



Condition 6 - Verification Report

This report has been prepared to verify the installation of SuDs systems, and detail their maintenance requirements, as requested under condition 6 of planning application 125018/FO/2019, dated 4th October 2019.

The report consists of:

- System descriptions
- Description of maintenance requirements
- Photos & As-Built Drawings



System Description

Whilst not industry recognised SuDs systems, such as swales, blue roofs, and rain gardens etc. the measures introduced uses a combination of infiltration, attenuation, and slow conveyance. All has been designed and installed in accordance with the Drainage Strategy contained as part of the application. The systems described therein include:

- Flow Restrictors
- Attenuation Tank
- Perforated drains within reduced fines and no-fines aggregate
- Drainage joints

Flow Restrictor

A Flow Restrictor has been fitted inside manhole S7, as shown on figure 1 below which is the final manhole before connection to the Culvert known as Cornbrook. The Flow Restrictor has been installed to limit flow to 7.0 litres / second with max head = 1.2m.

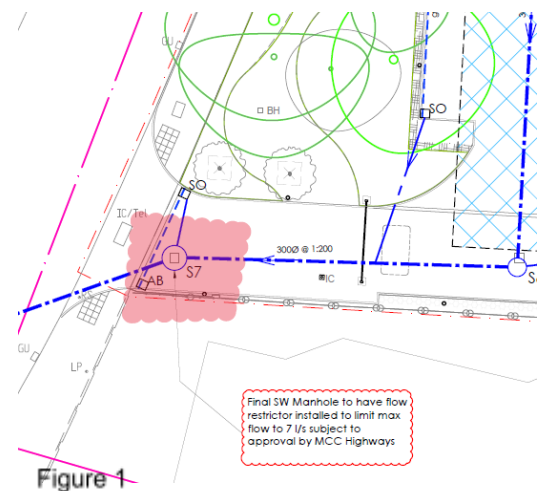
Maintenance requirements involves:

- Regular checks of Flow Restrictor as required by the manufacturer and at least every six months and in particular after autumn leaf falls. Any debris to be removed
- Regular checks for silt and debris every six months and fully clean / pump out to remove all silt and debris which has accumulated in the sump

Ideally these checks will take place in November and April every year.

As-Built Drawing Reference: BB-DWC-ZZ-C-DR103

Photo Reference : 1





Attenuation Tank

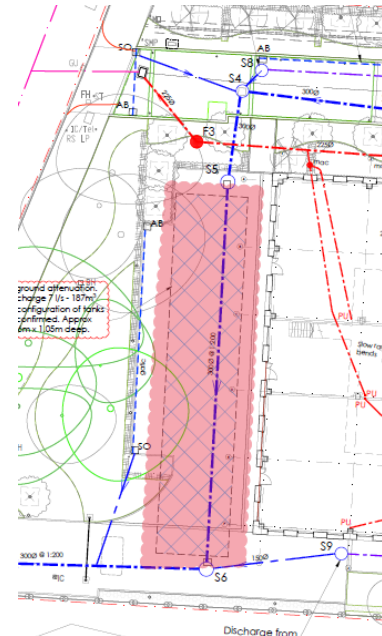
A large 187 m³ attenuation tank has been installed between manhole S5 and S6, as shown in figure 2, just before the Flow Restrictor. The tank is 30 m x 6 m x 1.05 m deep.

Maintenance requirements involves:

- Flushing the tank annually from the upstream manhole in accordance with the manufacturers recommendations

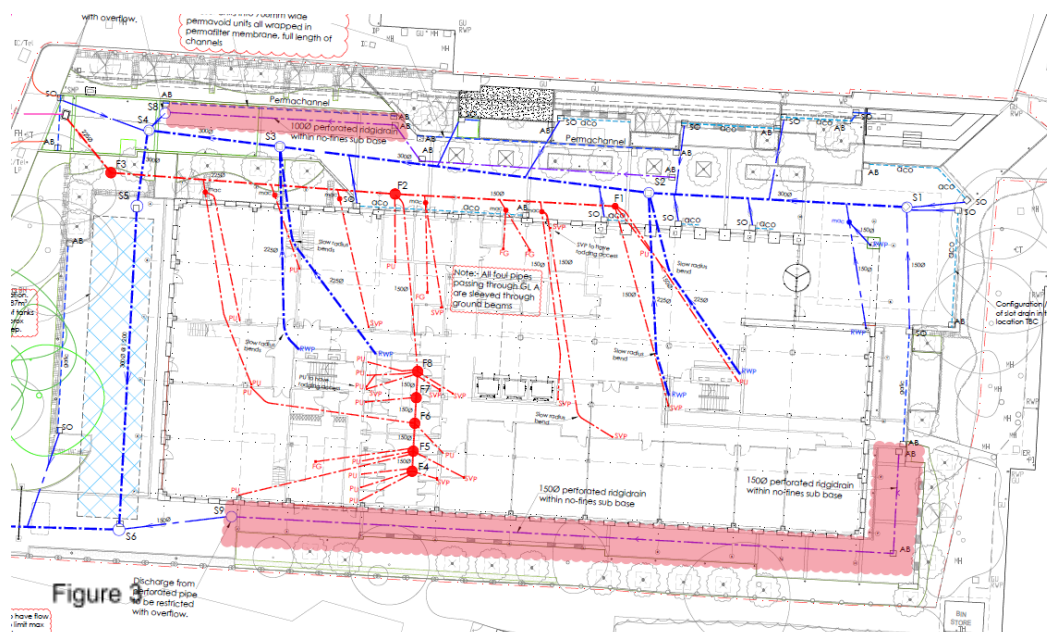
As-Built Drawing Reference: BB-DWC-ZZ-C-DR101-C2;
GRAF EcoBlock product literature;

Photo Reference: 2a, 2b, & 2c.



Perforated Drains & Reduced Fines

Perforated drains have been installed along the southern path as shown in figure 3. These drains are encapsulated using no fines and reduced fine aggregates within the paving build up.



Maintenance requirements involves:

- Clearing blockages when apparent.

As-Built Drawing Ref: BB-DWC-ZZ-C-EX101

Photo Ref: 3a, 3b, 3c, 3d, 3e, 3f

Drainage Joint

To the south elevation, above the aforementioned perforated drain, the pavers will contain drain joints allowing water to infiltrate to the attenuation system and land drain below. Please refer to figure 3 for location.

Maintenance requirements involves:

- Little to no maintenance requirements other than replacing any joints which come away from the pavers

As Built Drawing Ref: Hardscape Drain Joint Product Literature

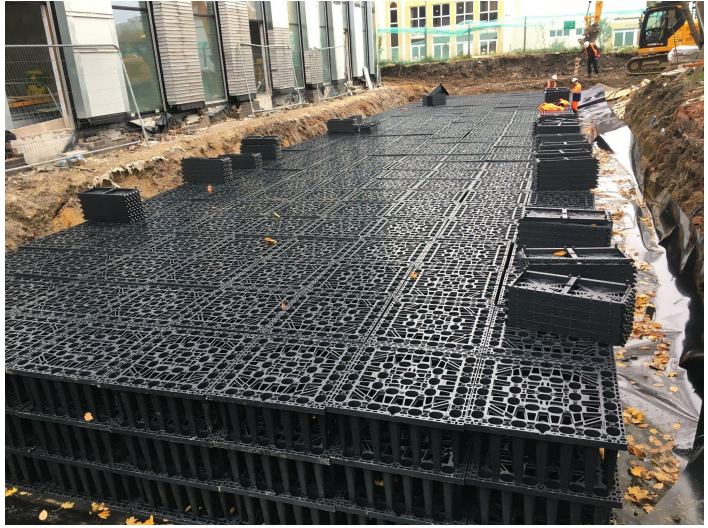
Photo Reference: 4a and 4b



Photo Schedule

Photo Ref	Description	Photo
1	Flow Restrictor	



2a	Attenuation Tank	
2b	Attenuation Tank	



2c	Attenuation Tank	
3a	Sub-base 3 MOT	



3b	Visqueen taped membrane	
3c	Sub-base 2 No Fines MOT	



3d	Perforated drain set within trenching area & wrapped with Terram	
3e	Perforated drain set within trenching area & wrapped with Terram	

