



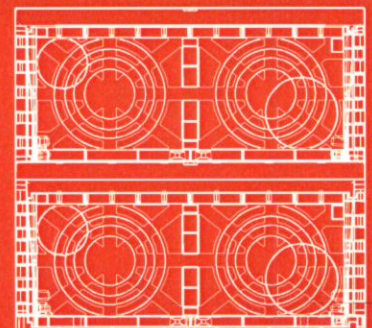
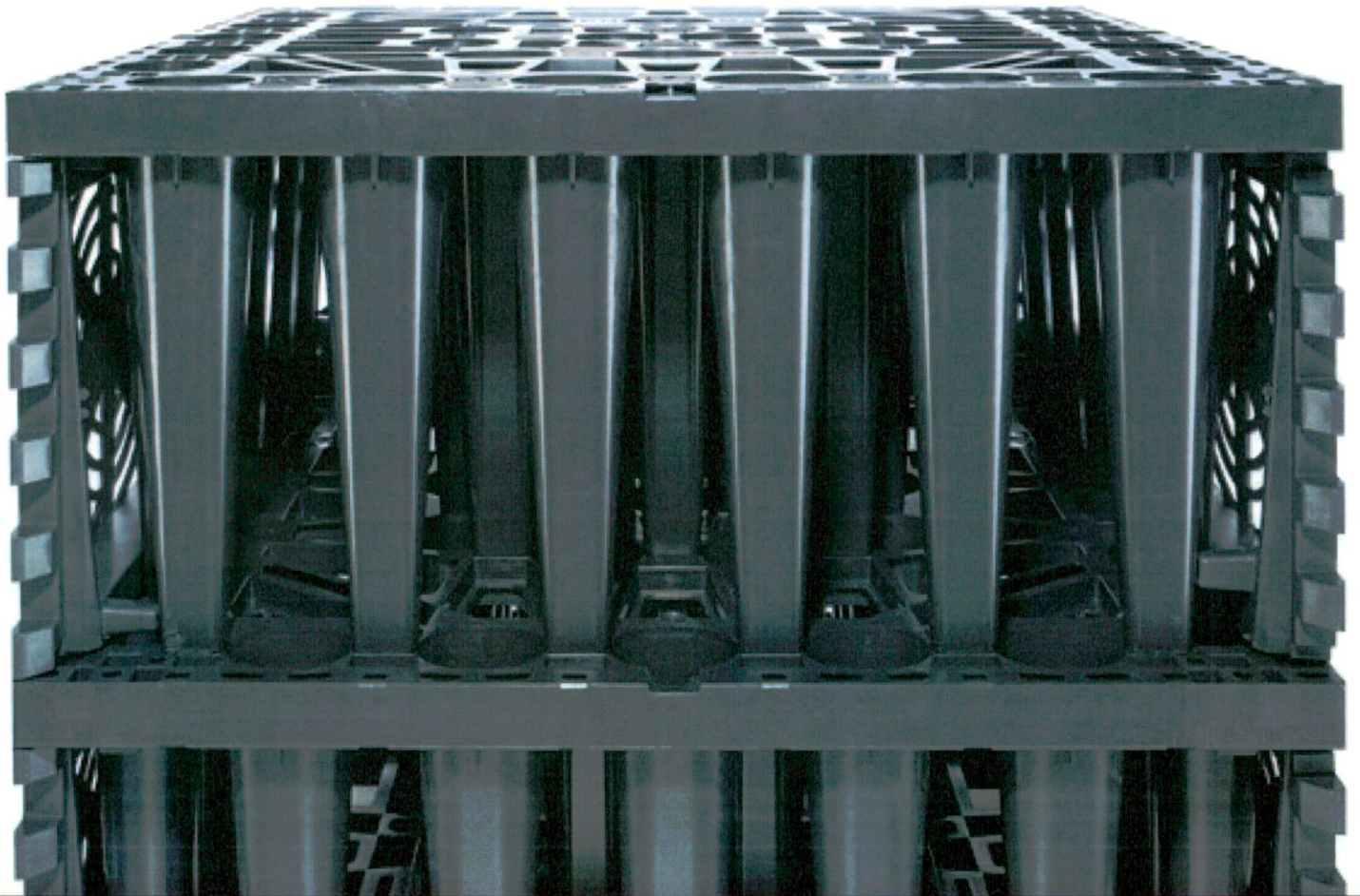
## 10 APPENDIX B – GRAFF ECO BLOCK SYSTEM AND PERMEABLE TARMAC







# EcoBloc System Stormwater management







Production site in Dachstein (France)

Production site in Teningen (Germany) near Freiburg

## GRAF – Setting standards in quality

Otto Graf GmbH has been supplying high-quality plastic products to its customers for 50 years. In 1974, GRAF developed its first pioneering range of rainwater harvesting products. Today we are market leader in numerous countries for Rainwater Harvesting Systems.

### High Quality Manufacturing

Graf continuously invests in the expansion of its headquarters in Teningen, near Freiburg (Breisgau). The facility has now an approximate area of 155,000 m<sup>2</sup> and is one of the most modern production facilities for plastic products in the world. Our choice of Germany for the new production site was easy. On the one hand, we feel an obligation to the site because of our history. On the other, we would like to offer our customers products of the highest quality.

### Where quality comes first

To ensure consistent high product quality, you need optimised production processes and outstanding quality management. Every individual tank at the new production site in Teningen is checked for dimensional accuracy, wall thickness and weight. All production parameters, e.g. material composition, machine settings and the staff involved in the production process, are documented for each individual product.

### Our goal: your satisfaction

More than 100,000 satisfied customers already benefit from the advantages of GRAF products.



Manufacturing certified according to ISO 9001



Manufacturing certified according to ISO 50001



## Internationally proven: GRAF infiltration technology



Warehouse, Kent (UK)



Housing development, Singapur (SG)



Energy supplier, Warwick (UK)



Daycare centre, Lörrach (DE)



University of Agriculture, Prague (CZ)



Industrial building, Tumelstham (AT)



# EcoBloc Stormwater management system

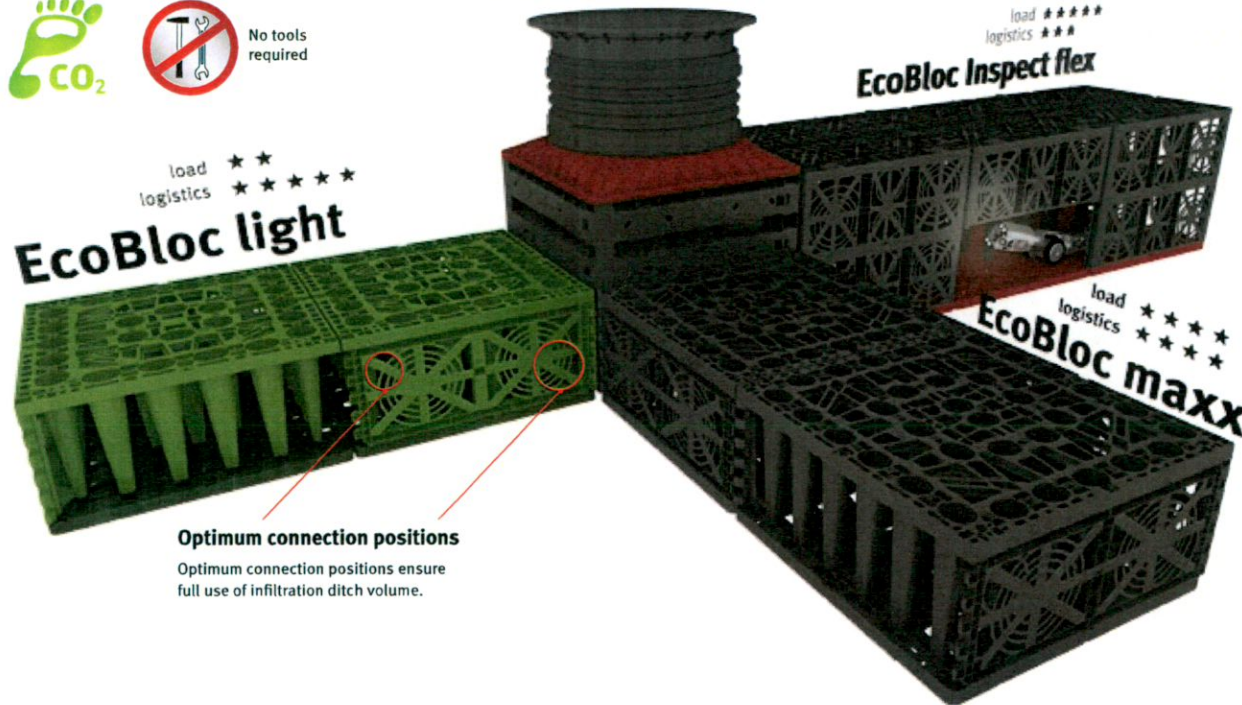


## Various applications

- ✓ Rainwater infiltration
- ✓ Stormwater attenuation
- ✓ Rainwater harvesting



No tools required



### Optimum connection positions

Optimum connection positions ensure full use of infiltration ditch volume.

## Fully integrated shaft

The Vario 800 flex shaft system (page 12) can be directly installed in an EcoBloc infiltration or infiltration/attenuation system. The connection surfaces of the inspection channels in the Vario 800 flex shaft system are accurately matched to the EcoBloc system.

## Lorry-bearing up to 60 tons

The GRAF EcoBloc Inspect flex has a heavy-duty lorry-bearing capacity of 60 tons with an 800 mm (2' 7.5") earth covering.



## High pressure jetting possible

GRAF EcoBloc Inspect flex can easily resist high pressure jetting.



## Easy to inspect

The standard inspection channel allows the entire infiltration/attenuation system to be monitored effectively. The EcoBloc Inspect flex allows access by commercially available inspection cameras. This has been confirmed by several independent testing authorities.



## High storage volume

GRAF infiltration modules have three times the storage volume of a standard gravel infiltration ditch. One module therefore takes the place of around 1300 kg (1.4 tons) of gravel or a 50 m (164') drainage pipe. Since you don't have to excavate so much soil and enjoy great value for money compared with a standard gravel infiltration ditch, the GRAF modules save you hard-earned cash!



