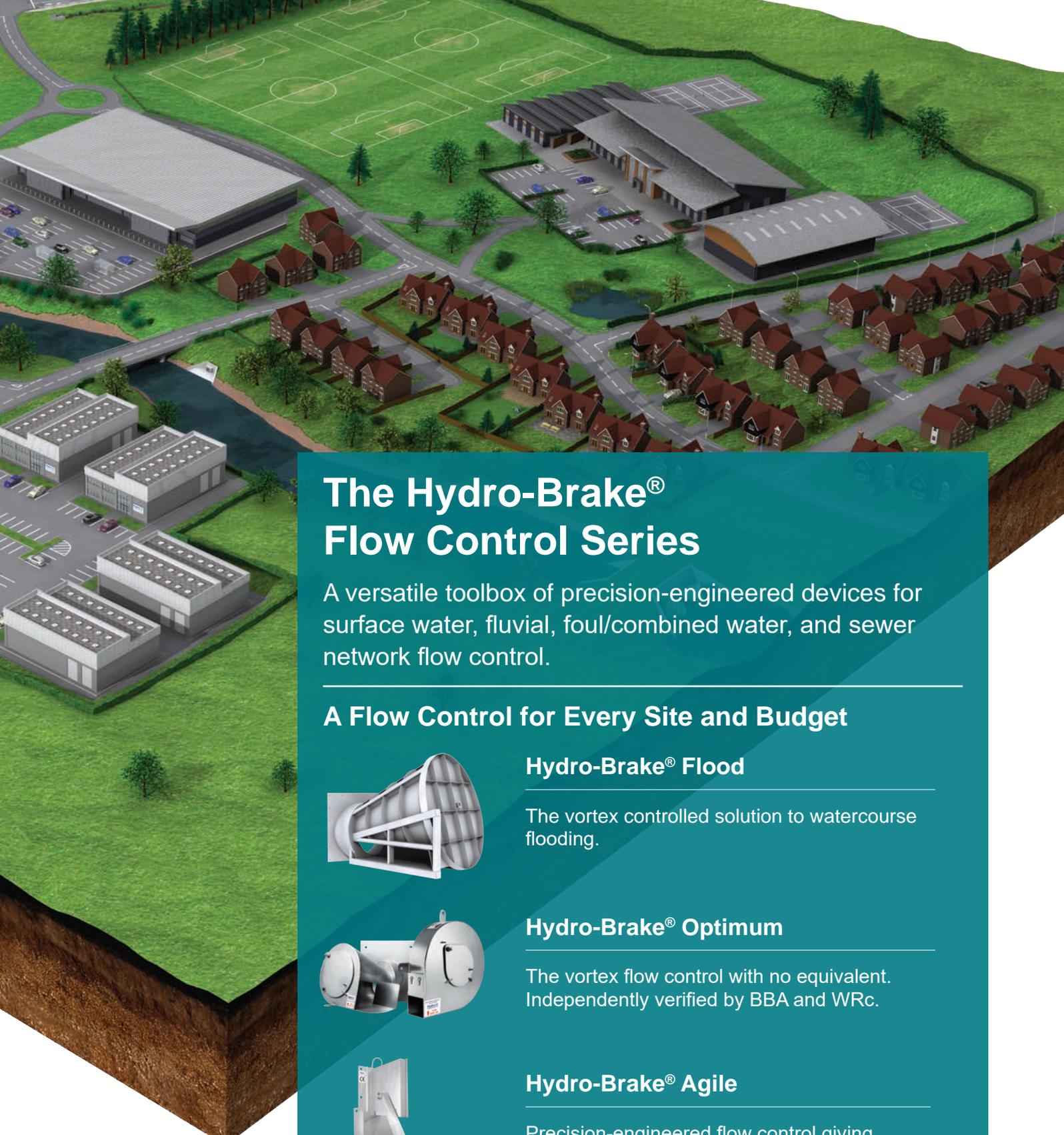


Hydro-Brake®  
Orifice



**The element of control**

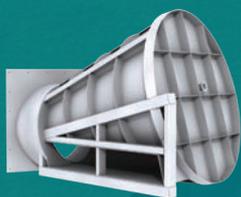
Turning Water Around®



# The Hydro-Brake® Flow Control Series

A versatile toolbox of precision-engineered devices for surface water, fluvial, foul/combined water, and sewer network flow control.

## A Flow Control for Every Site and Budget



### Hydro-Brake® Flood

The vortex controlled solution to watercourse flooding.



### Hydro-Brake® Optimum

The vortex flow control with no equivalent. Independently verified by BBA and WRc.



### Hydro-Brake® Agile

Precision-engineered flow control giving reduced on-site storage for highly constrained applications.



### Hydro-Brake® Orifice

The low cost option for unconstrained sites.



## The Element of Control

---

**Hydro International has set the highest standards in flow control technology during more than 35 years of specialist water engineering. When it comes to understanding, predicting and controlling the flow of water, Hydro works with scientific rigour.**

Our customers are constantly challenged to deliver imaginative solutions, despite tough commercial and physical constraints. Committed to precision in product development and manufacture, we partner with you to engineer the best-possible water management solutions.

Hydro International's unrivalled knowledge and outstanding technical design support give our customers complete reassurance of system performance and value.

**We give you the element of control.**

## Precision-Engineered for Reliable, Repeatable Performance

---

The Hydro-Brake® Flow Control Series offers a comprehensive choice for sustainable, performance-optimised attenuation and control whatever the project. Fully scalable and adaptable to your site conditions, there is no need to compromise on your project requirements.

All Hydro International flow controls are manufactured to the same exacting standards of quality. Tested, proven and independently accredited by regulatory bodies across the world, they offer the reassurance of reliable, repeatable performance.

## Technical Design Support

---

Faced with increasingly varied environmental and planning stipulations, engineers need to adapt their solutions accordingly and balance flow rates with storage requirements and optimise the drainage system performance over the duration of a storm. In these circumstances, Hydro International's expert design support can advise on the correct flow control selection and design.

A full range of technical services, including detailed hydraulic modelling, easy-to-use design tools and integration into industry-standard software, all help engineers to achieve optimum hydraulic performance.

## Buildable, Maintainable, Adoptable

---

Hydro International flow controls are designed and manufactured for ease of installation and reliable through-life performance with minimum intervention. Simple, predictable, low-maintenance regimes make them straightforward for management organisations to take on, and remove any concerns for adopting authorities.

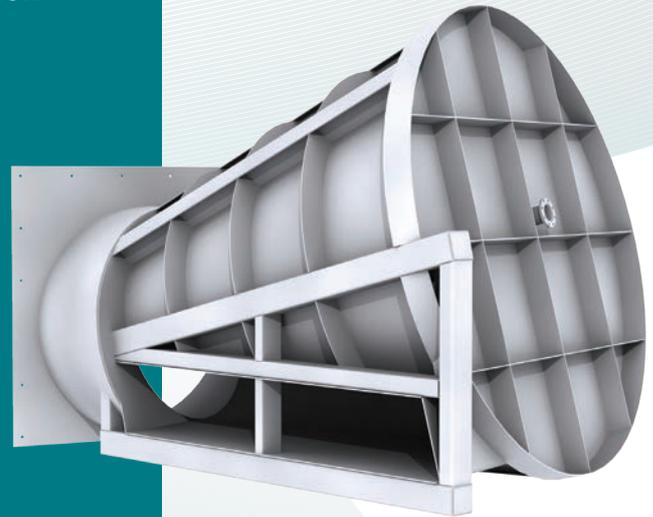
# Hydro-Brake® Flood

Hydro-Brake® Flood is a highly sustainable, precision-engineered vortex technology for preventing watercourse flooding.

Hydro-Brake® Flood flow controls have been installed at the heart of low-maintenance, self-activating flood defences since the 1990s, and now protect more than 6,000 properties from an estimated £200m of flood damage in pioneering schemes across the UK.