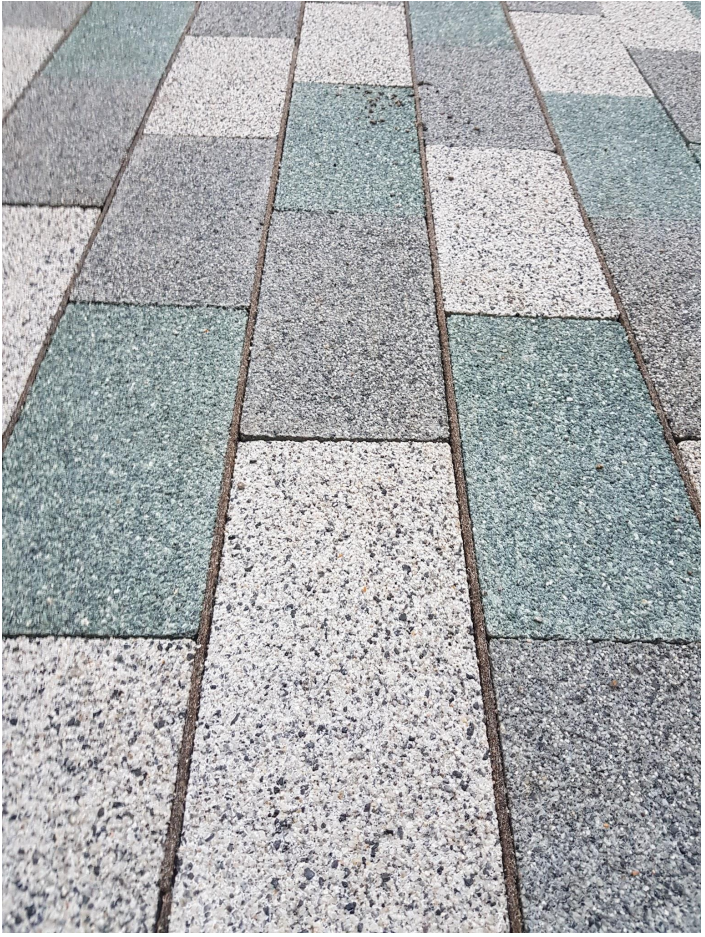


3f	Perforated drain wrapped and being covered with Reduced Fines	
-----------	--	---



4a	Drain Joint	
----	-------------	---



4b	Drain Joint	
----	-------------	---



As-Built Information

10

Underground Drainage Layout
1:200 at A0

Surface water discharge from site is limited to
MAX 7.0 litres / second and attenuation
storage is sized for a 1 in 100 year storm event
+ 40% extra for Climate Change.

No works should commence until the details
shown on this drawing are fully approved by
the Local Authority and United Utilities.

KEY

- F1
ST
- NEW PRIVATE FOUL MANHOLE
- NEW PRIVATE SURFACE WATER MANHOLE
- NEW PRIVATE FOUL DRAIN + FLOW DIRECTION
(HEP WORTH SUPERLEVEL/HEP LEVEL) -
CLASS 3 BEDDING
- NEW PRIVATE SURFACE WATER DRAIN + FLOW
DIRECTION (HEP WORTH SUPERLEVEL/
HEP LEVEL) - CLASS 3 BEDDING
- EK ADOPTED COMBINED SEWER
- GATIC 150mm WIDE SLOT DRAIN (MEDIUM DUTY)
WITH D400 COVER (U.N.O.) - 200mm C28/35
CONCRETE BED + SURROUND WITH TRAPPED,
RODDABLE SUMP OUTLET AND ACCESS POINTS
- ACO
- ACO MULTIDRAIN WITH STAINLESS STEEL SLOTTOP
CHANNEL 150mm WIDE SLOT DRAIN (MEDIUM
DUTY) WITH D250 COVER (U.N.O.) - 150mm
C28/35 CONCRETE BED + SURROUND WITH
TRAPPED, RODDABLE SUMP OUTLET AND ACCESS
POINTS
- permachannel
- POLYPIPE PERMACHANNEL WITH PERMAVOID
DIFFUSERS TO DISCHARGE INTO NO FINES SUB
BASE BELOW PAVING. CHANNEL TO HAVE 150mm
C28/35 CONCRETE BED + SURROUND WITH
ACCESS POINTS
- 1500 / 1000 RIDGIDRAIN PERFORATED PIPE WRAPPED
IN 100mm GRASS BED + SURROUND & TERRAM -
PLACED WITHING NO-FINES SUB BASE LAYER.
- MD
HD
- MEDIUM DUTY (GRADE C250)
HEAVY DUTY (GRADE D400)
- MAC
- 3000 x 4000 MINI ACCESS CHAMBER
(To foul or surface water)
(Hepworth code Ref:- SDAC1/I1)
- FG
- FLOOR GULLY, TRAPPED WITH RODDABLE
OUTLET
- PU
- POP-UP IN FLOOR
- SO
- SILT PIT WITH OUTLET AND + MD COVER
TO BE TRAPPED AND RODDABLE
- AP
- ACCESS POINT AND MD COVER
- SVP
- SOIL VENT PIPE
- RWP
- RAIN WATER PIPE

NEW MANHOLE SCHEDULE						
MH REF.	C.L. (m) TBC	I.L. (m)	MH TYPE & DETAIL No	MH SIZE	COVER & FRAME SIZE & TYPE	REMARKS
F1	35.200*	34.300	CONC	1050 DIA.	600 x 600 HD	
F2	35.200*	34.000	CONC	1050 DIA.	600 x 600 HD	
F3	34.800*	32.575	CONC	1200 DIA.	750 x 750 MD	
F4	35.150	34.400	CONC	1200 DIA.	600 x 600 MD	Double sealed internal cover.
F5	35.150	34.375	CONC	1050 DIA.	600 x 600 MD	Double sealed internal cover.
F6	35.150	34.330	CONC	1050 DIA.	600 x 600 MD	Double sealed internal cover.
F7	35.150	34.300	CONC	1200 DIA.	600 x 600 MD	Double sealed internal cover.
F8	35.150	34.250	CONC	1200 DIA.	600 x 600 MD	Double sealed internal cover.
UU Manhole 2204	34.300**	32.490**	Extg.	Extg.	Extg.	New chamber may be required subject to UU requirements.
S1	35.000*	33.800	CONC	1200 DIA.	600 x 600 HD	
S2	35.100*	33.477	CONC	1200 DIA.	600 x 600 HD	
S3	34.900*	33.167	CONC	1200 DIA.	600 x 600 HD	
S4	34.700*	33.101	CONC	1200 DIA.	600 x 600 HD	
S5	34.800*	Pipe - 33.086 Sump - 32.786	CONC	1200 DIA.	600 x 600 MD	Silt pit manhole - 300mm deep. All pipe inverts level
S6	35.200*	Pipe - 32.906 Sump - 32.606	CONC	1200 DIA.	600 x 600 HD	Silt pit manhole - 300mm deep. All pipe inverts level
S7	34.712*	Pipe - 32.795 Sump - 33.345	CONC	1500 DIA.	750 x 600 HD	450mm deep silt pit manhole with flow control fitted in MH. Flow restricted to 7.0 litres / sec with a max head of 1.2m. All pipe inverts level. Flow restrictor to have built in overflow. See drawing DR103
S8	34.620*	Pipe In - 34.130* Sump - 33.680* Pipe Out - 33.980*	CONC	1050 DIA.	750 x 600 HD	Overflow manhole with sump. 200 orifice plate restrictor at incoming pipe invert with weir wall overflow at 34.420. See drawing DR105.
S9	34.830*	Pipe In - 34.340* Sump - 33.890* Pipe Out - 34.190*	CONC	1050 DIA.	750 x 600 HD	Overflow manhole with sump. 200 orifice plate restrictor at incoming pipe invert with weir wall overflow at 34.630. See drawing DR105

* Denotes proposed levels to be confirmed on site
** Denotes existing sewer levels to be confirmed on site

Note:
All manhole covers in external hard surfacings,
and all internal covers are to be recessed to
receive finishes to match their location

Note:
ALL Cover Levels to be confirmed following final confirmation of
external surface levels. ALL invert levels are based upon
INTERPOLATED levels of the existing adopted surface and foul runs
within the site boundary.