## Service life of over 50 years

A durable product design ensures sustainability. The GRAF EcoBloc system and the Vario 800 flex shaft system is designed for a service life of over 50 years.

## Easy to install

The modules are fitted simply, at speed and in various ways. They can be installed without heavy machinery – one EcoBloc Inspect flex module weighs just 8 kg (17.6 lbs), even only 7 kg (15.4 lbs) for one EcoBloc light

## Up to 97 % reservoir volume

The GRAF EcoBloc light has a gross volume of 225 litres (59.4 US gal.) and a reservoir volume of 219 litres (57.9 US gal.). With a reservoir volume in excess up to 97%, it is a market-leading product. The EcoBloc variants maxx and Inspect flex still offer a reservoir coefficient of 96% despite their high load-bearing capacity.

## Installation depth of up to 5 metres (16' 4.8")

Even under very heavy loads, GRAF EcoBloc Inspect flex modules can be installed at a depth of up to 5 metres (16' 4.8"). This means that up to 14 layers are possible. Please consult GRAF when the installation depth is greater than 5 metres.

## GRAF EcoBloc Configurator

Please ask your GRAF sales consultant for your login account information to the GRAF EcoBloc Configurator.



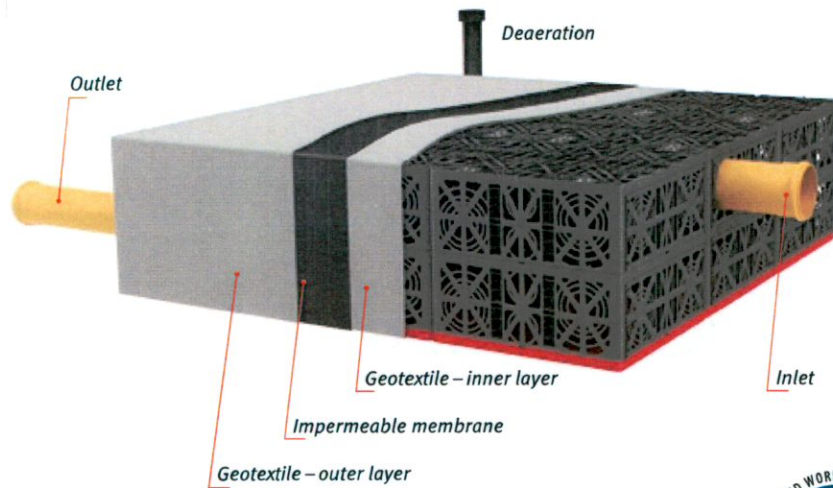


## Stormwater attenuation

The controlled discharge of rainwater is increasingly important during heavy rain. The GRAF EcoBloc modules can

be also surrounded by an impermeable membrane, which prevents water from escaping from the system unchecked.

Restricted outflow allows the water to be discharged into the sewage system in a controlled manner.

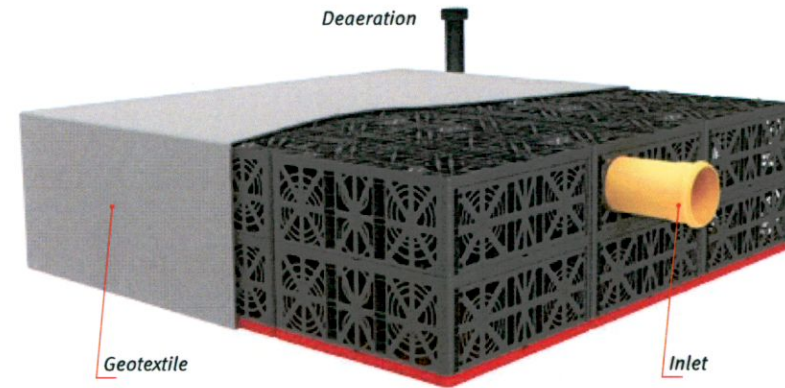


## Rainwater infiltration

Local infiltration of rainwater is gaining in importance. As we cover over more and more ground with concrete, we are interrupting the natural water

cycle. The GRAF EcoBloc modules combine environmental management of rainwater with the opportunity to protect against flooding. It stores rainwater

and gradually releases it back into groundwater reserves.



### 1. Stackable

To save space during transport, the EcoBloc maxx and EcoBloc light modules are stacked into each other. This minimizes transport costs, storage space in stock and CO<sub>2</sub> emissions.

### 2. Easy installation

The EcoBloc base plate forms the foundations of each EcoBloc system. Up to 14 EcoBloc modules can be fitted on one base plate.



### 3. Ready

The side faces are sealed with EcoBloc end plates. The EcoBloc system can be adapted to match individual requirements.

## Eco-friendly product – green logistics

One lorry can transport up to 2700 EcoBloc light units. That corresponds to a volume of 610 m<sup>3</sup> (161,145 US gal.). This reduces carbon emissions during transport by 85 %!



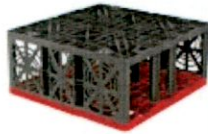


# The system at a glance



## EcoBloc Inspect flex

- Lorry-bearing 60 tons/HS-25
- 150 m<sup>3</sup> (39,625 US gal.)/Truck
- Inspectable
- High pressure jetting possible



Load ★★★★★  
Logistics ★★★



## EcoBloc Inspect flex

DN 100 (4")/150 (6")/200 (8") connecting surfaces

Volume	Length	Width	Height	Weight	Colour	Order no.
205 l (54.2 US gal.)	800 mm (2' 7.5")	800 mm (2' 7.5")	320 mm (12.6")	8 kg (17.6 lbs)	grey	402005

Q Webcode G4107



## EcoBloc Inspect flex base plate

Forms the foundation of the EcoBloc Inspect flex system

Volume	Length	Width	Height	Weight	Colour	Order no.
25 l (6.6 US gal.)	800 mm (2' 7.5")	800 mm (2' 7.5")	40 mm (1.6")	4 kg (8.8 lbs)	grey	402006

## EcoBloc Inspect flex end plates

The front ends of an EcoBloc Inspect flex system are sealed by end plates with DN 100 (4")/150 (6")/200 (8") contact surfaces

Item	Colour	Order no.
EcoBloc Inspect flex end plates (Set 2 units)	grey	402002

## EcoBloc maxx

- Lorry-bearing 40 tons/HS-20
- 410 m<sup>3</sup> (108,310 US gal.)/Truck



Load ★★★★★  
Logistics ★★★★★

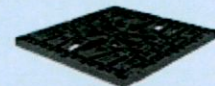


## EcoBloc maxx

Connecting surfaces on EcoBloc maxx end plates

Volume	Length	Width	Height	Weight	Colour	Order no.
225 l (59.4 US gal.)	800 mm (2' 7.5")	800 mm (2' 7.5")	350 mm (13.8")	9 kg (19.8 lbs)	grey	402200

Q Webcode G4108



## EcoBloc maxx base plate

Forms the foundation of the EcoBloc maxx system

Volume	Length	Width	Height	Weight	Colour	Order no.
25 l (6.6 US gal.)	800 mm (2' 7.5")	800 mm (2' 7.5")	40 mm (1.6")	4 kg (8.8 lbs)	grey	402201

## EcoBloc maxx end plates

The outside surface of an EcoBloc maxx system is sealed by end plates with contact surfaces DN 100 (4")/150 (6")/200 (8")/250 (10")

Item	Colour	Order no.
EcoBloc maxx end plates (Set 2 units)	grey	402203

## EcoBloc light

- Lorry-bearing 12 tons
- 610 m<sup>3</sup> (161,145 US gal.)/Truck



Load ★★  
Logistics ★★★★★

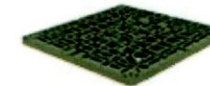


## EcoBloc light

Connecting surfaces on EcoBloc light end plates

Volume	Length	Width	Height	Weight	Colour	Order no.
225 l (59.4 US gal.)	800 mm (2' 7.5")	800 mm (2' 7.5")	350 mm (13.8")	7 kg (15.4 lbs)	green	402300

Q Webcode G4109



## EcoBloc light base plate

Forms the foundation of the EcoBloc light system

Volume	Length	Width	Height	Weight	Colour	Order no.
25 l (6.6 US gal.)	800 mm (2' 7.5")	800 mm (2' 7.5")	40 mm (1.6")	4 kg (8.8 lbs)	green	402301

## EcoBloc light end plates

The outside surface of an EcoBloc light system is sealed by end plates with contact surfaces DN 100 (4")/150 (6")/200 (8")/250 (10")

Item	Colour	Order no.
EcoBloc light end plates (Set 2 units)	green	402303

## EcoBloc System accessories

### EcoBloc connectors

For horizontal connection

Order no. 402015	Set 10 units
Order no. 402018	Set 25 units
Order no. 402020	Set 50 units
Order no. 402025	Set 200 units



### Deaeration end

DN 100 (4")

Order no. 369017



### Adaptor plate

Order no. 402030	DN 300 (12")
Order no. 402031	DN 400 (16")
Order no. 402032	DN 500 (20")



### GRAF-Tex geotextile

size of 2.50 x 2.50 m (8' 2.4" x 8' 2.4")

Order no. 231006

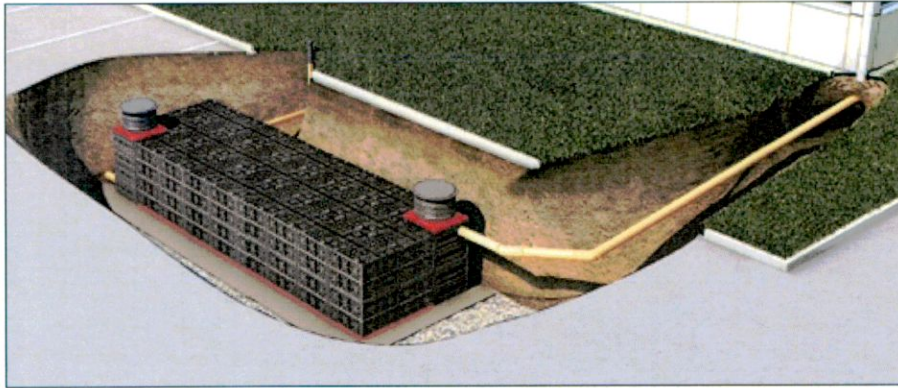


Sold by the metre, roll width 5 m (16' 4.8")

