



Wastewater treatment solutions

THE WASTEWATER TREATMENT RANGE



WASTEWATER TREATMENT SYSTEMS
SEPTICTANKS CESSPOOLS INFILTRATION



Production site at Dachstein (France)



Production site at Teningen (Germany) near Freiburg

GRAF – Setting standards in quality

For over 45 years, Otto Graf GmbH has been offering highclass plastic products to its customers. In 1974 GRAF developed its first pioneering range of rainwater harvesting products. We are the market leader in Germany and Europe for plastic rainwater collectors.

High Quality Manufacturing

GRAF has invested more than € 20 million in a new production site specially set up for the new Carat range. The new facility has an approximate surface area of 155 000 m² - that is the same as 31 football pitches - 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.

Quality is at the forefront

What you need most to ensure consistent, high product quality are 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, all machine settings and also the staff involved in the production process, are documented for each individual product.

Our goal: your satisfaction

More than 100.000 satisfied customers are already benefiting from the advantages of GRAF rainwater harvesting systems.



Environmental friendly: The GRAF product range

COMPOSTERS

HORTICULTURE & VITICULTURE

STORMWATER MANAGEMENT





DOWNPIPE FILTERS

RAINWATER HARVESTING



WASTEWATER TREATMENT



RAINWATER HARVESTING

WATER EXTRACTION



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Member of
German Water Partnership



www.graf.info

Q Webcode G1202

The Webcode will lead you directly to the required information.

- Installation instructions
- Technical drawings
- Detailed product information
- Downloads

Symbols in the catalogue

Load capacity



Suitable for pedestrian loading



Suitable for vehicle loading



Lorry-bearing

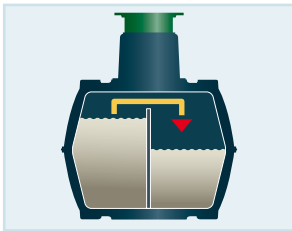
How does a wastewater treatment system work?

Cleaning process SBR system

With the SBR technology (sequencing batch reactor) there is separate primary treatment to retain the coarse material and a combined sludge

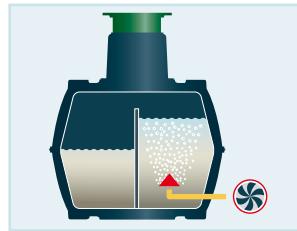
activation and final treatment reservoir, the so-called SBR reservoir. This system comprises 2 chambers.

System Klaro E Professional
(>> page 8)
System Aquato
(>> page 12)



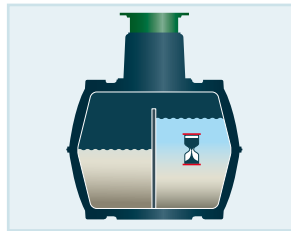
1. Charging phase

The wastewater goes first into primary treatment (1st chamber), where the solid substances are retained. From there, the wastewater is fed into the SBR reservoir (2nd chamber).



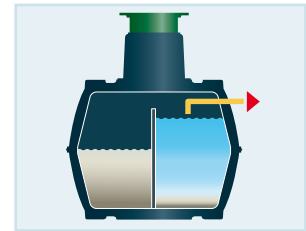
2. Aeration phase

The actual biological cleaning by microorganisms now occurs in the SBR reservoir. Short aeration and rest phases interchange in a controlled cleaning process. The so-called activated sludge can now develop with millions of microorganisms and clean the water thoroughly.



3. Rest phase

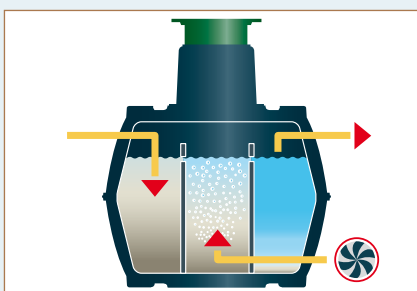
A rest phase now follows, during which the live sludge sinks to the bottom of the system. This allows a clarified water zone to form at the top of the SBR reservoir.



4. Sewage water draw-off

The purified wastewater is now fed into a discharge system (stream, river, sea) or into a infiltration system. Afterwards, the sludge is fed back from the SBR reservoir into the first chamber.

Cleaning process Moving bed system



1. A Moving bed system comprises three chambers. The wastewater first enters the first chamber. All solids sink to the bottom here. Floating particles is retained thanks to the transfer pipe.

2. The wastewater enters the second chamber through the transfer pipe. Actual biological cleaning by microorganisms occurs here. Those microorganisms stick to the carrier material, which is made of plastic. The carrier material has a very large surface. The bacteria needed for purification stick to the carrier material such as a „biofilm“.

So that the bacteria receive enough oxygen to „breathe“, the Moving bed is regularly streamed with air. An air compressor is used for this purpose, which is installed in the cellar or in the garden outside the reservoir.

3. Then the wastewater enters the third chamber for final treatment. The remaining solids settle there and they are pumped back to the first chamber from here. The purified wastewater can now be fed into a discharge system (stream, river, sea) or into a GRAF infiltration system.



System Picobell (>> page 16)

System comparison

System	System Klaro E Professional	System Aquato	System Moving bed
Page in catalogue for complete	8/9	12/13	16/17
Systems Conformity	EN-12566-3	EN 12566-3	EN-12566-3**
+D optional	○	○	—
+P optional	○*	○	—
+H optional	○*	○	—
Purifying technology	fully biological SBR lifting technology	fully biological SBR pump technology	fully biological Fluid bed technology
One-reservoir systems available up to	14 inhabitants	8 inhabitants	8 inhabitants
Two-reservoir systems available up to	28 inhabitants	16 inhabitants	18 inhabitants
XXL systems available up to	200 inhabitants	—	200 inhabitants
Warranty for underground tank	15 years	15 years	15 years
Warranty for purifying technology	3 years	3 years	3 years
Warranty for carrier material			15 years

Control	System Klaro E Professional	Picobell system	
Optional convenience package	○	—	
Control Power failure recognition	●	○	
Temperature sensor to protect against overheating	○*	—	
Automatic economy mode	○*	—	
Logbook function	●	—	
Operation	4 keys (○ 14 keys*)	58 x 32 mm	
Remote transmission (GSM-modem)	○*	—	
Serial interface for software updates	●	—	
External control cabinet for installing control unit outdoors	○	—	
Annual power consumption	346 kWh (8 inhabitants)	276 kWh (4 inhabitants)	410 kWh (4 inhabitants)

● Standard equipment ○ Available as options — not available

* only in conjunction with optional convenience control

**only with optional compressor monitoring

Limit values	Cleaning performance for Klaro E Professional***	Cleaning performance for Aquato	Cleaning performance for Picobell
COD (chemical oxygen demand)	91,9%	87,2%	86,4%
BOD ₅ (biochemical oxygen demand)	95,9%	92,3%	92,2%
SS (suspended solids)	94,4%	91,0%	93,2%
NH ₄ -N	65,4%	45,2%	—
N _{total}	57,1%	48,6%	—

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

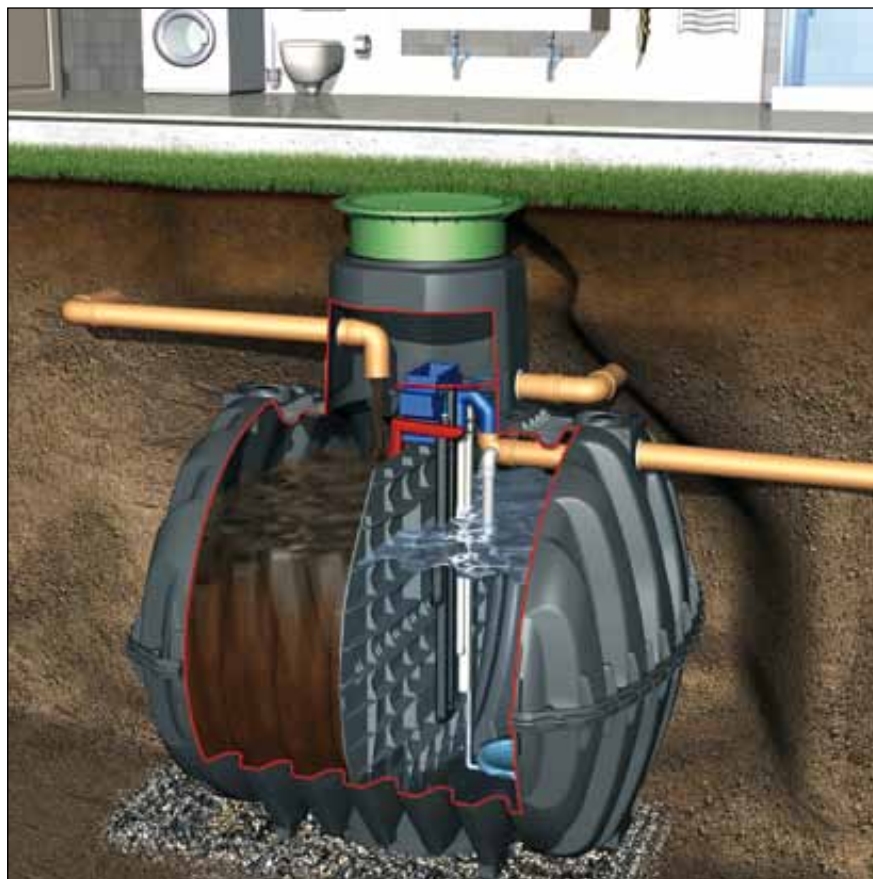
SBR wastewater treatment system

GRAF Klaro E Professional

The GRAF SBR wastewater treatment system Klaro E Professional works according to the principle of SBR lifting technology. No live parts need to be installed in the tank. All movement processes are performed by three air lift pumps, which are operated using a compressor. The compressor also provides the plate ventilator on the bottom of the SBR reservoir with air. The compressor and all other technical components are low maintenance offer power failure recognition and stored in a switch cabinet, which can be installed in the plant room of the house.