GENERAL NOTES

Do not scale this drawing.
Contractor to check all dimensions and report all errors and
omissions to the engineer.

- All external setting out to be confirmed on
Architects drawings.
- Manhole IL's relate to outgoing main pipe.
Where incoming pipes are of a smaller
diameter to the outgoing pipes they are to
be positioned with pipe soffits level UNO.
- All pipes under the building to be given
Class Z conc bed + surround. In addition all
pipes in vehicle paved areas where the
cover is less than 750mm are to be given a
Class Z concrete bed + surround.
Typically pipes to have Class 3 bedding.
- For exact location of all SVP's, RWP's and
Pop-Ups refer to Buro Happold drawings.
- All foul pipes to be 1000 at min 1:60 fall
unless noted otherwise.
- All surface water pipes to be 1500 unless
noted otherwise.
- Attenuation system and flow restrictor are
based upon a max. discharge from the SW
system of 7.0l/s. This MUST be approved by
the Local Authority and United Utilities prior
to any works being carried out.
- Legend refers to clay pipelines. Alternative
twin wall pipes can be used, as DW
Consulting Specification - contractor to
choose.
- For details of drainage refer to drawing
BB-DWC-ZZ-C-DR102, DR103, DR104 &
DR105.

C2	Internal drainage setting out adjusted to suit latest BA drawing.			16.03.21
C1	Issued for Construction.			9.11.20
Rev	Detail	By	Chk	Date
Revisions				

**DW Consulting
Engineers LLP**

Manland House, Manland Road
Sale, Cheshire, M33 3AQ
Tel: 0161 947 4144
Web: www.dwc-llp.com

Client
Bruntswood SciTech

Project
BASE

Location
Manchester Science Park

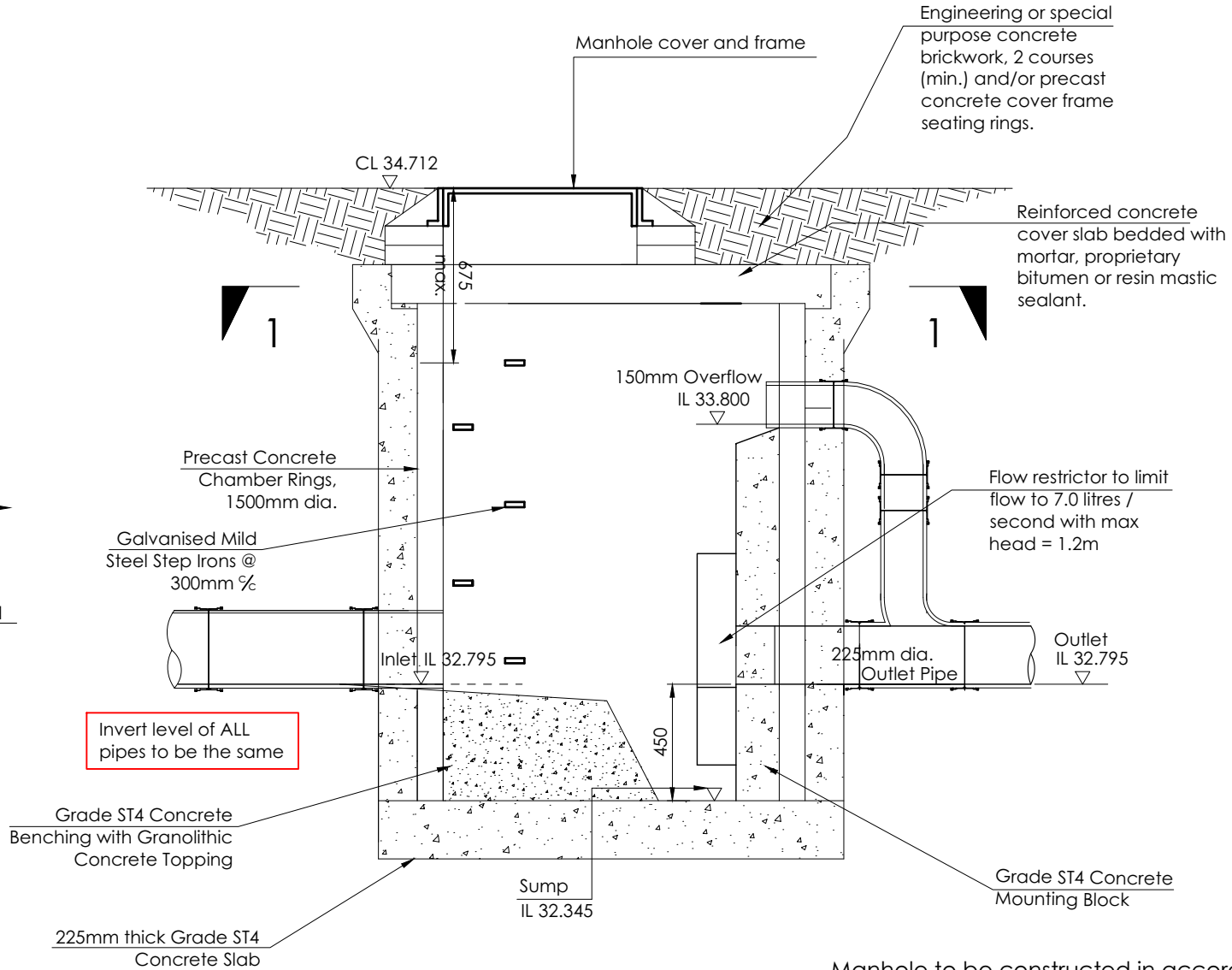
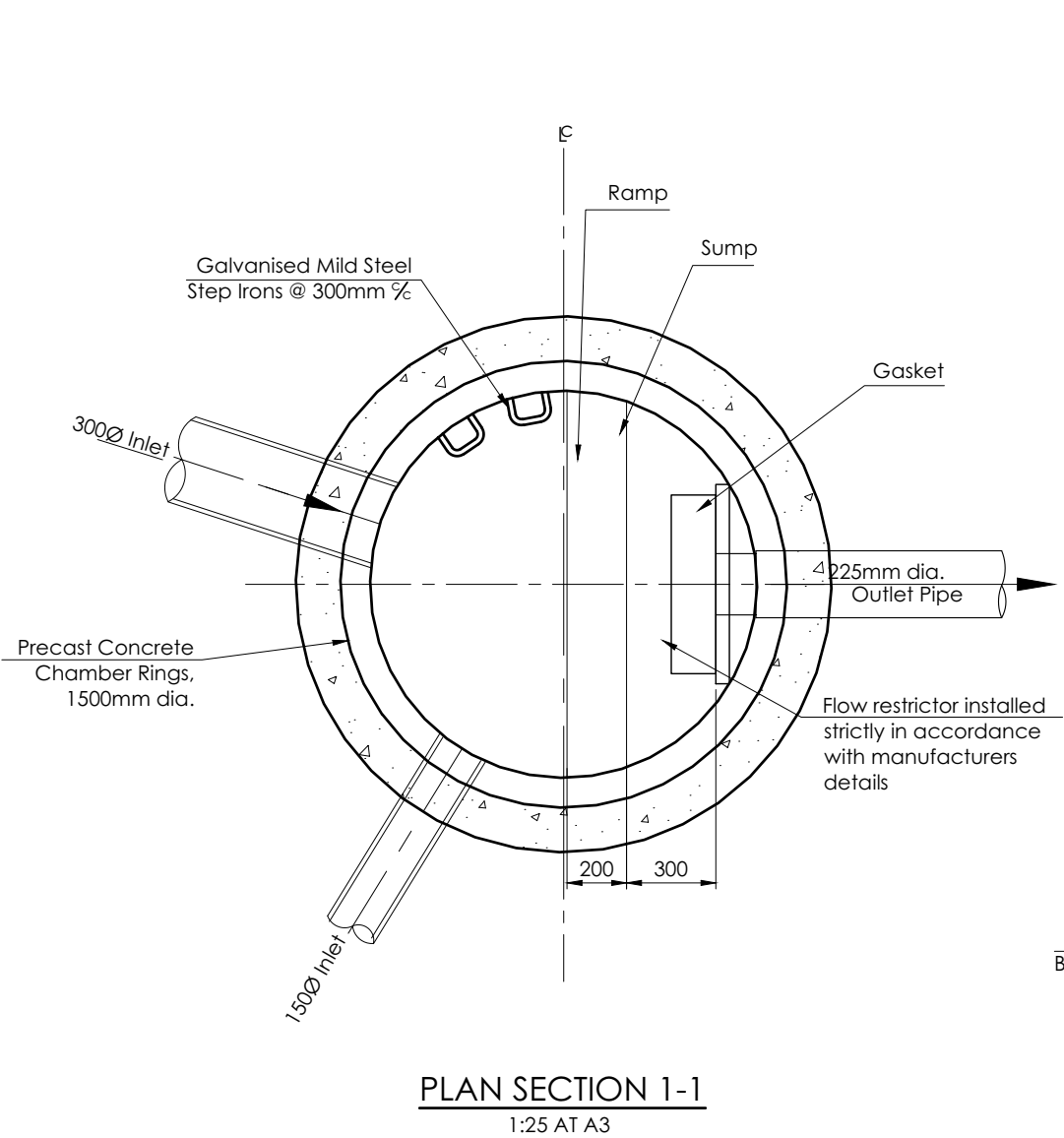
Drawing Title
Underground Drainage Layout