Order no. 231002



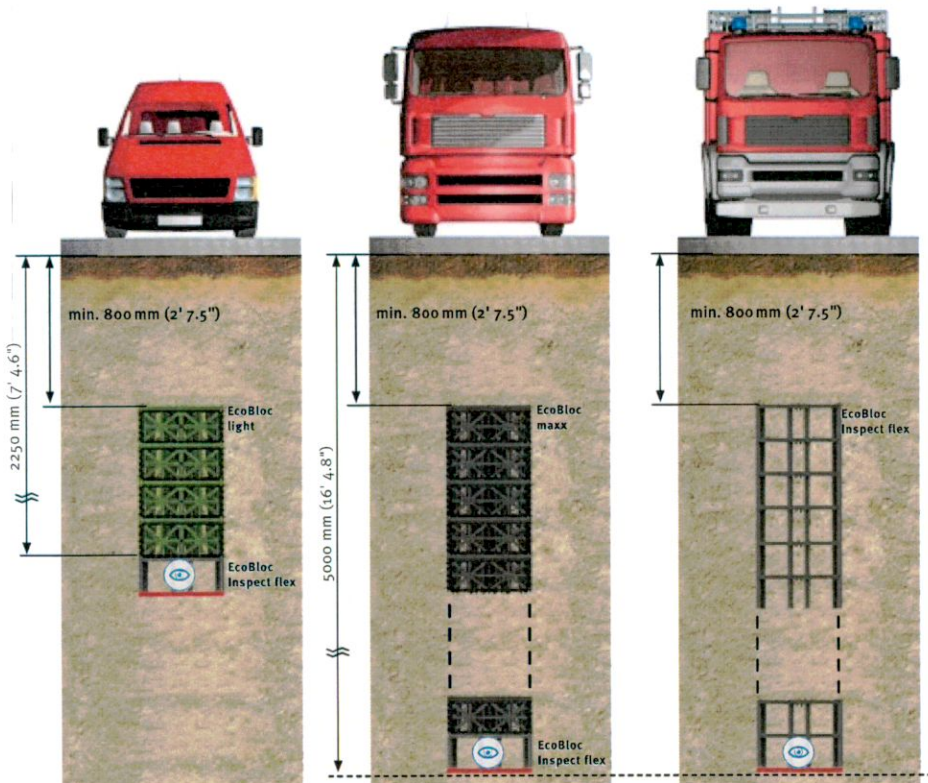
# Applications and loads



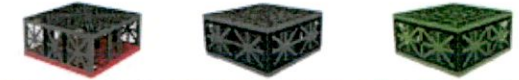
12 tons / H-10 / H-15

40 tons / HS-20

60 tons / HS-25



# Technical data sheet



Infiltration module	EcoBloc Inspect flex	EcoBloc maxx	EcoBloc light	
Gross volume	205 l (54.2 US gal.)	225 l (59.4 US gal.)	225 l (59.4 US gal.)	
Net volume	195 l (51.5 US gal.)	217 l (57.3 US gal.)	219 l (57.9 US gal.)	
Storage coefficient	96%	96%	97%	
Inspectable	•	•	•	
High pressure jetting possible	•	•	•	
<b>Load</b>				
Load	Short-term max. 100 kN/m <sup>2</sup> Long-term max. 59 kN/m <sup>2</sup>	max. 100 kN/m <sup>2</sup> max. 59 kN/m <sup>2</sup>	max. 75 kN/m <sup>2</sup> max. 35 kN/m <sup>2</sup>	
Without traffic load	min. earth covering	250 mm (9.8")	250 mm / 500 mm <sup>1)</sup> (9.8") / (1' 7.7") <sup>1)</sup>	250 mm <sup>2)</sup> (9.8") <sup>2)</sup>
	max. earth covering	2750 mm (9')	2750 mm / 2000 mm <sup>3)</sup> (9') / (6' 6.7") <sup>3)</sup>	1500 mm / 1250 mm <sup>3)</sup> (4' 11") / (4' 1.2") <sup>3)</sup>
	max. installation depth	5000 mm (16' 4.8")	5000 mm (16' 4.8")	2500 mm (8' 2.4")
Vehicle	max. number of layers	14	13	6
	min. earth covering	250 mm (9.8")	250 mm / 500 mm <sup>1)</sup> (9.8") / (1' 7.7") <sup>1)</sup>	500 mm / o.r. <sup>2)</sup> (1' 7.7") / o.r. <sup>2)</sup>
	max. earth covering	2750 mm (9')	2750 mm / 2000 mm <sup>3)</sup> (9') / (6' 6.7") <sup>3)</sup>	1250 mm / o.r. <sup>2)</sup> (4' 1.2") / o.r. <sup>2)</sup>
Lorry 12/H-10/H-15	max. installation depth	5000 mm (16' 4.8")	5000 mm (16' 4.8")	2250 mm (7' 4.6")
	max. number of layers	14	13	4
	min. earth covering	500 mm (1' 7.7")	500 mm / 800 mm <sup>1)</sup> (1' 7.7") / (2' 7.5") <sup>1)</sup>	800 mm / o.r. <sup>2)</sup> (2' 7.5") / o.r. <sup>2)</sup>
Lorry 30	max. earth covering	2750 mm (9')	2750 mm / 2000 mm <sup>3)</sup> (9') / (6' 6.7") <sup>3)</sup>	1000 mm / o.r. <sup>2)</sup> (3' 3.3") / o.r. <sup>2)</sup>
	max. installation depth	5000 mm (16' 4.8")	5000 mm (16' 4.8")	2250 mm (7' 4.6")
	max. number of layers	13	12	4
Lorry 40/HS-20	min. earth covering	500 mm (1' 7.7")	500 mm / 800 mm <sup>1)</sup> (1' 7.7") / (2' 7.5") <sup>1)</sup>	800 mm / o.r. <sup>2)</sup> (2' 7.5") / o.r. <sup>2)</sup>
	max. earth covering	2500 mm (8' 2.4")	2500 mm / 1750 mm <sup>3)</sup> (8' 2.4") / (5' 8.9") <sup>3)</sup>	1500 mm / o.r. <sup>2)</sup> (4' 11") / o.r. <sup>2)</sup>
	max. installation depth	5000 mm (16' 4.8")	5000 mm (16' 4.8")	5000 mm (16' 4.8")
Lorry 60/HS-25	max. number of layers	13	11	
	min. earth covering	800 mm (2' 7.5")	800 mm (2' 7.5")	
	max. earth covering	2000 mm (7' 4.5")	2000 mm (7' 4.5")	
max. installation depth	5000 mm (16' 4.8")	5000 mm (16' 4.8")		
max. number of layers	13			
<b>Connections</b>				
DN 100 (4")	•	•	•	
DN 150 (6")	•	•	•	
DN 200 (8")	•	•	•	
DN 250 (10")	•	•	•	
DN 300 (12")	• 3)A)	• 3)A)	• 3)A)	
DN 400 (16")	• 3)A)	• 3)A)	• 3)A)	
DN 500 (20")	• 4)	• 4)	• 4)	
<b>Measurements</b>				
Length	800 mm (2' 7.5")	800 mm (2' 7.5")	800 mm (2' 7.5")	
Width	800 mm (2' 7.5")	800 mm (2' 7.5")	800 mm (2' 7.5")	
Height	320 mm (12.6")	350 mm (13.8")	350 mm (13.8")	
Weight	8 kg (17.6 lbs)	9 kg (19.8 lbs)	7 kg (15.4 lbs)	

<sup>1)</sup> When combined with EcoBloc Inspect flex

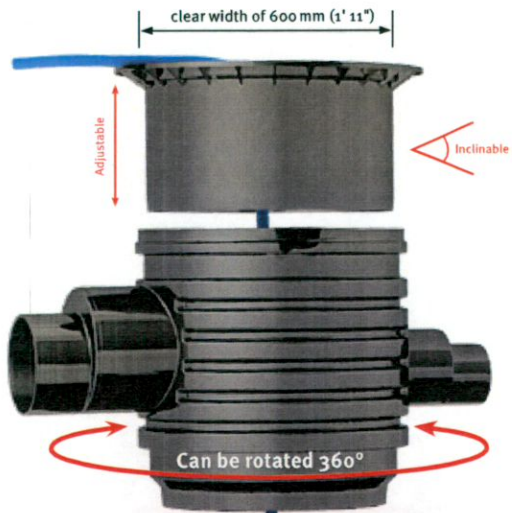
<sup>2)</sup> Values on request when combined with EcoBloc Inspect flex

<sup>3)</sup> Optionally available with Vario shaft (page 12)

<sup>4)</sup> Optionally available with adaptor plates (page 9)



# Vario 800 flex shaft system



### Flexible use

The GRAF Vario 800 shaft provides easy access to all EcoBloc modules. It can be used in many different ways:

- ✓ As an inspection shaft
- ✓ As an inlet shaft
- ✓ As a filter shaft
- ✓ As a flow control shaft

### Easy to inspect

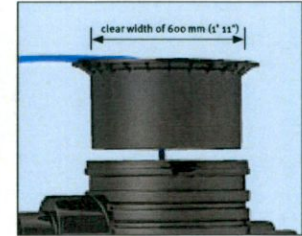
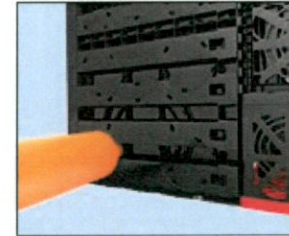
The Vario 800 shaft allows easy access to the EcoBloc system by commercially available inspection cameras. This has been confirmed by several independent testing authorities.



No tools required

### Lorry-bearing up to 60 tons

The GRAF Vario 800 shaft has a heavy-duty lorry-bearing capacity of 60 tons with an 800 mm (2' 7.5") earth covering. The fibreglass reinforced material gives the shaft extra strength.

