

CONVERSION OF REDUNDANT BARN INTO 1 DWELLING TYDDYN DEDWYDD, RHOSTYLLEN

Foul Drainage Proposal

NRW Ref: CAS-138223-W6V9

Planning Ref: P2021/0060

Existing Site Drainage

The site currently consists of a 3-bedroom farmhouse and a 2-bedroom self-contained flat. Both properties discharge foul sewerage into separate septic tanks which we understand have gravity piped outfalls to drainage fields in the lower field to the east.

The site benefits from two separate water quality exemptions for effluent discharge to ground of 2.0cu.m or less.

Refer to Exemption Ref Nos. EPR/WE5298AC/A001 and EPR/VE5598AW/A001.

Refer to Appendix 1 Existing site layout.

Proposed Site Drainage

There are 2 proposed properties:

1. **P/2017/0295**, 3-bedroom dwelling (full planning granted – Under Construction)
2. **P/2021/0059** proposed 3-bedroom barn conversion (this application)

Following discussions with NRW we are proposing to replace the two existing septic tanks on site with two package treatment plants with discharge to ground and connecting 2 properties to each (one existing, one proposed).

Government guidance on private sewerage in [Welsh Government Circular 08/2018](#) considers use of a package treatment plant a betterment over use of a septic tank.

We are proposing to replace the septic tanks for two 10 PE GRAF One2clean treatment plants. These are high performance system which achieves sustainable discharge values with an efficiency factor of up to 99% and generate a low volume of sludge.

The daily discharge rate for each will be a maximum of 1.5cu.m. (existing 3-bed, proposed 3-bed) which is below the 2.0cu.m permitted under the water quality exemptions already in place for the site. As the site is located within the River Dee and Bala Lake Special Area of Conservation, we understand this proposal can potentially allow NRW / LPA to screen out proposals without the need to undertake a Habitats Regulations Assessment (HRA).

We are also proposing to construct new drainage fields for both WTP's. It is unclear on the actual size of the of the existing components so following successful percolation tests ($V_p=55$) we are proposing to replace the existing with new correctly sized drainage fields which will incorporate a sampling chamber. Access for the treatment plant and drainage field will be provided for future maintenance via the farmhouse driveway which will include a turning facility for a tanker.

The grazing field will be also fenced off to keep the treatment plants and drainage fields separate.

Existing calculation:

Septic tanks have an allowance of phosphate loading between 10 – 12 mg/l in the effluent discharged.

Septic Tank 1 serves 3- bedroom Farmhouse)

3 bed (5 person), $5 \times 150\text{L} \times 10 \text{ mg/l} = 7,500 \text{ mg/l P}_{\text{tot}}$.

Septic Tank 2 serves 2- bedroom self-contained flat)

3 bed (5 person), $5 \times 150\text{L} \times 10 \text{ mg/l} = 7,500 \text{ mg/l P}_{\text{tot}}$.

Proposed Calculation:

We are proposing to replace the septic tanks with a new GRAF One2clean treatment plants with a treated effluent discharge to ground.

WTP 1 will serve 3-bedroom farmhouse and 3-bedroom dwelling (PE=10)

Using a GRAF One2clean treatment plant the phosphate loading is reduced to 1.6 mg/l in the effluent discharge

$10 \text{ PE} \times 150\text{L} \times 1.6 \text{ mg/l} = 2,400 \text{ mg/l P}_{\text{tot}}$.

Overall reduction from 7,500 mg/l to 2,400 mg/l.

WTP 2 will serve 2-bedroom self-contained flat and a 3-bedroom barn conversion (PE=10)

Using a GRAF One2clean treatment plant the phosphate loading is reduced to 1.6 mg/l in the effluent discharge

$10 \text{ PE} \times 150\text{L} \times 1.6 \text{ mg/l} = 2,400 \text{ mg/l P}_{\text{tot}}$.

Overall reduction from 7,500 mg/l to 2,400 mg/l.

Maintenance

All properties will be responsible for the future maintenance and operation of the treatment plant. Residents will make annual contributions to a management company set-up by our client.

Maintenance is based on the following requirements and includes both self-checks (by residents) and specialist maintenance work to be carried out by fully trained engineers.

The self-checks and self-tests are described precisely in the logbook that is supplied along with every Graf Wastewater system. These checks are summarised in the table below:
System

System Component	Operation	Notes	Frequency
Control panel	Inspection	Check control panel has a green light and no warning signals can be heard	Daily
Visual inspection	Inspection	Check water levels, and discharge pipes are clear of blockages	Monthly
Operations log	Record	Read operating hours for air compressor and valves	Monthly
Air filters	Inspection/ maintenance	Check any air filters on control cabinets and clean if necessary	Monthly