Drawing Status
Construction

Project No.	Discipline	Drawing No.
BB-DWC-ZZ	C	DR101
Scale	Sheet Date	Revision
1:200	AO	
Rev	Drawn	Checked
DEC'19	VE	RM

DWG INFO: Z:\DW LLP\DW LLP JOBS\DW1815 BASE BUILDING\DRAWINGS\DW DRAWINGS\CURRENT DWGS\SITE AND DRAINAGE\BB-DWC-ZZ-C-DR103-C1 DR104-C1 DR105-C1

GENERAL NOTES
Do not scale this drawing.
Contractor to check all dimensions and report all errors and omissions to the engineer.



Manhole to be constructed in accordance with details on drawing DW1815-C-DR02 for Concrete Manholes up to 3m deep.

Surface water design philosophy

Storm water attenuation is designed on the basis of maximum discharge of 7 litres / second and a 1 in 100 year storm event + 40% Climate Change. No works are to be undertaken until the drainage connection and design is approved by the Statutory Authority.

C1	Issued for Construction.				9.11.20
Rev	Detail	By	Chk	Date	
Revisions					

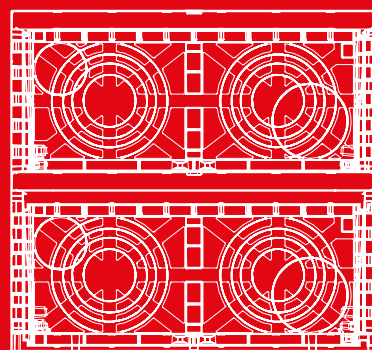
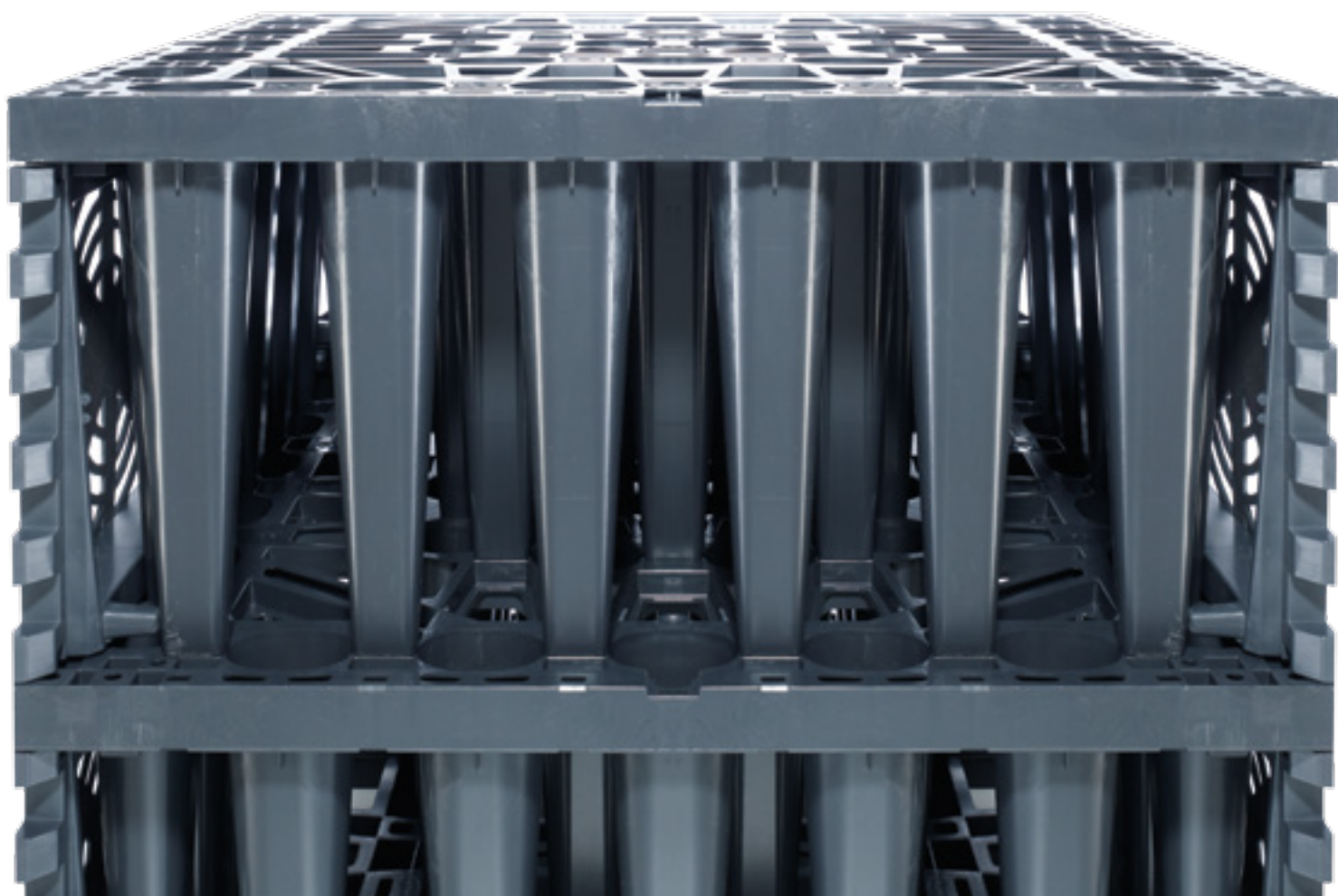
Client Bruntwood SciTech		DW Consulting Engineers LLP		Drawing Title Details of Flow Restrictor Manhole S7	
Project BASE		Manchester Science Park		Project No. BB-DWC-ZZ	
Drawing Status Construction		Marsland House, Marsland Road Sale, Cheshire, M33 3AQ		Discipline C	Drawing No. DR103
Tel: 0161 969 4144 web: www.dwlip.com		Scale 1:25		Sheet Size A3	Revision C1
Date Feb'20		Drawn RM	Checked CC	Auth CC	

© This drawing may not be copied without prior written permission



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 m² 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, Tumeltsham (AT)

EcoBloc

Stormwater management system

Various applications

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

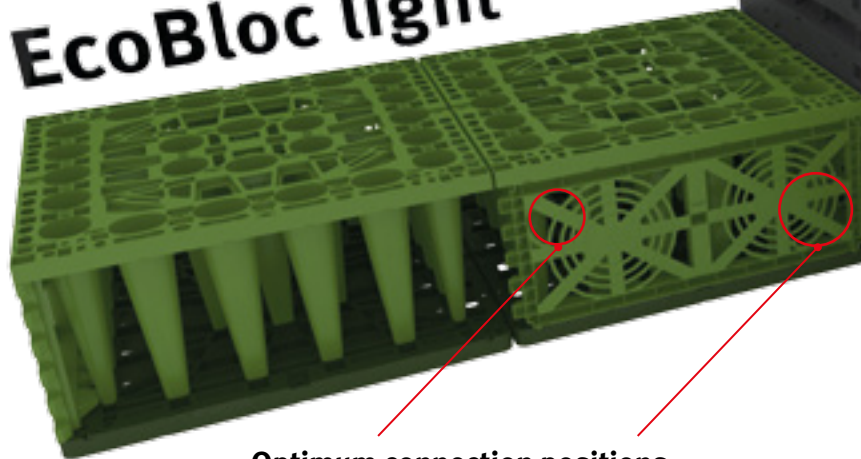


No tools required

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.

load ★ ★
logistics ★ ★ ★ ★ ★
EcoBloc light



Optimum connection positions

Optimum connection positions ensure full use of infiltration ditch volume.