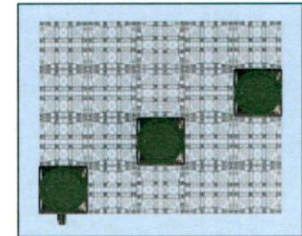


### Connection surfaces up to DN 400 (16")

The Vario 800 comes with DN 200 (8"), DN 300 (12") and DN 400 (16") connection surfaces. The optional, freely rotating inlet module can be connected to pipes of sizes DN 150 (6"), DN 200 (8"), DN 250 (10") and DN 300 (12").

### Wide access

The Vario 800 is terminated at the top by GRAF telescopic dome shafts. With a clear width of 600 mm, it gives easy access to the shaft. The base of the shaft itself is 800 x 800 mm (2' 7.5" x 2' 7.5") in size, providing sufficient space for all possible applications.



### No additional excavation

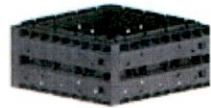
The Vario 800 flex shaft system can be directly installed in an EcoBloc infiltration or detention system. The connection surfaces of the inspection channels in the Vario 800 flex shaft system are accurately matched to the EcoBloc system.

### Can be positioned in any location

The dimensions of the Vario 800 shaft enable free positioning within the EcoBloc system. The corner position enables the connection of large pipe diameters of up to DN 400 (16") on the two side panels. The central position offers ideal access to the inspection camera from all directions. Using the optional inlet module, a connection of up to DN 300 (12") can be made with a freely defined angle.



# Vario 800 flex shaft system



**Vario 800 flex, type 1**  
shaft body for one or more layer of EcoBloc system

Volume	Length	Width	Height	Weight	Colour	Order no.
230 l (60.7 US gal.)	800 mm (2' 7.5")	800 mm (2' 7.5")	355 mm (1' 2")	16 kg (35.3 lbs)	grey	450050

Q Webcode G9303



**Vario 800 flex, type 2**  
shaft body for two or more layer of EcoBloc system

Volume	Length	Width	Height	Weight	Colour	Order no.
420 l (113.5 US gal.)	800 mm (2' 7.5")	800 mm (2' 7.5")	660 mm (2' 2")	27 kg (59.5 lbs)	grey	450051



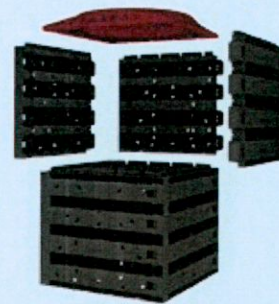
**Vario 800 flex, base/cover set**  
base- and cover for Vario 800 flex shaft

Item	Colour	Order no.
set consisting out of Vario base- and cover plate	grey	450052



## 1. Stackable

To save space during transport and storage, the parts of the Vario 800 are stacked into each other. This minimizes transport costs and CO<sub>2</sub> emissions.



## 2. Easy installation

Groups of four wall elements are connected in a few simple steps and without tools to form a single height unit of the Vario 800. The height can be easily adjusted to the EcoBloc tank depth. A shaft cover and base plate complete the element.



## 3. Ready

GRAF accessory components can now be added to the Vario 800 shaft as required.

# Accessories



## Shaft components

### Infiltration filter strainer DN 600 (24")

Made entirely from stainless steel, mesh width 0.75 mm (0.03")

Order no. 340523



### Infiltration inlet module DN 600 (24")

Incl. profile seal for telescopic dome shaft; DN 150 (6") / DN 200 (8") / DN 250 (10") / DN 300 (12") connections

Order no. 330360



### Infiltration connecting piece 1000 DN 600 (24")

With DN 200 (8") contact surface, incl. profile seal, length 1000 mm (3' 3.3"), 750 mm (2' 5.5"), 500 mm (1' 7.7")

Order no. 371015



### Infiltration connecting piece 1000 DN 600 (24")

With DN 200 (8") pipe connections, incl. profile seal, length 1000 mm (3' 3.3"), 750 mm (2' 5.5"), 500 mm (1' 7.7")

Order no. 371016



## Retention accessories

### Choke drain DN 100 (4")

Incl. emergency overflow and DN 100 (4") connector seal; flow rate of 1.0 l (0.26 US gal.)/sec. up to 6.5 l (1.72 US gal.)/sec.

Order no. 330547



### Choke drain DN 150 (6")

Incl. emergency overflow and DN 150 (6") connector seal; flow rate of 2.0 l (0.53 US gal.)/sec. up to 16 l (4.22 US gal.)/sec.

Order no. 330598



## Tank Covers

### Mini telescopic dome shaft

Suitable for pedestrian loading, height adjustable from 140–340 mm (5.5"–13.4")

Order no. 371010



### Maxi telescopic dome shaft

Suitable for pedestrian loading, height adjustable from 140–440 mm (5.5"–17.3")

Order no. 371011



### Cast iron telescopic dome shaft

Suitable for vehicle loading, height adjustable from 140–440 mm (5.5"–17.3")

Order no. 371020



### Telescopic dome shaft lorry

Suitable for lorry-bearing loading, height adjustable from 140–440 mm (5.5"–17.3")

Order no. 371021

Cover and compensating ring to be provided on site







# GRAF

## RAINWATER HARVESTING



## INFILTRATION



## WASTEWATER TREATMENT SOLUTIONS



## MULTIPURPOSE CONTAINERS



Your expert specialist dealer:

### Rainwater harvesting solutions

For more information about our rainwater harvesting solutions, ask for our catalogue.

#### Prices:

A price list with our export conditions is available on request.

#### Warranty clause:

The warranty mentioned in this brochure only refers to the tank in question and not to the accessories. Within the warranty period we grant free replacement of the material. Further benefits are excluded. Pre-condition for warranty benefits are proper handling, assembly and installation according to the mounting guidelines.

N.B. Protect tanks from frost when installed above ground! In case of groundwater installation, please contact us for further information prior to purchase!

For all dimensions and abstracts provided in this brochure, we reserve a tolerance of +/- 3%. Depending on the connection type, the useful volume of the underground tanks may be up to 10% below the tank capacity.

Subject to technical modifications and errors. Design details, methods and standards of individual products may change as a result of technical advancements and environmental regulations.

For all our offers and conclusions of contract, only our General Terms and Conditions of Business dated 01/10/2012 shall apply, which we will send to you on request.

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## 11 APPENDIX C – BYPASS PETROL / OIL INTERCEPTOR PETROL / OIL INTERCEPTOR





# SEPARATORS

A RANGE OF FUEL/OIL SEPARATORS  
FOR PEACE OF MIND



**60** YEARS OF  
Expertise &  
1955-2015 Innovation





# Separators

## A RANGE OF FUEL/OIL SEPARATORS FOR PEACE OF MIND

Surface water drains normally discharge to a watercourse or indirectly into underground waters (groundwater) via a soakaway. Contamination of surface water by oil, chemicals or suspended solids can cause these discharges to have a serious impact on the receiving water.

The Environment Regulators, Environment Agency, England and Wales, SEPA, Scottish Environmental Protection Agency in Scotland and Department of Environment & Heritage in Northern Ireland, have published guidance on surface water disposal, which offers a range of means of dealing with pollution both at source and at the point of discharge from site (so called 'end of pipe' treatment). These techniques are known as 'Sustainable Drainage Systems' (SuDS).

Where run-off is draining from relatively low risk areas such as car-parks and non-operational areas, a source control approach, such as permeable surfaces or infiltration trenches, may offer a suitable means of treatment, removing the need for a separator.

Oil separators are installed on surface water drainage systems to protect receiving waters from pollution by oil, which may be present due to minor leaks from vehicles and plant, from accidental spillage.

Effluent from industrial processes and vehicle washing should normally be discharged to the foul sewer (subject to the approval of the sewerage undertaker) for further treatment at a municipal treatment works.

### SEPARATOR STANDARDS AND TYPES

A British (and European) standard (EN 858-1 and 858-2) for the design and use of prefabricated oil separators has been adopted. New prefabricated separators should comply with the standard.

### SEPARATOR CLASSES

The standard refers to two 'classes' of separator, based on performance under standard test conditions.

#### CLASS I

Designed to achieve a concentration of less than 5mg/l of oil under standard test conditions, should be used when the separator is required to remove very small oil droplets.

#### CLASS II

Designed to achieve a concentration of less than 100mg/l oil under standard test conditions and are suitable for dealing with discharges where a lower quality requirement applies (for example where the effluent passes to foul sewer).

Both classes can be produced as full retention separators. The oil concentration limits of 5 mg/l and 100 mg/l are only applicable under standard test conditions. It should not be expected that separators will comply with these limits when operating under field conditions.

### FULL RETENTION SEPARATORS

Full retention separators treat the full flow that can be delivered by the drainage system, which is normally equivalent to the flow generated by a rainfall intensity of 65mm/hr.

On large sites, some short term flooding may be an acceptable means of limiting the flow rate and hence the size of full retention systems.

Get in touch for a **FREE** professional site visit and a representative will contact you within 5 working days to arrange a visit.

[helpingyou@klargester.com](mailto:helpingyou@klargester.com) to make the right decision or call **028 302 66799**

### BYPASS SEPARATORS

Bypass separators fully treat all flows generated by rainfall rates of up to 6.5mm/hr. This covers over 99% of all rainfall events. Flows above this rate are allowed to bypass the separator. These separators are used when it is considered an acceptable risk not to provide full treatment for high flows, for example where the risk of a large spillage and heavy rainfall occurring at the same time is small.

### FORECOURT SEPARATORS

Forecourt separators are full retention separators specified to retain on site the maximum spillage likely to occur on a petrol filling station. They are required for both safety and environmental reasons and will treat spillages occurring during vehicle refuelling and road tanker delivery. The size of the separator is increased in order to retain the possible loss of the contents of one compartment of a road tanker, which may be up to 7,600 litres.