Watercourse  
flood prevention



- ✓ No external power.
- ✓ No moving parts.
- ✓ Upstream flood storage minimised.
- ✓ Minimal maintenance.

## Bespoke, Precision Engineering

Each Hydro-Brake® Flood is a bespoke solution that precisely manages watercourse flows, right up to major dams with pass forward flow rates of 30 m<sup>3</sup>/s. The same technology is used just as successfully in smaller, dispersed schemes.

Each Hydro-Brake® Flood scheme is purpose-designed to optimise flow control performance characteristics and precisely calculate the amount of upstream storage required. Using Hydro-Brake® Flood vortex technology can reduce the volume of floodwater to be stored by up to 30% compared to fixed orifice controls.

## A Simple, Elegant Solution

The internal geometry of Hydro-Brake® Flood is designed so that water can flow through it without restriction for as long as possible, minimising the upstream storage required. A self-activating vortex is created when the water reaches the pre-determined hydraulic head, holding back excess water, and releasing it at a controlled rate.

## Expert Design and Manufacture

Designing fluvial interventions, whether on a large or small scale, requires expert engineering and hydraulic modelling in line with the flood risk management strategy. Hydro International can support with detailed design using Computational Fluid Dynamics and structural design using Finite Element Analysis, scale testing and production of detailed design drawings and specifications.

Hydro-Brake® Flood vortex flow controls are manufactured in high-grade stainless steel to be structurally fit-for-purpose, using modern production and control methods to ensure the design and performance objectives are delivered.

## Low Impact, Minimal Maintenance

The Hydro-Brake® Flood has a large open area at all flow rates, resulting in a low risk of blockages. With no power or moving parts, the flow controls require minimal operational attention and maintenance.

## Future-Proofed

Hydro-Brake® Flood schemes can be designed to allow for future variances in fluvial flows. A facility for future adjustment to allow for climate change can be incorporated without necessitating new engineering or construction works.

## Monitoring

Flood alleviation at the fluvial level can be demonstrated to deliver a level of protection that is worth far more than the project costs. We can offer support and advice on post-installation monitoring of the value of the intervention.

## Case Studies



### Flood Prevention Scheme Protects 1,750 Properties in Glasgow

Glasgow City Council's £53 m White Cart Water Flood Prevention scheme protects 1,750 properties in the south of the city. Normally a shallow river, White Cart Water is prone to flash flooding. As little as twelve hours of rain can cause water levels to rise by six metres.

New manufacturing and installation techniques were developed as part of the project that saw the world's five largest-ever Hydro-Brake® Flood vortex flow controls installed in 3 dams in the highlands above the city. The final scheme controls flow rates and velocities up to a 1 in 200 year flood event, with a 45% maximum reduction in peak flows, holding back more than 2.5 billion litres of floodwater in upstream storage areas that make best use of the natural environment.



### Vortex Technology Protects Northallerton Homes and Businesses

In the North Yorkshire town of Northallerton, a £3.1 million flood alleviation scheme is using Hydro-Brake® Flood technology to protect 170 homes and businesses. Two large Hydro-Brake® Flood vortex flow controls were installed in refurbished culverts on town's outskirts.

They enable excess water to be held back in specially-built flood storage basins. Before the scheme was built, excess floodwaters could overtop the watercourse in the agricultural land on its approach to the culverts sending flows to cause flooding in the east of the town. Hydro International carefully-sized the flow controls to minimise upstream storage requirements.

## Hydro-Brake® Flood Selection Criteria

Suitability:	For rivers & watercourses; Flood storage reservoirs		
Flow Range (l/s)	Head Range (m)	Ability to match greenfield discharge rate	On-site water storage requirement
550 – 12,000 *	1.5 – 10 *	n/a	Low
Moving Parts?	External Power?	Risk of blockage?	
No	No	Very low	

\* higher flows and heads may be possible (contact Hydro International to discuss)

# Hydro-Brake® Optimum

The Hydro-Brake® Optimum is Hydro International's flagship passive flow control device and the most advanced vortex flow control available.

Hydro-Brake® Optimum is the only vortex flow control for which the head and discharge relationship can be fine-tuned to optimise your design. Designers can size a Hydro-Brake® Optimum to achieve the perfect hydraulic performance curve and engineer the best possible passive flow control performance.



Surface water management and SuDS



Combined drainage systems and CSOs



Watercourse flood prevention



Sewer network optimisation



Wastewater treatment plants



- ✓ No external energy source.
- ✓ No moving parts.
- ✓ Future-proof.
- ✓ Large outlet clearances prevent blockages.

## There is No Equivalent

Hydro-Brake® Optimum dispenses with the need to choose from a range of sizes and types and instead offers built-in flexibility to size each unit for absolute fit. Each Hydro-Brake Optimum® is individually-sized, so you achieve performance without compromise for every project.

## Maximise Storage Savings

The increased hydraulic efficiency of the Hydro-Brake® Optimum means you can reduce on-site storage by up to 15% than if an alternative vortex control is used. With reduced storage, you can lower construction and excavation costs as well as saving project time and overall land-use.

## Best Value for Every Project

Selecting the superior performance of Hydro-Brake® Optimum does not mean a higher cost for your project. On the contrary, because your upstream storage can be fine-tuned to achieve the smallest volumes, construction, excavation and material costs are reduced.

## Easy to Install

Hydro-Brake® Optimum comes with a range of installation options and accessories to make construction and installation as simple as possible.

## Setting the Standard

The Hydro-Brake® Optimum is the culmination of more than 35 years of research and development by Hydro International, and the company continues to take an international lead in vortex technology and expertise. Hydro-Brake® Optimum is the only vortex flow control to be independently certified by BBA and WRc.



## Minimal Maintenance

With up to 20% larger outlet clearances compared to other vortex devices, there is significantly less risk of blockage with a Hydro-Brake® Optimum. With no power source or moving parts, it offers minimal, predictable maintenance.

## Future-Proofed

Hydro-Brake® Optimum can be supplied with an adjustable inlet so flows can be altered by up to 40% post-installation, to allow for future changes in operating conditions, for example as a result of site expansion or climate change.

## Flow Control Chamber

A Hydro-Brake® Optimum flow control can be supplied prefitted in a precast reinforced concrete chamber. Custom options including high level emergency bypass, rodding pipe and removable units are also available.

## Case Studies



### Tight Fit for New Homes

Engineers challenged to solve a “tight fit” surface water management challenge on a West Yorkshire housing development used the Hydro-Brake® Optimum Design Tool to calculate a solution that optimised the limited pipe storage area. Using conventional flow control devices would have required more back up storage than would fit in the space available, but by using Hydro-Brake® Optimum flood protection measures, challenging discharge limits were met for a 1 in 100 year storm.



### ‘Optimum’ Savings for Developer with 21st Century Drainage

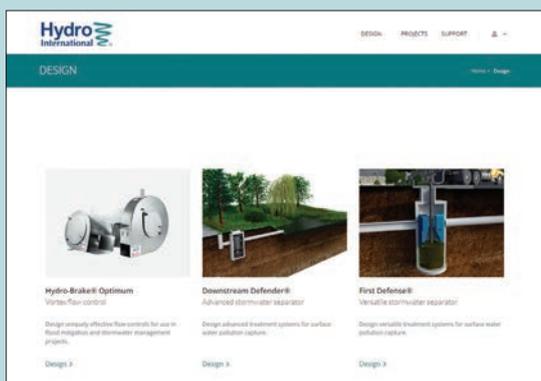
The first phase of Edinburgh City Council's 21st Century Homes project, the Gracemount development showcases sustainable construction. A major feature of the drainage solution is Hydro International's high performance Hydro-Brake Optimum® to control surface water which saved the developers over 30% in storage construction costs.