System control
Klaro E Professional



Q Webcode G5101

No live technology in the reservoir

The GRAF SBR wastewater treatment system Klaro E Professional does not need consistent integration of live technology in the tank. All movement processes are performed by an air compressor, which is built into the Klaro E Professional system control. The distribution of air in the individual pump processes is realised via the control. The air compressor is very durable and whisper-quiet.

Flexible, as expandable

The SBR wastewater treatment system Klaro E Professional can be flexibly adjusted to changing conditions by altering the cycle times. The system can

also be switched to holiday mode. The aeration automatically adjusts to the load with the convenience package.

Simple installation

The air pressure hoses of the reservoir and the corresponding connections to the system control are colour-coded. This avoids installation errors. Already fitted to the carrier system at the factory, the whole system just needs to be fitted to the baffle of the reservoir. Thanks to the Klaro E Professional carrier system, the purifying technology is extremely fast to install (one-reservoir system).

Low maintenance

The compact switch cabinet for system control with air compressor and valve unit is installed in the plant room of the house and requires little maintenance. The LCD display shows the operating hours of the individual devices. Any power failure is indicated with a visual and audio alarm. All components installed in the switch cabinet are arranged in such a way that they can be exchanged very easily. This modular design saves a lot of time and, therefore, money on any maintenance or repair work.

¹⁾ 15-year warranty on sewage reservoirs ²⁾ 3-year warranty on technology

Klaro E Professional one-reservoir system



Inhabitants [max.]	Max. daily flow [L/d]	Max. organic load [kg BSB ₅ /d]	Total volume [ltrs]	Capacity [ltrs]	Length [mm]	Width [mm]	Height [mm]	Weight [kg]
5	750	0,30	2700	2700	2080	1556	2010	140
8	1200	0,48	3750	3750	2280	1755	2200	175
10	1500	0,60	4800	4800	2280	1985	2430	220
14	2100	0,84	6500	6500	2390	2100	2710	265

One complete system consists of: 1 Carat S underground tank with baffle, 1 tank dome, 1 telescopic dome shaft, system pack Klaro E Professional for one-reservoir system (▶ page 28 – the modular system). Please order the air hoses separately (accessories).

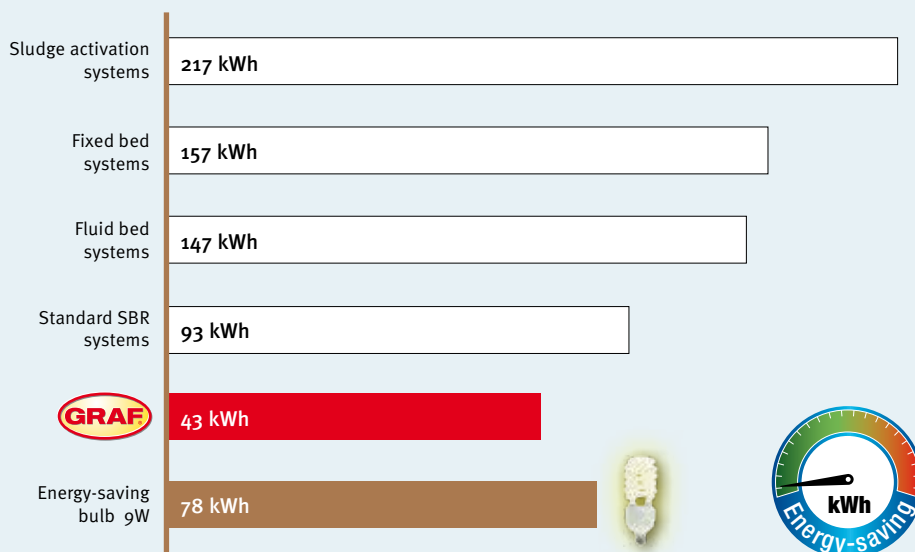
Klaro E Professional two-reservoir system



Inhabitants [max.]	Max. daily flow [L/d]	Max. organic load [kg BSB ₅ /d]	Total volume [ltrs]	Capacity [ltrs]	Length [mm]	Width [mm]	Height [mm]	Weight [kg]
10	1500	0,60	5400	2 x 2700	2080 2080	1565 1565	2010 2010	120 120
16	2400	0,96	7500	2 x 3750	2280 2280	1755 1755	2200 2200	150 150
22	3300	1,32	9600	2 x 4800	2280 2280	1985 1985	2430 2430	185 185
28	4200	1,68	13000	2 x 6500	2390 2390	2190 2190	2710 2710	220 220

One complete system consists of: 2 Carat S underground tanks, 2 tank domes, 2 telescopic dome shafts, system pack Aquato for two-reservoir system (▶ page 28 – the modular system). Please order the air hoses separately (accessories).

Annual power consumption of wastewater treatment systems¹⁾



¹⁾ The diagram indicates the annual power consumption of various wastewater treatment systems. Source: "wwt" magazine, edition 6/2007 "The wastewater treatment system as a permanent solution", page 15, table 3, practical data; Klaro E Professional: test report by PIA (Prüfinstitut für Abwassertechnik GmbH, Testing Institute for Wastewater Technology), Aachen, test number PIA2011-141B15

For every situation the right solution



EPP internal switch cabinet
(up to 10 inhabitants)



Metal internal switch cabinet
(up to 50 inhabitants)



Plastic External switch cabinet

Klaro E Professional EPP internal switch cabinet:

- High-quality cabinet version with contemporary design
- Easy to install on a wall
- Air connections from below
- Cabinet size up to 10 inhabitants
- Extremely quiet air compressor – as quiet as a refrigerator
- Power failure detection as standard

Klaro E Professional metal internal switch cabinet:

- The classic
- High-quality metal cabinet version
- Dust-proof encapsulation
- Air connections at the side
- Suited to all system sizes
- Different compressor types depending on requirements
- Power failure detection as standard

Klaro E Professional outdoor control cabinet:

- Different versions in plastic and concrete
- Timeless, durable design
- Safe function, even in frosty weather
- Can be accessed by maintenance companies at any time
- No installation work in your home
- Extremely quiet air compressor – as quiet as a refrigerator
- Extensive range of accessories available (acoustic and visual warning equipment, sockets, ...)
- Power failure detection as standard

Accessories

SBR hose package

(1x Ø 19mm; 3x Ø 13 mm)

in 5 mtr length Order no. 107189

in 10 mtr length Order no. 107190

in 15 mtr length Order no. 107191

in 20 mtr length Order no. 107192

Sampling point

internal for two-and-more-reservoir systems up to 80 PE

Order no. 107170

Sampling point

external for XXL wastewater systems from 115-160 PE

Order no. 107030

+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.

+K Convenience package

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



- Automatic underload detection
- Automatic switch to holiday mode
- Energy saving
- 14 keys for convenient operation
- Add-on options

+H Disinfection

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, this reliably kills off germs and microorganisms. The clarified water therefore corresponds to the EU bathing water directive.



- Can be retrofitted with ease
- Easy to use
- No environmental impact
- Low operating costs

+P Phosphate removal

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



- Complements the modular concept
- Subsequent installation possible
- Long service life thanks to simple technology
- Maintenance-friendly

+R Remote transmission

Remote monitoring allows error messages to be texted to mobiles and operating data to be queried by text. 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

SBR wastewater treatment system

GRAF Aquato

With the GRAF SBR Aquato system you get to enjoy a fully biological wastewater treatment system that is state-of-the-art and based on modern pump technology. The ingenious modular design allows the system to be installed at speed and maintained with ease. Three powerful pumps handle conveyance and venting of the SBR container. Only the compact system control has to be installed in the building's utility room.