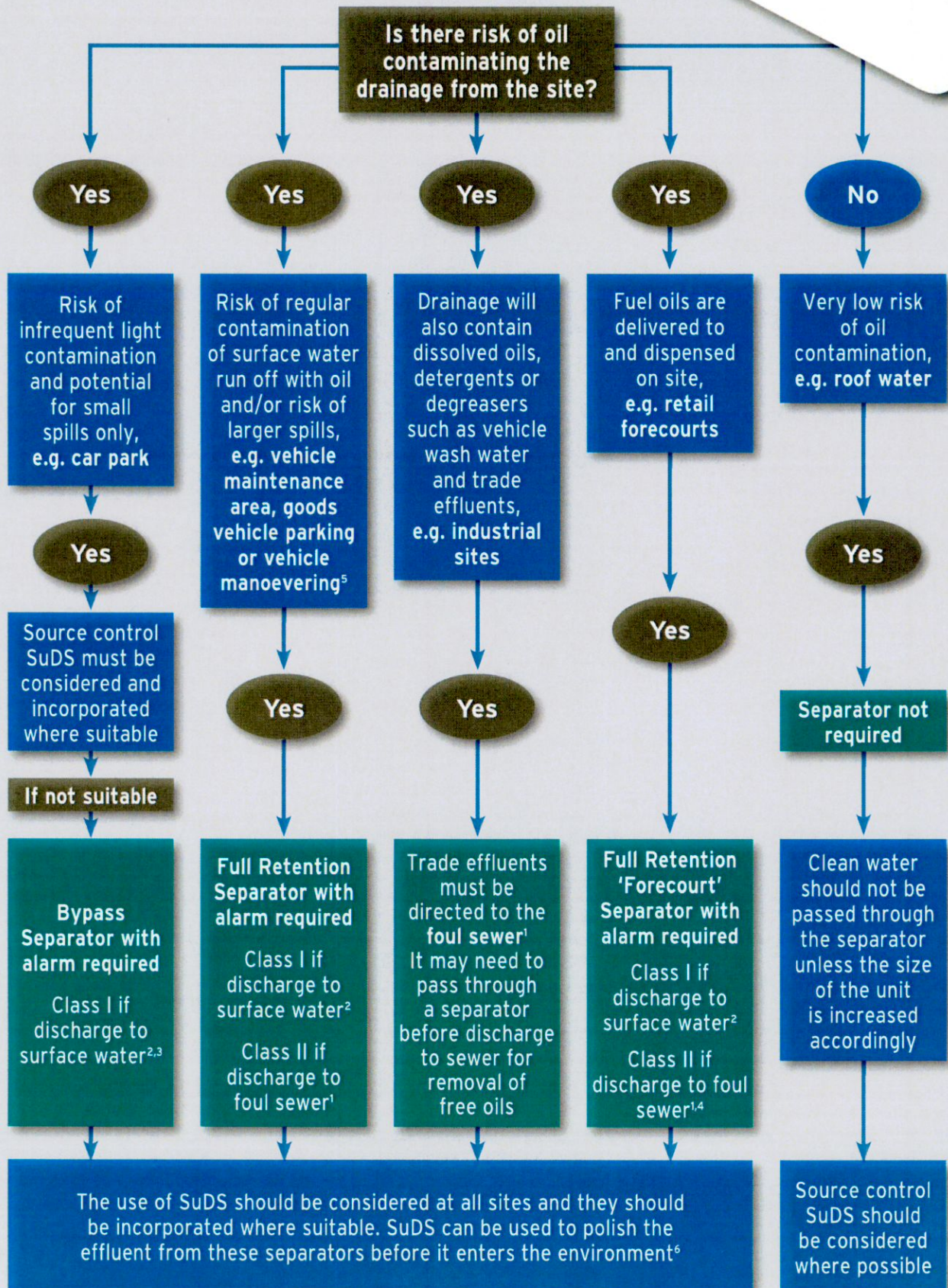
### SELECTING THE RIGHT SEPARATOR

The chart on the following page gives guidance to aid selection of the appropriate type of fuel/oil separator for use in surface water drainage systems which discharge into rivers and soakaways.

For further detailed information, please consult the Environment Agency Pollution Prevention Guideline 03 (PPG 3) 'Use and design of oil separators in surface water drainage systems' available from their website.

Kingspan Klargester has a specialist team who provide technical assistance in selecting the appropriate separator for your application.





1 You must seek prior permission from your local sewer provider before you decide which separator to install and before you make any discharge.

2 You must seek prior permission from the relevant environmental body before you decide which separator to install.

3 In this case, if it is considered that there is a low risk of pollution a source control SuDS scheme may be appropriate.

4 In certain circumstances, the sewer provider may require a Class 1 separator for discharges to sewer to prevent explosive atmospheres from being generated.

5 Drainage from higher risk areas such as vehicle maintenance yards and goods vehicle parking areas should be connected to foul sewer in preference to surface water.

6 In certain circumstances, a separator may be one of the devices used in the SuDS scheme. Ask us for advice.



# Bypass NSB RANGE

## APPLICATION

Bypass separators are used when it is considered an acceptable risk **not to provide full treatment, for very high flows, and are used, for example, where the risk of a large spillage and heavy rainfall occurring at the same time is small, e.g.**

- Surface car parks.
- Roadways.
- Lightly contaminated commercial areas.

## PERFORMANCE

Klargester were one of the first UK manufacturers to have separators tested to EN 858-1. Klargester have now added the NSB bypass range to their portfolio of certified and tested models. The NSB number denotes the maximum flow at which the separator treats liquids. The British Standards Institute (BSI) tested the required range of Kingspan Klargester Bypass separators and certified their performance in relation to their flow and process performance assessing the effluent qualities to the requirements of EN 858-1. Klargester bypass separator designs follow the parameters determined during the testing of the required range of bypass separators.

Each bypass separator design includes the necessary volume requirements for:

- Oil separation capacity.
- Oil storage volume.
- Silt storage capacity.
- Coalescer.

The unit is designed to treat 10% of peak flow. The calculated drainage areas served by each separator are indicated according to the formula given by PPG3  $NSB = 0.0018A(m^2)$ . Flows generated by higher rainfall rates will pass through part of the separator and bypass the main separation chamber.

Class I separators are designed to achieve a concentration of 5mg/litre of oil under standard test conditions.



## FEATURES

- Light and easy to install.
- Inclusive of silt storage volume.
- Fitted inlet/outlet connectors.
- Vent points within necks.
- Oil alarm system available (required by EN 858-1 and PPG3).
- Extension access shafts for deep inverts.
- Maintenance from ground level.
- GRP or rotomoulded construction (subject to model).

To specify a nominal size bypass separator, the following information is needed:-

- The calculated flow rate for the drainage area served. Our designs are based on the assumption that any interconnecting pipework fitted elsewhere on site does not impede flow into or out of the separator and that the flow is not pumped.
- The drain invert inlet depth.
- Pipework type, size and orientation.

## SIZES AND SPECIFICATIONS

UNIT NOMINAL SIZE	FLOW (l/s)	PEAK FLOW RATE (l/s)	DRAINAGE AREA (m <sup>2</sup> )	STORAGE CAPACITY (litres)		UNIT LENGTH (mm)	UNIT DIA. (mm)	ACCESS SHAFT DIA. (mm)	BASE TO INLET INVERT (mm)	BASE TO OUTLET INVERT	STANDARD FALL ACROSS (mm)	MIN. INLET INVERT (mm)	STANDARD PIPEWORK DIA.
NSBP003	3	30	1670	300	45	1700	1350	600	1420	1320	100	500	160
NSBP004	4.5	45	2500	450	60	1700	1350	600	1420	1320	100	500	160
NSBP006	6	60	3335	600	90	1700	1350	600	1420	1320	100	500	160
NSBE010	10	100	5560	1000	150	2069	1220	750	1450	1350	100	700	315
NSBE015	15	150	8335	1500	225	2947	1220	750	1450	1350	100	700	315
NSBE020	20	200	11111	2000	300	3893	1220	750	1450	1350	100	700	375
NSBE025	25	250	13890	2500	375	3575	1420	750	1680	1580	100	700	375
NSBE030	30	300	16670	3000	450	4265	1420	750	1680	1580	100	700	450
NSBE040	40	400	22222	4000	600	3230	1920	600	2185	2035	150	1000	500
NSBE050	50	500	27778	5000	750	3960	1920	600	2185	2035	150	1000	600
NSBE075	75	750	41667	7500	1125	5841	1920	600	2235	2035	200	950	675
NSBE100	100	1000	55556	10000	1500	7661	1920	600	2235	2035	200	950	750
NSBE125	125	1250	69444	12500	1875	9548	1920	600	2235	2035	200	950	750

■ Rotomoulded chamber construction ■ GRP chamber construction \* Some units have more than one access shaft – diameter of largest shown.



# Full Retention NSF RANGE



## APPLICATION

Full retention separators are used in high risk spillage areas such as:

- Fuel distribution depots.
- Vehicle workshops.
- Scrap Yards

## PERFORMANCE

Kingspan Klargester were the first UK manufacturer to have the required range (3-30 l/sec) certified to EN 858-1 in the UK. The NSF number denotes the flow at which the separator operates.

The British Standards Institute (BSI) have witnessed the performance tests of the required range of separators and have certified their performance, in relation to their flow and process performance to ensure that they met the effluent quality requirements of EN 858-1. Larger separator designs have been determined using the formulas extrapolated from the test range.

Each full retention separator design includes the necessary volume requirements for:

- Oil separation capacity.
- Oil storage volume.
- Silt storage capacity.
- Coalescer (Class I units only).
- Automatic closure device.

Klargester full retention separators treat the whole of the specified flow.

## FEATURES

- Light and easy to install.
- Class I and Class II designs.
- 3-30 l/sec range independently tested and performance sampled, certified by the BSI.
- Inclusive of silt storage volume.
- Fitted inlet/outlet connectors.



**Advanced rotomoulded construction on selected models**

- Compact and robust
- Require less backfill
- Tough, lightweight and easy to handle

- Oil alarm system available.
- Vent points within necks.
- Extension access shafts for deep inverts.
- Maintenance from ground level.
- GRP or rotomoulded construction (subject to model).

To specify a nominal size full retention separator, the following information is needed:-

- The calculated flow rate for the drainage area served. Our designs are based on the assumption that any interconnecting pipework fitted elsewhere on site does not impede flow into or out of the separator and that the influent is not pumped.
- The required discharge standard. This will decide whether a Class I or Class II unit is required.
- The drain invert inlet depth.
- Pipework type, size and orientation.