*Photo courtesy of Edinburgh City Council*

## Hydro-Brake® Optimum Selection Criteria

Suitability:	Most sites, from very low to very high flow rates		
Flow Range (l/s)	Head Range (m)	Ability to match greenfield discharge rate	On-site water storage requirement
0.7 – 550 *	0.4 – 4.0	Very good	Low
Moving Parts?	External Power?	Risk of blockage?	
No	No	Very low	

\* lower flows may be possible (contact Hydro International to discuss)



## Explore the Options with our Online Design Tool

Our online design tool is a sizing engine that gives you the flexibility to compare flow control design options, output detailed design drawings and hydraulic data and import the results into commercially-available hydraulic modelling software.

The tool also has the added options to size and design the First Defense® and Downstream Defender® stormwater treatment separators.

[hydro-int.design](https://hydro-int.design)

# Hydro-Brake® Agile

The Hydro-Brake® Agile flow control delivers precision engineering with best value for even the most constrained sites.

The Hydro-Brake® Agile flow control is a float-activated flow control that maintains a constant discharge to deliver precise performance over a wide range of heads. It is ideally suited to applications with constrained discharge requirements or where the flood storage area available through attenuation is very limited.



Surface water management and SuDS



Combined drainage systems and CSOs



Watercourse flood prevention



Sewer network optimisation



Wastewater treatment plants



- ✓ No external energy source.
- ✓ Rapid drain-down provides resilience to subsequent rainfall events.
- ✓ Future-proof – simple adjustments possible for future changes in operating conditions.
- ✓ Repeatable, predictable maintenance regime.

## Meet Stringent Discharge Consents

Designing flood storage, whether above or below ground, is dependent on the rate at which excess water can be controlled and discharged. The Hydro-Brake® Agile flow control is the only flow control design that achieves a constant rate of discharge and therefore the minimum possible upstream storage.

Whether controlling surface water on a housing development, or regulating flows in a wastewater treatment works, investment in a precision-engineered device can result in considerable savings in total project costs.

## Sustainable Solution

The Hydro-Brake® Agile flow control provides sustainable control of flood storage without the need for external power sources or control circuits. Simple adjustments can be made to future-proof the device to allow for climate change.

## Quality Manufacture

The Hydro-Brake® Agile flow control is precision-engineered using high-grade stainless steel with long-life, durable components and CE marked in accordance with the EU Machinery Directive (2006/42/EC). Manufactured in the UK, the flow control can be transported quickly to site to meet project timescales.

## Easy to Install and Maintain

During dry weather periods, and especially during the first flush of a storm, the outlet area is at its largest, reducing the risk of blockages.

In the event of a blockage, an integrated release mechanism can be operated from surface level, enabling the gate to be fully opened and returned to its operating position.

## Hydro-Brake® Agile Flow Control Chamber

The Hydro-Brake® Agile flow control can be supplied pre-fitted in a precast reinforced concrete chamber for quick and easy installation on site.

A range of outlet pipe sizes is also available to suit site requirements. Once lifted into position, the connecting pipework can be connected and a cover slab installed. To suit the location and invert required, the chamber depth can be easily varied with concrete rings.

## Example Solutions

### Constrained Space

For an urban in-fill housing project in a heavily-developed inner city area, the design team were keen to deliver an effective drainage strategy. However, there was limited space available, conflicting demands from new and existing services, and an existing drainage infrastructure with very limited capacity to accept additional flows.

Using a flow control that provided a near-constant discharge rate within the parameters of the available downstream capacity, the surface water was moved off-site as quickly and effectively as possible, enabling the on-site storage to be reduced to a level that could be accommodated in the heavily constrained space available.

### Constant Discharge

Providing temporary flood storage through attenuation was the solution to a known surface water flooding problem. A flow control was needed to limit flow to the existing drainage network, with the excess rainwater overflowing into an off-line attenuation tank. Implementation costs had to be kept to an absolute minimum or the project may not have been feasible. In addition, any surcharge to the upstream drainage network would have moved flooding to a different part of the catchment.

A constant discharge flow control was therefore used to pass forward an appropriate amount of flow at all times, minimising pressure on the upstream network and only putting floodwater into the attenuation structure when absolutely necessary.

## Hydro-Brake® Agile Selection Criteria

Suitability:	Constrained sites with stringent discharge consents		
Flow Range (l/s)	Head Range (m)	Ability to match greenfield discharge rate	On-site water storage requirement
4.5 – 100	0.4 – 2.4	Good	Very low
Moving Parts?	External Power?	Risk of blockage?	
Yes	No	Not suited to all sites	

# Hydro-Brake® Orifice

The Hydro-Brake® Orifice delivers cost-effective, precise, repeatable flow control and is suitable for unconstrained sites with generous discharge consents

The Hydro-Brake® Orifice is a precision-cut orifice plate flow control, available in a broad range of configurations. A low-cost, low-complexity flow control, it is the ideal choice where there is minimal limitation on space available for on-site flood storage and attenuation, or where there are generous discharge consents.



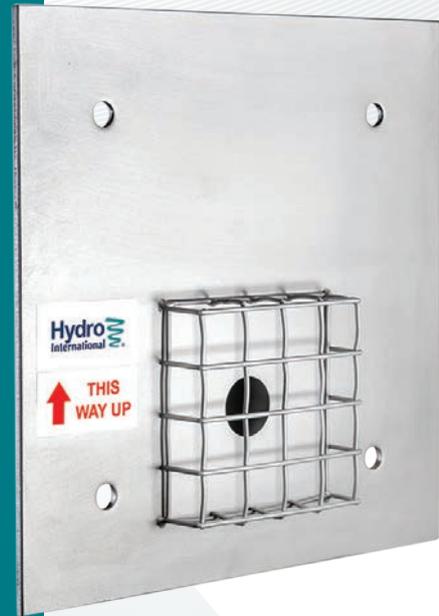
Surface water management and SuDS



Watercourse flood prevention



Sewer network optimisation



## Flexible and Versatile

Already trusted as part of Hydro International's family of precision-engineered flow control devices, the Hydro-Brake® Orifice can be designed and manufactured to meet a wide variety of configurations. With the Hydro-Brake® Orifice there is no need to compromise on your project needs.

## Configured for Each Site

Each Hydro-Brake® Orifice is manufactured to suit the precise hydraulic requirements specified for the application. Our experienced professional engineering team will work with you to understand the needs of your site and recommend the best solution.

A wide variety of configurations and mounting options is available, for example integrated mesh guards, curve mount, pipe inserts and slide- or pivot-mounts. Hydro International can advise on sizing and flow rates and recommend the best solution for your site.

## Quality Manufacture

The Hydro-Brake® Orifice is manufactured from high-grade stainless steel under strict Quality Assurance to the exacting methods and tolerances set out in the international standard BS EN ISO 5167-2: 2003.

## Simple to Install

The Hydro-Brake® Orifice is simple to install. It can also be supplied pre-fitted in a precast reinforced concrete chamber for 'plug-and-play' installation on site.

## Resilience by Design

The Hydro-Brake® Orifice can be supplied with integrated protection against the risk of blockages. Alternatively, the Hydro-Brake® Orifice can be mounted on moveable or removable structures to allow for manual intervention to drain the control chamber from surface level and clear any blockages that do occur.

## Hydro-Brake® Orifice Selection Criteria

Suitability:	Unconstrained sites with generous discharge consents		
Flow Range (l/s)	Head Range (m)	Ability to match greenfield discharge rate	On-site water storage requirement
2.5 – 100 *	0.25 – 2.0 *	Not suited to all sites	Unconstrained
Moving Parts?	External Power?	Risk of blockage?	
No	No	Not suited to all sites	

\* flows and heads may be possible outside of these ranges (contact Hydro International to discuss)

# Hydro-Brake® Flow Control Series Selection Guide

The Hydro-Brake® Flow Control Series is a versatile toolbox for surface water, fluvial, foul water, and sewer network flow control. No matter what the site and budget, every flow control offers the same precision-engineered performance.