The benefits of the Aquato system at a glance

[Webcode G5102](#)

Benefits of the complete system

- Turnkey complete system
- Easy to maintain
- Power failure recognition

Benefits of purifying technology

- 3-year warranty
- Automatic underload detection
- Height-adjustable installation kit

Benefits of the septic tank

- 15-year warranty
- 100 % watertight and corrosion-resistant
- Groundwater-stable
- Lorry-bearing
- Easy to transport and install
- Sealed up to the top of the tank
- Cover can be fitted (in continuously variable manner) to suit your ground level



¹⁾ 15-year warranty on sewage reservoirs ²⁾ 3-year warranty on technology

Aquato one-reservoir system



Inhabitants [max.]	Max. daily flow [L/d]	Max. organic load [kg BSB ₅ /d]	Total volume [ltrs]	Capacity [ltrs]	Length [mm]	Width [mm]	Height [mm]	Weight [kg]
2-4	600	0,24	3750	3750	2280	1755	2200	175
4-6	900	0,36	4800	4800	2280	1985	2430	220
6-8	1200	0,48	6500	6500	2390	2190	2710	265

One complete system consists of: 1 Carat S underground tank with baffle, 1 tank dome, 1 telescopic dome shaft, system pack Aquato for one-reservoir system (➤ page 28 – the modular system). Please order the air hoses separately (accessories).

Aquato two-reservoir system



Inhabitants [max.]	Max. daily flow [L/d]	Max. organic load [kg BSB ₅ /d]	Total volume [ltrs]	Capacity [ltrs]	Length [mm]	Width [mm]	Height [mm]	Weight [kg]
4-8	1200	0,48	7500	2 x 3750	2280 2280	1755 1755	2200 2200	150 150
8-12	1800	0,72	9600	2 x 4800	2280 2280	1985 1985	2430 2430	185 185
12-16	2400	0,96	13000	2 x 6500	2390 2390	2190 2190	2710 2710	220 220

One complete system consists of: 2 Carat S underground tanks, 2 tank domes, 2 telescopic dome shafts, system pack Aquato for two-reservoir system (➤ page 28 – the modular system). Please order the air hoses separately (accessories).

Options



Denitrification package
(removal of nitrogen)

Order no. 107062



Disinfection package:

The clear water extracted is also irradiated with strong UV light. Microorganisms are reliably killed.



Phosphate removal package
On request

On request

Accessories

Plastic External switch cabinet

cannot be combined with Package

Order no. 107278

Wastewater treatment systems for retrofitting



Want to bring your multi-chamber pit bang up to date?

Then get in touch!

The GRAF installation kits allow existing tanks to be used with the proven GRAF Klaro E Professional and GRAF Aquato systems.

Retrofitting - what do I need to note?

- All of the tank's chambers must be easily accessible.
- The tank should be fully emptied and cleaned. A seal integrity check should be run.
- The condition of the existing tank should be assessed. If the concrete is heavily corroded, retrofitting is not recommended and we would recommend fitting a new tank.
- The current tank volume should be calculated and compared with the volume required. If you send us a sketch with the dimensions of your tank, we will happily check whether a retrofit is possible.
- If retrofitting without any additional septic tanks, the openings in the baffle between the planned SBR reactor and preliminary sedimentation should be sealed. The baffle must be sealed.
- An empty pipe should be routed to connect the control unit which can either be housed in the building's utility room or in an outdoor control cabinet. There must be an isolated ground receptacle for the control unit's power supply. This should have a separate fuse and circuit breaker.
- If an additional plastic tank is fitted downstream of the current pit, the infeed and outfeed heights required should be noted



You will find an enquiry form and sizing assistance on our website www.graf.info

Retrofitting in an existing septic tank

A fully functional multi-chamber pit can be fully modernised with the retrofit kit. The pit must simply be of a sufficient volume and the baffles must be sealed.

Minimum volume required for multi-chamber pit

Inhabitants max.	Volume Concrete* [litres]	Volume Plastic* [litres]
2-4 inhabitants	3500	3750
4-6 inhabitants	4000	4800
6-8 inhabitants	5200	6500
8-10 inhabitants	6500	7500
10-12 inhabitants	7800	9600
12-18 inhabitants	11700	13000

* Tank volume with a max. water depth of 1650 mm. Get in touch – we are happy to help.

Klaro E Professional retrofit kit



Inhabitants max.	for concrete Order no.
2-4 inhabitants	107097
4-6 inhabitants	107098
6-8 inhabitants	107099

[Webcode G5201](#)

Other sizes for up to 160 inhabitants

* A larger compressor may be required for a tank depth of more than 1.65 m (additional charge). For property-related installation kits, the kit is supplied made up of HT pipes

Inhabitants [max.]	for plastic Order no.
2-4 inhabitants	107076
4-6 inhabitants	107077
6-8 inhabitants	107078

[Webcode G5202](#)

Aquato retrofit kit



For one-reservoir system

Inhabitants max.	for concrete Order no.
4-16 inhabitants	107283

Inhabitants max.	for plastic Order no.
4-16 inhabitants	107284

For two-reservoir system

Inhabitants max.	for concrete Order no.
4-16 inhabitants	107285

Inhabitants max.	for plastic Order no.
4-16 inhabitants	107286

[Webcode G5203](#)

[Webcode G5204](#)

Moving bed wastewater treatment system

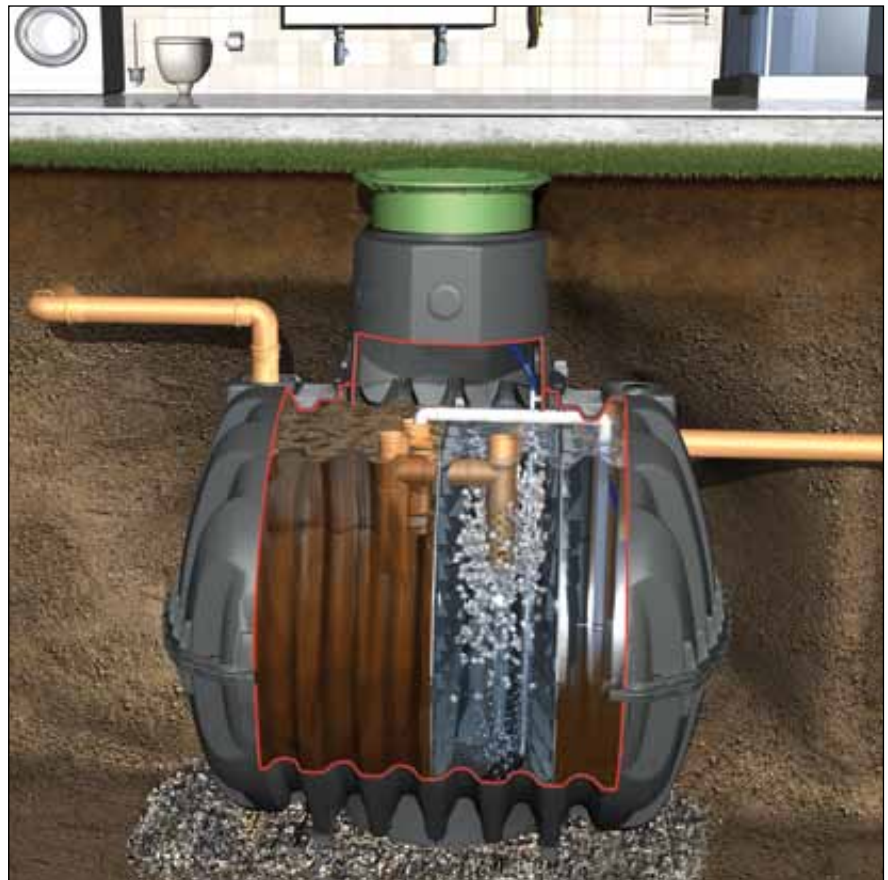
GRAF Picobell

Simple and cost-effective

With the development of the Picobell Moving bed system, a GRAF treatment system is now available which has simple technology and, at the same time, offers high cleaning performance.

The system's technology comprises just one air compressor, a compressor guard, power failure recognition, a pipe ventilator, sludge removal and the carrier material.

The system works completely without electronic control, pumps and magnetic valves. A further advantage of the Moving bed system is that the high cleaning performance is also maintained with strong underfill.



System control
Picobell

Compressor
monitoring



Cost-effective and well thought-out

The compact and quiet air compressor is integrated in compact housing. It reduces the system's energy consumption to a minimum and is easily installed in the plant room of the house. Additionally, the system does not need consistent integration of live technology in the tank.

All the movement processes are performed by the whisper quiet air compressor.

Maintenance

The need for maintenance is kept to a minimum. This is mainly due to the permanent self-cleaning of the carrier material and the modern control technology. Thus, maintenance just consists of regular function testing and sludge removal.

Self-cleaning Picobells

The carrier material is constantly mixed in the wastewater through aeration. During the mixing and swirling these will get automatically cleaned. The possible degradation with the time of the cleaning performance belongs now to the past.

The biofilm, which is responsible for cleaning the wastewater, settles on the approx. 3 cm wide Picobells. The unique, lamellae-shaped design gives the carrier material a maximum surface and this is where the cleaning power lies.