## SIZES AND SPECIFICATIONS

UNIT NOMINAL SIZE	FLOW (l/s)	DRAINAGE AREA (m <sup>2</sup> PPG-3 (0.018))	STORAGE CAPACITY (litres)		UNIT LENGTH (mm)	UNIT DIA. (mm)	BASE TO INLET INVERT (mm)	BASE TO OUTLET INVERT	MIN. INLET INLET (mm)	STANDARD PIPEWORK DIA. (mm)
			SILT	OIL						
NSFP003	3	170	300	30	1700	1350	1420	1345	500	160
NSFP006	6	335	600	60	1700	1350	1420	1345	500	160
NSFA010	10	555	1000	100	2610	1225	1050	1000	500	200
NSFA015	15	835	1500	150	3910	1225	1050	1000	500	200
NSFA020	20	1115	2000	200	3200	2010	1810	1760	1000	315
NSFA030	30	1670	3000	300	3915	2010	1810	1760	1000	315
NSFA040	40	2225	4000	400	4640	2010	1810	1760	1000	315
NSFA050	50	2780	5000	500	5425	2010	1810	1760	1000	315
NSFA065	65	3610	6500	650	6850	2010	1810	1760	1000	315
NSFA080	80	4445	8000	800	5744	2820	2500	2450	1000	300
NSFA100	100	5560	10000	1000	6200	2820	2500	2450	1000	400
NSFA125	125	6945	12500	1250	7365	2820	2500	2450	1000	450
NSFA150	150	8335	15000	1500	8675	2820	2550	2450	1000	525
NSFA175	175	9725	17500	1750	9975	2820	2550	2450	1000	525
NSFA200	200	11110	20000	2000	11280	2820	2550	2450	1000	600

■ Rotomoulded chamber construction ■ GRP chamber construction



# Forecourt



## APPLICATION

The forecourt separator is designed for installation in petrol filling station forecourts and similar applications. The function of the separator is to intercept hydrocarbon pollutants such as petroleum and oil and prevent their entry to the drainage system, thus protecting the environment against hydrocarbon contaminated surface water run-off and gross spillage.

## PERFORMANCE

Operation ensures that the flow cannot exit the unit without first passing through the coalescer assembly.

In normal operation, the forecourt separator has sufficient capacity to provide storage for separated pollutants within the main chamber, but is also able to contain up to 7,600 litres of pollutant arising from the spillage of a fuel delivery tanker compartment on the petrol forecourt. The separator has been designed to ensure that oil cannot exit the separator in the event of a major spillage, subsequently the separator should be emptied immediately.

## FEATURES

- Light and easy to install.
- Inclusive of silt storage volume.
- Fitted inlet/outlet connectors.
- Vent points within necks.
- Extension access shafts for deep inverts.
- Maintenance from ground level.



- Class I and Class II design.
- Oil storage volume.
- Coalescer (Class I unit only).
- Automatic closure device.
- Oil alarm system available.

## INSTALLATION

The unit should be installed on a suitable concrete base slab and surrounded with concrete or pea gravel backfill. See sales drawing for installation.

If the separator is to be installed within a trafficked area, then a suitable cover slab must be designed to ensure that loads are not transmitted to the unit.

The separator should be installed and vented in accordance with Health and Safety Guidance Note HS(G)41 for filling stations, subject to Local Authority requirements.

## SIZES AND SPECIFICATIONS

ENVIROCEPTOR CLASS	TOTAL CAP. (litres)	DRAINAGE AREA (m <sup>2</sup> )	MAX. FLOW RATE (l/s)	LENGTH (mm)	DIAMETER (mm)	ACCESS SHAFT DIA. (mm)	BASE TO INLET INVERT (mm)	BASE TO OUTLET INVERT (mm)	STD. FALL ACROSS UNIT (mm)	MIN. INLET INVERT (mm)	STD. PIPEWORK (mm)	EMPTY WEIGHT (kg)
I	10000	555	10	3963	1920	600	2110	2060	50	400	160	500
II	10000	555	10	3963	1920	600	2110	2060	50	400	160	500
I	10000	1110	20	3963	1920	600	2110	2060	50	400	200	500
II	10000	1110	20	3963	1920	600	2110	2060	50	400	200	500

# Alarm Systems

British European Standard EN 858-1 and Environment Agency Pollution Prevention Guideline PPG3 requires that all separators are to be fitted with an oil level alarm system and that it should be installed and calibrated by a suitably qualified technician so that it will respond to an alarm condition when the separator requires emptying.

- Easily fitted to existing tanks.
- Excellent operational range.
- Visual and audible alarm.
- Additional telemetry option.





# Washdown & Silt

## APPLICATION

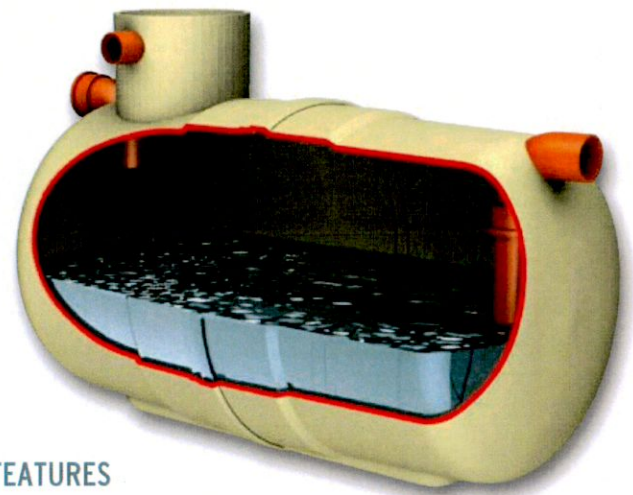
This unit can be used in areas such as car wash and other cleaning facilities that discharge directly into a foul drain, which feeds to a municipal treatment facility.

If emulsifiers are present the discharge must not be allowed to enter an NS Class I or Class II unit.

- Car wash.
- Tool hire depots.
- Truck cleansing.
- Construction compounds cleansing points.

## PERFORMANCE

Such wash down facilities must not be allowed to discharge directly into surface water but must be directed to a foul connection leading to a municipal treatment works as they utilise emulsifiers, soaps and detergents, which can dissolve and disperse the oils.



## FEATURES

- Light and easy to install.
- Inclusive of silt storage volume.
- Fitted inlet/outlet connectors.
- Vent points within necks.
- Extension access shafts for deep inverts.
- Maintenance from ground level.

## SIZES AND SPECIFICATIONS

REF.	TOTAL CAPACITY (litres)	MAX. REC. SILT	MAX. FLOW RATE (l/s)	LENGTH (mm)	DIAMETER (mm)	ACCESS SHAFT DIA. (mm)	BASE TO INLET INVERT (mm)	BASE TO OUTLET INVERT (mm)	STANDARD FALL ACROSS UNIT (mm)	MIN. INLET INVERT (mm)	STANDARD PIPEWORK DIA. (mm)	APPROX EMPTY (kg)
WI/010	1000	500	3	1123	1225	460	1150	1100	50	500	160	60
WI/020	2000	1000	5	2074	1225	460	1150	1100	50	500	160	120
WI/030	3000	1500	8	2952	1225	460	1150	1100	50	500	160	150
WI/040	4000	2000	11	3898	1225	460	1150	1100	50	500	160	180
WI/060	6000	3000	16	4530	1440	600	1360	1310	50	500	160	320
WI/080	8000	4000	22	3200	2020	600	2005	1955	50	500	160	585
WI/100	10000	5000	27	3915	2020	600	2005	1955	50	500	160	680
WI/120	12000	6000	33	4640	2020	600	2005	1955	50	500	160	770
WI/150	15000	7500	41	5435	2075	600	1940	1890	50	500	160	965
WI/190	19000	9500	52	6865	2075	600	1940	1890	50	500	160	1200

# Car Wash Silt Trap

## APPLICATION

Car Wash silt trap is designed for use before a separator in car wash applications to ensure effective silt removal.

## FEATURES

- FACTA Class B covers.
- Light and easy to install.
- Maintenance from ground level.





## PROFESSIONAL INSTALLERS

### Kingspan Klargester Accredited Installers

Experience shows that correct installation is a prerequisite for the long-lasting and successful operation of any wastewater treatment product. This is why using an installer with the experience and expertise to install your product is highly recommended.



Services include :

- Site survey to establish ground conditions and soil types
- Advice on system design and product selection
- Assistance on gaining environmental consents and building approvals
- Tank and drainage system installation
- Connection to discharge point and electrical networks
- Waste emptying and disposal

Discover more about the Accredited Installers and locate your local expert online.

[www.kingspanenviro.com/klargester](http://www.kingspanenviro.com/klargester)



## CARE & MAINTENANCE

### Kingspan Environmental Services

Who better to look after your treatment plant than the people who designed and built it?



Kingspan Environmental have a dedicated service division providing maintenance for wastewater products.

Factory trained engineers are available for site visits as part of a planned maintenance contract or on a one-off call out basis.

To find out more about protecting your investment and ensuring peace of mind, call us on:

**0844 846 0500**

or visit us online:

[www.kingspanenvservice.com](http://www.kingspanenvservice.com)



## COMMERCIAL WASTEWATER SOLUTIONS

- **BIODISC® & ENVIROSAFE**  
HIGH PERFORMANCE SEWAGE TREATMENT SYSTEMS
- PACKAGE PUMP STATIONS
- **PUMPSTOR24** PUMPING SYSTEMS
- OIL/WATER SEPARATORS
- BELOW GROUND STORAGE TANKS
- GREASE & SILT TRAPS

## RAINWATER SOLUTIONS

- BELOW GROUND RAINWATER HARVESTING SYSTEMS
- ABOVE GROUND RAINWATER HARVESTING SYSTEMS

### Klargester

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

Tel: +44 (0) 1296 633000 Fax: +44 (0) 1296 633001 Scottish Office: Tel: +44 (0) 1355 248484

email: [klargester@kingspan.com](mailto:klargester@kingspan.com)

Ireland: Unit 1a, Derryboy Road, Carnbane Business Park, Newry, Co. Down BT35 6QH

NI Tel : +44 (0) 28 302 66799 Fax: +44 (0) 28 302 60046 ROI Tel: 048 302 66799 Fax: 048 302 60046

email: [klargesterinfor@kingspan.com](mailto:klargesterinfor@kingspan.com)

Visit our website [www.kingspanenviro.com/klargester](http://www.kingspanenviro.com/klargester)



In keeping with Company policy of continuing research and development and in order to offer our clients the most advanced products, Kingspan Environmental reserves the right to alter specifications and drawings without prior notice.