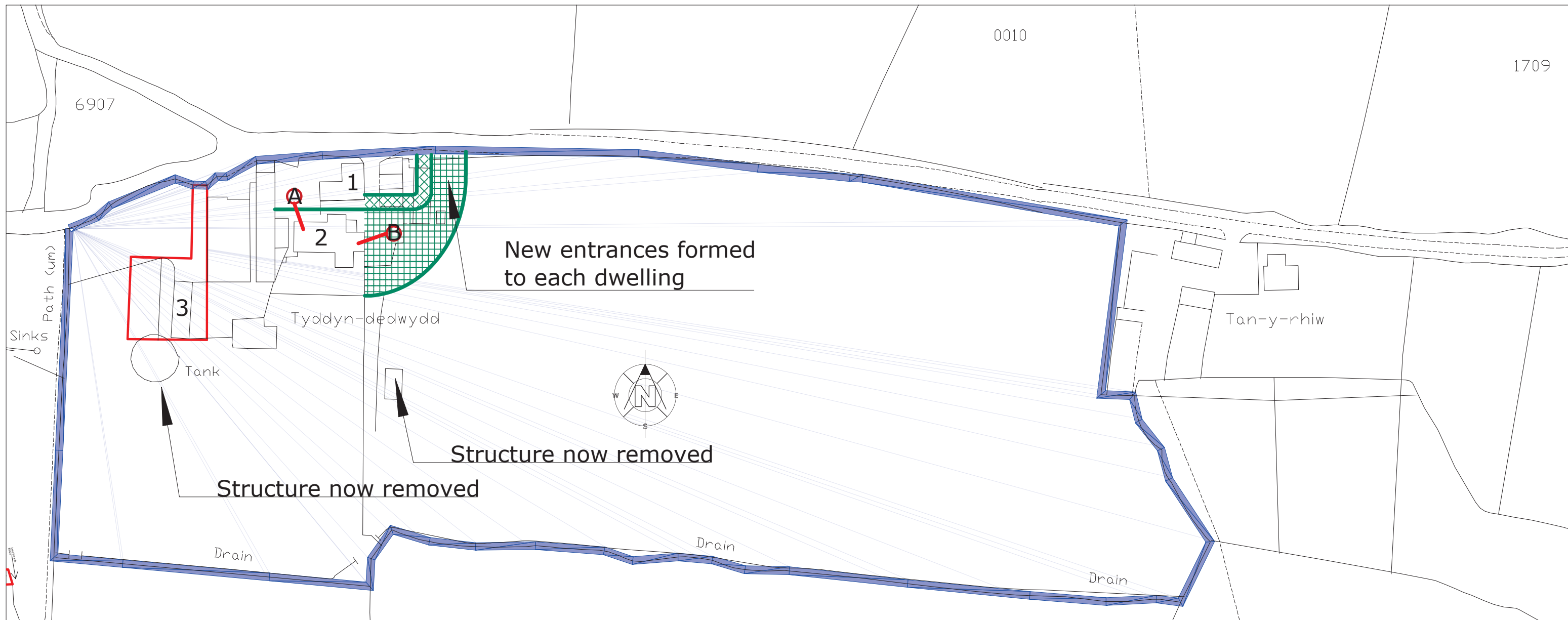
Maintenance should be carried out by a specialist Company approximately every 12 months. The maintenance checks undertaken during these visits are detailed in the table below:

System Component	Operation	Notes	Frequency
Visual inspection	Inspection	Check accessibility to the system, tank lid secure, baffle watertight, correct water levels. System components in correct place	Annually
System analysis	Inspection	Take measurements of sludge storage volume, activated sludge, pH and oxygen and the concentration of clear water discharge	Annually
System functions	Inspection/ maintenance	Check that the system is functioning correctly on all stages; charging, aeration, discharge and sludge return	

Andy Jones
Drainage Engineer
Dated – 14th June 2024

Appendix 1

Site layout



SITE LAYOUT PLAN @ 1:1250

- 1 = Approval for 3 Bedroom dwelling with new septic tank under P/2013/0380
- 2 = 3 Bedroom Farm House Dwelling and 2 bedroom Flat attached
- 3 = Proposed 4 bedroom Barn Conversion under P/2021/0059
- A = Flat Septic Tank (Existing)
- B = Farm House Septic Tank (Existing)

Project Information			
Client	Mr Baker		
Address	Barn at Tyddyn Dedwydd Frondeg Rhostyllen LL14 4ND		
Project	Barn Conversion		

Drawing Information			
Title	Existing Sewerage Treatment Arrangemetn Plan		
DWG No.	TYDDYN/23/1	Date	15/02/23
Scale	As Shown	Revision	
Sheet	A3 Sheet 1 of 1		

Appendix 2

Proposed Drainage Layout

Appendix 3

Pecolation Test

Foul Percolation Test Results Undertaken by client in lower field.

Date: 9th April 2024

Weather: Wet / Windy

Test Hole 1	Test Hole 2	Test Hole 3
Percolation test	Percolation test	Check water table
300mm x 300mm x 800mm deep	300mm x 300mm x 800mm deep	1500mm x 600mm x 2000mm dp
300mm topsoil over sandy gravely strata	300mm topsoil over sandy gravely strata	300mm topsoil over sandy gravely strata becoming clayey at base

Results:

Test Hole 1				Test Hole 2			
	Time (seconds)		Vp		Time (seconds)		Vp
Test 1	6,970	/150	46	Test 1	6,900	/150	46
Test 2	7,620	/150	51	Test 2	7,860	/150	52
Test 3	10,20	/150	68	Test 3	10,020	/150	67
Test Hole 1 Average Vp = 55				Test Hole 1 Average Vp = 55			
Average VP of Test Holes 1 and 2				55			

Drainage field for wastewater treatment plant:

$$P \times Vp \times 0.20 = At$$

$$10 \times 155 \times 0.2 = 110\text{sq.m}$$

Using a 0.9m wide trench a total length of 122m will be required within the drainage field.

2m separation between trenches to be provided.

Appendix 4

GRAF One2clean Packaged Treatment Plant

Manufacturers Product Information



Prüfinstitut für
Abwassertechnik
GmbH

PERFORMANCE RESULTS

Otto Graf GmbH

Carl-Zeiss-Str. 2 - 6, 79331 Teningen, Germany

EN 12566-3

Small wastewater treatment systems for up to 50 PT

Small wastewater treatment system one2clean

SBR plant in one two-zone polypropylene tank

Test report PIA2014-216B14.01.e

Nominal organic daily load*	0.27	kg/d	
Nominal hydraulic daily load	0.75	m³/d	
Material	polypropylene		
Treatment efficiency (nominal sequences)		Efficiency	Effluent
	COD	94.2 %	43 mg/l
	BOD ₅	98.0 %	7 mg/l
	SS	96.3 %	14 mg/l
	NH ₄ -N**	98.3 %	0.5 mg/l
	N _{tot} **	87.0 %	7.9 mg/l
	P _{tot}	80.2 %	1.6 mg/l
Electrical consumption	0.63	kWh/d	

*at a test influent of ≥ 300 mg/l BOD₅ (mean)

**determined for temperatures $\geq 12^{\circ}\text{C}$ in the bioreactor

Performance tested by:

PIA – Prüfinstitut für Abwassertechnik GmbH

(PIA GmbH)

Hergenrath Weg 30

52074 Aachen, Germany

This document replaces neither the declaration
of performance nor the CE marking.