¹⁾ 15-year warranty on sewage reservoirs, 15-year warranty on Picobells

²⁾ 3-year warranty on technology

Picobell one-reservoir system



Inhab. [max.]	Max. daily flow [L/d]	Max. organic load [kg BSB ₅ /d]	Total volume [ltrs]	Capacity [ltrs]	Length [mm]	Width [mm]	Height [mm]	Weight [kg]
2-4	600	0,24	3750	3750	2280	1755	2200	200
4-6	900	0,36	4800	4800	2280	1985	2430	255
6-8	1200	0,48	6500	6500	2390	2190	2710	310

One complete system consists of: 1 Carat S underground tank with 2 baffles, 1 tank dome, telescopic dome shaft, system pack Picobell for one reservoir system (▶ page 28 – the modular system). Please order the air hose separately (accessories).

Picobell two-reservoir system



Inhab. [max.]	Max. daily flow [L/d]	Max. organic load [kg BSB ₅ /d]	Total volume [ltrs]	Capacity [ltrs]	Length [mm]	Width [mm]	Height [mm]	Weight [kg]
8-10	1500	0,60	7500	2x3750	2280 2280	1755 1755	2200 2200	150 175
10-12	1800	0,72	9600	2x4800	2280 2280	1985 1985	2430 2430	185 220
12-18	2700	1,08	13000	2x6500	2390 2390	2190 2190	2710 2710	220 265

One complete system consists of: 1 Carat S underground tank, 1 Carat S underground tank with baffle, 2 tank domes, 2 telescopic dome shafts, system pack Picobell for two-reservoir system (▶ page 28 – the modular system). Please order the air hose separately (accessories).

Accessories



Compressor monitoring

Pressure monitoring of compressor,
Acoustic alarm in event of pressure drop.
Order no. 107533



Power failure recognition

Acoustic alarm in event of power failure
Order no. 107070

Air hose

available by roll
Order no. 372791

XXL wastewater treatment system

up to 200 inhabitants



You have the choice

There are two purification systems available for converting large systems: the Moving bed XXL and Klaro XXL systems are available in sizes for up to 200 inhabitants. Additionally, on request for large systems you also have the choice of the proven options of the Klaro XXL system, such as phosphate removal or additional disinfecting of the cleaned wastewater with UV light.

Property consultation - Planning and sizing

Large systems must always be adjusted to individual requirements like cleaning performance or official requirements. When sizing a large system, you must take many basic factors into account. GRAF is happy to support you on individual planning of this type of project and will gladly create individual sizing for your property.

Options



The proven options of the system Klaro XXL are also available on request for large systems.

Accessories

For all large scale treatment systems are external cabinets available on request.



You will find an enquiry form and sizing assistance on our website www.graf.info

System Klaro XXL for the Carat S underground tank

Inhab. [max.]	Max. daily flow [L/d]	Max. organic load [kg BSB ₅ /d]	Total number of reservoirs	Primary treatment [capacity in ltrs]	SBR reservoir [capacity in ltrs]	Required air hoses [quantity x Ø mm]	Length* [m]	Width* [m]
32	4800	1,92	4	2x3750	2x4800	4x13 + 2x19	10,70	2,00
44	6600	2,64	4	2x4800	2x6500	6x19	11,10	2,20
50	7500	3,00	4	2x6500	2x6500	6x19	11,10	2,20
80	12000	4,80	5	2x6500	3x6500	9x19	11,10	4,90
115	17250	6,90	7	3x6500	4x6500	12x19	11,10	4,90
145	21750	8,70	9	4x6500	5x6500	14x19	14,00	4,90
160	24000	9,60	10	4x6500	6x6500	16x19	11,10	7,60

*Total measurements
(> page 28 – the modular system)

System Klaro XXL - fully prefitted in the Carat XL underground tank

Inhab. [max.]	Max. daily flow [L/d]	Max. organic load [kg BSB ₅ /d]	Total number of reservoirs	Primary treatment [capacity in ltrs]	SBR reservoir [capacity in ltrs]	Required air hoses [quantity x Ø mm]	Length* [m]	Width* [m]	Order no.
25	3750	1,50	2	1x8500	1x8500	3x13 + 1x19	7,50	2,04	106170
30	4500	1,80	2	1x10000	1x10000	3x13 + 1x19	7,54	2,24	106171
80	12000	4,80	4	2x8500	2x8500	6x19	15,50	2,04	106172
100	15000	6,00	4	2x10000	2x10000	6x19	15,58	2,24	106173
120	18000	7,20	5	2x8500	3x8500	9x19	11,50	7,12	106174
145	21750	8,70	5	2x10000	3x10000	9x19	11,56	7,72	106175
165	24750	9,90	7	3x8500	4x8500	12x19	7,50	9,66	106176
200	30000	12,00	7	3x10000	4x10000	12x19	7,54	10,46	106177

Scope of supply: Carat XL underground tanks with factory-prefitted technology and switch cabinet for internal fitting.
The air hoses from the underground tanks to the control panel are not included. *Total measurements

System Moving bed XXL for the Carat S underground tank

Inhab. [max.]	Max. daily flow [L/d]	Max. organic load [kg BSB ₅ /d]	Total number of reservoirs	Primary treatment [capacity in ltrs]	Moving bed [capacity in ltrs]	Final treatment [capacity in ltrs]	Sludge storage [capacity in ltrs]	Length* [m]	Width* [m]
20	3000	1,20	4	2x3750	1x2700	1x2700**	-	10,20	1,80
28	4200	1,68	4	2x4800	1x3750	1x3750**	-	10,60	2,00
36	5400	2,16	4	2x6500	1x3750	1x3750**	-	10,80	2,20
44	6600	2,64	4	2x6500	1x3750	1x3750**	-	10,80	2,20
50	7500	3,00	5	3x4800	1x4800	1x4800**	-	13,40	2,20
70	10500	4,20	5	3x4800	1x6500	1x6500**	-	13,62	2,20
90	13500	5,40	8	3x6500	2x4800	2x4800	1x4800	10,62	7,16
120	18000	7,20	9	4x6500	2x6500	2x6500	1x6500	11,06	7,27
140	21000	8,40	9	4x6500	2x6500	2x6500	1x6500	11,06	7,57
160	24000	9,60	11	5x6500	3x6500	2x6500	1x6500	13,95	7,57
200	30000	12,00	12	5x6500	3x6500	2x6500	2x6500	13,95	7,57

*Total measurements / **One baffle required
(> page 28 – the modular system)

Accessories

for Carat XL tank covers please see page 33

References



Moving bed XXL 50 PE, Latvia



Klaro XXL 80 PE, Spain



Moving bed XXL 50 PE, Ukraine



Moving bed 28 PE, Plovdiv, Bulgaria



Klaro XXL 115 PE, France



Klaro E Professional 5 PE, Uurainen, Finland

Septic tank Carat S

Three chambers / Two chambers / One chamber



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

- Low weight: can also be installed in difficult local conditions without a crane
- Reasonable purchase and installation costs. Compare!
- Low maintenance: maintenance or cleaning work can be performed through the shafts
- Tanks can be used as rainwater harvesting systems after thorough cleaning

[Q Webcode G5501](#)



Carat S underground tank with two chambers



Inhabitants [max]	Total volumes [ltrs]	Capacity [ltrs]	Length [mm]	Width [mm]	Height [mm]	Weight [kg]
5	2700	2700	2080	1565	2010	145
7	3750	3750	2280	1755	2200	175
9	4800	4800	2280	1985	2430	220
13	6500	6500	2390	2190	2710	260

One complete system consists of: Carat S underground tank with baffle. Without baffle also as a one-chamber septic tank available. (» page 33 - suitable covers » page 34 - different baffle position)

Accessories

Inspection end DN 200

for Carat S 4800 ltrs and 6500 ltrs

Order no. 340527

Cesspool Carat S

Why GRAF wastewater tanks?

- Easy installation due to low net weight.
- The tank can also be used as a rain-water collection tank after cleaning.
- Can be expanded as required



Carat S underground tank Cesspool



Capacity [ltrs]	Length [m]	Width [m]	Height [m]	Weight [kg]
2700	2080	1565	2010	120
3750	2280	1755	2200	150
4850	2280	1985	2430	185
6500	2390	2190	2710	220

(>> page 33 - suitable covers)

Accessories



Overflow guard

Emits visual and audio alarm, battery-operated (9V).

Order no. 351017



Odour filter for ventilation shaft

Reliably filters unpleasant odours.

Order no. 104018

Special seal DN 100

for connections

Order no. 332033

Drill DN 100

with view shaft

Order no. 202003

Cesspool Carat XL

8500 and 10000 Litres



Carat XL underground tank suitable for vehicle loading / lorry bearing¹⁾



8500 Litres

Order no. 370005

10000 Litres

Order no. 370006



Illustration shows 10000 litres tank with Telescopic dome shaft with cast iron lid, suitable for vehicle loading.