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.

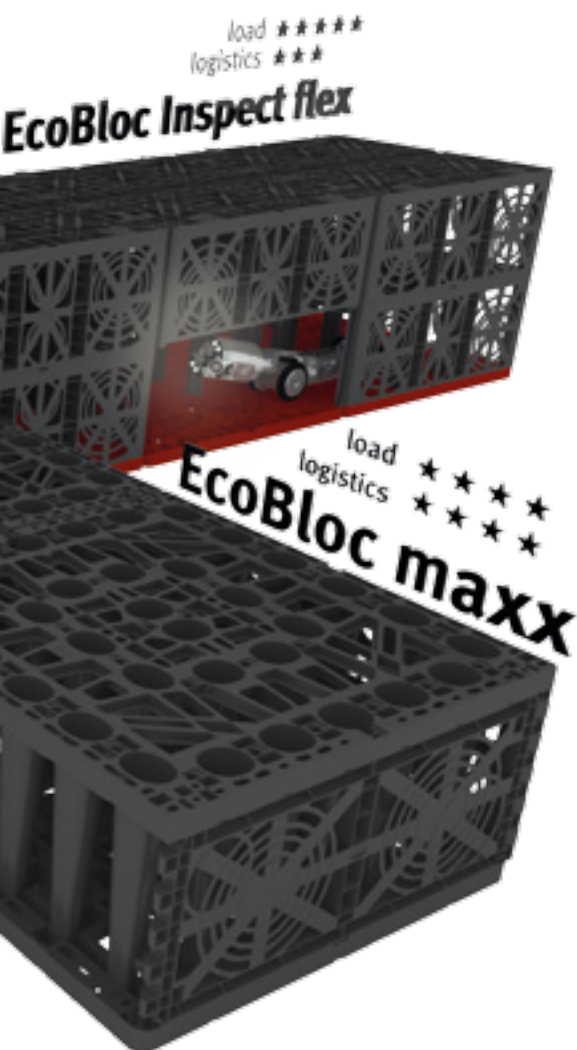
Easy to install

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



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.



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.



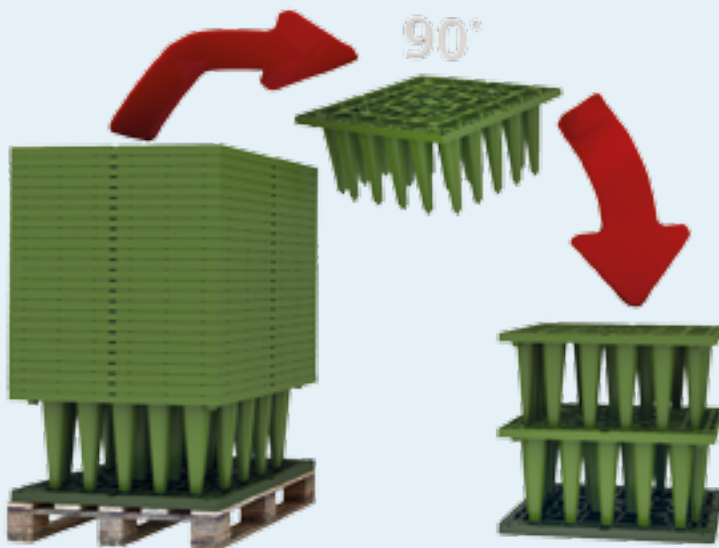
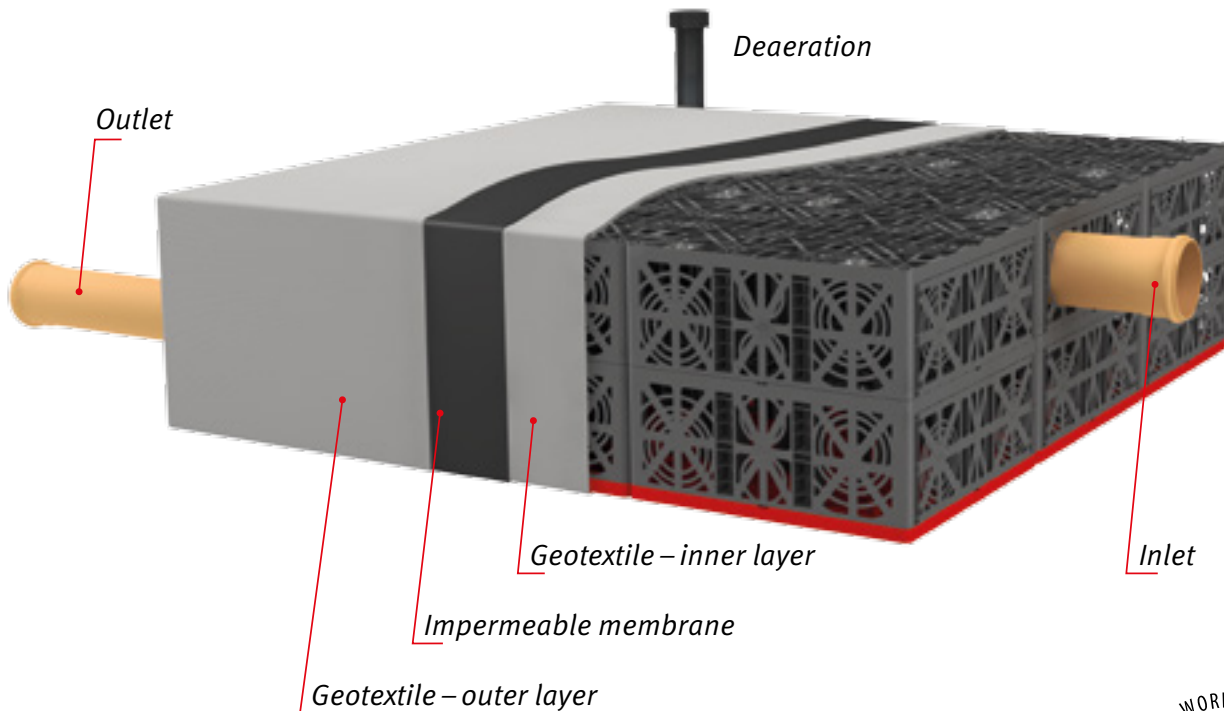
Application and logistics

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.



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 CO₂ 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

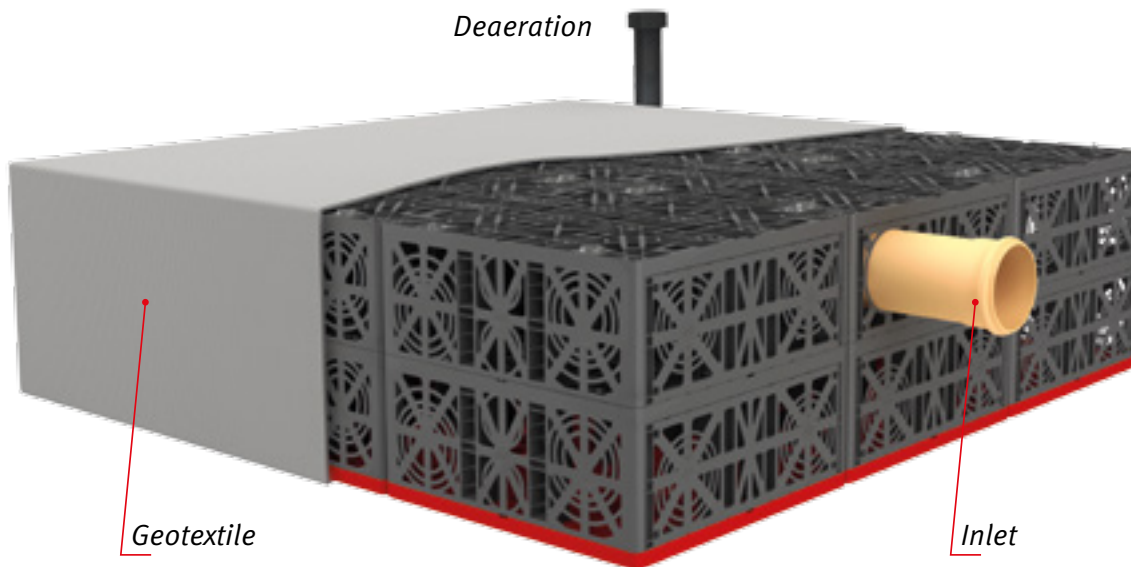
The side faces are sealed with EcoBloc end plates. The EcoBloc system can be adapted to match individual requirements.