Features	Hydro-Brake® Flood	Hydro-Brake® Optimum	Hydro-Brake® Agile	Hydro-Brake® Orifice
Suitability	For watercourses; Flood storage reservoirs	Most sites, from very low to very high flow rates	Constrained sites with stringent discharge consents	Unconstrained sites with generous discharge consents
Flow Range (l/s) *	550 – 12,000	0.7 – 550	4.5 – 100	2.5 – 100
Head Range (m) *	1.5 – 10	0.4 – 4.0	0.4 – 2.4	0.25 – 2.0
Ability to Match Greenfield Discharge Rate	n/a	Very good	Good	Not suited to all sites
Moving Parts	No	No	Yes	No
External Power Requirement	No	No	No	No
Constant Discharge	No	No	Yes	No
On-site Storage	Low	Low	Very low	Unconstrained
Risk of Blockage	Very low	Very low	Not suited to all sites	Not suited to all sites

\* flows and heads outside of these ranges may be possible (contact Hydro International to discuss)

## Expert Design Support

No matter how big or small the project, Hydro International's professional engineers are on hand to provide free support to designers and specifiers to aid with the correct selection and configuration of Hydro flow controls for each project design.

Our dedicated design support team advises on best-practice sizing, flow and storage calculations for the Hydro-Brake® Flow Control Series within your surface water, fluvial, sewer or wastewater plant design.

## Consultancy

Hydro International's Consultancy team is available for civil engineering, flood risk management and hydraulic system modelling for new and retrofit development, fluvial or wastewater treatment plant projects.

## Documentation

Our dedicated design support team can assist with the output of hydraulic data to support your system design and dimensioned installation drawings, as well as advising on successful integration with other Hydro International water treatment and storage products.

Call the Hydro-Brake® Hotline 01275 337937 or email [stormwater@hydro-int.com](mailto:stormwater@hydro-int.com).

For Flow Control  
Product and Design Advice:

---

Tel: 01275 337937

Email: [stormwater@hydro-int.com](mailto:stormwater@hydro-int.com)

**Hydro-Brake<sup>®</sup> Flow Control Series**

---

Shearwater House  
Clevedon Hall Estate  
Victoria Road, Clevedon  
BS21 7RD

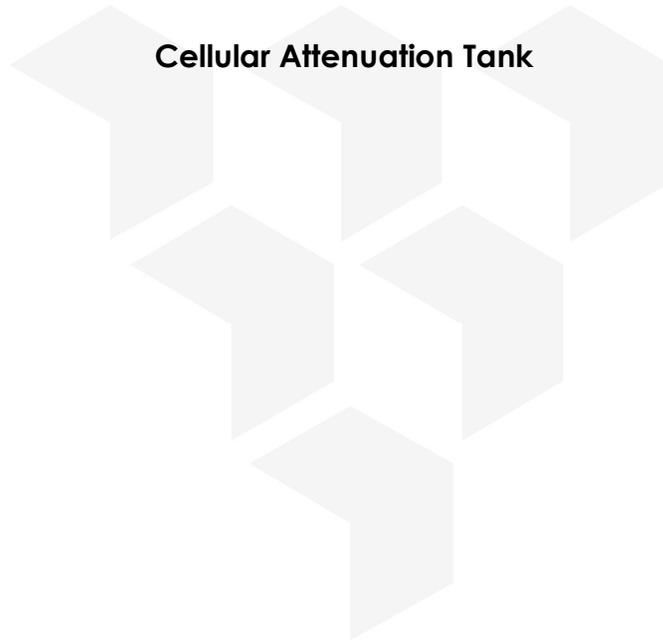
Tel: **01275 878371**  
Fax: **01275 874979**

[hydro-int.com](http://hydro-int.com)

Turning Water Around...<sup>®</sup>

## **Appendix B**

### **Cellular Attenuation Tank**



## Wavin UK (Holdings) Ltd

Crow Edge  
Hazlehead  
Sheffield  
South Yorkshire S36 4HG  
Tel: 01709 856300 Fax: 01709 856301  
e-mail: info@wavin.co.uk  
website: www.intesio.co.uk



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](http://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.*

British Board of Agrément  
Bucknalls Lane  
Garston, Watford  
Herts WD25 9BA

©2010

tel: 01923 665300  
fax: 01923 665301  
e-mail: [mail@bba.star.co.uk](mailto:mail@bba.star.co.uk)  
website: [www.bbacerts.co.uk](http://www.bbacerts.co.uk)

# 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 <sup>(1)(2)</sup> to 3.6.5 <sup>(1)(2)</sup> . 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.

## 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

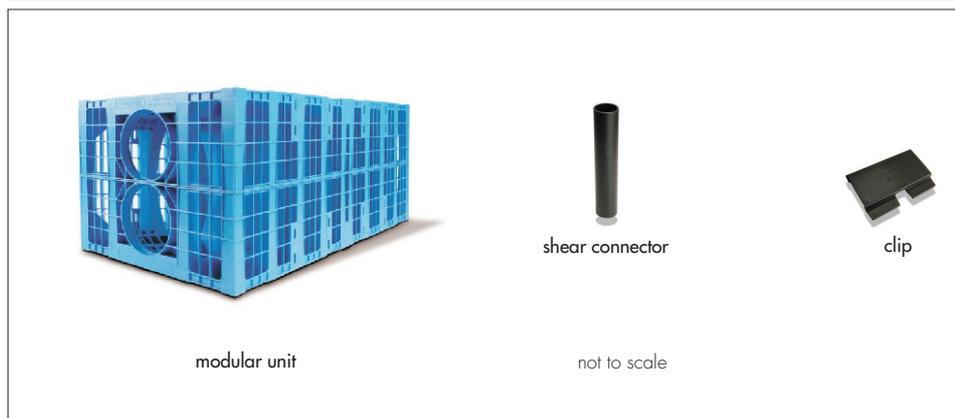
Element (Unit)	Value
Dimensions (nominal) (l x w x h) (mm)	1000 x 500 x 400
Volume (nominal) (m <sup>3</sup> )	0.20
Storage volume (nominal) (m <sup>3</sup> )	0.19
Porosity (void ratio) (%)	95
Ultimate compressive strength at yield (kN·m <sup>-2</sup> )	
– vertical loading on top face	650
– lateral loading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

(1) Applied load.

(2) At up to 20 years at 20°C at 232 kN·m<sup>-2</sup> 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 m<sup>2</sup> 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:

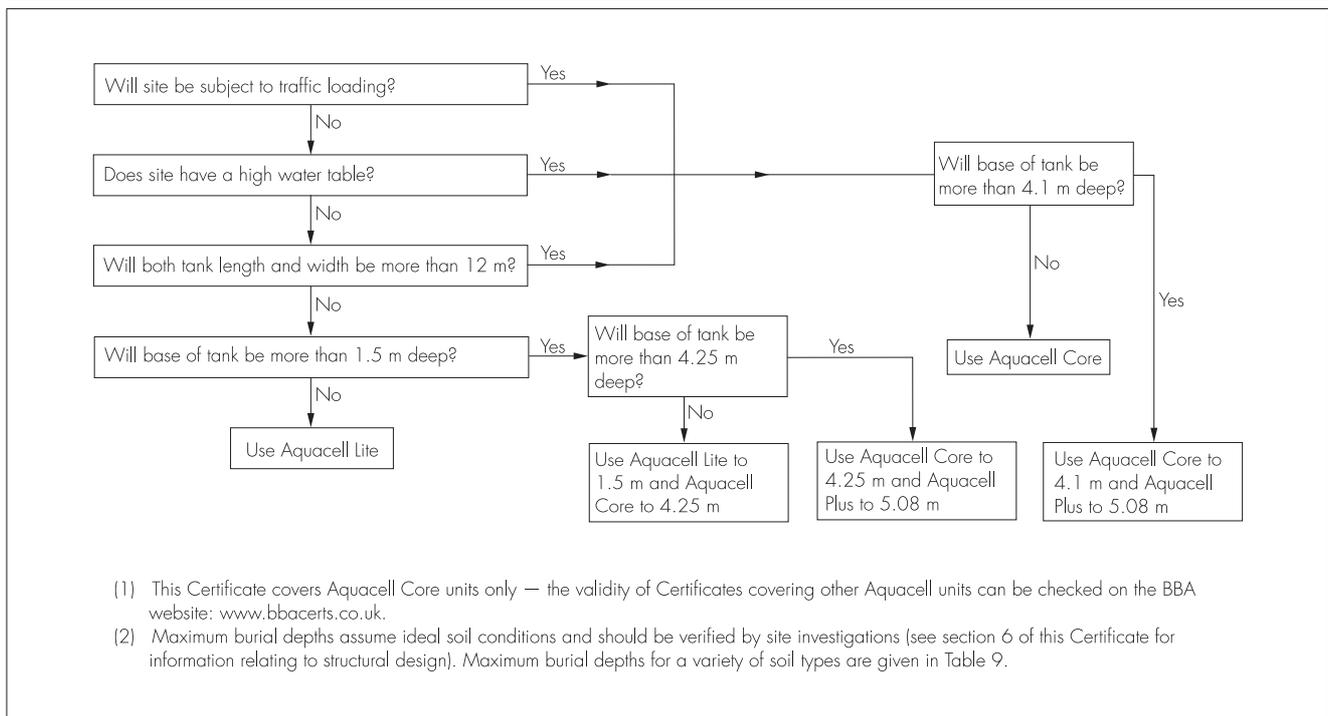
- Infiltration — water is collected in the units during rainfall and allowed to drain away by soaking into the surrounding ground over a period of time
- Attenuation — water is collected in the units during rainfall and released at a reduced flow rate through a flow control device into an appropriate 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<sup>(1) (2)</sup>



**Table 2 Design information checklist**

Description	Information source
<b>A Existing factors</b>	
Topography	Site survey or inspection
Area of catchment <sup>(1)</sup>	Site survey
Hydrology of catchment	Site inspection and observations
Soil type <sup>(1)</sup>	Site investigation
Structural properties of soil – CBR, stiffness	Site investigation and laboratory testing
Infiltration potential of soil	Site investigation
Contamination <sup>(1)</sup>	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>B Predicted factors</b>	
Development type and land use	Proposed development plans
Traffic loads	Proposed development plans
Rainfall data <sup>(1)</sup>	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.
<b>C Planned function</b>	
Infiltration	Conclusions from <b>A</b> and <b>B</b> audit/review
Attenuation	Conclusions from <b>A</b> and <b>B</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 m<sup>2</sup>, 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<sup>(1)</sup>.

(1) Technical Handbook (Domestic).

**Table 3 Design parameters for single-house roof soakaway**

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

(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 <sup>3</sup> )	Side area (m <sup>2</sup> )	Base area (m <sup>2</sup> )
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 <sup>3</sup> )	Side (m <sup>2</sup> )	Base (m <sup>2</sup> )	Vol (m <sup>3</sup> )	Side (m <sup>2</sup> )	Base (m <sup>2</sup> )	Vol (m <sup>3</sup> )	Side (m <sup>2</sup> )	Base (m <sup>2</sup> )
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 m<sup>3</sup> and the side area 1.6 by 40 = 64 m<sup>2</sup>.

#### 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

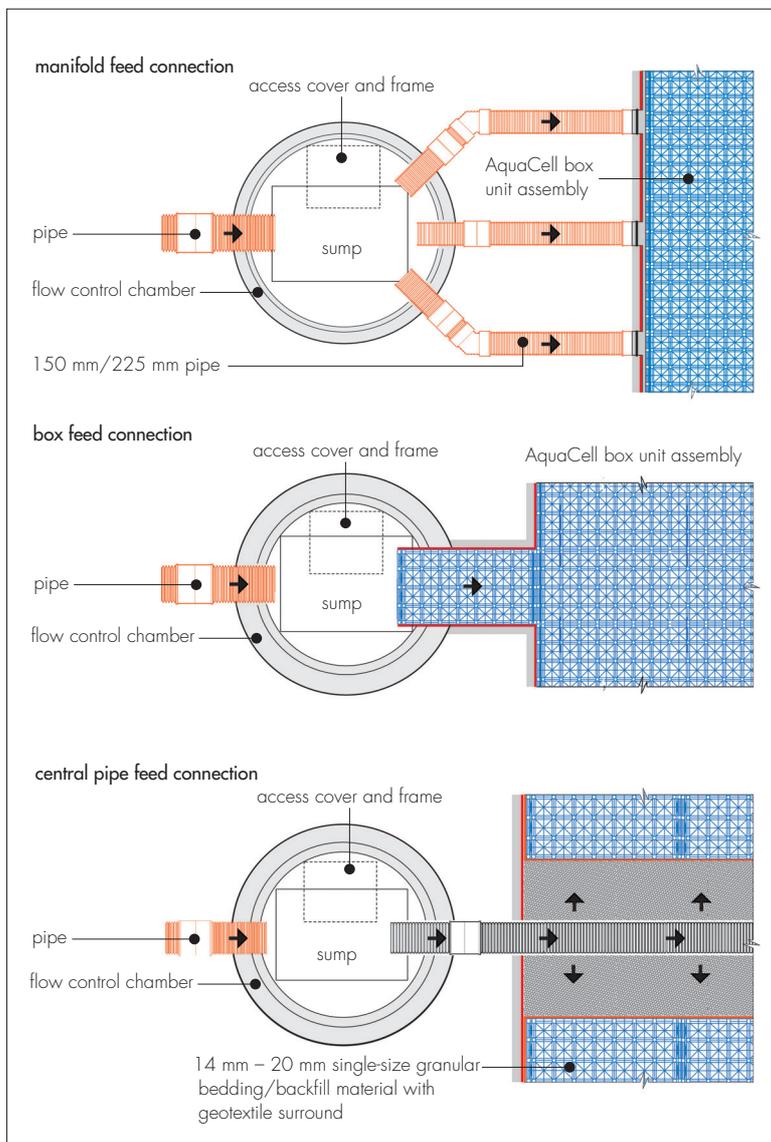


Table 6 Multiple manifolds

Surface type	Drainage area (m <sup>2</sup> )					
	Number of inlet pipes					
	1	2	3	4	5	6
Paved area	1110	2220	3330	4440	5550	6660
Roof area <sup>(1)</sup>	841	1682	2523	3364	4205	5046
Roof area <sup>(2)</sup>	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  $20^\circ\text{C}$ . 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 <sup>(1)</sup> (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  $29^\circ$ . 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)*

$\phi$ <sup>(1)(2)</sup>	Maximum depth of installation (to base of unit) (m)		
	Non-trafficked area	Trafficked area	
		Cars <sup>(3)</sup>	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  $\phi$ .