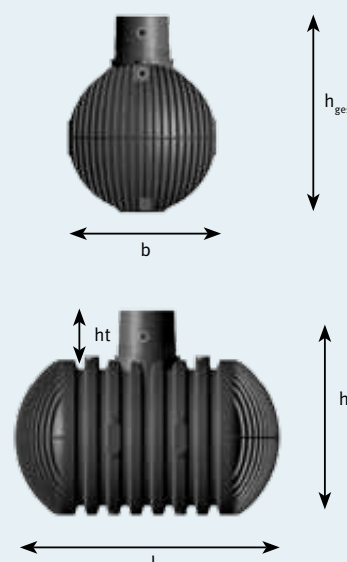
Technical data

Volume	Width	Length l	Height h	Height h _{ges}	Height Dome shaft ht	Internal Ø Dome shaft	Weight
8500 litres	2040 mm	3500 mm	2085 mm	2695 mm	610 mm	650 mm	380 kg
10000 litres	2240 mm	3520 mm	2285 mm	2895 mm	610 mm	650 mm	456 kg

(» page 33 - suitable covers)

Technical data

Max. earth covering (without groundwater vehicle loading)	1500 mm
Max. axle load	8 t
Earth covering required for vehicle loading	800-1200 mm
Groundwater stability	until middle of the tank
Earth covering required for groundwater stability	800-1200 mm
Connection	5 x DN 100



Cesspool Platin

Why GRAF wastewater tanks?

- Easy installation due to low net weight.
- The tank can also be used as a rainwater collection tank after cleaning.
- Can be expanded as required

Volume

Capacity/litres	US gallons	Order no.
1500	400	390000
3000	800	390001
5000	1350	390002
7500	1980	390005

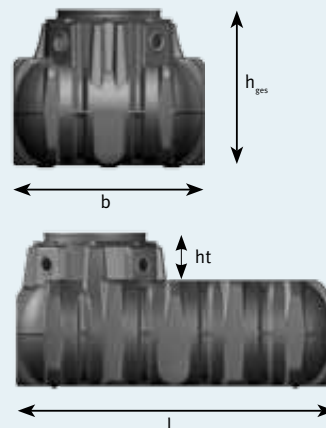


Technical data

Volume	Width	Length l	Height h	Height h _{ges}	Height Dome shaft ht	Internal Ø Dome shaft	Weight
1500 litres	1250 mm	2100 mm	700 mm	1015 mm	315 mm	650 mm	82 kg
3000 litres	2100 mm	2450 mm	735 mm	1050 mm	315 mm	650 mm	180 kg
5000 litres	2300 mm	2890 mm	950 mm	1265 mm	315 mm	650 mm	250 kg
7500 litres	2250 mm	3600 mm	1250 mm	1565 mm	315 mm	650 mm	360 kg

Technical data

Max. earth covering (without groundwater vehicle loading)	1200 mm
Max. axle load	2,2 t
Max. total weight	3,5 t
Earth covering required for vehicle loading	700-1000 mm
Groundwater stability	until Tank shoulder
Earth covering required for groundwater stability	700-1200 mm
Connection	4 x DN 100



Septic tank / Cesspool Herkules

For overground and underground installation



Advantages

- Stability tested according to European standard (DIN EN 12566-1)
- Construction approved by DIBt for domestic wastewater
- Groundwater stable
- Fits through any door (80 cm) – each half shell weighs just 30 kg
- Fast tank fitting with profile seal and patented fast connectors
- Tanks can be used for rainwater harvesting systems after thorough cleaning
- Can be expanded as required

Herkules Tank 1600 L

Order no. 320001



Herkules tank

Total volumes [ltrs]	Capacity [ltrs]	Capacity [US gallons]	Height [mm]	Ø max. [mm]	Weight [kg]
Herkules - Septic tank (Three chambers)					
	1600	421	1600	1350	60
4800	1600	421	1600	1350	60
	1600	421	1600	1350	60
Herkules - Septic tank (Two chambers)					
	1600	421	1600	1350	60
3200	1600	421	1600	1350	60
	1600	421	1600	1350	60
Herkules - Septic tank (One chamber)					
1600	1600	421	1600	1350	60
Herkules - Cesspool					
1600	1600	421	1600	1350	60

Accessories

Tank dome DN 200
with telescopic end, length 1 m

Order no. 322026

Extension set

2 x seal DN 100 without connection pipe

Order no. 202028

Drill DN 100

with view shaft

Order no. 202003

Incomparable advantages:



Long-Lasting

Durably sealed thanks to solid profile sealing (Sealing life-time of more than 25 years proven in laboratory tests)



Can be extended as desired

Shape-matched end connectors and connection surfaces enable volumes of several 10000 ltrs (2,639 US-gal)



Easy transport

Thanks to low weight of 30 kilos per half shell and practical size; fits through all doorways (up to 80 cm)



Stackable

GRAF Infiltration Tunnel /Infiltration Tunnel twin



The Graf Infiltration Tunnel has been mainly designed for the use in private and rural areas. The system which consists of one or several tunnel modules and two end plates can be extended at will. The laying is realized in one or more lines of the same level. As the weight of one module is only 11 kilos, the handling of the Infiltration Tunnel is excellent.

The surface beyond the tunnels is vehicle loading which offers versatile possibilities for utilisation.



Up to 12000 litres infiltration volume per pallet

Thanks to its special design the GRAF Infiltration Tunnel can be stacked easily. Consequently, the shipment of up to 40 infiltration tunnels on one pallet saves considerable transport and storage costs.

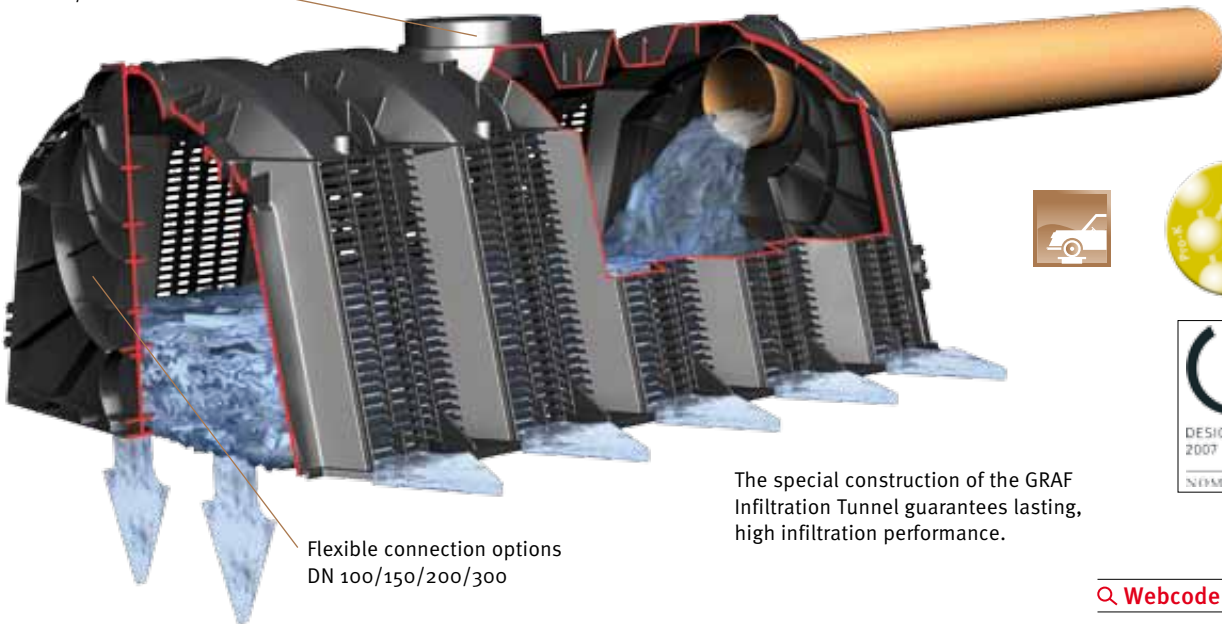
Vehicle loading

For offering versatile possibilities of utilisation, the surface beyond the infiltration tunnels can be loaded permanently up to 3.5 tons/sqm and thus is also suitable for vehicle loading.

Easy installation

The GRAF Infiltration Tunnels are laid in lines and can be flexibly adapted to specific conditions and to the individual storage volume requested. The installation of the modules is easy, quick and variable. The installation is possible without heavy equipment, as one infiltration tunnel only weighs 11 kilos. The tunnel modules are simply stuck together in one line and equipped with 2 end plates per line.

Flexible connection options
DN 100/200



The special construction of the GRAF Infiltration Tunnel guarantees lasting, high infiltration performance.

[Webcode G4103](#)

Infiltration Tunnel vehicle loading

Capacity [ltrs]	Length [mm]	Width [mm]	Height [mm]	Colour	Order no.
300	1160	800	510	black	230010



Inspection end

DN 200

Order no. 340527



Infiltration Tunnel Twin vehicle loading

Consisting of two Tunnel and 1 set Click-Bolt-Connector

Capacity [ltrs]	Length [mm]	Width [mm]	Height [mm]	Colour
600	1160	800	1020	black



Deaeration end

DN 100

Order no. 369017



End plate for Infiltration Tunnel / Twin

Item	Length [mm]	Colour	Order no.
End plates (Set 2 units)	30	black	231004



GRAF-Tex geotextile

For an Infiltration Tunnel size of 2.50 x 2.50 m

Order no. 231006

Roll width 5 m

Order no. 231002

250 mm



Pedestrian

500 mm



Vehicle loading

GRAF Click-Bolt-Connector

Connecting elements for Infiltration Tunnel Twin

Order no. 410094



The modular system Carat S

Simply unique

Carat S underground tank

The underground tank Carat S is the basis for the modular system. It is available in sizes from 2700 to 10000 litres (700 - 2640 US gallons) and combined up to 13000 litres (3400 US gallons). Its high-quality makes it suitable for vehicle loading and ground-water stable (>> page 30-32).