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

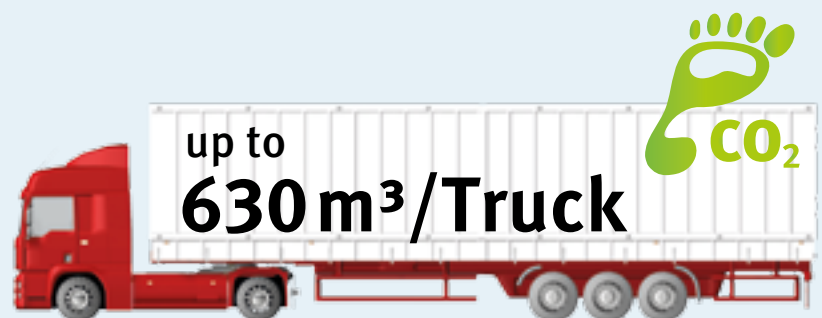
cycle. The GRAF EcoBloc modules combine environmental management of rainwater with the opportunity to protect against flooding. It stores rainwater

and gradually releases it back into groundwater reserves.



Eco-friendly product – green logistics

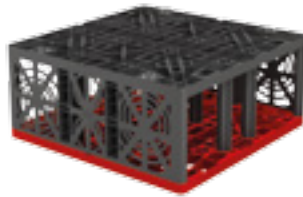
One lorry can transport up to 2800 EcoBloc light units. That corresponds to a volume of 630 m³ (22.250 ft³). This reduces carbon emissions during transport by 85 %!



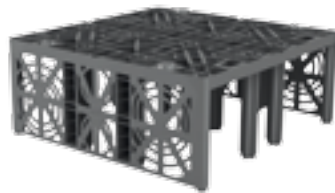
The system at a glance

EcoBloc Inspect flex

- Lorry-bearing 60 tons/HS-25
- 150 m³ (5.300 ft³)/Truck
- Inspectable
- High pressure jetting possible



Load ★★★★★
Logistics ★★★

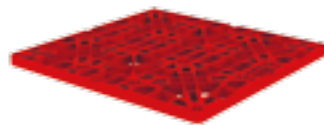


EcoBloc Inspect flex

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

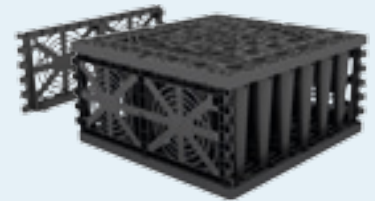
The front ends of an EcoBloc Inspect flex system are sealed by end plates with DN 100 (4")/150 (6")/200 (8") contact surfaces



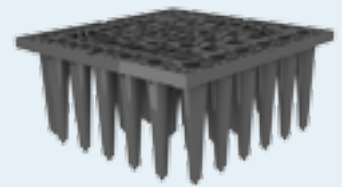
Item	Colour	Order no.
EcoBloc Inspect flex end plates (Set 2 units)	grey	402002

EcoBloc maxx

- Lorry-bearing 40 tons/HS-20
- 410 m³ (14.480 ft³)/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



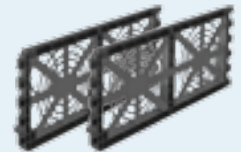
EcoBloc maxx base plate

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")



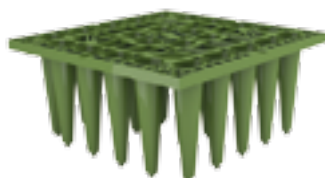
Item	Colour	Order no.
EcoBloc maxx end plates (Set 2 units)	grey	402203

EcoBloc light

- Lorry-bearing 12 tons
- 630 m³ (22.250 ft³)/Truck



Load ★★
Logistics ★★★★★

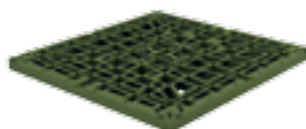


EcoBloc light

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

[Webcode G4109](#)



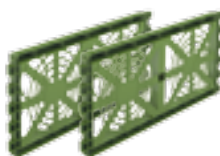
EcoBloc light base plate

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")

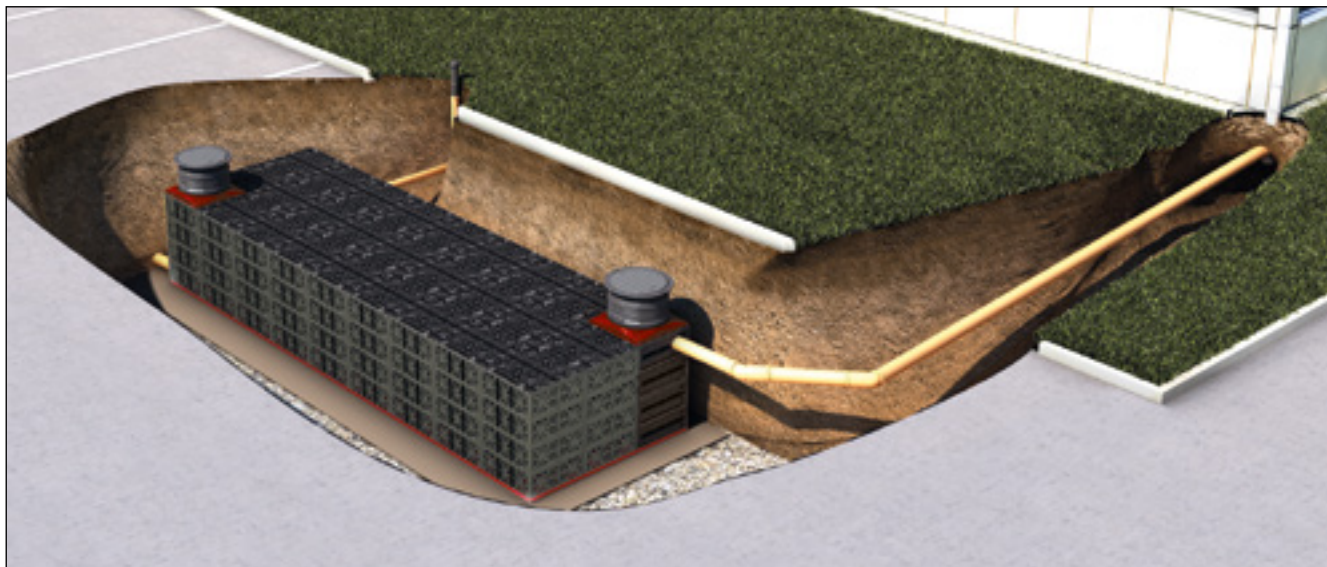


Order no. 231006

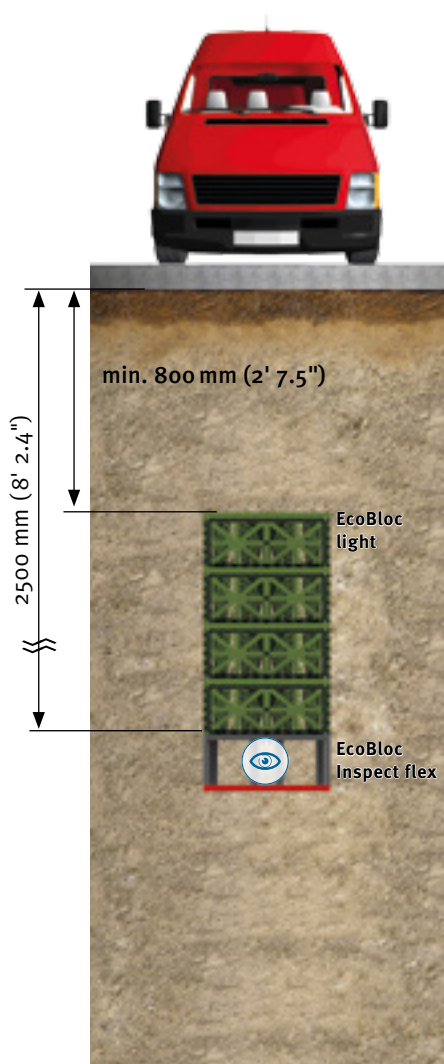
Sold by the metre, roll width 5 m (16' 4.8")