Notified Body
No.: 1739



Certified according to
ISO 9001:2008



Deutsche
Akkreditierungsstelle
D-PL-17712-01-00

Prüfinstitut für Abwassertechnik GmbH

geprüft - tested - testé

Elmar Lancé

November 2014



Wastewater Treatment Solutions

WASTEWATER TREATMENT SYSTEMS & SEPTIC TANKS



ADVANCED WASTEWATER TREATMENT SYSTEMS

ONE 2 CLEAN

SEPTIC TANKS

Welcome to Graf UK

By Matthew Rolph, Managing Director, Graf UK



For more than 50 years, the GRAF brand has represented high-quality plastic products. Our Carat wastewater tanks represent the state of the art. Our long-standing partner KLARO, which joined our group of companies in 2014, has grown over the last 10 years to become the European market leader in small SBR treatment systems with airlift technology. Our small wastewater treatment systems are already being used by 240,000 satisfied customers. When you buy a GRAF wastewater treatment system, you benefit from the experience gained from more than 300,000 satisfied wastewater customers and the quality of two established brands in local wastewater disposal.

Quality comes first

GRAF uses state-of-the-art production facilities. This is the only way to guarantee superlative quality at attractive prices. A high standard of quality in production is an essential foundation for unique products. End-to-end quality assurance and a high level of automation guarantee maximum reliability in production. GRAF broke into new ground by using injection embossing to make the Carat wastewater tank. To manufacture this tank, GRAF commissioned the development and construction of the world's largest injection moulding machine.



World's largest injection moulding machine



Blow moulding



Rotational moulding

How to choose a wastewater treatment system

Wastewater solutions for:

e.g. domestic properties



- **one2clean one-tank system** (>> page 6)
- **Septic tank** (>> page 15)
- **Anaerobix** (>> page 15)

Wastewater solutions for:

e.g. villages, office buildings, campsites, hotels



- **one2clean two-tank system** (>> page 6)
- **Advanced wastewater treatment multi-tank system** (>> page 9)

Wastewater solutions for:

e.g. holiday homes



- **Advanced wastewater treatment multi-tank system** (>> page 9)
- **Septic tank** (>> page 15)
- **Anaerobix** (>> page 15)

The Benefits of injection moulding systems

Plastic – clear advantages

Because of their low weight, plastic tanks can be installed without heavy equipment. This means that they can be easily transported and installed in locations that are difficult to access. Plastic tanks, have smooth inner surfaces that will not corrode.

Sustainability starts with production

GRAF products help to protect the environment, so it goes without saying that they are also manufactured in an environmentally friendly way. Injection-moulding a plastic part usually requires up to 2.7 kilowatt

hours of electricity per kilogram of plastic. GRAF needs just 0.38 to 0.5 kilowatt hours.

The injection moulding process therefore consumes up to **85% less energy** than normal.

The heat generated during manufacturing is processed by a modern heat recovery system and is used to heat the production and logistics buildings.

Durable products: reliable investment

Right from the product development stage, GRAF attaches great importance to durable design. Our decades of experience combined with modern production techniques guarantee that our plastic tanks last for over 50 years. GRAF offers a warranty of up to 25 years for its wastewater tanks. A 2 year warranty is offered for SBR technology. The efficiency of our wastewater treatment systems is regularly monitored by independent institutes. All products manufactured by GRAF are also 100% recyclable.

Benefits of the Carat system

The only wastewater underground tank of it's kind!

Unique manufacturing process

The GRAF Carat underground tank is unlike any other underground tank in the world. It is the largest tank of its kind to be manufactured by injection compression moulding. This technique provides the tank with unbeatable stability and ensures that each component is produced with the highest of accuracy.

Unlike other underground tanks, the wall thickness is equal in all areas of the tank. The production tolerances are kept to a minimum, resulting in a product of the highest quality, which is strong, accurate, reliable and extremely user friendly.

To manufacture the Carat range, one of the worlds largest injection moulding systems had to be developed.



The tank that turns its head for you

The GRAF Carat underground tank has a rotating tank dome. The tank dome can be aligned with the connections independently of the tank - this makes installation much easier! All installation pipes are connected using the five standard lip seals. The Carat telescopic dome shaft connects the system to the ground surface. The height of the tank can be smoothly adjusted to suit the local conditions and it can be tilted by 5°. The whole system is flush with ground level.



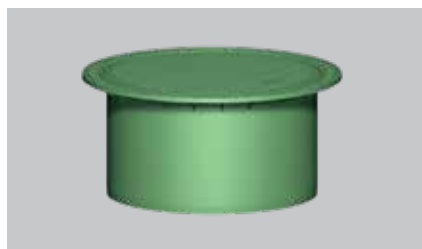
Flush with ground level

The Carat underground tank has numerous seals to efficiently stop dirt getting into the tank. This means that groundwater cannot get into the tank and, thus, dirt particles cannot contaminate the wastewater. The seals are in the intersection between the tank and the tank dome and between the tank dome and the telescopic dome shaft. All supply pipes connected to the tank dome are also sealed with five lip seals as standard.



Ribbed tank base

The tank base of the Carat underground tank is extremely stable thanks to the numerous ribs. These enable the Carat to be installed in groundwater up to the middle of the tank. Furthermore, the stable base means the tank is very robust for transportation to site. The tank base has already proven its excellent rigidity in numerous computer simulations during the development process. Please follow our installation instructions for this purpose (can also be downloaded at www.grafuk.co.uk).

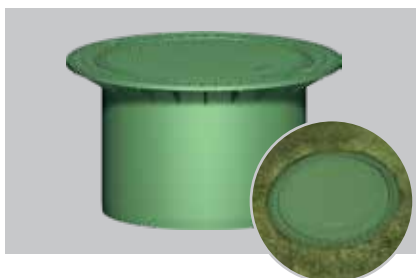


Telescopic dome shaft Mini

- With PE cover
- Suitable for pedestrian loading
- Weight 9kg
- Adjustable earth covering across upper tank surface

plus 140mm - 340mm earth covering

Order no. 371010



Telescopic dome shaft Maxi

- With PE cover
- Suitable for pedestrian loading
- Weight 15kg
- Adjustable earth covering across upper tank surface

plus 140mm - 440mm earth covering

Order no. 371011

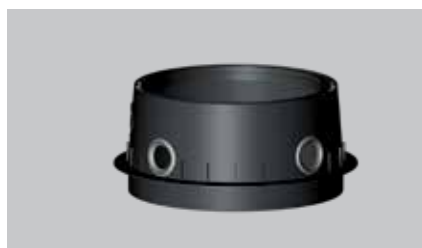


Telescopic dome shaft cast iron

- Suitable for vehicle loading - with child-proof cast iron cover up to 3.5t
- Weight 55kg
- Adjustable earth covering across upper tank surface