Tank cover

Would you like to install your tank in the garden or in a yard entrance with heavy traffic? GRAF offers you the most diverse telescopic tank covers from plastic to cast iron (>> page 33).



System Packs

From the simple garden pump to the fully automatic drinking water intake technology. The pump package also includes the accessories needed for installation (>> page 35).

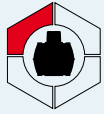
Baffle

The baffle separates the Carat S underground tank into two or three chambers as desired. This means that purifying systems with several chambers can be accommodated in just one reservoir. A Carat S underground tank with baffle is ready for use as a multi-chamber reservoir (>> page 34).



Choose your system

from four different modules



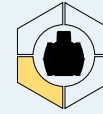
Carat S tank



Tank cover



Baffles



System packs



Carat S 2700 Litres
Order no. 372024

Carat S 3750 Litres
Order no. 372025

Carat S 4800 Litres
Order no. 372026

Carat S 6500 Litres
Order no. 372027



Mini telescopic dome shaft
Order no. 371010



Maxi telescopic dome shaft
Order no. 371011



Baffle 2700 Litres position 1/2:
Order no. 375067



Baffle 2700 Litres position 1/3:
Order no. 375077



Baffle 3750 Litres position 1/2:
Order no. 375025



Baffle 3750 Litres position 1/3:
Order no. 375080



Baffle 4800 Litres several positions:
Order no. 375026



Baffle 6500 Litres several positions:
Order no. 375027



System pack Klaro E Professional



System pack Aquato



System pack Picobell



Dome shaft Mini for Carat S
Order no. 371041



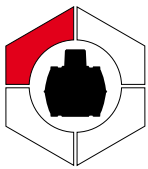
Dome shaft Maxi for Carat S
Order no. 371040



Telescopic dome shaft cast iron
Order no. 371020



Extension
Order no. 371003

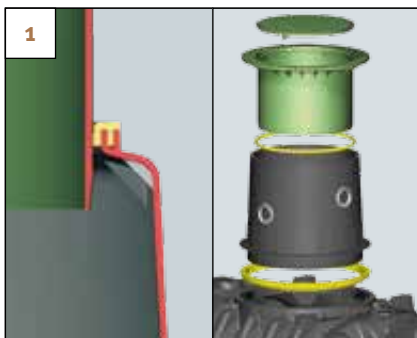
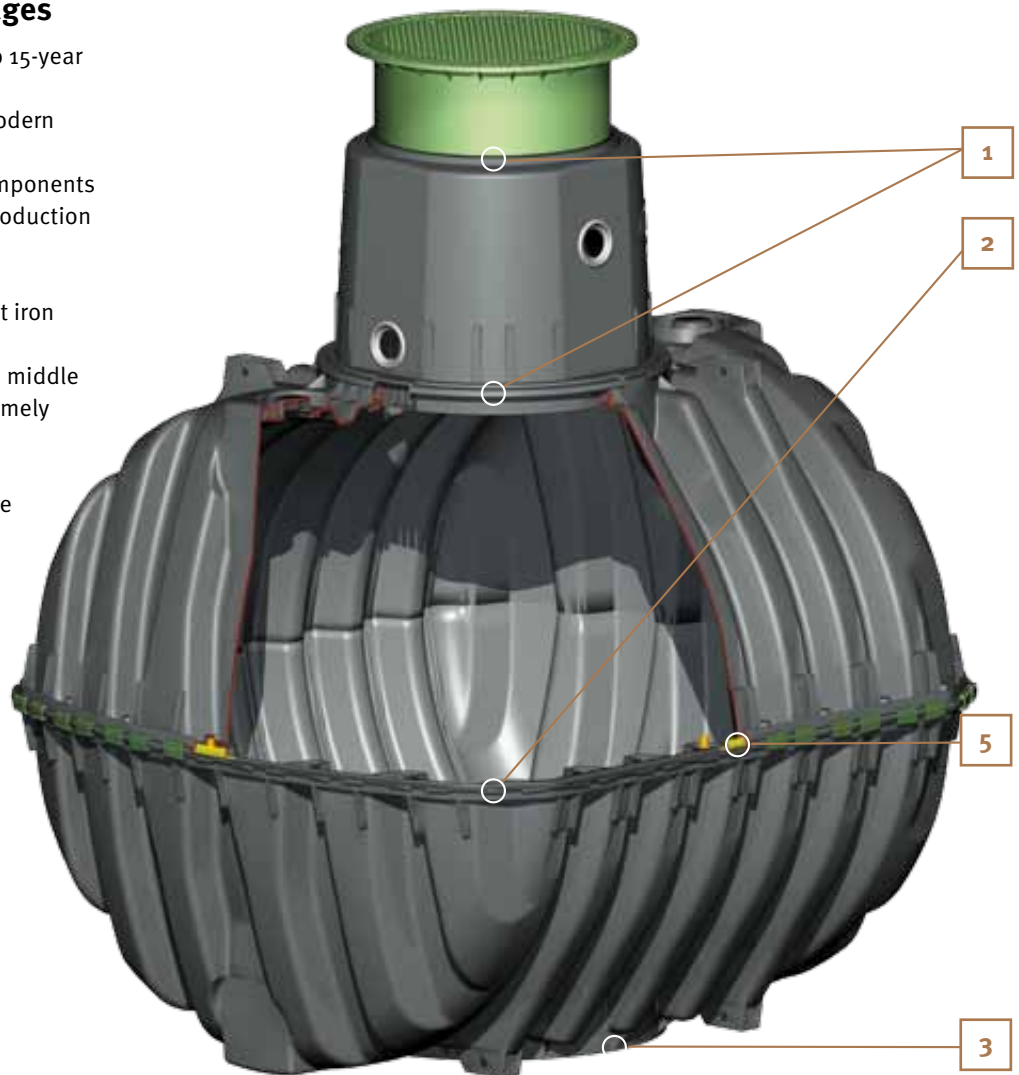


The Carat S

The wastewater underground tank of its kind!

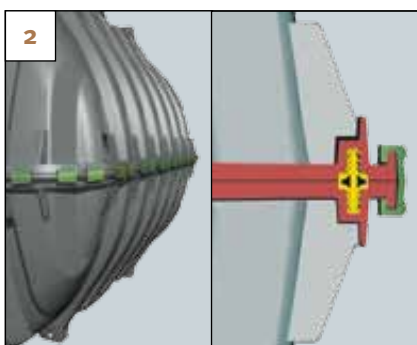
An overview of advantages

- Investment security thanks to 15-year warranty — compare it!
- Highest stability thanks to modern production methods
- Unique fit accuracy of the components
- Consistent quality through production monitoring
- Suitable for vehicle loading (when combined with the cast iron telescopic dome shaft)
- Groundwater-stable up to the middle of the tank thanks to its extremely stable construction
- Easy to transport due to low weight and encircling H profile
- Can be expanded as required



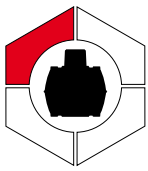
1 Flush with ground level (2 seals)

The Carat S underground tank has numerous seals to effectively stop dirt getting into the tank. This means that seepage water cannot get into the tank and, thus, dirt particles cannot contaminate the rainwater. 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.