Order no. 231002

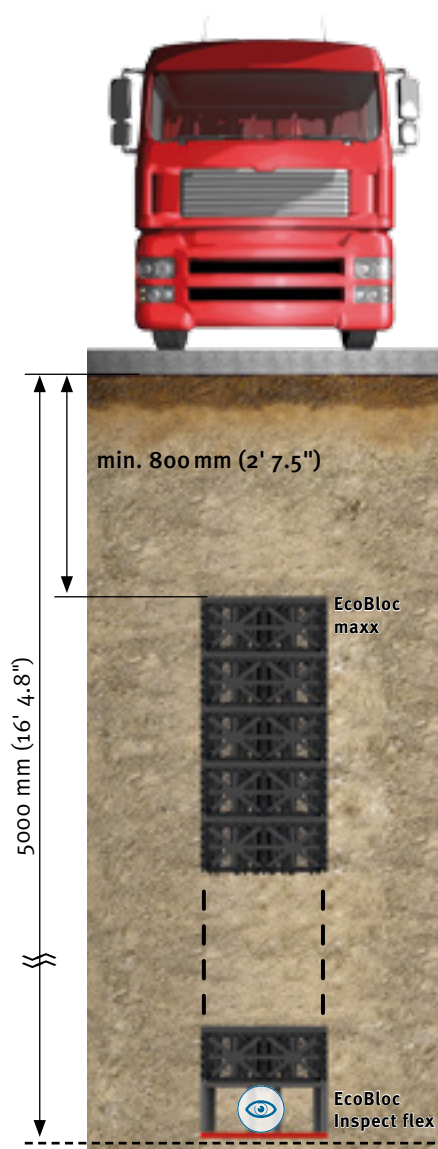
Applications and loads



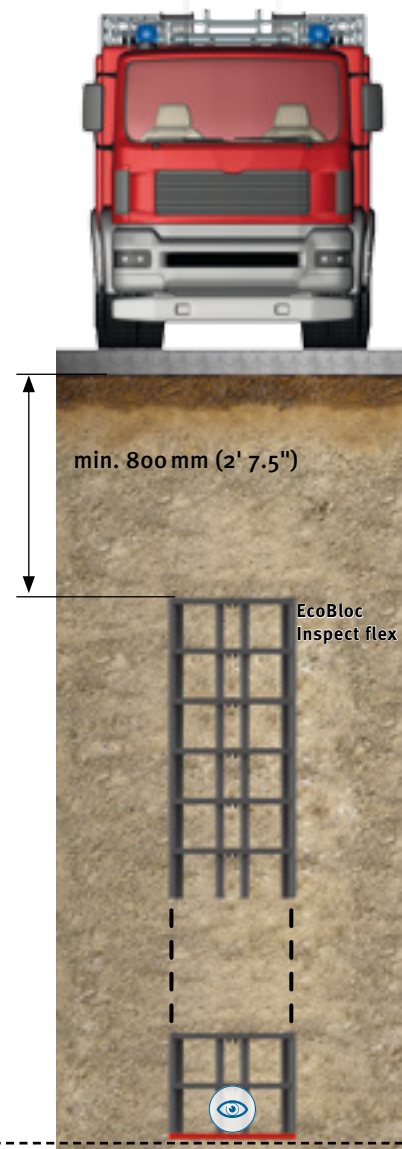
12 tons

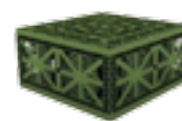


40 tons / HS-20



60 tons / HS-25





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		•	•	•
Load				
Load	Short-term	max. 100 kN/m ²	max. 100 kN/m ²	max. 75 kN/m ²
	Long-term	max. 59 kN/m ²	max. 59 kN/m ²	max. 35 kN/m ²
Without traffic load	min. earth covering	250 mm (9.8")	250 mm / 500 mm ¹⁾ (9.8") / (1' 7.7") ¹⁾	250 mm / o.r. ²⁾ (9.8") / o.r. ²⁾
	max. earth covering	2750 mm (9')	2750 mm / 2000 mm ¹⁾ (9') / (6' 6.7") ¹⁾	1500 mm / o.r. ²⁾ (4' 11") / o.r. ²⁾
	max. installation depth	5000 mm (16' 4.8")	5000 mm (16' 4.8")	2500 mm (8' 2.4")
	max. number of layers	14	14	6
Vehicle	min. earth covering	250 mm (9.8")	250 mm / 500 mm ¹⁾ (9.8") / (1' 7.7") ¹⁾	500 mm / o.r. ²⁾ (1' 7.7") / o.r. ²⁾
	max. earth covering	2750 mm (9')	2750 mm / 2000 mm ¹⁾ (9') / (6' 6.7") ¹⁾	1250 mm / o.r. ²⁾ (4' 1.2") / o.r. ²⁾
	max. installation depth	5000 mm (16' 4.8")	5000 mm (16' 4.8")	2250 mm (7' 4.6")
	max. number of layers	14	14	4
Lorry 12	min. earth covering	500 mm (1' 7.7")	500 mm / 800 mm ¹⁾ (1' 7.7") / (2' 7.5") ¹⁾	800 mm / o.r. ²⁾ (2' 7.5") / o.r. ²⁾
	max. earth covering	2750 mm (9')	2750 mm / 2000 mm ¹⁾ (9') / (6' 6.7") ¹⁾	1000 mm / o.r. ²⁾ (3' 3.3") / o.r. ²⁾
	max. installation depth	5000 mm (16' 4.8")	5000 mm (16' 4.8")	2250 mm (7' 4.6")
	max. number of layers	13	13	4
Lorry 30	min. earth covering	500 mm (1' 7.7")	500 mm / 800 mm ¹⁾ (1' 7.7") / (2' 7.5") ¹⁾	800 mm / o.r. ²⁾ (2' 7.5") / o.r. ²⁾
	max. earth covering	2500 mm (8' 2.4")	2500 mm / 1750 mm ¹⁾ (8' 2.4") / (5' 8.9") ¹⁾	1750 mm / o.r. ²⁾ (5' 8.9") / o.r. ²⁾
	max. installation depth	5000 mm (16' 4.8")	5000 mm (16' 4.8")	2500 mm (8' 2.4")
	max. number of layers	13	13	13
Lorry 40/HS-20	min. earth covering	500 mm (1' 7.7")	800 mm (2' 7.5") ¹⁾	800 mm (2' 7.5") ¹⁾
	max. earth covering	2250 mm (7' 4.5")	2250 mm / 1500 mm ¹⁾ (7' 4.5") / (4' 11") ¹⁾	1500 mm / o.r. ²⁾ (4' 11") / o.r. ²⁾
	max. installation depth	5000 mm (16' 4.8")	5000 mm (16' 4.8")	5000 mm (16' 4.8")
	max. number of layers	13	11	11
Lorry 60/HS-25	min. earth covering	800 mm (2' 7.5")	800 mm (2' 7.5")	800 mm (2' 7.5")
	max. earth covering	2250 mm (7' 4.5")	2250 mm (7' 4.5")	2250 mm (7' 4.5")
	max. installation depth	5000 mm (16' 4.8")	5000 mm (16' 4.8")	5000 mm (16' 4.8")
	max. number of layers	13	13	13
Connections				
DN 100 (4")		•	•	•
DN 150 (6")		•	•	•
DN 200 (8")		•	•	•
DN 250 (10")		–	•	•
DN 300 (12")		• 3), 4)	• 3), 4)	• 3), 4)
DN 400 (16")		• 3), 4)	• 3), 4)	• 3), 4)
DN 500 (20")		• 4)	• 4)	• 4)
Measurements				
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)

