

XFlow surface drainage

### DRAINAGE CELL FOR RAINWATER COLLECTION AND INFILTRATION



## **XFlow**

Fields of application



Carparks/traffic areas page 12–13, 20



Outdoor storage areas page 14



Planted areas/tree tubs page 15, 21



Park/Green areas page 16



**Sports areas** page 18



TALL



# All down the line -**GRAF** project support





The increasing sealing of building areas such as parking lots for supermarkets are problematic especially in heavy rain events. Usage of permeable surfaces like paving stones with wide joints or grass pavers is important to prevent flooding. With the help of these permeable surfaces the accumulating rainwater is quickly drained into the ground. In the layers beneath, it must either be infiltrated quickly or be temporarily stored. XFlow significantly improves the infiltration performance thanks to its wide effective area and the good hydraulic connectivity. In addition, the high storage coefficient compared to typical installations with gravel/ crushed stones improves the characteristic for the temporary storage of rainwater in the operational area.





# **Benefits in operation and maintenance**





- Local flooding through clocked storm drain
- Service vehicle required
- Bad maintenance only during heavy rain event in detectable
- Storm drain deepest point vulnerable to dirt





- Easy maintenance of catchment area
- No labor intensive maintenance and inspection necessary
- Ideal for areas outside of the regular maintenance scope
- Only the usual cleaning work is necessary on carparks and traversable surfaces and paths
- No further underground construction products required
- Fast detection of missing service

The best of two sizes

Easy and flexible assembly

✓ For all combinations with XFlow 50-L & XFlow 50-S lengthwise and crosswise

Improve your permeable areas

✓ High stability combined with the best hydraulic properties

Reduction of puddles

Ideal for high point and traffic loads, also under special vehicles



# Mix it to your needs

### XFlow 50-S

- 1 cell = 0.16 m<sup>2</sup> (1.72 ft<sup>2</sup>) infiltration/collector area
- Storage coefficient of 85 %
- Gross/net volume: 8.2 l (2.16 US gal.) / 7.0 l (1.85 US gal.)



### XFlow 50-L

- 1 cell = 0.64 m<sup>2</sup> (6.89 ft<sup>2</sup>) infiltration/collector area
- Storage coefficient of 88 %
- Gross/net volume: 32.6 l (8.61 US gal.) / 28.7 l (7.58 US gal.)



### **Optimisable installation**

Xflow 50-L and XFlow 50-S can be combined to optimal effect, even in unusual geometries. The interaction between these two sizes serves to minimise cut waste and shorten assembly times to the same extent.



### Improved handling

Fastest assembly – easy onsite handling. XFlow drainage cell feature a convenient plugin system for huge time savings in installation. The various cells can be assembled in any direction.



#### Maximised stability

XFlow drainage cell are made of high performance GRAF XFlow provides free 3D-hydraulic flows. For infiltration compounds. Just the one installation of small thickness applications water flows directly into the ground. Also other between traversable surface and XFlow is enough to safeguard applications are supported by this design e.g. collecting and the strength and stability of the drainage cell over decades. directing rainwater.







World wide fastest installation performance



### Hydraulic performance

## **XFlow**

#### System overview and components

#### XFlow 50-S

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Technical data	XFlow
Volume gross/net	8.2 l (2.16 US gal.) / 7.
Storage coefficient	85 9
Flow rate (@ 1% grad)	

#### Loading volume

Ultimate compressive strength





/---<mark>60t</mark>

#### XFlow 50-S

Drainage cell with one quarter of the area for installation over small areas or for supplementing edge areas around large installations with XFlow 50-L.

A	rea	Length	Width	Height	Weight	Colour	ltem no.
		-		2	1.2 kg (2.64 lbs)	black	495001

#### XFlow 50-L

Drainage cell ideal for large installations with high savings potential in installation times and work.

Area	Length	Width	Height	Weight	Colour	ltem no.
0.64 m² (6.89 ft²)	1120 mm (44")	560 mm (22")	52 mm (2")	4.3 kg (9.47 lbs)	black	495000

#### Loading class





Vehicle loading

Lorry-bearing 40 t/HS-20

#### Accessories

#### **GRAF-Tex geotextile**

For the installation of XFlow drainage cell Sold by the metre, roll width 2.5 m (8' 2.4") ltem no. 231007 Sold by the metre, roll width 5 m (16' 4.8") ltem no. 231002







**Combination options** 







	70'	20	00	32		705	27
[	$\infty$	$\infty$	$\infty$	$\infty$	$\mathbf{x}$	XX	х
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- 6	$\infty$	$\infty$	$\infty$	$\infty$	$\infty$	$\infty$	х
- 0	$\infty$	$\infty$	$\infty$	$\infty$	$\infty$	$\infty$	х
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- 1	$\infty$	$\infty$	$\infty$	$\infty$	XX	XX	X
	20		00		200	2.00	-



#### 1 50-S

7.0 l (1.85 US gal.) 32.6 l (8.61 US gal.) / 28.7 l (7.58 US gal.)