(2) The design is very sensitive to small changes in the assumed value of  $\phi$ , 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<sup>(1)</sup>*

Design load case	Minimum cover depth <sup>(1)</sup> (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 <sup>(2)</sup>

(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<sup>(1)</sup>, and are not recommended for use with the AquaCell Plus system<sup>(2)</sup>. 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)	$\pm$ 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 ( $\text{m}^3\cdot\text{m}^{-2}\cdot\text{s}^{-1}\cdot\text{atm}^{-1}$ )	$0.8 \times 10^{-9}$	BRE
Permeability coefficient	$1.8 \times 10^{-12}$	
Application temperature (°C)	>4	

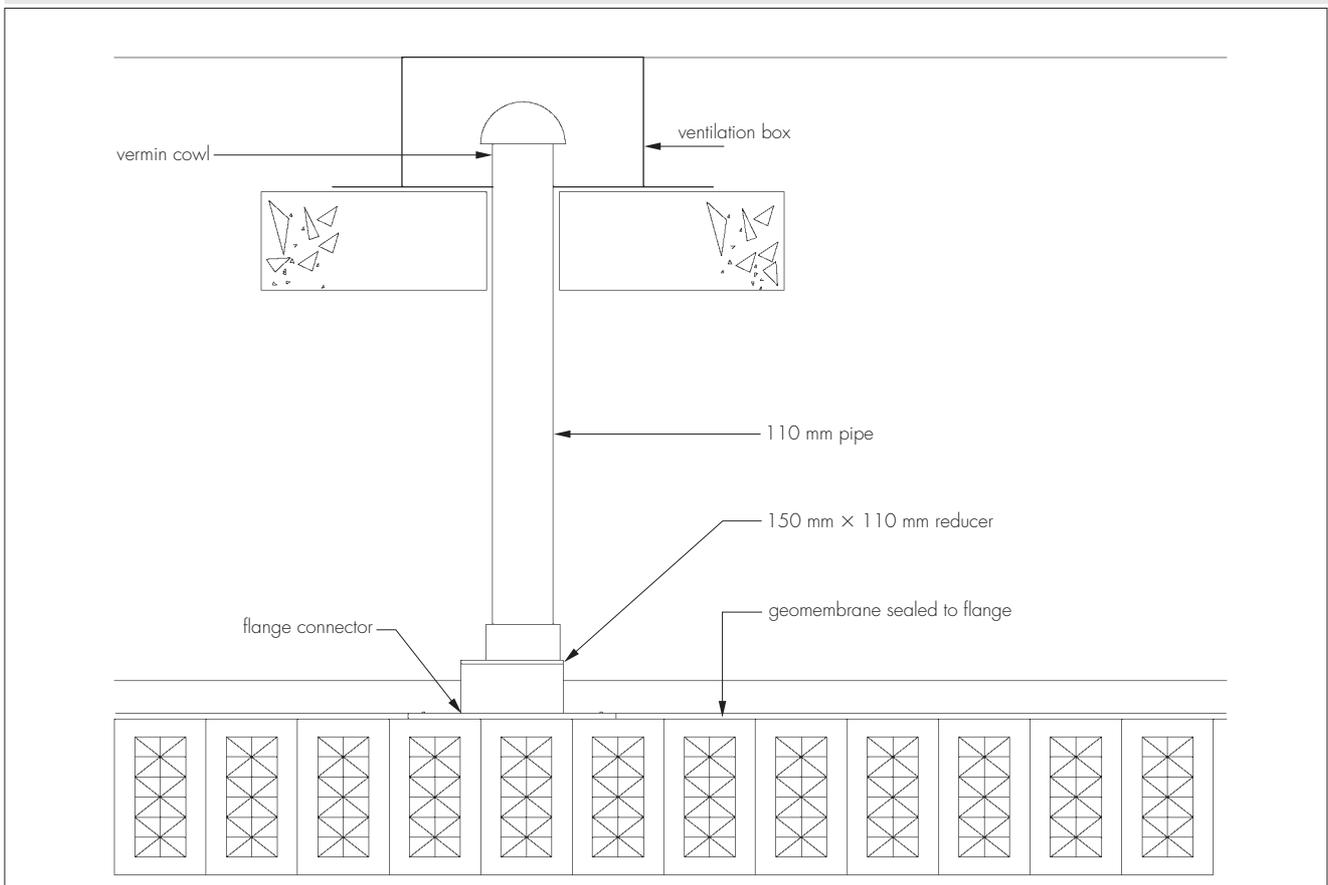
7.7 To ensure total impermeability, joints between adjacent sheets of impermeable geomembranes should be sealed correctly using proprietary welding techniques. The integrity of joints should be demonstrated by non-destructive testing<sup>(1)</sup>.  
 (1) Advice on seam testing is given in CIRIA SP124 *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 m<sup>2</sup> 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.

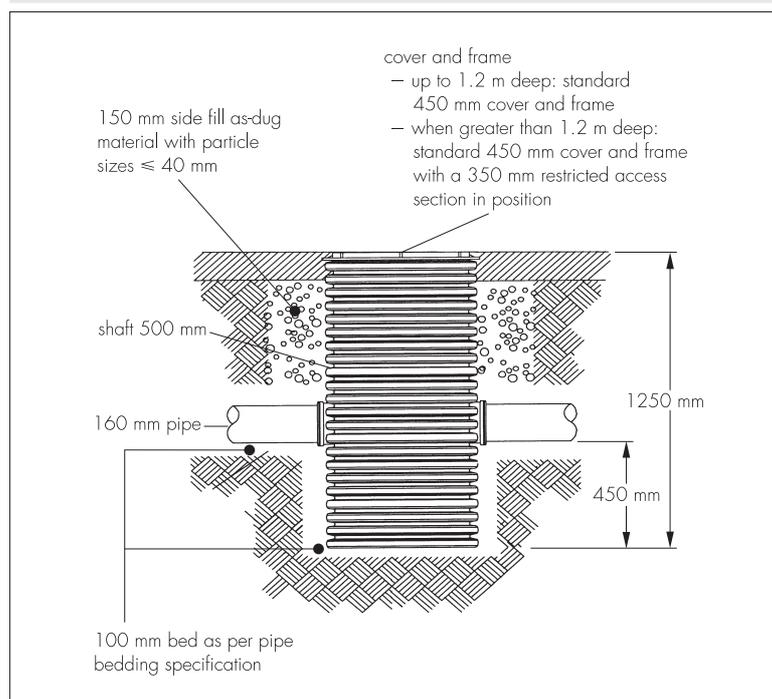
10.3 For large installations or where the receiving waters are environmentally sensitive, a system of regular inspections should be established to prevent the accumulation of silt in the system which, if allowed to develop, would reduce effectiveness. They should also be inspected after every major storm 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



---

## TABLE OF CONTENTS

1	GENERAL.....	3
2	INSTALLATION .....	4
2.1	GA-1 control unit .....	4
2.2	GA-SG1 sensor.....	5
2.3	Installation Accessories .....	5
3	OPERATION.....	6
3.1	Modes of operation .....	6
4	TROUBLE-SHOOTING .....	8
5	REPAIR AND SERVICE .....	9
6	SAFETY INSTRUCTIONS.....	9
7	TECHNICAL DATA.....	10

## 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.

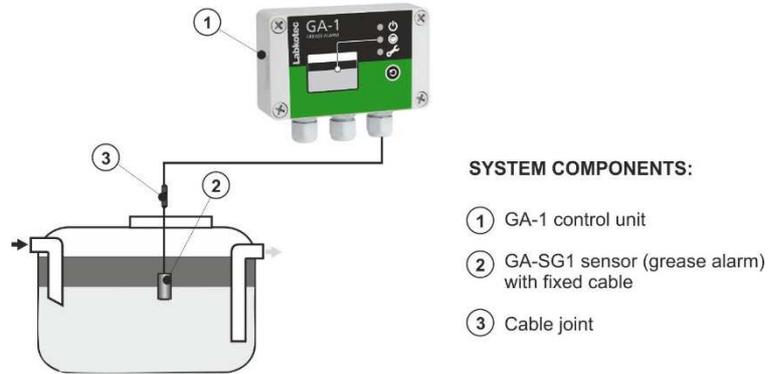


Figure 1. Grease separator supervision with GA-1 alarm device

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.