plus 140mm - 440mm earth covering

Order no. 371020



Tank dome Mini



Tank dome Maxi



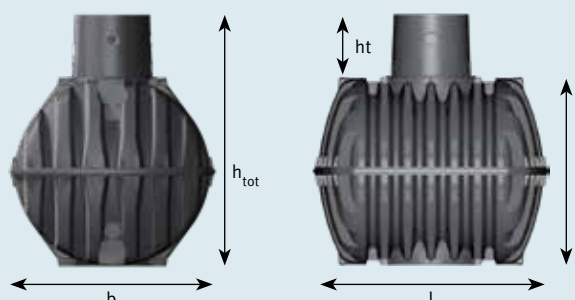
Tank dome Micro

Dimensions

Volume [l]	Width b [mm]	Length l [mm]	Height h [mm]	Height h _{tot} [mm]	Height of tank dome ht [mm]	Inner Ø of tank dome [mm]	Weight [kg]	Order no.
2,700 (700 US gal.)	1565 (61.6")	2080 (81.9")	1400 (55.1")	2010 (79.1")	610 (24.0")	650 – 800 (25.6 – 31.5")	120 (265 lbs.)	372028
3,750 (1,000 US gal.)	1755 (69.1")	2280 (89.8")	1590 (62.6")	2200 (86.6")	610 (24.0")	650 – 800 (25.6 – 31.5")	150 (331 lbs.)	372029
4,800 (1,250 US gal.)	1985 (78.2")	2280 (89.8")	1820 (71.6")	2430 (95.7")	610 (24.0")	650 – 800 (25.6 – 31.5")	185 (408 lbs.)	372030
6,500 (1,700 US gal.)	2190 (86.2")	2390 (94.1")	2100 (82.7")	2710 (106.7")	610 (24.0")	650 – 800 (25.6 – 31.5")	220 (485 lbs.)	372031

Technical data

Max. earth covering (without groundwater vehicle loading)	1200 mm (47.2")
Max. vehicle weight	Suitable for vehicle loading (3.5 t) Higher loads on request
Earth covering required for vehicle loading	800 – 1200 mm (31.5 – 47.2")
Groundwater stability	up to middle of tank
Earth covering required for groundwater stability	800 – 1000 mm (31.5 – 39.4")
Connection	DN 100 / DN 150 / DN 200 on top



The one2clean system

The only wastewater underground tank of it's kind!

- ✓ Only one tank with just one chamber required
- ✓ Less energy consumption and less wear
- ✓ No mechanical elements in the wastewater
- ✓ No pumps in the wastewater
- ✓ No electrical components in the wastewater
- ✓ Incredibly low volume of sewage sludge



one2clean set-up kit

- Conventional wastewater treatment systems require up to three pumping processes. one2clean only requires one pumping process, which saves energy and extends the lifetime of the air compressor – the core part of the system
- Rugged clear water lifter manufactured in one seamless piece. No connectors or screws necessary
- Simple maintenance via an integrated, self-cleaning sampling container

one2clean system control

- The one2clean has a compact controller
- The microprocessor control system ensures simple operation and maintenance

Wastewater tank

- Telescopic cover
- State-of-the-art manufacturing for maximum stability
- Suitable for vehicle loading in conjunction with telescopic vehicle dome shaft
- 100% watertight and corrosion-resistant
- Can be installed in groundwater up to the middle of the tank