Issue No. 21: September 2015





## 12 APPENDIX D – HYDROBRAKE INFORMATION





## Design Data

# Hydro-Brake® Optimum

## Vortex Flow Control



Inspired by nature and engineered to deliver the perfect curve, the Hydro-Brake® Optimum is the most advanced vortex flow control available. There is no equivalent to the Hydro-Brake® Optimum when it comes to delivering the best possible hydraulic performance with a passive flow control.

With a wide range of configurations and options available, the Hydro-Brake® Optimum is able to provide precision flow control to suit the vast majority of applications.



Figure 1 - The Hydro-Brake® Optimum is designed and manufactured to deliver precise, repeatable flow control.

### Precision Engineered Vortex Flow Controls

Each Hydro-Brake® Optimum is custom configured to suit the application and is manufactured under strict quality assurance procedures to deliver precise flow control to exacting requirements.

Every unit is backed by significant R&D investment to fine-tune the performance, meaning that the Hydro-Brake® Optimum is the only vortex flow control to have been independently certified by the BBA and WRc.



### Benefits

- Manufactured from high grade stainless steel.
- Future proof – adjustable or replaceable inlet plates available to alter flow rates post-installation.
- Configurations available to suit a wide variety of installations.
- Large cross sectional area at all heads.
- Simple installation.
- Self-activating.
- No moving parts or external power requirement.

### Versatile and Flexible

At Hydro International, we pride ourselves on providing solutions that meet your requirements, rather than providing a standard solution and asking you to compromise on your project needs.

The Hydro-Brake® Optimum offers designers options to precision-engineer a vortex flow control to:

- Minimise upstream storage volumes.
- Maximise internal (inlet & outlet) cross sectional areas to prevent blockages.
- Build-in a climate change factor to allow for future changes in flow rate.

Furthermore, if you need to retrofit a flow control, our dedicated team of engineers can assist with providing a customised Hydro-Brake® Optimum suitable for installation into existing drainage infrastructure.

Hydro-Brake® Flow Control Series

Hydro-Brake® Hotline: 01275 337937

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

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



# Design Data

## Hydro-Brake® Optimum

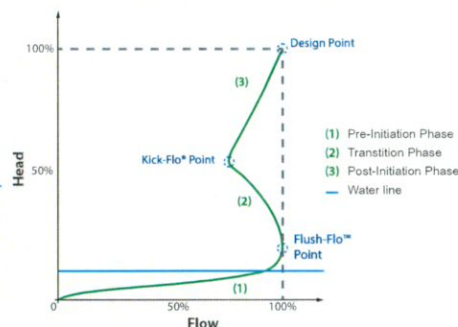
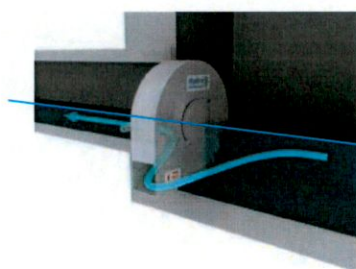
### Vortex Flow Control

## Operating Principles

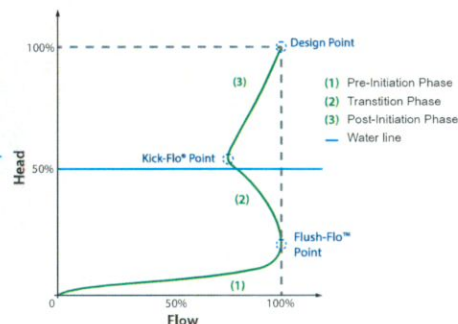
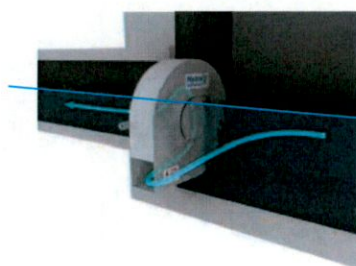
The hydraulic behaviour of the Hydro-Brake® Optimum is described by its hydraulic characteristic curve, which relates the discharge flow from the unit to the hydraulic head acting upon that unit.

The hydraulic characteristic curve consists of three distinct sections, each corresponding to a different governing flow control regime:

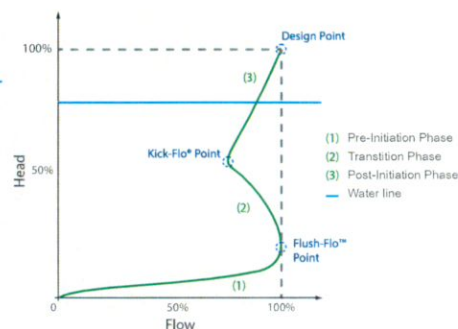
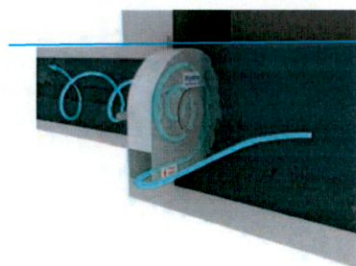
1. The pre-initiation phase – governed by **orifice flow and defined on the characteristic curve as the region between the origin and the point at which the vortex begins to have a throttling effect (Flush-Flo™ point). In this region, the depth of water is below the soffit of the outlet orifice of the Hydro-Brake® Optimum.**



2. The transition phase – governed by **vortex formation and defined on the characteristic curve as the region between the Flush-Flo™ and the point at which the vortex has fully initiated (Kick-Flo® point). In this region the vortex will continually form and collapse. A trapped volume of air inside the Hydro-Brake® Optimum will exert a backpressure and cause the discharge rate to reduce even though the hydraulic head continues to increase.**



3. The post-initiation phase – governed by **stable vortex flow and defined on the characteristic curve as the region above the Kick-Flo® point. A stable vortex is formed and sustained. An air filled core at the centre of the vortex acts as a pseudo-physical flow restriction by reducing the cross sectional area available for the passage of water.**

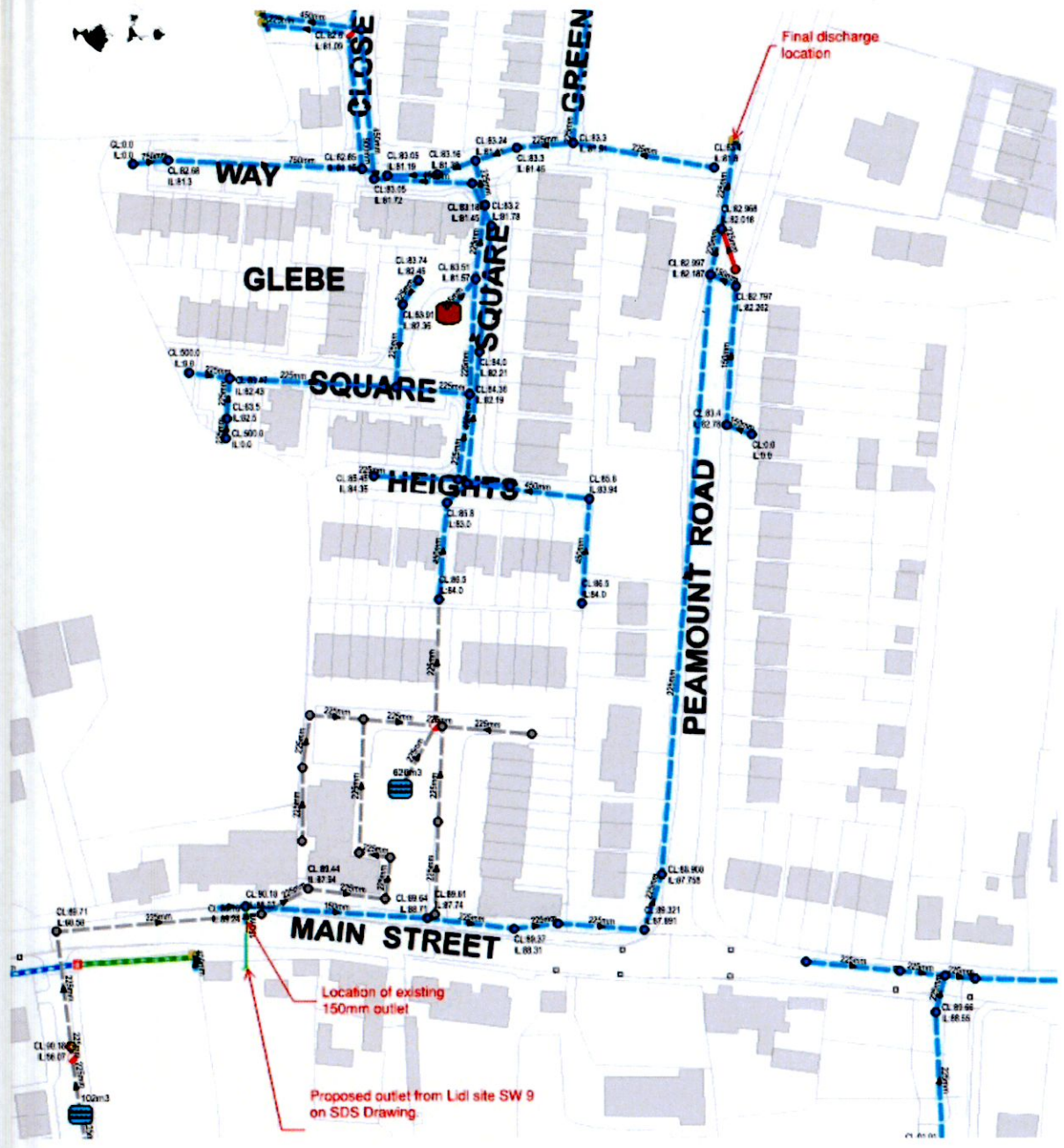


## Design Flexibility

It is possible for the Design Point to be achieved using a number of different flow control configurations, each with a different hydraulic response or characteristic curve.