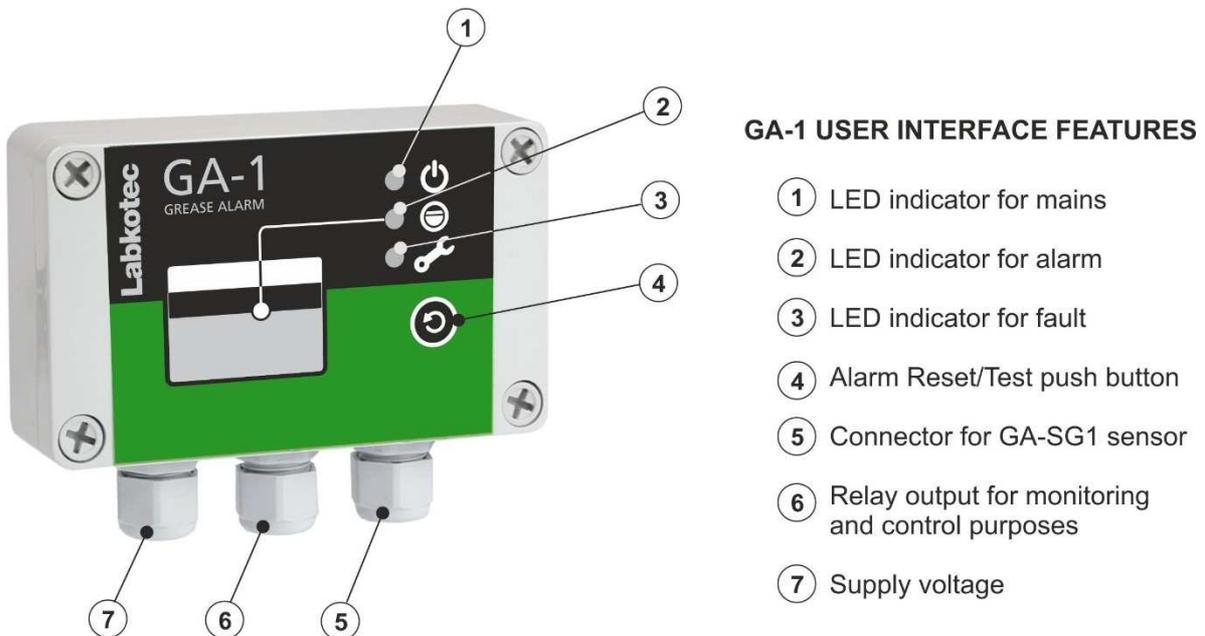


Figure 2. GA-1 control unit – features

## 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!

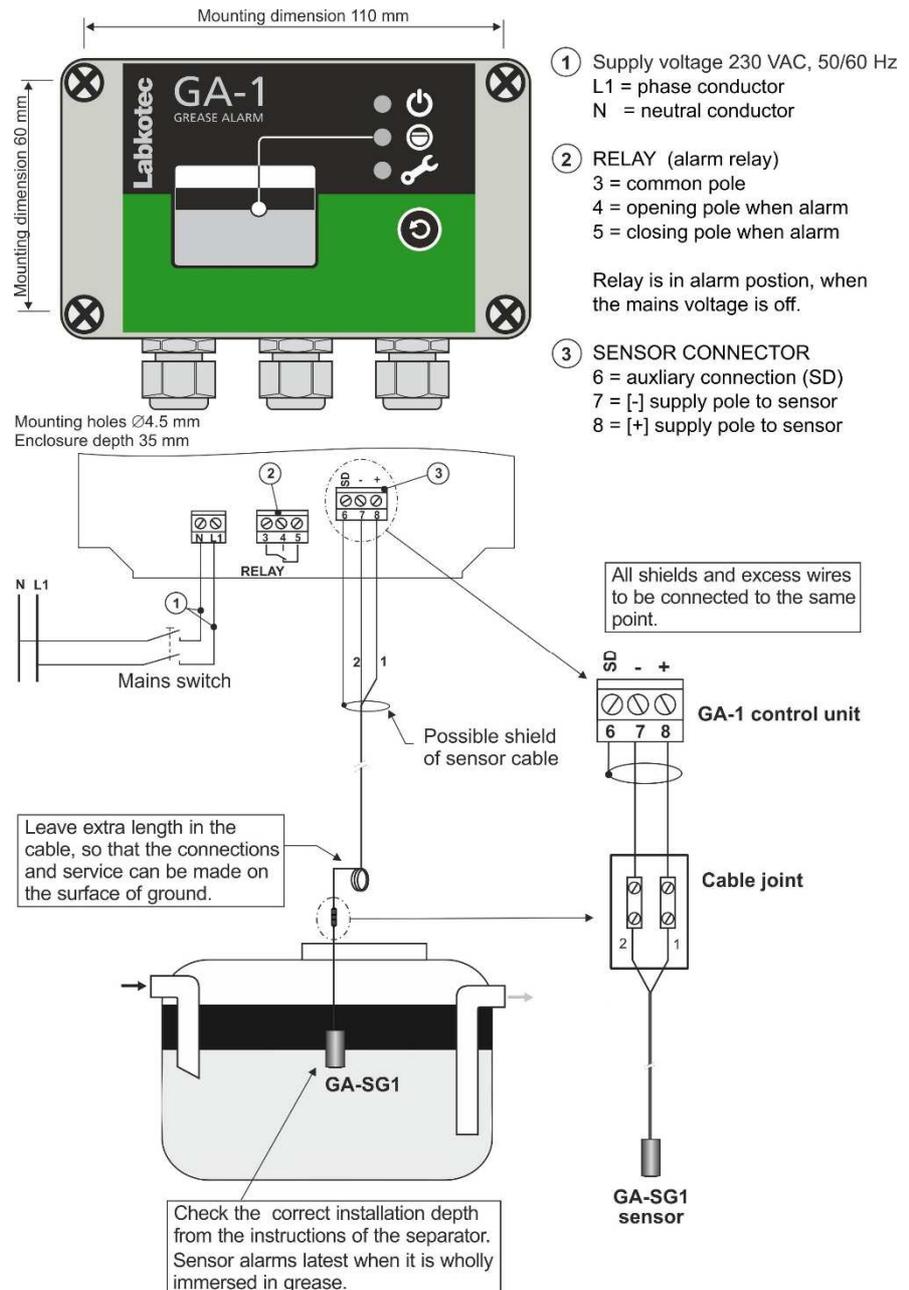


Figure 3. GA-1 alarm device installation.

## 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 <sup>2</sup> . 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	GAxxxxxYY where YY = manufacturing year (e.g. 14 = 2014)