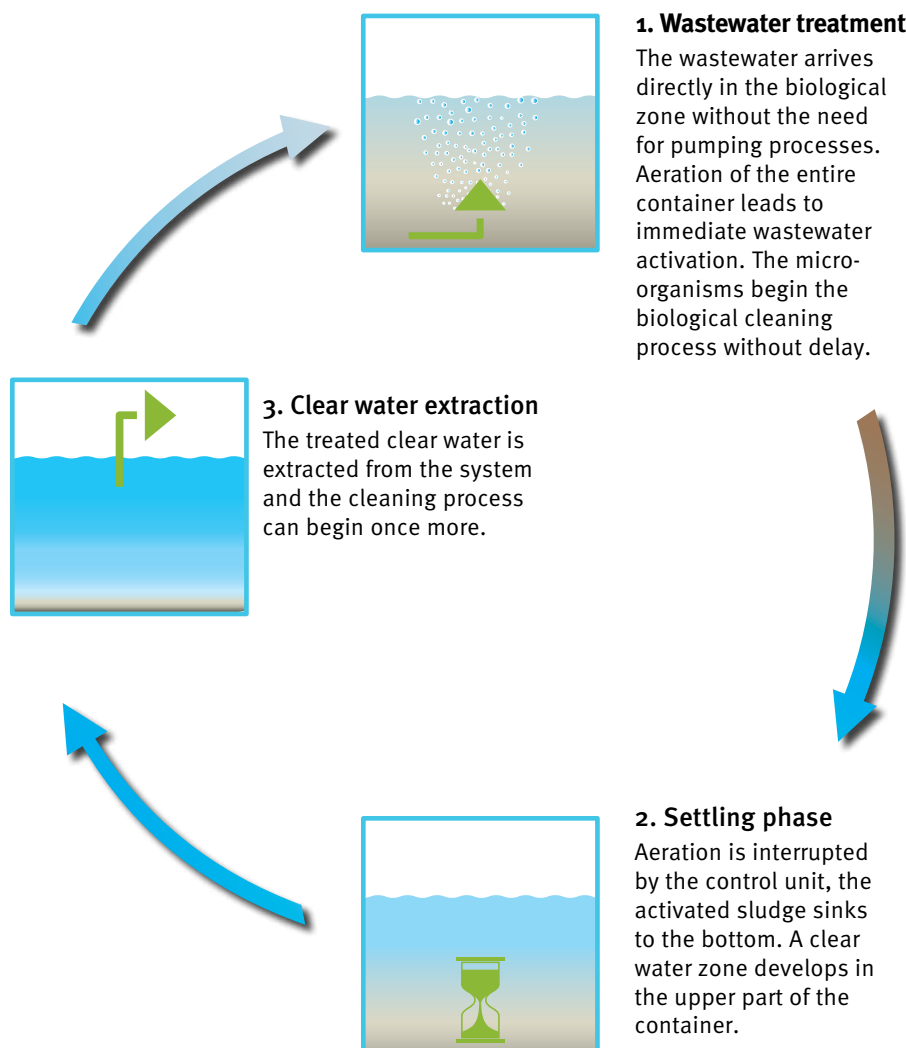
Technical data

System	one2clean
System conformity	EN 12566-3
Purifying technology	fully biological SBR lifting technology
One-tank systems available up to	9 inhabitants 1,350 l/d
Two-tank systems available up to	18 inhabitants 2,700 l/d
Maintenance interval	1 – 2 per year
Warranty for underground tank	10 years
Warranty for purifying technology	2 years
Cleaning performance	7, 14, 0.5
Control	
Holiday mode	Manual
+D Removal of nitrogen	●
+C Carbon infeed	○
Logbook function	●
Operation	4 keys
External control cabinet for installing control unit outdoors	○
Annual power consumption	230 kWh (5 inhabitants 750 l/d)

Parameter	%	mg/l
COD (chemical oxygen demand)	94.2%	43
BOD ₅ (biochemical oxygen demand)	98.0%	7
SS (suspended solids)	96.3%	14
NH ₄ -N	98.3%	0.5
N _{total}	87.0%	7.9

Results of practical testing undertaken by the Prüfinstitut für Abwassertechnik (Testing Institute for Wastewater Technology), Aachen

- Standard equipment
- Available as options
- not available



Incredibly low volume of sewage sludge

- Aeration of the entire wastewater tank
- Immediate wastewater activation
- Minimisation of the sludge
- Less sludge removal
- Cost savings

Conventional wastewater treatment systems



one2clean



Minimum maintenance costs

- Simple construction
- High-quality components
- As much technology as necessary, as little technology as possible.
- Integrated sampling point

Minimum power consumption

- one2clean has only one pumping process, reducing energy consumption and running costs
- Economical motor valve
- Energy-optimised membrane compressor

one2clean only needs 3 steps to produce clear water

The wastewater treatment is carried out in one chamber in just one tank. This eliminates unnecessary pumping processes and sludge return.

one2clean is odourless

The entire volume of wastewater is immediately activated with oxygen using the unique one2clean technology. The final process of the one2clean produces an odourless, clear treated water for extraction to soakaway or waterway.

one2clean already meets the needs of tomorrow

one2clean achieves sustainable discharge values with an efficiency factor of up to 99%! This offers high investment security – even if legal requirements become stricter.

One-tank system

Inhabitants [max.]	Max. daily flow [l/d]	Max. organic load [kg BOD ₅ /d]	Total volume [l]	Volume [l]	Length [mm]	Width [mm]	Height [mm]	Weight [kg]
5	750	0.3	3,750	3,750	2280	1755	1880	150
7	1,050	0.42	4,800	4,800	2280	1985	2110	185
9	1,350	0.54	6,500	6,500	2390	2190	2390	220

Two-tank system

Inhabitants [max.]	Max. daily flow [l/d]	Max. organic load [kg BOD ₅ /d]	Total volume [l]	Volume [l]	Length [mm]	Width [mm]	Height [mm]	Weight [kg]
10	1,500	0.6	7,500	2 x 3,750	5160	1755	1880	300
14	2,100	0.84	9,600	2 x 4,800	5160	1985	2110	370
18	2,700	1.08	13,000	2 x 6,500	5380	2190	2390	440

GRAF EPP control cabinet - Easy, flexible application

- Easy access for maintenance
- Function checking is simple as the control unit is located immediately next to the sytem
- Ideal solution for large distances from the house (>20m)
- Flexible use of the proven GRAF EPP control cabinet in a plastic external column
- Lockable housing in sturdy, weather-resistant plastic
- Integrated double power socket for easy maintenance



GRAF Plastics external control cabinet S for EP control cabinet (size upto 7 inhabitants)



GRAF Plastics external control cabinet M for EP control cabinet (size upto 18 inhabitants)

Carbonator (Carbon dosage)

Sewage treatment plants require a constant inflow of wastewater into the tank in order for them to work correctly. The seasonal occupation of holiday homes is a challenge for wastewater treatment systems that rely on constant inflow to keep the microorganism poulation stable. Any destabilisation of the microorganisms within the system incurs extra operating costs.

The Carbonator was especially designed to keep wastewater treatment systems with seasonal inflow stable and working correctly. The additional Carbonator module automatically feeds the

systems with nutrients that keep the microorganisms alive when there is no wastewater inflow.

Benefits

- Regardless of system - suitable for other treatment plants (one2clean compatible)
- Individual adjustment of dosage
- Low power consumption
- Fast installation
- Simple operation

Empty pipe seal DN 100

- Air-tight seal for empty pipe
- No insulating foam required
- Clean, professional solution



Minimum power consumption

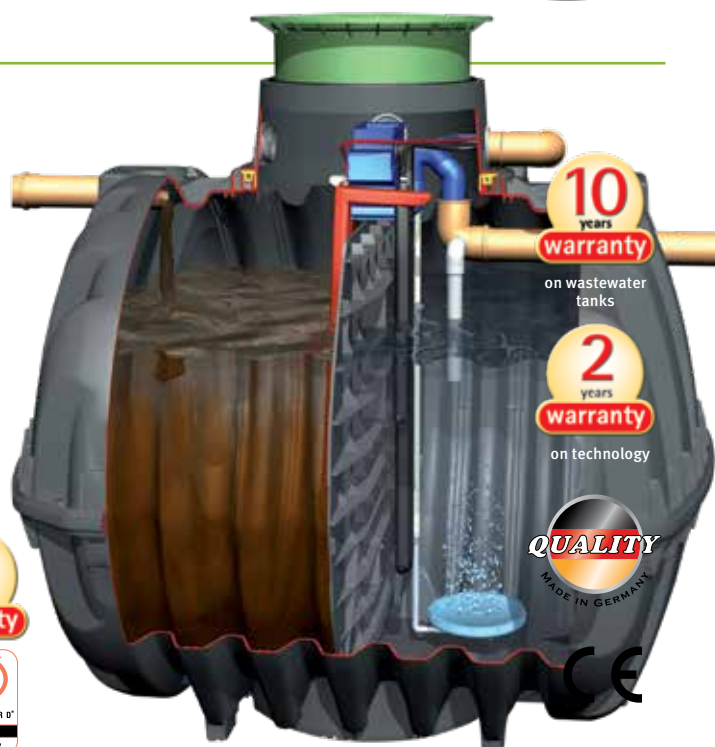
- one2clean has only one pumping process, reducing energy consumption and running costs
- Economical motor valve
- Energy-optimised membrane compressor



Only 46 kWh per person and per year!