An in-depth understanding of the flow regimes and interactions at each stage of the hydraulic characteristic curve allows custom configuration of the Hydro-Brake® Optimum to achieve the hydraulic profile best suited to the site requirements.





Final discharge location

Location of existing 150mm outlet

Proposed outlet from Lidl site SW 9 on SDS Drawing

GLEBE

WAY

SQUARE

HEIGHTS

MAIN STREET

PEAMOUNT ROAD

CLOSE

GREEN

CL 86.71  
L 86.07

CL 85.71  
L 86.07

CL 500.0  
L 5.0

CL 82.85  
L 81.10

CL 83.05  
L 81.72

CL 83.15  
L 81.45

CL 83.3  
L 81.45

CL 82.98  
L 82.018

CL 82.797  
L 82.252

CL 83.4  
L 82.75

CL 82.0  
L 0.0

CL 85.45  
L 84.35

CL 85.8  
L 85.0

CL 85.8  
L 83.94

CL 86.3  
L 84.0

CL 86.3  
L 84.0

CL 86.3  
L 84.0

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CL 86.3  
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CL 86.800  
L 87.735

CL 85.321  
L 87.891

CL 89.66  
L 86.55

CL 86.71  
L 86.07

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# Design Data

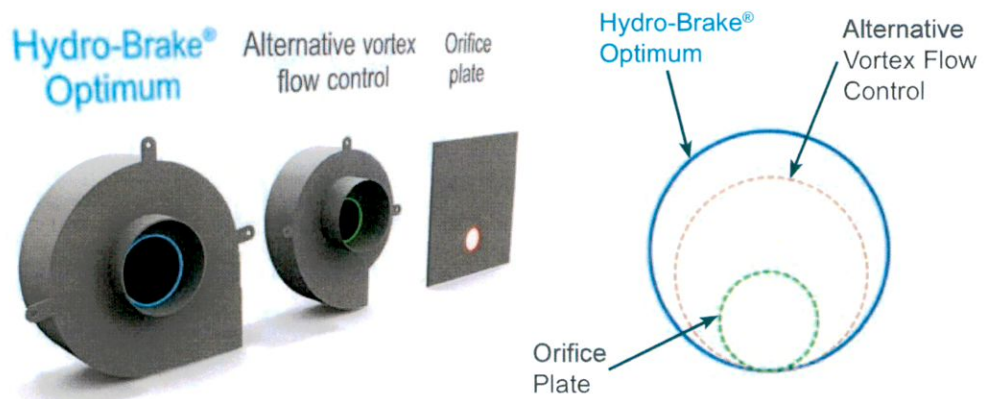
## Hydro-Brake® Optimum

### Vortex Flow Control

#### Resilience by Design

Hydro-Brake® Optimum has outlets (clearances) up to 20% larger than competitor products to minimise the risk of blockages. All units are fitted with a pivoting bypass door to enable full access to the internal chamber and the outlet structure in the event that a blockage does occur.

All Hydro-Brake® Optimum units can also be supplied with an adjustable or replaceable inlet to future-proof the device, allowing flows to be altered post-installation, to account for site expansion or climate change.



#### Expert Design Support Services

Hydro International's professional engineers work with you to provide expert technical and aftersales support to ensure your projects meet exacting design requirements and deliver the very best hydraulic controls for your site.

With over 35 years' experience of flow control knowledge and experience, Hydro International's design support team is available to advise on any aspect of water flow management, including detailed modelling of vortex flow controls and composite outlet structures.

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

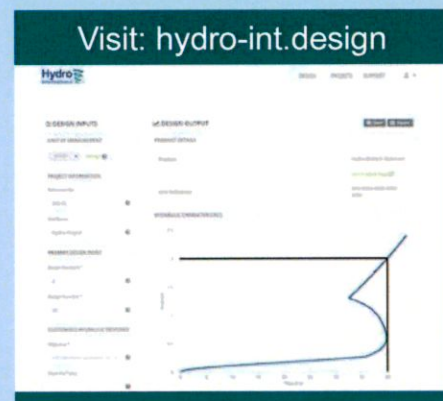
#### Online Design Tool

Engineers have the flexibility to try out any number of flow control iterations and explore their impact on hydraulic performance.

Our Online Design Tool allows you to quickly and easily compare a number of different flow control options for your site to develop the most robust and sustainable drainage solution possible.

The new tool now also has the added options to size and design the First Defense® and Downstream Defender® stormwater treatment separators, alongside the existing functionality to size and design Hydro-Brake® Optimum flow controls.

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



#### Full MicroDrainage® Compatibility

Engineers can carry out sizing and flow rate calculations and conduct hydraulic modelling of drainage networks containing Hydro-Brake® Optimum units using the industry-standard drainage design software, MicroDrainage®.

XP solutions





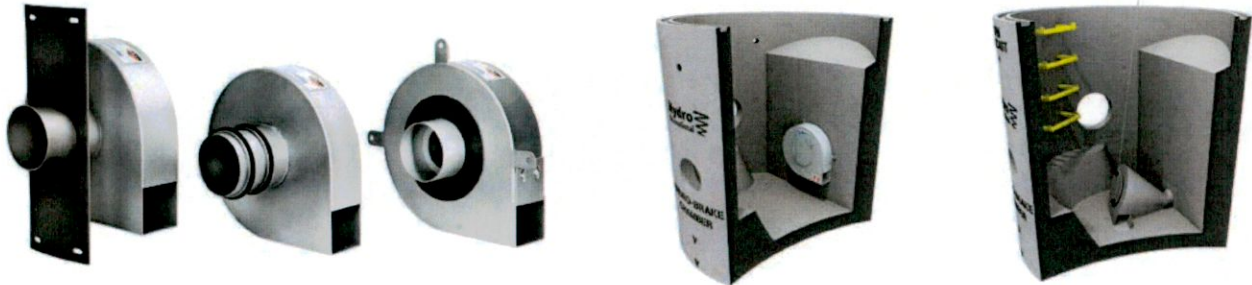
# Design Data

## Hydro-Brake® Optimum

### Vortex Flow Control

### Easy to Install

Hydro-Brake® Optimum has a range of mounting options for ease of installation or can be supplied ready fitted into a manhole chamber (with or without a weir wall) for simple plug-and-play installation. There are no set-up or commissioning requirements.

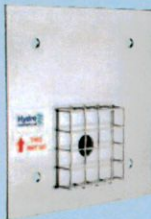


## The Hydro-Brake® Flow Control Series

As a brand leader for vortex flow controls for more than 30 years, Hydro International continues to set the standard in flow control management technologies. The Hydro-Brake® Flow Control Series is a comprehensive and versatile toolbox of precision-engineered devices for flow attenuation and control that can help deliver compliant schemes with scalable, precision flow control performance.

Every device in the series is tested and manufactured to exacting standards and wherever possible, independently accredited to provide the reassurance of reliable, repeatable through-life operation.

### Hydro-Brake® Orifice



The low-cost option for unconstrained sites (shown with optional screen).

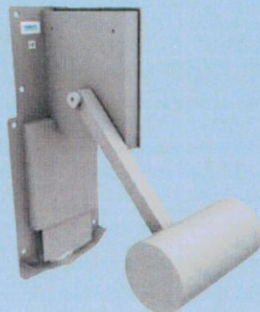
### Hydro-Brake® Optimum



The vortex flow control with no equivalent, delivering Nature's Perfect Cuve with no moving parts and independently verified by the BBA and WRc.

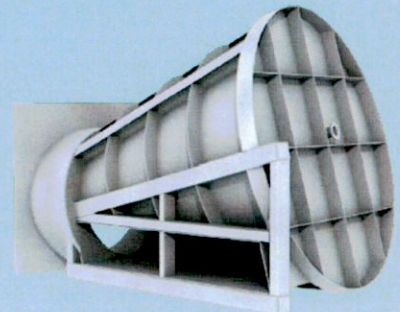
### Hydro-Brake® Agile

Precision engineered flow control for highly constrained applications.



### Hydro-Brake® Flood Alleviation

The vortex controlled solution to watercourse flooding.



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

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Tel: +44 (0)1275 337 937 [stormwater@hydro-int.com](mailto:stormwater@hydro-int.com)

Hydro International  
Shearwater House, Clevedon Hall Estate, Victoria Road, Clevedon, BS21 7RD  
Hydro-Brake® Optimum Flow Control Design Data Sheet D/0519

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





## 13 APPENDIX E – EXISTING LOCAL AUTHORITY SERVICES MAP





# South Dublin County Council Surface / Storm Water Drainage System

## Legend

- Standard Manhole
- Hydrobrake Manhole
- Oil / Petrol Interceptor
- CSO Outlet MH
- Downstream Defender
- Other/Specify
- Private
- Backdrop Manhole
- Grit Trap
- Hatchbox
- Surface Water Pumping Station
- Surface Water Outfall (no valve)
- Surface Water Outfall (with valve)
- Attenuation Tank
- Attenuation Arch/Tunnel
- Attenuation Cell
- Surface Water Inlet (trash screen)
- Surface Water Inlet
- Gravity Surface Water Sewer
- Open Drainage Channel
- Combined Sewer O/F (CSO)
- Pumping Main
- Private Surface Water Sewer
- Culvert
- Conveyance Infiltration Trench
- Roadway
- Road Gully
- ★ Road Monitoring Locations
- Attenuation Pond
- Swale
- Detention Basin
- Integrated Constructed Wetland
- County Boundary

Note:-

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2. Whilst every care has been taken in its compilation, South Dublin County Council gives the information as to the position of its underground Surface Water network as a general guide only, on the strict understanding that it is based on the best available information of our records. South Dublin County Council can assume no responsibility for a site or guarantee, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided and does not accept any liability arising from any errors or omissions.
3. This information should not be relied upon in the event of excavations or any other works being carried out in the vicinity of the South Dublin County Council Surface Water underground network. The onus is on the parties carrying out the excavations or other works, to ensure the exact location of the underground network is identified prior to excavations or any other works being carried out. Private drains are not shown but their presence should be anticipated.

Scale: 1:1,000

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