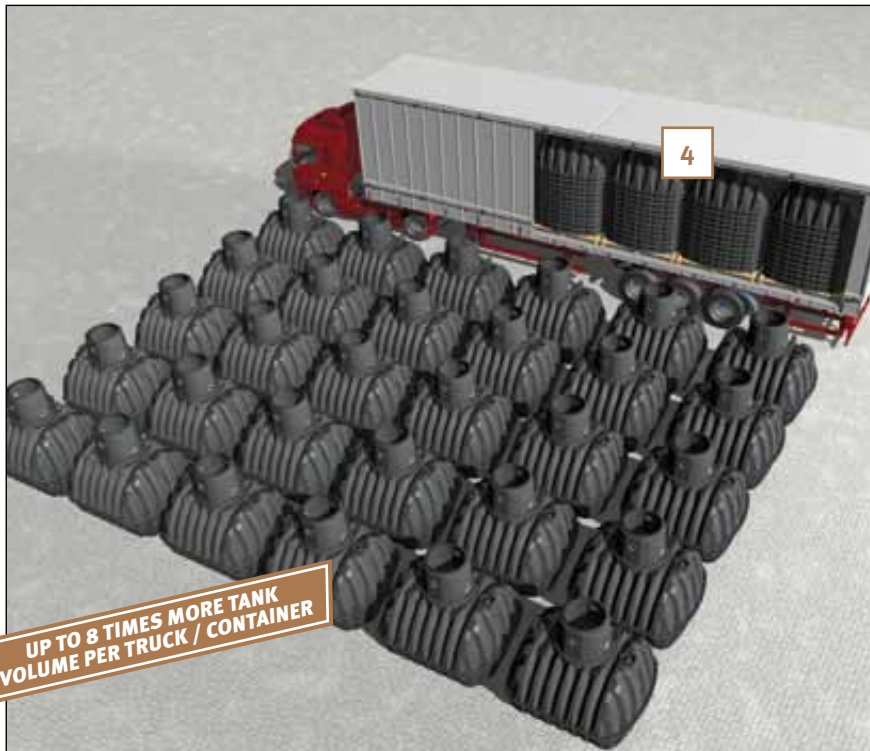
2 Encircling stabilisation ring in unique H profile

The Carat S underground tank has an unique profile for more stability and security. Thanks to the additional ribbing, the Carat S underground tank suffers no significant warping even under extreme loads. Therefore, the Carat S underground tank is suitable for vehicle loading in principle up to a total weight of 3.5 t, groundwater-stable up to the middle of the tank and can be installed with an earth covering up to 1.2 m. Additionally, the encircling H profile acts as a convenient carry handle for transport and as a tread when fitting the tank dome. Please follow our installation instructions for this (can also be downloaded at www.graf.info).



Benefits of the Carat S system

Flexible, stackable, user-friendly



Logistical advantages

- Easy to transport
- Tank consisting of two half-shells
- 5 – 9 tanks per pallet
- This allows up to 8 times more tank volume to be shipped thanks to this unique product design
- Up to 36 complete WWTPs per lorry



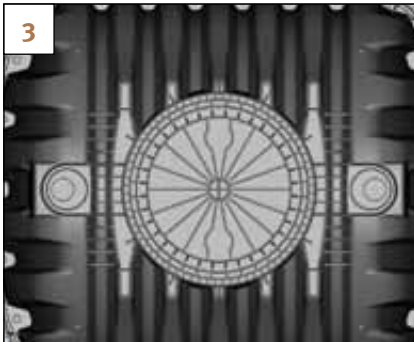
PRODUCT-VIDEO
www.graf.info



You will find an enquiry form and sizing assistance on our website www.graf.info

UP TO 8 TIMES MORE TANK VOLUME PER TRUCK / CONTAINER

3



Ribbed tank base

The tank base of the Carat S underground tank is extremely stable thanks to the numerous ribs. These enable the Carat S 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.graf.info).

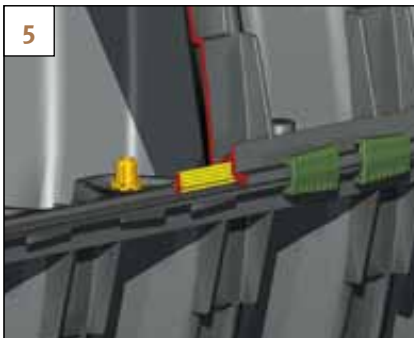
4



Logistical advantages of the Carat S

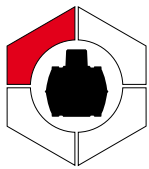
The Carat S tank consists of two half shells which can be stacked on top of each other, allowing multiple tanks to be stacked on a single pallet for shipping. For example, it is possible to stack five 6500 ltrs (1700 US gallon) or nine 2700 ltrs (700 US gallon) Carat S tanks on a single pallet. This allows a standard 40 ft. shipping container to house a total tank volume of up to 170000 ltrs (44 855 US gallons). The tanks unique stacking feature directly reduces transport costs and environmental impact from vehicle emissions, whilst allowing shipments to any destination in the world.

5



Easy and safe assembly

The patented quick connection (illustrated in green), allows the Carat S tank to be assembled without screws in only a few minutes. Disassembly is possible at any time. The first-class EPDM material used in the profile sealings (illustrated in yellow), has been laboratory tested to last more than 25 years. The centering bolt (illustrated in orange) assures the accurate and easy assembly of the two half shells preventing any leaks.



The modular system Carat S

Choose your tank size

Carat S underground tank for vehicle loading

Size 2700 – 6500 litres (700 – 1700 US gallons). Designed to be used in conjunction with the vehicle loading telescopic dome shaft. The access dome is designed in accordance to DIN testing.

Illustration shows 4800 litres (1250 US gallon) tank with telescopic dome shaft for pedestrian loading

Volume

Capacity/litres	US gallons	Order no.
2700	700	372024
3750	1000	372025
4800	1250	372026
6500	1700	372027



Dome shaft Maxi
Order no. 371040

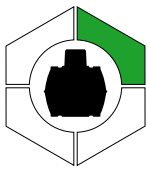


Dome shaft Mini
Order no. 371041



Technical data

Dimensions / weight	2700 litres 700 US gallons	3750 litres 1000 US gallons	4800 litres 1250 US gallons	6500 litres 1700 US gallons
Length	2080 mm (81.9")	2280 mm (89.8")	2280 mm (89.8")	2390 mm (94.1")
Width	1565 mm (61.6")	1755 mm (69.1")	1985 mm (78.2")	2190 mm (86.2")
Height (including tank dome)	2010 mm (79.1")	2200 mm (86.6")	2430 mm (95.7")	2710 mm (106.7")
Height of tank dome Maxi		610 mm (24.0")		
Height of tank dome Mini		290 mm (11.4")		
Internal Ø tank dome		650 mm (31.5")		
Weight	120 kg (265 lbs.)	150 kg (331 lbs.)	185 kg (408 lbs.)	220 kg (485 lbs.)
Load				
Max. axle load		Suitable for vehicle loading		
Earth covering		800 - 1200 mm (31.5 - 47.2")		
Groundwater				
Groundwater-stable		Up to the middle of the tank		
Earth covering		800 mm - 1000 mm (31.5" - 39.4")		



The modular system Carat S

Select your desired tank cover



Mini telescopic dome shaft with PP lid, suitable for pedestrian loading

Infinitely adjustable from 750 mm - 950 mm earth covering above the tank, can be tilted by 5°. Including PP cover with childproof lock. Colour: Grass green. Height: 360 mm (14.2"), Ø inner: 600 mm (23.6"), Ø outer: 780 mm (30.6"),

weight 9 kg. The well thought-out cover for the Carat S underground tank. Ideal for garden use.

Order no. 371010



Maxi telescopic dome shaft with PP lid, suitable for pedestrian loading

Infinitely variable from 750 mm - 1050 mm (29.5 - 41.3") earth covering above the back of the tank. Including PP cover with childproof lock. Colour: Grass green. Height: 476 mm (18.7"), Ø inner: 600 mm (23.6"), Ø outer: 850 mm

(33.5"), weight 15 kg. The sturdy cover for the Carat S underground tank. Ideal for household use.

Order no. 371011



Telescopic dome shaft with cast iron lid, suitable for vehicle loading

For vehicle loading - with class B cast iron cover. Infinitely variable from 750 mm - 1050 mm (31.4" - 41.3") earth covering over the tank. Height: 476 mm (18.7"), Ø inner: 600 mm (23.6"),

Ø outer: 850 mm (33.5"). For use in the home and garden. The tank is flush with the ground.

Order no. 371020



Extension

Length: 400 mm (19.7"), Effective Length: 300 mm, Ø 680 mm (27.6"). An earth covering of max. 1200 mm (59.1") can be implemented using the extension and the telescopic

dome shaft. For use with the basic Carat S tank with an earth covering of 1 m. Follow the installation instruction.