*Based on a 5PE One2Clean plant

- ✓ No live electrical parts in the water
- ✓ Low power consumption
- ✓ Optional automatic adjustment to living situation (underload detection)
- ✓ Optional remote monitoring
- ✓ High-quality components mean low maintenance costs



Super-quiet control cabinet

- Extremely low noise thanks to EPP housing and very quiet air compressor
- Battery-free power failure detection
- Very easy installation
- Interchangeable plug-in components

High-tech installation kit

- Integrated self-cleaning sampling container
- Each lifter manufactured as a single piece. No connectors or screws necessary
- Colour-coded and pre-assembled
- Special lifter design prevents sludge from leaking in
- Lifters easy to remove for maintenance without the use of tools

Wastewater tank

- Telescopic cover
- State-of-the-art manufacturing for maximum stability
- Suitable for vehicle loading in conjunction with telescopic vehicle dome shaft
- 100% watertight and corrosion-resistant
- Can be installed in groundwater up to the middle of the tank

Technical data

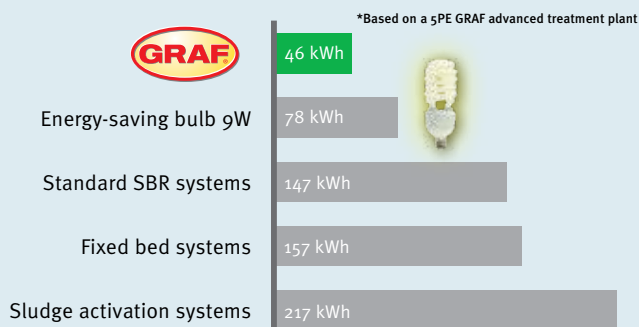
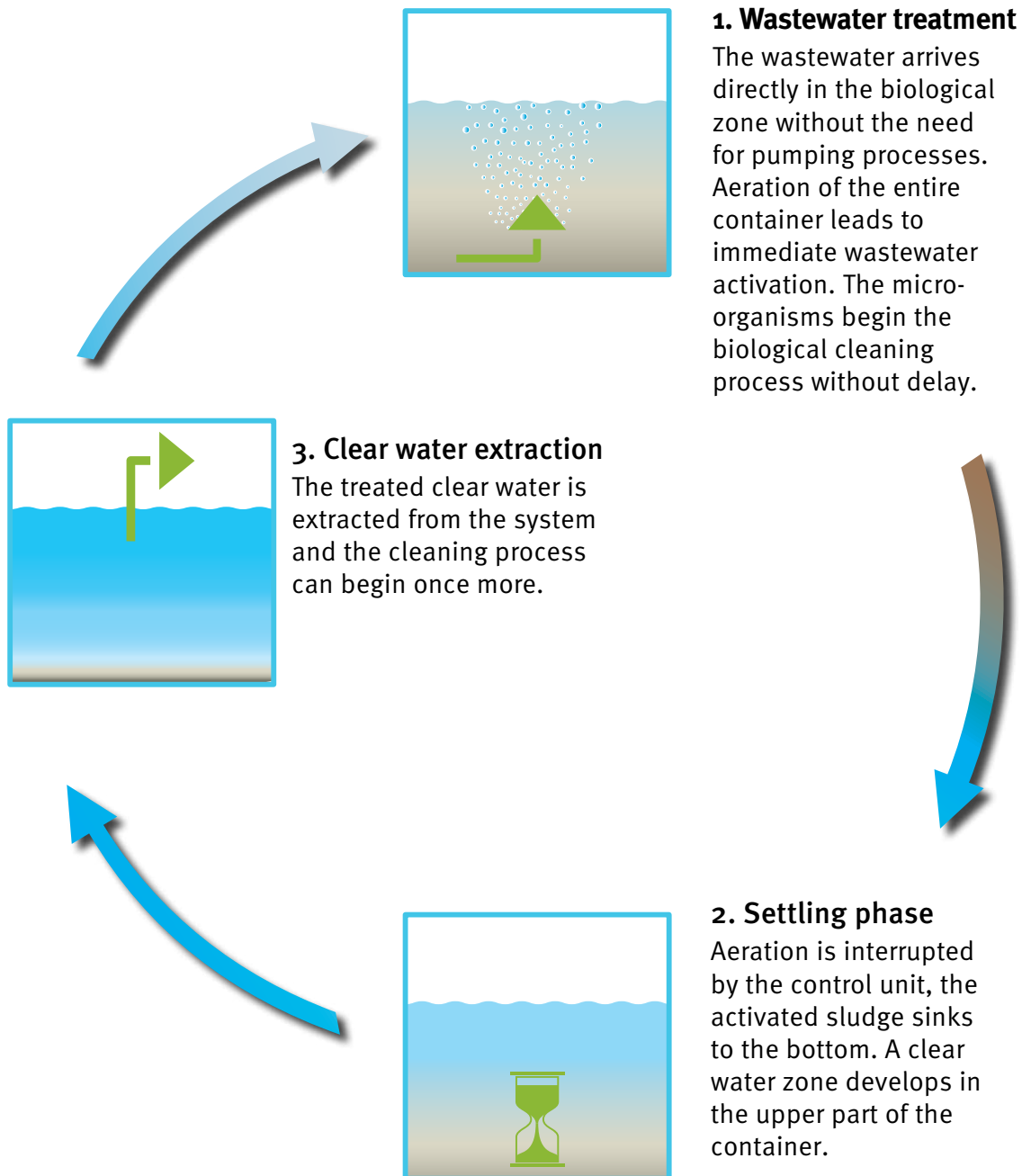
System	Advanced WWT Systems
System conformity	EN 12566-3
Purifying technology	fully biological SBR lifting technology
One-tank systems available up to	9 inhabitants 1,350 l/d
Maintenance interval	1 – 2 per year
Warranty for underground tank	10 years
Warranty for purifying technology	2 years
Cleaning performance	7, 14, 0.5 (5-18PE) / 12, 20, 12 (22-50PE)
Control	KL24plus (+K)
Holiday / economy mode (underload detection)	Automatic
Back pressure monitoring	●
+R Remote transmission (GSM modem)	○
+P Phosphate removal	○
+C Carbon infeed	○
+H Hygiene package (Disinfection)	○
+D Removal of nitrogen	○
Control power failure recognition	●
Temperature sensor to protect against overheating	●
Logbook function	●
Operation	14 keys
Serial interface for software updates	●
External control cabinet for installing control unit outdoors	○