%

88 %

XFlow 50-L

>3.0 l/sec/m

min 2000 kN/m²

min 2000 kN/m²



Lorry-bearing 60 t/HS-25





XFlow 50-L







# **Carparks/traffic areas**

Avoid wet shoes



#### Advantages

- Paved carparks for fewer puddles
   Moving stormwater hydraulics from overground to underground
- Reduction of peak hydraulics for pipe networks

Installations with XFlow drainage cells under carparks reinstate unrestricted use of the areas just a short time after a heavy rain event. Puddling is transported under the top edge of the ground into the drainage cell. Thanks to the generous storage of up to 45 l/m<sup>2</sup>, all of the accumulating water is generally stored directly underground.







Plane formation: chips 8/16 mm, crushed material (50 – 80 mm) on compacted base layer

Dry feet for your customers and visitors









#### Advantages

- Also usefull for the drainage of smaller areas
- Ideally for different land forms
- Reduction of the risk of slipping
- Visually appealing surface
- Reduced maintenance effort

#### Curbstone



### **Outdoor storage areas**

The best storage areas for your products



#### Advantages

- Any size of surface installations
- Under surfaced and unsurfaced areas (chippings, gravel, or other bulk materials)
- Faster availability of storage areas during and after heavy rain
- Less splashing during drives through rain!

Heavily used outdoor and chipping areas are prone to surface deformation, and water collects quickly in the depressions. Also heavy rainfall, cloudbursts, and similar can promote the formation of standing water on surfaces. Installed XFlow drainage cells reduce or eliminate surface standing water, so the affected areas are available at all times. In addition, the valuable goods in storage and vehicles sustain no damage or soiling from excessive splashing.



#### Protect your goods





## **Planted areas / tree tubs**

Easy tending of planted islands







#### Advantages

- No standing water around sensitive roots
- Indirectly regulated water management
- No anaerobic conditions promoted by rotting in water pockets
- Temporary water storage serves to lengthen watering intervals

XFlow drainage cells are the ideal solution for improving plant and plant tub water management. The drainage cell functions here as a buffer

- After heavy rain or excessive watering, the water first collects in the XFlow drainage cells. This prevents water from collecting in the soil and reduces rotting processes
- If, on the other hand, the soil dries out and there is still water in the XFlow, the water management can regulate itself automatically via capillary forces.

Other installation options can be realised e.g. with geotextiles that permit roots to enter the drainage cells unobstructed.



## **Park/Green areas**

Drainage concepts for green spaces and paths



#### Advantages

- No surface wetness or puddling just
- a short time after bad weather • Targeted removal of collecting rainwater without additional maintenance

Intelligent drainage with XFlow 50-L and 50-S in green spaces and carparks safeguards the rapid removal of rainwater under heavy rain. The stratum concept behind the drainage cells can be realised under both lawn and paved areas as well as under paths. XFlow can store up to 45 litres of rainwater per square metre. In addition, the drainage cell presents an open structure for direct infiltration or for transport between adjacent cells in the system.



Protect underground infrastructure







Plane formation: chips 8/16 mm, crushed material (50 – 80 mm) on compacted base layer

#### Protect your green area









#### Advantages

- Fast drying of soil around all sizes of underground infrastructure
- No wetting and no additional hydraulic uncertainties in slip joints (inclines, embankments, backfills)
- Removal of slope water in terrace/ platform structures
- High hydraulic percolation performance supports all arrangements and inclinations of water carrying strata
- High stability also ideal for hillsides exposed to shearing horizontal loads

Hillside/stratum water can collect specifically in new buildings on terraces and in recently developed areas on steep hillsides. XFlow is designed for the targeted removal of collecting stratum water. The water is collected over a wide area and drained off in a wide range of ways. Additional geotextiles acting as interstratum geomembrane serve to separate the water carrying from the dry strata.



# **Sports areas**

Wide range of potential applications



#### Advantages

- No surface wetness or puddling just
- a short time after bad weather
- Quickly playable again
- Reuse of the rainwater for irrigation of the grass field possible

For a great many sports disciplines, the excellent quality of the lawn is of paramount importance. The availability and playability of lawns may become restricted after heavy rain or under puddling. Swamping (and therefore damage) on the lawn can be prevented when the strata features XFlow for the targeted storage, removal, or recollection of water.



#### Further sports areas

Also sports areas featuring synthetic surfaces (track and field, football pitches, etc.), loose materials (beach volleyball fields, outdoor riding facilities, golf bunkers, etc.) benefit from the targeted XFlow storage and removal of excessive rainwater. Specifically the faster availability and better playing conditions enhance the convenience for players.



No permanent wetness, specifically on lawns - more robust, and not muddy. Faster replayability!





#### Suitable for:

- Football lawns or other lawn sports areas (rugby, polo, etc.)
- Base layers in outdoor riding facilities
- The collection and reuse of rainwater when an additional geomembrane is used in the XFlow installation
- Other facilities where XFlow can have positive effects in the strata, e.g. golf, artificial turf, bowls, etc.





### **Enhance surface quality**

The surfaces benefit from XFlow drainage cells in particular in terms of service life, visual appeal, and availability. It is a well known fact that lawns suffer in particular when played on after the formation of standing water.

This usually and regularly involves labour intensive rework or the replacement of sods. A good drainage concept can help to lengthen considerably the intervals between replacements. Yet also synthetic turf and loose material are seriously compromised in their service life and visual appeal by wetness and standing water.



#### Advantages

- 100 % decentralised system
- Improves groundwater recharge
- Increased protection rate against floods
- All parts heavy load accessable

XFlow drainage cells can also be combined with infiltration crates. The pavement surface is installed with a small incline, so that the rainwater is lead to the drainage pipe, which is installed under the XFlow drainage cells. The infiltrations crates offer an additional temporary storage volume, which could be relevant for heavy rain events and/or bad soil conditions.

### **Green City**

Building ecologically and sustainably





**Stormwater Management** For more information about our stormwater management, ask for our catalogue.

#### **Green vision**

XFlow can be used everywhere as a water carrying and water storage element. In addition, the drainage cells can also be filled with plant substrates, and their stability gives the surrounding material its shape. The free XFlow structure and design serve as an underlying frame.

#### **Rainwater harvesting and XFlow**

XFlow drainage cells can also be combined with a geomembrane to collect rainwater in the soil and to transport this specifically to an underground collection tank. In this process, the rainwater may already have been filtered during its passage through the various interlayers (e.g. chips, sand, or similar) and can be harvested without further filtration.

Possible applications here are, for example, under paved areas in courtyard access roads, etc., that can reharvest rainwater. Excess rainwater is then either infiltrated or transferred through the emergency overflow to the sewers or other infiltration system.

Talk to us about a potential application in your building project.





#### Integration in infrastructure

The return to natural construction materials and green elements in urban planning offers limitless potential. Yet it must be borne in mind at all times that drainage concepts have been incorporated under ground/in the background. As a measure to prevent damage to surfaces, also from more frequently occurring heavy rain events, XFlow drainage cells are used to safeguard the fast removal of standing rainwater.

All forms of above ground use and arrangement are possible. Irrespectively of this, XFlow can be installed flexibly and in any manner and provides robust, dry, and usable surfaces for both green spaces and paths.

#### **Green spaces**

Today, planning a modern city very often includes green centres for encounters and activities. And likewise this planning's realisation requires green drainage concepts that can be seamlessly incorporated. XFlow offers here flexible and limitless installations in megacities as well. The combination with green oases (see page 16), carparks (see page 12), and other natural landforms gives rise to sprawling green recreational areas.



# **Case Study**

Expansion of outdoor storage area in Dachstein (France)





The extensive expansion of outdoor storage area in Alsace, France was the goal of this construction. An area of more than three football fields will be used to store goods, pallets and others products. The area shall be usable also in heavy rain conditions and floods/damages must be avoided. So, landowner decided to combine permeable grid on the surface with GRAF XFlow 50-L and 50-S in top layers to prevent flooding and store temporarily stormwater during stormy weather.

The rainwater will infiltrate from GRAF XFlow drainage cells directly into the soil or is lead through the cells to an overground sewer system. GRAF XFlow drainage cells ensure high-volume for stormwater and best hydraulic performance on each squaremeter of installation under permeable pavements, grid areas or similar. The two product dimensions serve fastest installations with GRAF XFlow 50-L and highest flexibility in design and landscape forms with GRAF XFlow 50-S.

### Summary

Dachstein (France)		
Products	XFlow 50-L & XFlow 50-S drainage cells	
Application	Subsurface drainage	
Specifics	<ul> <li>Installation time: XFlow 50-L 2.500 - 2.700 m²/day (26.9 - 29.1 sqft) XFlow 50-S 1.500 - 1.700 m²/day (16.1 - 18.3 sqft) with 5 installers</li> </ul>	
	• 27.090 m² (291.6 sqft) covered surface	











#### Upcyclen – raw material made by GRAF

In Germany, only 16% of all plastic waste is recycled, worldwide less than 10%. Most of the rest ends up in waste incineration. 70% of GRAF environmental products are made from GRAF Upcyclen. This material is produced in the GRAF Competence Centre for Raw Materials, mainly out of recyclable materials from collection centres for private

households and small businesses. This involves short-lived packaging being turned into long-lasting environmental products. In this way GRAF makes an important contribution to the recycling of materials.









24 Otto Graf GmbH

Short-lived packaging



Future-oriented recycling process Recyclate on a par with the quality of primary plastics

1





# Sustainability goes beyond the product

70% recycled content

100,000 t LESS CO2 emissions through recycling – equivalent to the CO2 emissions of 60,000 cars

80% renewable energy share used in production

State-of-the-art production facilities for LOW ENERGY CONSUMPTION

Environmental products for SUSTAINABLE use of water

LONG SERVICE LIFE and spare parts availability

Products are FULLY RECYCLABLE



Headquarter at Teningen near Freiburg (Germany) with production site and warehouse

### **GRAF** – solutions for global challenges

Pure, clean water is one of our most important resources. GRAF develops, manufactures and markets an extensive range of products for water management. GRAF provides solutions to global challenges, such as protecting watercourses or preventing flooding, with typical German quality.

#### Active in over 70 countries, with roots in Germany

GRAF products are exported to more than 70 countries around the world. Despite being highly active abroad, GRAF is also continually investing in its headquarters at Teningen. By constructing its raw materials competence centre in Herbolzheim, GRAF is expanding its German roots yet further.

#### Sustainably manufactured environmental products

GRAF environmental products are 100% recyclable and are designed for as long a life as possible. This ensures that fewer resources are used and the environmental impact is minimised. Right from the stage of developing its products, GRAF attaches great importance to sustainable product design. Through years of intensive research, GRAF has managed to replace 70% of the raw materials used in production with recycled products without compromising product quality. This also improves the environmental performance of the GRAF product range. Sustainability is also hugely important during the manufacturing process. For example, the waste heat from production is used to heat the production and logistics building.

#### From pioneer to market leader

GRAF has over 50 years of experience in the development and manufacturing of high-quality plastic products. The company launched its first rainwater barrels in 1974 with the slogan "Rainwater is free" and soon started marketing other rainwater harvesting products too. GRAF's innovative and user-friendly water management solutions have since made the company a leading system vendor in Europe.

#### Quality comes first

GRAF uses state-of-the-art production facilities. A high standard of quality in production is an essential starting point for unique products. End-to-end quality assurance and a high level of automation guarantee maximum reliability in production. Because of our high standard of quality, we offer a warranty of up to 15 years on GRAF products.

Centre of expertise in raw materials in Herbolzheim (Germany)

#### Partner to the specialist construction material trade

The GRAF brand represents the exclusive specialist trade range from Otto Graf GmbH.

The company prides itself on working in partnership with the trade to support various target groups, such as gardening/landscaping/construction companies and planners.

#### Support for the whole process – the GRAF project team

All the companies involved in a construction project need to work together directly and pragmaticallyespecially on large-scale undertakings. The GRAF project team provides such projects with valuable support, ranging from planning and assistance with official approvals to functional construction site logistics and on-site consultation.

#### 99% supply capacity even during the busy season

GRAF products are exported around the globe. Intelligent logistics and sufficient stock levels ensure first-class availability and fast responses even during periods of high demand.

#### Benefits of working with GRAF

- Exclusive specialist trade range
  - Clear sales strategy
  - Training/support for sales staff in
  - the trade
  - Consistent brand management
  - Comprehensive assistance with marketing



Dachstein (France) - production site and warehouse



Perth (Australia) - production site and warehouse



Skierniewice (Poland) - production site and warehouse



**RAINWATER HARVESTING** 

**YEARS OF** EXPERIENCE

GRAF

STORMWATER MANAGEMENT



#### **Rainwater Harvesting Solutions**

For more information about our Rainwater Harvesting Solutions, ask for our catalogue.

WASTEWATER TREATMENT SOLUTIONS





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Pictures and photographs are approximate only.

The applicable technical documentation for the products shall control, which we will be happy to send you on request.

All offers, deliveries and services are subject to our general terms and conditions, which we will also be happy to send you.

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