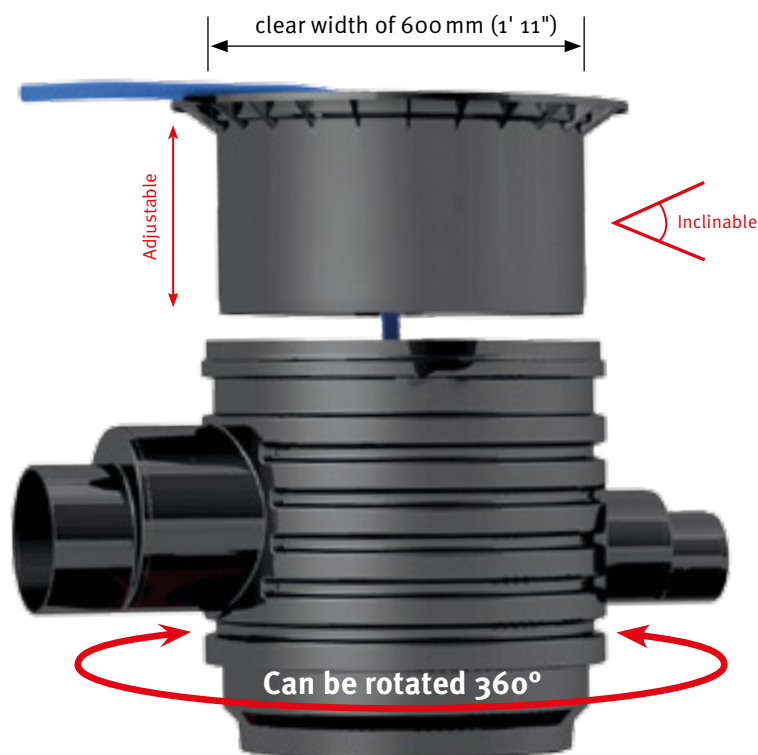
¹⁾ When combined with EcoBloc Inspect flex

²⁾ Values on request when combined with EcoBloc Inspect flex

³⁾ Optionally available with Vario shaft (page 12)

⁴⁾ 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.

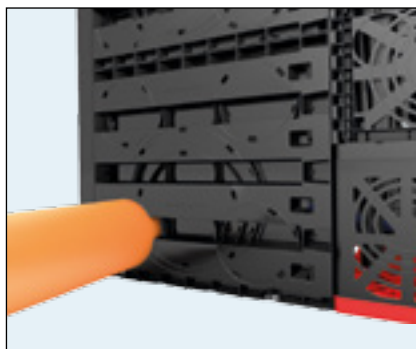


No tools required



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").



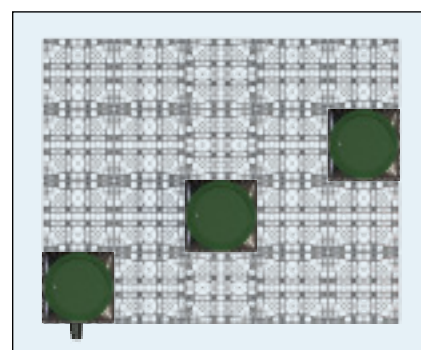
Wide access

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

[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

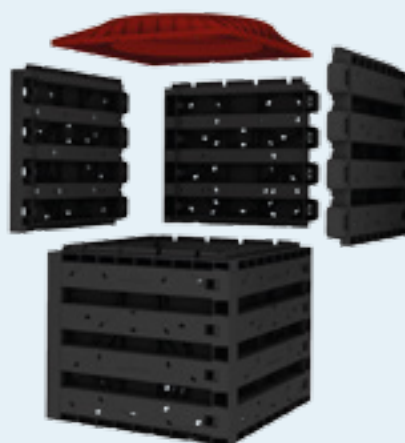
base- and cover for Vario 800 flex shaft

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



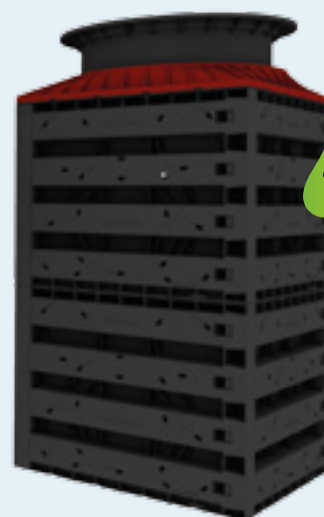
1. Stackable

To save space during transport and storage, the parts of the Vario 800 are stacked into each other. This minimizes transport costs and CO₂ 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.



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



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 $\pm 3\%$. 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.

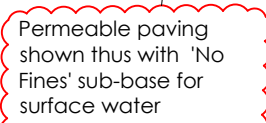
Otto Graf GmbH
Kunststoffzeugnisse
Carl-Zeiss-Straße 2 – 6
79331 Teningen, Germany

Tel.: +49 7641 589-0
Fax: +49 7641 589-50
mail@graf.info
www.graf-water.com

Graf UK Ltd
Target House
Thorpe Way Ind.Estate
Banbury, Oxfordshire
UK-OX16 4SP

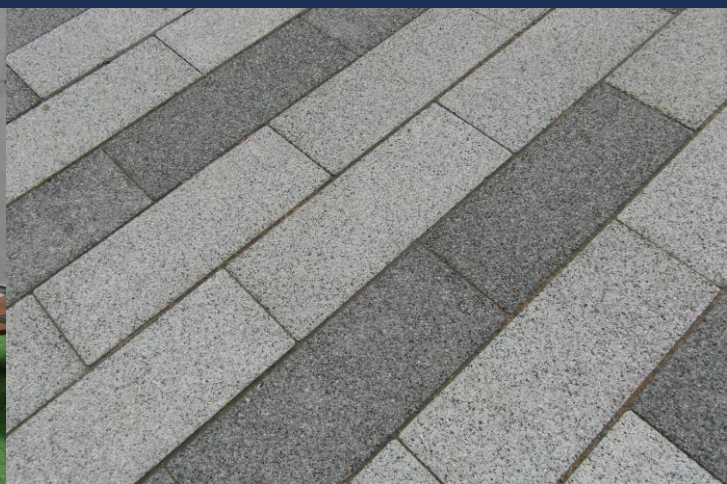
Tel.: +44 1608 661-500
Fax: +44 1295 211-333
info@grafuk.co.uk
www.grafuk.co.uk

© Otto Graf GmbH, Teningen, Germany
Reproduction – even in extracts –
only with written authorisation
Item no. 950431/EN



Drainjoint

A Permeable Paving Solution



Drainjoint

A Permeable Paving Solution



Drainjoint permeable paving is easy to install and can be used with many different materials. Removing the need for pavers to carry nibs or extensions and avoiding the requirement for large, unsightly aggregate joints, the system preserves the beauty of the paving material.

Drainjoint allows for any material to be laid as a permeable paving system, be it natural stone, clay or concrete, and it can accommodate any paving size (not just those designed for a 6mm aggregate joint). The product is designed to be sustainable, cost-effective and easy to install.

No aggregate joints mean no continuous maintenance or rattling of blocks. No rattling reduces the potential for surface failure and eradicates the need for expensive rejointing.

Paving can be cleaned with a standard mechanical sweeper and, as Drainjoint is non-degradable and does not absorb water, there is no potential for freeze-thaw damage.

Key Technical Features:

- Permeable infiltration joint
- Suitable for pedestrian and vehicular uses
- DEFRA compliant design service
- Paving can be laid to 'no falls'
- For use on standard permeable sub-base with sand joints as per Interpave and BS EN standards

Development:

DrainJoint was developed with the intention to create something which would:

- Be easy to implement
- Have little or no maintenance requirements
- Be a cost-effective solution

Cost reduction:

- Capacity of sewers can be reduced when developing new residential areas
- Costs of construction
- Maintenance costs
- No special maintenance is needed
- Drainjoint can be used with all kinds of paving materials and sizes



Traditional Permeable paving products:

- Only available in concrete or clay
- Only available in restricted sizes – 105mm x 210mm
- Frequent maintenance – replacement of aggregate in joints