Parameter	%	mg/l
COD (chemical oxygen demand)	94.2 / 91.9%	43/51
BOD ₅ (biochemical oxygen demand)	98.0/95.9%	7/12
SS (suspended solids)	96.3/94.4%	14/20
NH ₄ -N	98.3/65.4%	0.5/12
N _{total}	87.0/57.1%	7.9

Results of practical testing undertaken by the Prüfinstitut für Abwassertechnik (Testing Institute for Wastewater Technology), Aachen

- Standard equipment
- Available as options
- not available

Advanced wastewater treatment systems



Minimal power consumption per inhabitant¹⁾

¹⁾The diagram indicates the annual power consumption of various wastewater treatment systems. Source: "wwt", edition 6/2007 "The wastewater treatment system as a permanent solution", page 15, table 3, practical data; One2Clean: test report by PIA (Prüfinstitut für Abwassertechnik GmbH, Testing Institute for Wastewater Technology), Aachen, test number PIA2014-216B14.01.e



Advanced wastewater treatment one-tank systems

Inhabitants [max.]	Max. daily flow [l/d]	Max. organic load [kg BOD ₅ /d]	Total volume [l]	Volume [l]	Length [mm]	Width [mm]	Height [mm]	Weight [kg]
5	750	0.3	3,750	3,750	2280	1755	1880	150
7	1,050	0.42	4,800	4,800	2280	1985	2110	185
9	1,350	0.54	6,500	6,500	2390	2190	2390	220

Advanced wastewater treatment multitank system

Inhabitants [max.]	Max. daily flow [l/d]	Max. organic load [kg BOD ₅ /d]	Total volume [l]	Volume [l]	Length* [mm]	Width* [mm]	Height [mm]	Weight [kg]
10	1,500	0.6	7,500	2 x 3,750	5160	1755	1880	300
14	2,100	0.84	9,600	2 x 4,800	5160	1985	2110	370
18	2,700	1.08	13,000	2 x 6,500	5380	2190	2390	440
22	3,300	1.68	9,600	2 x 4,800	5160	1985	2250-2450	440
28	4,200	1.92	13,000	2 x 6,500	5380	2190	2530-2730	530
35	5,250	2.10	17,000	2 x 8,500	15500	2040	2515-2715	780
40	6,000	2.40	20,000	2x10,000	15500	2240	2715-2915	930
50	7,500	3.00	26,000	4x 6,500	11360	2190	2850-3050	1060
60	9,000	3.60	26,000	4x 6,500	11360	2190	2850-3050	1060

Advanced wastewater treatment system accessories

Plastic external control cabinet M

for up to 18 inhabitants
Order no. 107773



Plastic external control cabinet L

for up to 22-40 inhabitants



Benefits

- Easy access for maintenance
- Function checking is simple as the control unit is located immediately next to the system
- Ideal solution for large distances from the house (> 20 m)
- Flexible use of the proven GRAF EPP control cabinet in a plastic external column
- Lockable housing in sturdy, weather-resistant plastic
- Integrated double power socket for easy maintenance

Easy, flexible application for the GRAF EPP control cabinet M



EPP control cabinet
Part of the wastewater treatment system



GRAF Plastics external control M cabinet for EP control cabinet (size up to 18 inhabitants)



+K Convenience package

Convenience package: control with larger display and keypad. Underload detection by a pressure sensor in the control.

Standard

KL24plus



- SD card slot for easy logbook transfer
- Automatic underload detection
- Suitable for phosphate precipitation and UV module
- Large display and 14 keys for comfortable operation
- Automatic logging
- Battery-free power failure detection
- High-contrast display with blue backlighting
- Durable, gas-tight membrane keypad

+O Outlet with clear water pump

Lift the clear water when the outlet pipe is lower than the water course.

On request



+D Removal of nitrogen

The +D package for denitrification (removal of nitrogen) results in the clarified water quality satisfying very strict requirements. The GRAF systems thereby attain a N_{total} value (total parameters of inorganic nitrogen compounds) of less than 25 mg/l. Order no. 107520

+P Phosphate removal package

Phosphate in water results in a massive build-up of algae. The GRAF +P package ensures the safe removal of phosphate and therefore great water quality

On request

+C Carbon infeed

Solution for weekend homes

The addition of carbon as a nutrient allows the purification process to continue and prevents the biology from dying off.

On request



+R Remote transmission

Remote monitoring allows error messages to be transmitted to mobile phones and operating data to be queried by text message. Convenient remote wastewater treatment system control by GSM is also possible.

- Greater efficiency
- Greater operating reliability
- Optimised service intervals
- Greater customer benefit thanks to monitoring service
- Low-cost remote diagnosis in the event of a fault without the service fitter having to come on site

Order no. 107117



+H Hygiene package

Disinfection using the +H package satisfies even the most stringent of purity requirements for a GRAF wastewater treatment system. Without the use of chemical substances, it reliably kills off germs and microorganisms. The clarified water therefore complies with the EU Bathing Water Directive.