Order no. 371003





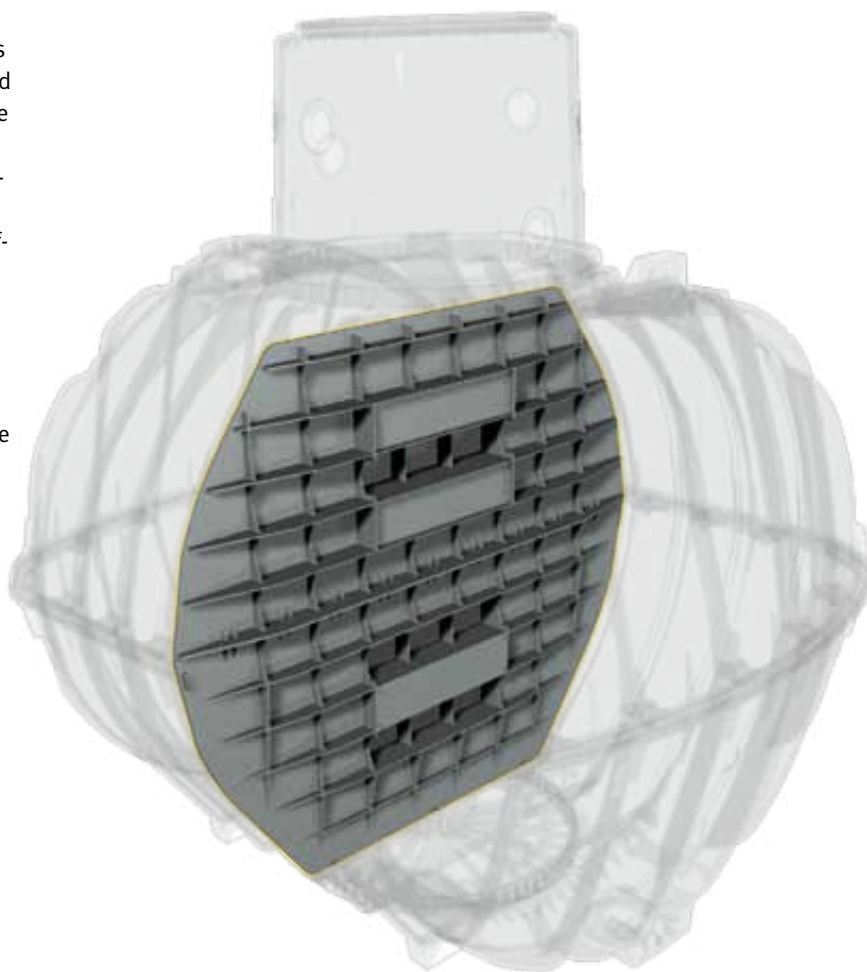
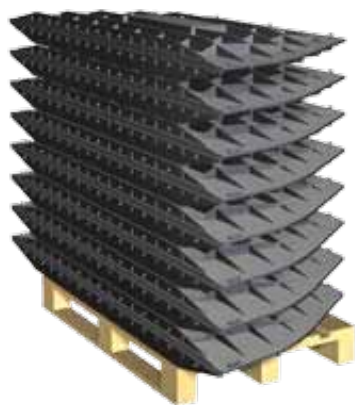
The modular system Carat S

Choose your baffle position

The baffle separates the Carat S underground tank into two or three chambers as desired. It consists of two halves and is simple to insert when assembling the second tank half of the Carat S.

A profile seal provides reliable and permanent separation of the chambers.

The Carat S underground tank with baffle is ready for use as a multi-chamber reservoir. This can be then expanded to a wastewater treatment system with a system pack (>> page 35). The system pack is simply fitted to the baffle and the control unit is installed in the house - the wastewater treatment system is ready to go.



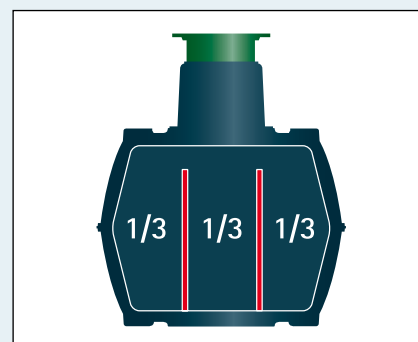
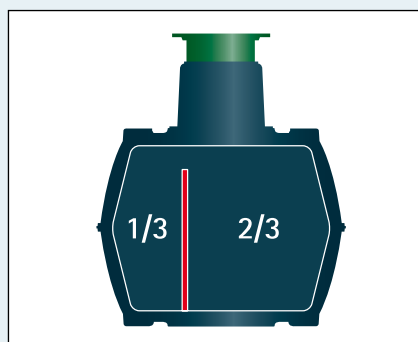
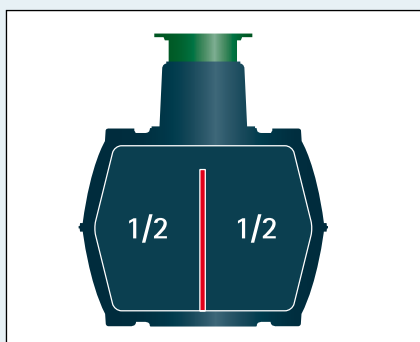
Baffle for Carat S tank

Capacity/litres	Positions	Weight [kg]	Order no.
2700	1/2	20	375067
2700	1/3	20	375077
3750	1/2	25	375025
3750	1/3	25	375080
4800	several positions	35	375026
6500	several positions	45	375027

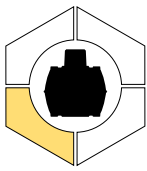


The baffles of the Carat S underground tank are supplied on pallets and can easily be inserted in the tanks as needed.

Flexible baffle positions



Examples for different baffle positions.



The modular system Carat S

Choose your system pack



System pack Klaro E Professional



The system pack Klaro E Professional (▶ page 8) works according to the SBR air lift pump process. This requires a sewage reservoir with two chambers. Scope of supply: switch cabinet with air compressor for internal mounting, system pack Klaro E Professional comprises air lift pumps and plate ventilator. Air hose not included.

SBR hose package

(1x Ø 19mm; 3x Ø 13 mm)

in 5 mtr Order no. 107189

in 10 mtr Order no. 107190

in 15 mtr Order no. 107191

in 20 mtr Order no. 107192

Sizes

Inhabitants [max.]	Capacity [ltrs]	System packs [Order no.]	
for one reservoir systems			
		Set-up kits	Internal control cabinet
5	2700	107437	107445
8	3750	107438	107447
10	4800	107439	107449
14	6500	107440	107457
for two reservoir systems			
		Set-up kits	Internal control cabinet
10	2 x 2700	107495	107457
16	2 x 3750	107496	107457
22	2 x 4800	107497	107470
28	2 x 6500	107498	107471
for XXL plants		XXL system packs*	
32	4 x 3750	107375	
44	4 x 4800	107376	
50	4 x 6500	107377	
80	5 x 6500	372711	

*Other sizes in request! (▶ page 15)

System pack Aquato



Sizes

Inhabitants [max.]	Capacity [ltrs]	System packs [Order no.]
for one reservoir systems		
2-4 PE	3750	107284
4-6 PE	4800	107284
6-8 PE	6500	107284
for two reservoir systems		
4-8 PE	2 x 3750	107286
8-12 PE	2 x 4800	107286
12-16 PE	2 x 6500	107286

System pack Picobell



The system pack Picobell (▶ page 16) works according to the Moving bed process. This requires a sewage tank with three chambers. Scope of supply: switch cabinet with analogue control and air compressor, carrier material, ventilator, sludge removal and all connecting links. Air hose not included.

Air hose

Ø 19 mm

Order no. 372791

Compressor monitoring

Order no. 107533

Power failure recognition

Order no. 107070

Sizes

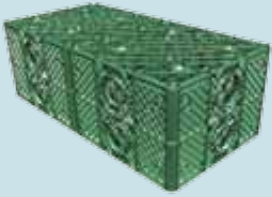
Inhabitants [max.]	Capacity [ltrs]	System packs [Order no.]
for one reservoir systems		
2-4	3750	372700
4-6	4800	372701
6-8	6500	372702
for two reservoir systems		
8-10	2 x 3750	372703
10-12	2 x 4800	372704
12-18	2 x 6500	372705
for XXL plants		XXL system packs*
120	9 x 6500	372723
140	9 x 6500	372724
160	11 x 6500	372725
200	12 x 6500	372726

*Other sizes on request! (▶ page 18)

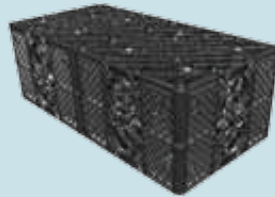


Stormwater management

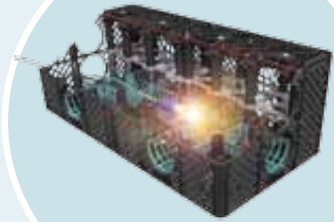




Rain bloc vehicle loading



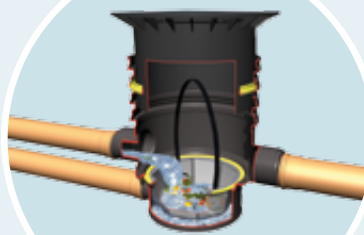
Rain bloc lorry bearing



Rain bloc lorry bearing / inspect



Multi Infiltration shaft DN 400 / 600



Industrial Universal filter 3



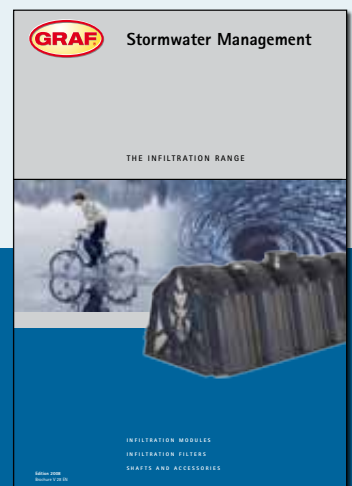
Carat S retention detention



Infiltration Tunnel



Infiltration Tunnel twin



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



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 previous to the purchase!

For all indications of measurements in this brochure we reserve a tolerance of +/- 3%. The useful volume of the tanks may be up to 10% lower than the tank capacity, according to the connecting option.

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

For all our offers and conclusions of contract are only valid our General Terms and Conditions of Business dated 01/03/2010 which we will send to you on request.

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