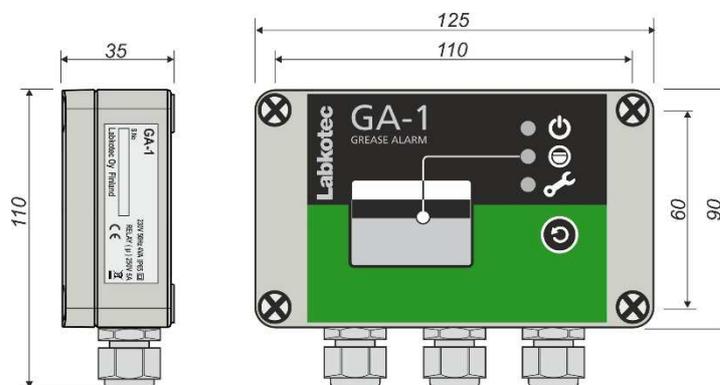


Figure 7. GA-1 control unit

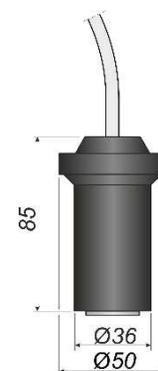
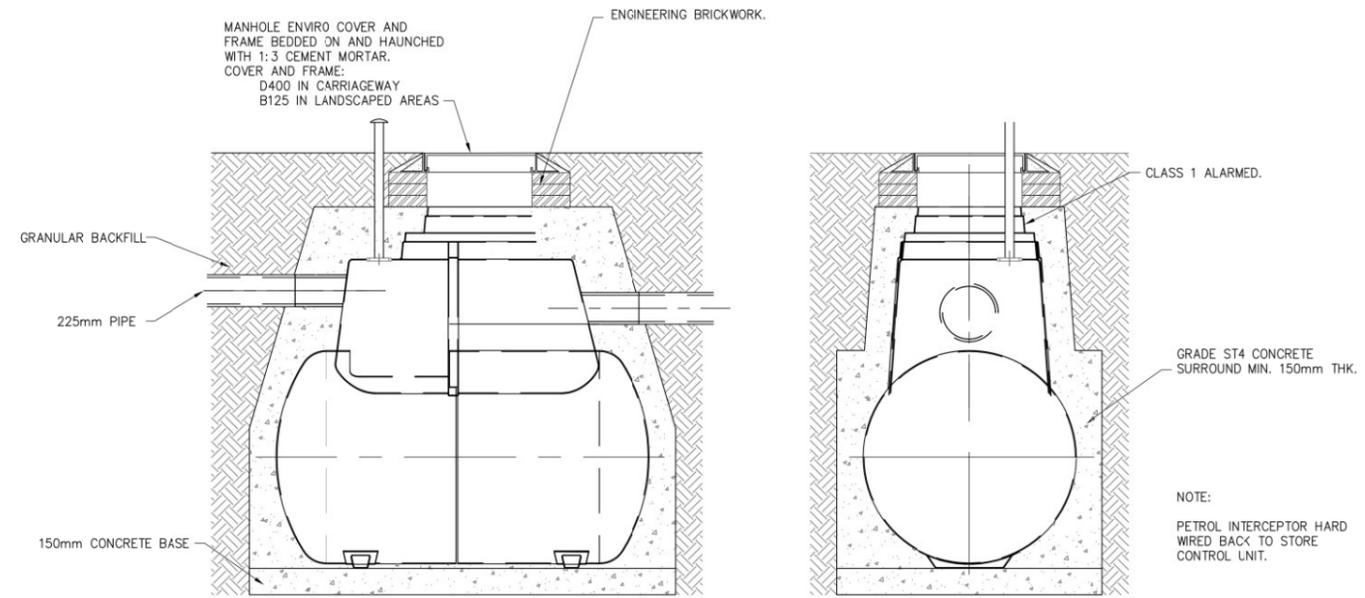
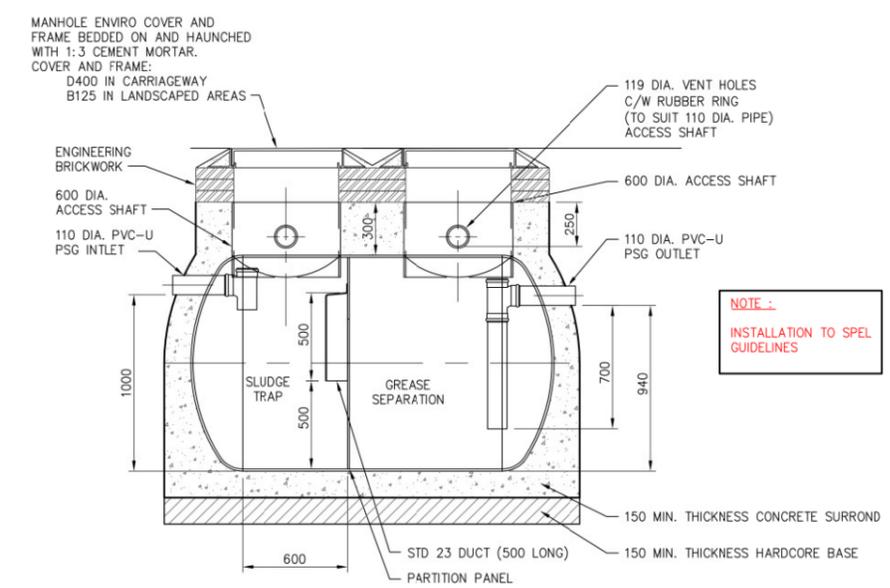


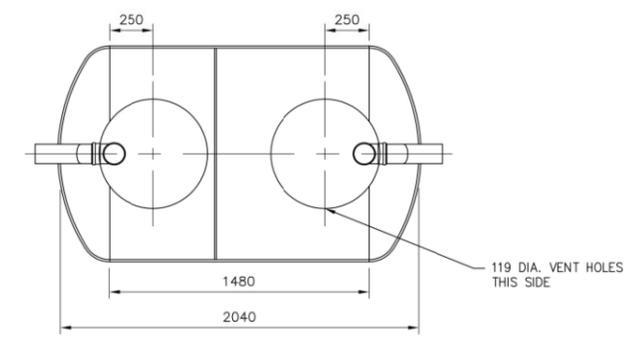
Figure 8. GA-SG1 sensor



**SPEL 206 C1 PETROL INTERCEPTOR (OR SIMILAR APPROVED). CONCRETE SURROUND**  
 Scale 1:20



**SECTION**



**PLAN**

**2000L SPEL GREASE INTERCEPTOR WITH TELEMTRY ALARM**  
 SCALE 1:20

**FOR INFORMATION ONLY**

Rev.	Description	Date	Chkd

**Glanville**  
 3 Grovelands Business Centre  
 Boundary Way  
 Hemel Hempstead, Herts. HP2 7TE  
 Tel: (01442) 835999 Fax: (01442) 258924  
 postbox@glanvillegroup.com www.glanvillegroup.com

Client: RESTAURANT

Project: MCDONALD'S RESTAURANT

Title: **PROPOSED GREASE TRAP & PETROL INTERCEPTOR**

Project Engineer: J.H. Scale: AS SHOWN  
 Project Director: J.B. Date: APR' 2014  
 Status: INFORMATION

## 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:**

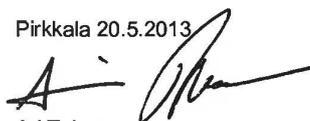
EN 61010-1 (2010) Safety requirements for electrical equipment for measurement, control and laboratory use. Part 1: General requirements.

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**  
**Maintenance Schedule**



**Inspection Log - Year .....sheet 1 of 2**

<b>Inspection Date</b>	<b>A - Surface Water Catchpit Manholes</b>	<b>B - Foul Water Manholes</b>	<b>C - Gulley</b>	<b>D - Channel Outlets</b>	<b>E – Surface Water Treatment</b>	<b>F – Surface Water Flow Control Chamber</b>	<b>G – Cellular Attenuation Tank</b>	<b>H - Grease Trap</b>	<b>J – Foul Pumping Chamber</b>	<b>Comments</b>
<b>January</b>										
<b>February</b>										
<b>March</b>										
<b>April</b>										
<b>May</b>										
<b>June</b>										

**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	B - Foul Water Manholes	C - Gulley	D - Channel Outlets	E - Surface Water Treatment	F - Surface Water Flow Control Chamber	G - Cellular Attenuation Tank	H - Grease Trap	J - Foul Pumping Chamber	Comments
<b>July</b>										
<b>August</b>										
<b>September</b>										
<b>October</b>										
<b>November</b>										
<b>December</b>										

**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.



Hertfordshire

Oxfordshire

Cambridgeshire

Bristol

[postbox@glanvillegroup.com](mailto:postbox@glanvillegroup.com) | [www.glanvillegroup.com](http://www.glanvillegroup.com)



Glanville Consultants Ltd, Registered office: 3 Grovelands Business Centre,  
Boundary Way, Hemel Hempstead, Hertfordshire, HP2 7TE