On request

- Easy to operate
- Maintenance-friendly thanks to easy-to-remove module
- Fitted in downstream shaft



Accessories for small wastewater treatment systems

Sampling point, internal

For two- and multitank systems

Order no. 107170

Empty pipe seal DN 100

- Air-tight seal for empty pipe
- No insulating foam required
- Clean, professional solution

Order no. 107613



Filling granulate for external cabinets

Prevents soil moisture from rising into the external control cabinet. Required amount: 1 bag per external control cabinet for 12 – 28 inhabitants; 50 l bag

Order no. 107607

Voltage transformer

- From 110 V – 230 V
- Up to 300 W (LA 200)

Order no. 107421

Odour filter

For DN 100 ventilation openings; reliably filters out unpleasant odours; filter insert of multi-layer mesh with impregnated activated carbon

Order no. 104018



Filter insert

For odour filter; replace at least every two years or when odour is perceptible

Order no. 104024



SBR hose package (Advanced)

Includes:

1 x Ø 19 mm and 3 x Ø 13 mm PVC hose; colour-coded for Advanced WWT system

Length: 20 m

Order no. 107192

SBR hose package (One2Clean)

Includes:

1 x Ø 19 mm and 1 x Ø 13 mm PVC hose; colour-coded for One2Clean system

Length: 20 m

Order no. 107668

Large advanced wastewater treatment systems

Special requirements

Systems for more than 50 inhabitants work on the same principle as small wastewater treatment systems and use the SBR process. Because of the special requirements involved, all systems for more than 50 inhabitants are planned as individual projects. Our experienced team of engineers and technicians will help you to plan your project. We take all local circumstances into account from the concept planning phase to implementation.



Klaro L



Klaro XL



Klaro XXL

Options

+D +P +C +H +R

The proven options of the advanced wastewater treatment systems are also available on request for large systems.



Inhab. [max.]	Max. daily flow [l/d]	Max. organic load [kg BOD ₅ /d]	Volume [litres]	Length [mm]	Width [mm]	Product code
75	12,250	3.60	2X 16,000	9900	2500	G50036
90	13,500	5.40	2X 22,000	12900	2500	G50038
100	15,000	7.20	2X 22,000	12900	2500	G50040
150	22,500	9.00	2X 32,000	17700	2500	G50042
200	30,000	10.80	4X 22,000	26400	2500	G50044
250	45,000	15.00	1X 52,000 2X 32,000	13300	8700	G50046
300	45,000	18.00	1X 52,000 2X 32,000	13300	8700	G50048
350	52,500	21.00	3X 22,000 2X 38,000	19900	5600	G50050
400	60,000	24.00	3X 22,000 2X 44,000	21400	5600	G50052
450/500	75,000	27.00/30.00	3X 22,000 4X 32,000	27500	5600	G50054
550/600	90,000	33.00/36.00	3X 26,000 4X 32,000	16200	11800	G50056
650/700	105,000	39.00/42.00	2X 32,000 4X 38,000	27500	5600	G50058
750/800	120,000	45.00/48.00	1X 38,000 3X 22,000 6X 28,000	26200	8700	G50060
850/900	135,000	51.00/54.00	1X 54,000 3X 22,000 6X 34,000	29100	8700	G50062
950/1000	150,000	57.00/60.00	1X 54,000 3X 22,000 6X 38,000	30500	8700	G50064

External control cabinets



L metal external cabinet



XL metal external cabinet



Concrete external cabinet

To plan your system, we need the following information:

- What type of project? (Domestic, hotel, commercial etc.)
- How many people will use the system and what is the water consumption per head?
- What legal requirements apply to wastewater at the location?
- Local power grid

Carat Septic Tank

Two chambers



Floating and removable material is extracted from domestic wastewater in mechanical wastewater tanks. This is purely mechanical cleaning.

Benefits

- Low weight: can also be installed in difficult local conditions without a crane
- Low maintenance: maintenance or cleaning work can be performed through the shafts
- Tanks can be used as rainwater harvesting systems after thorough cleaning

12566-1*

Hydraulic efficiency **99.9%**

*Refer to the installation instructions for CE-compliant Septic tanks



Carat S Septic tank

Inhabitants [max]	Total volume [l]	Capacity [l]	Length [mm]	Width [mm]	Height [mm]	Weight [kg]
4	2,700	2,700	2080	1565	2010	145
11	3,750	3,750	2280	1755	2200	175
18	4,800	4,800	2280	1985	2430	220
30	6,500	6,500	2390	2190	2710	260

One complete system consists of: Carat underground tank with baffle. Also available without baffle as a one-chamber wastewater tank.

Anaerobix – Wastewater Treatment System with Biological Filter

Simple and low-cost

- Anaerobix is the new low-cost anaerobic filter system for wastewater tanks in Graf tanks
- Filled with the carrier material supplied, it increases the cleaning performance of a wastewater tank several times over. The large surface of the recyclable plastic carrier material (141 m²/m³) allows the biofilm responsible for the cleaning process to cover a large area.

The benefits of the Anaerobix system at a glance

- Very good cleaning performance: efficiency over 90%, PIA-certified (Testing Institute for Waste Water Technology)
- No power consumed, no electrical or mechanical components (e.g. pumps or float switch) in tank
- Largely maintenance-free
- Installation in proven Graf tanks
- Easy to install with standard DN 100 pipes
- Very good value for money



Technical data

System	Anaerobix
Purifying technology	Anaerobic system
One-tank systems available up to	3,750 l/d
Maintenance interval	1 – 2 per year
Warranty for underground tank	10 years

Anaerobix single-tank system

Tank volume	2,700 litres	3,750 litres	4,800 litres	6,500 litres
Max. daily flow [l]	1,200	2,250	2,850	3,750



Limit values

BOD ₅ (biochemical oxygen demand)	75 %
SS (suspended solids)	90 %

**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 indications of measurements in this brochure we reserve a tolerance of $\pm 3\%$. The usage volume of the tanks may be up to 10% lower than the tank Volume, depending on the connecting option.

Technical modifications and further development of the various products are subject to change. Errors excepted.

RAINWATER HARVESTING**INFILTRATION****WASTEWATER TREATMENT SOLUTIONS****MULTIPURPOSE CONTAINERS**

Graf UK Ltd
Regen House
Beaumont Road
Banbury
Oxfordshire OX16 1RH

T: 01608 661500
F: 01295 211333
E: info@grafuk.co.uk
www.grafuk.co.uk

Graf UK Ltd (Scotland)
220 Blairtummock Road
Queenslie Industrial Estate
Glasgow
G33 4ED

T: 0141 465 1540
F: 01295 211333
E: info@grafuk.co.uk
www.grafuk.co.uk

Graf Ireland
Milltown Business Park
Milltown
Co. Galway

T: +353 93 51765
F: +44 1295 211333
E: info@grafireland.ie
www.grafireland.ie

Your expert specialist dealer: