



Rainwater Harvesting

INSTALLATION MANUAL

The Carat-S tank Garden Comfort system



GENERAL NOTES

1.1 Safety

The relevant accident prevention regulations must be observed during all work.

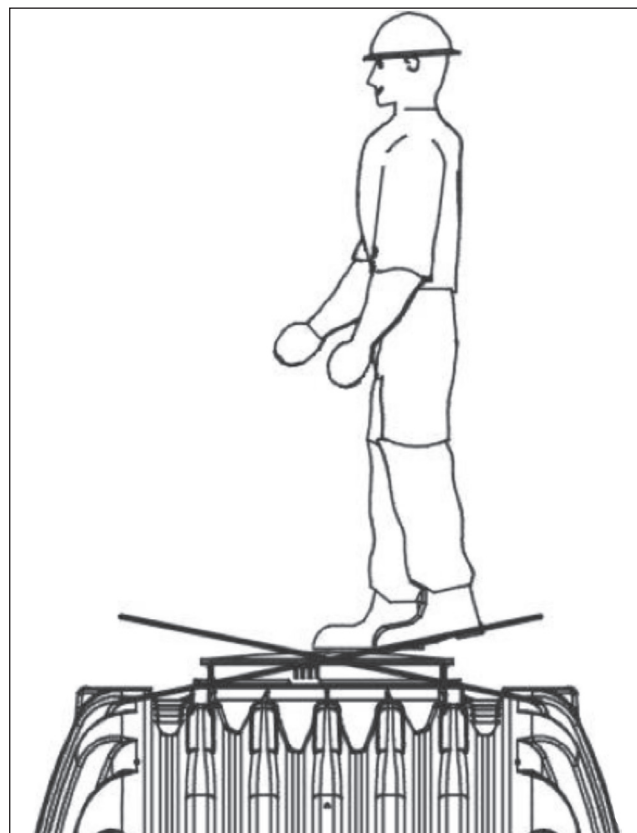
The relevant regulations and standards must additionally be taken into consideration during installation, assembly, servicing, repair, etc.

The system or individual parts of the system must be installed by qualified specialists.

During all work on the system or parts of the system, the entire system must always be rendered inoperable and secured to prevent unauthorised reactivation.

Except in the event of work carried out in the tank, the cover of the tank must always be kept sealed, as this otherwise constitutes a maximum risk of accident. Only original GRAF covers or covers approved in writing by GRAF must be used.

GRAF offers an extensive range of accessories, all of which are designed to match each other and which can be extended to form complete systems. The use of accessories that have not been approved by GRAF results in the exclusion of the warranty/guarantee.



1.2 Identification obligation - Regulation

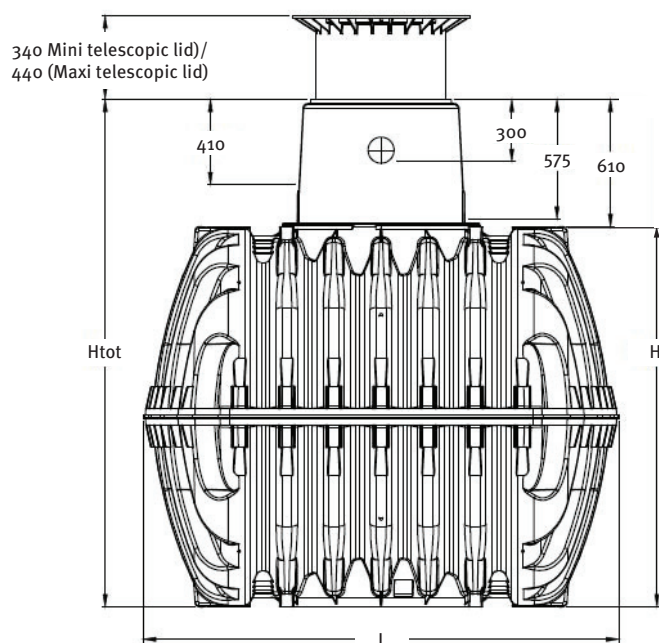
The water in these systems is not suitable for consumption or personal hygiene.

All pipe work and outlets of the water systems are to be labelled with the words **“Not drinking water”** either in words or graphically. British Standard BS EN 16941-1:2018) so that after years of use, an accidental connection to the drinking water system is prevented. Even when correctly labelled it may possibly be mistaken, for example by children. For this reason, all the outlets of the systems process water must be fitted with child safe valves.

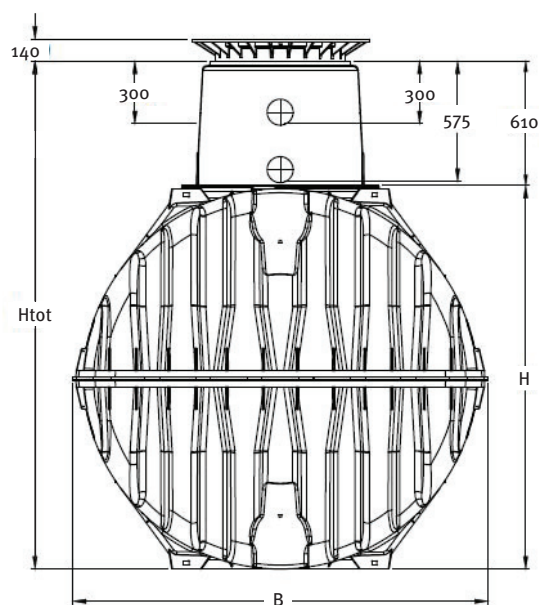
2

TECHNICAL DATA

* Telescopic dome shaft at maximum height



* Telescopic dome shaft at minimum height



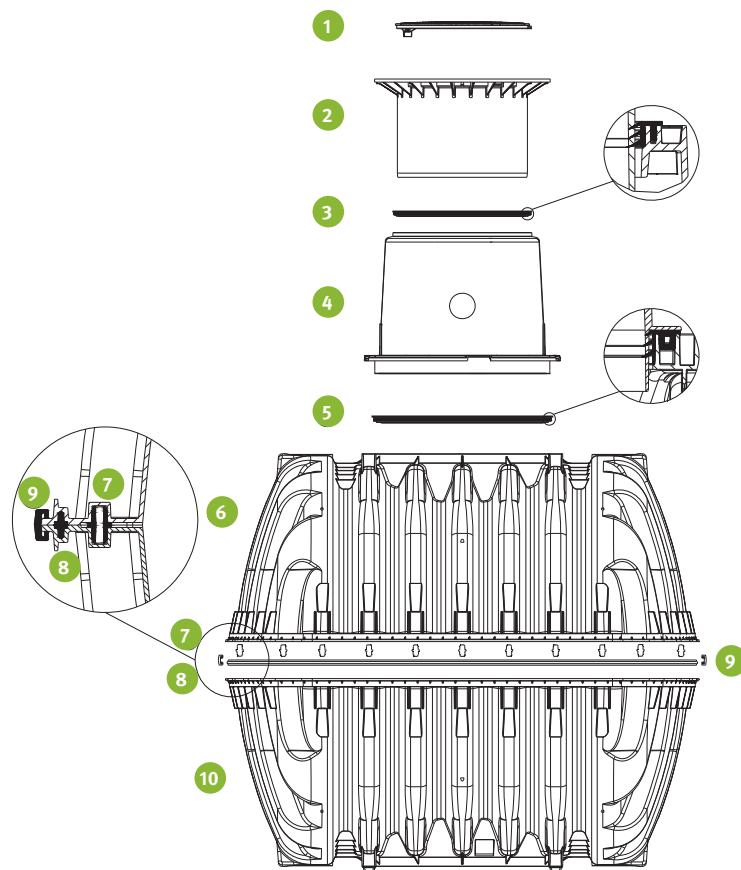
Tank	2700 litres 700 US-gallons	3750 litres 1000 US-gallons	4800 litres 1250 US-gallons	6500 litres 1700 US-gallons
Weight	120 kg	150 kg	185 kg	220 kg
L	2080 mm	2280 mm	2280 mm	2390 mm
W	1565 mm	1755 mm	1985 mm	2190 mm
H	1400 mm	1590 mm	1820 mm	2100 mm
Htot*	2010 mm	2200 mm	2430 mm	2710 mm

* Htot = total height (without telescopic dome shaft)

3

TANK STRUCTURE

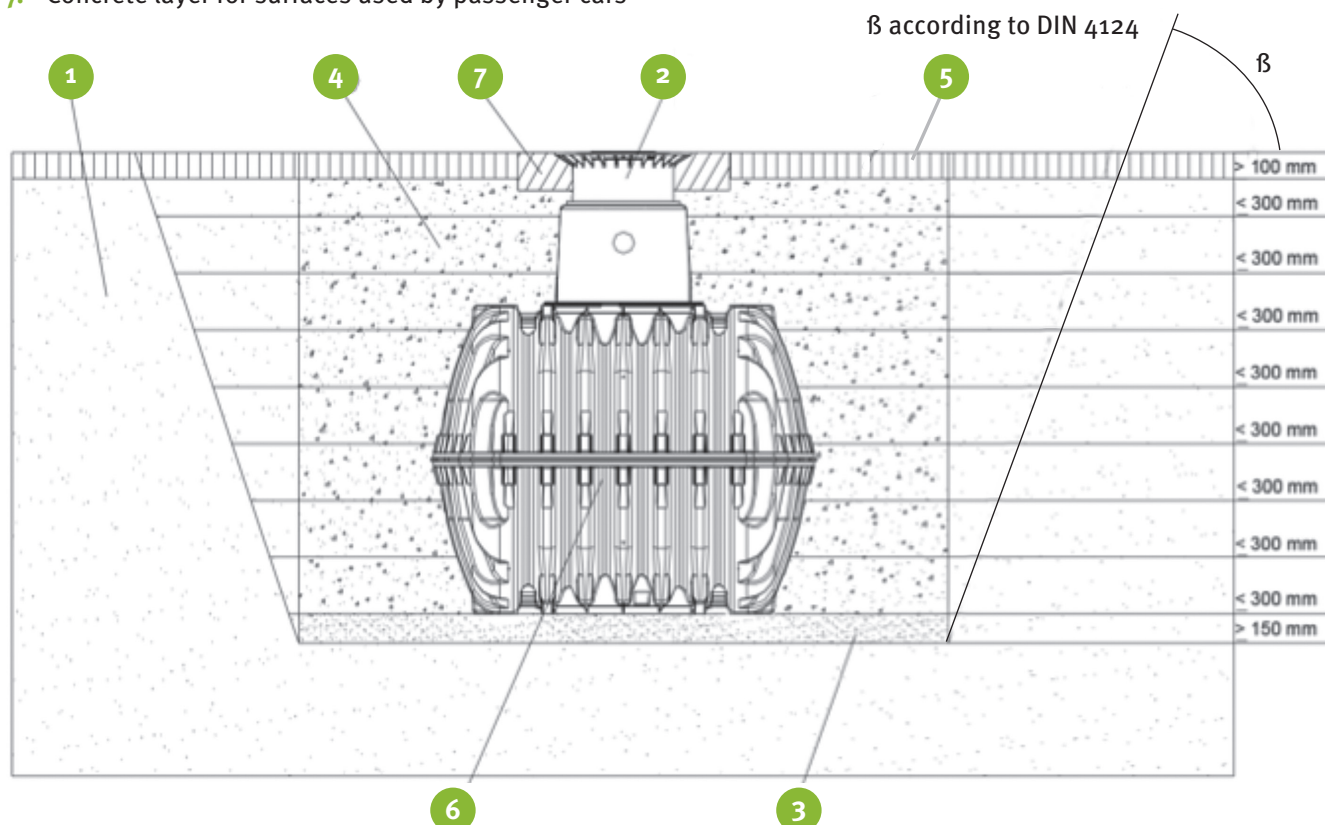
1. Cover
2. Telescopic dome shaft (can be inclined by 5°)
3. Profile seal
4. Tank dome (can be rotated by 360°)
5. Tank – Tank dome seal
6. Upper half shell / Carat underground tank
7. Centring pins
8. Profile seal
9. Quick connection
10. Lower half shell / Carat underground tank



4

INSTALLATION & ASSEMBLY

1. Subsoil
2. Telescopic dome shaft
3. Compact foundation
4. Surrounding (round-grained gravel, maximum grain size 10 to 20mm)
5. Covering layer
6. Carat underground tank
7. Concrete layer for surfaces used by passenger cars

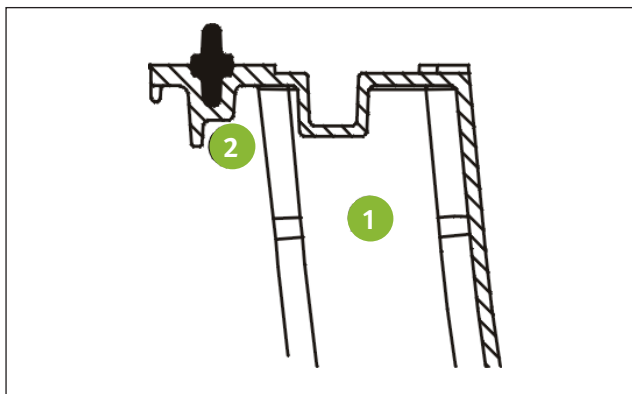


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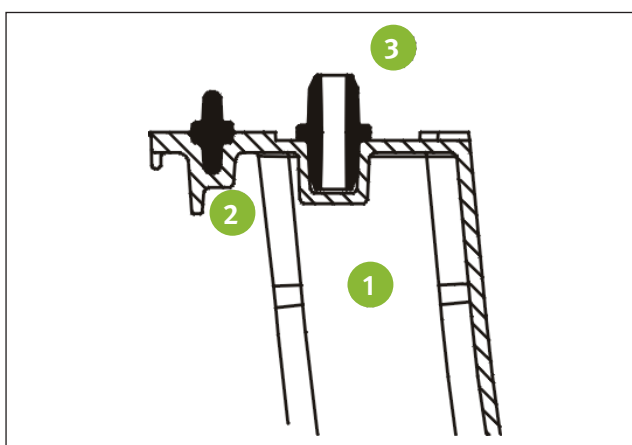
INSTALLATION & ASSEMBLY

4.1 Tank assembly

First insert the circumferential profile seal **2** into the sealing groove in the lower half shell **1**. Lightly coat the seal with the enclosed soft soap.

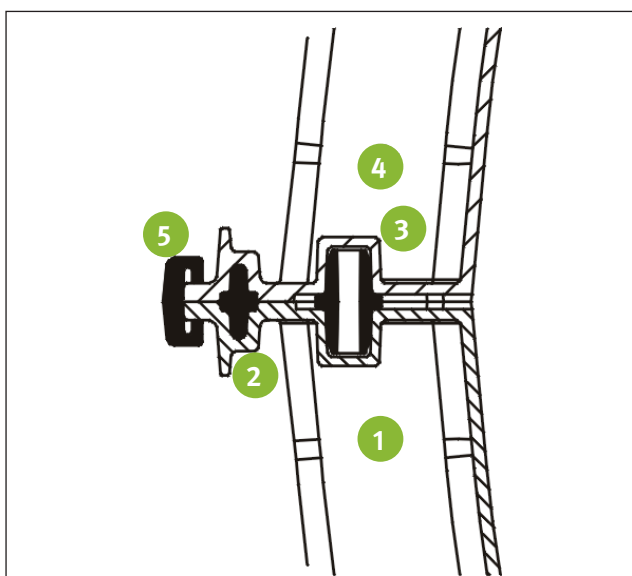


Then insert the centring pins **3** into the intended mountings around the circumference.



The upper half shell **4** is now positioned onto the lower half shell **1** and the quick connectors **5** are installed. To do this, each 2nd quick connector is pre-adjusted in the 1st step and is secured with a hammer and a wooden support. The quick connectors engage in their end position. The remaining quick connectors are then installed.

Attention: When positioning the upper half shell, it must be ensured, under all circumstances, that the seal does not slip out of the groove.

**4.2 Construction site**

Under all circumstances, the following points must be clarified prior to installation:

- The structural suitability of the ground according to DIN 18196
- Maximum groundwater levels which occur and drainage capability of the subsoil
- Types of load which occur, e.g. traffic loads

An expert ground report should be requested from the local planning authority to determine the physical characteristics of the subsoil.

4.3 Trench

To ensure that sufficient space is available for working, the base area of the trench must exceed the dimensions of the tank by 500 mm on each side; the distance from solid constructions must be at least 1000 mm.

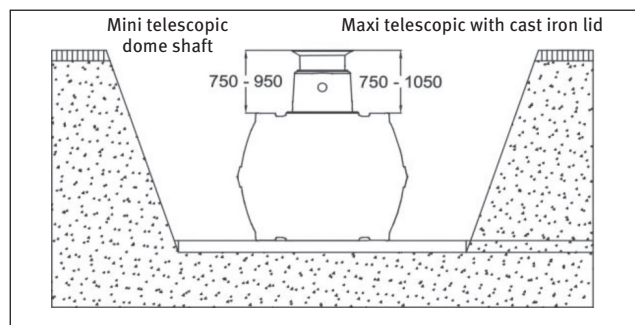
The trench embankment must be designed so that slippage or collapse of the embankment wall is not to be anticipated. The construction site must be horizontal and plane and must guarantee sufficient load-bearing capacity.

The depth of the trench must be dimensioned so that the max. earth coverage (see point 2 – installation conditions) above the tank is not exceeded. To use the system throughout the entire year, it is necessary to install the tank and those parts of the system which hold water in the frost-free area. The frost-free depth is usually approx. 600 mm – 800 mm; precise information in this regard can be obtained from the responsible authority.

A layer of compacted, round-grain gravel (grain size 8/16, thickness approx. 150 - 200 mm) is applied as the foundation.

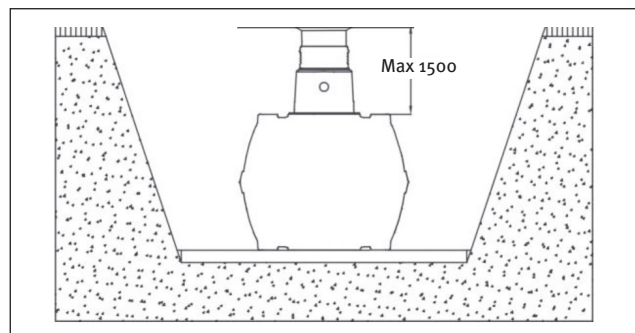
4.4.1 Standard installation overview

Coverage heights with telescopic dome shaft in green areas.



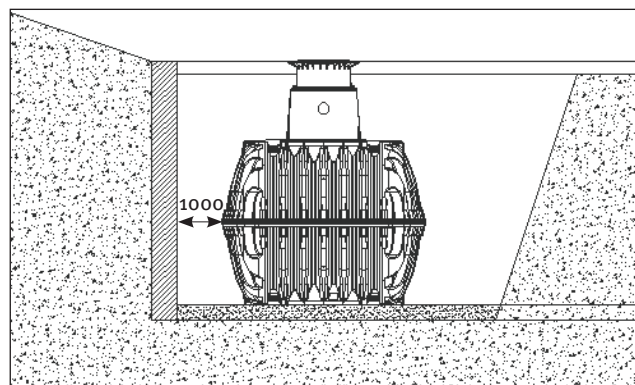
4.4.2 Maximum cover permitted over tank

Maximum coverage heights with extensions and telescopic dome shaft.



4.4.3 Slope, embankment, etc.

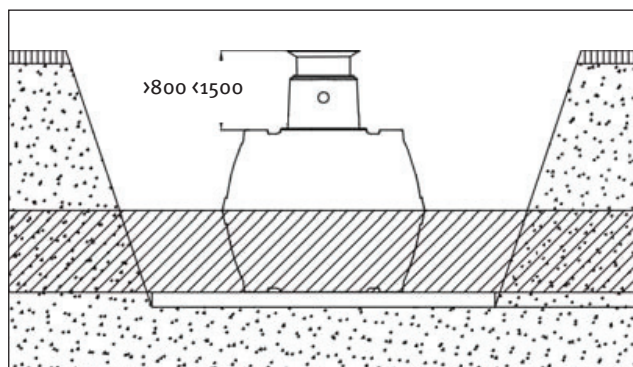
On installation of the tank in the immediate vicinity (<5 m) of a slope, earthen mound or slope, a statically calculated supporting wall must be erected to absorb the soil pressure. The wall must exceed the dimensions of the tank by at least 500 mm in all directions, and must be located at least 1000 mm away from the tank.



4.4.4 Groundwater and cohesive (water-impermeable) soils (e.g. clay soil)

If it is anticipated that the tanks will be immersed deeper into the groundwater than is shown in the adjacent figure, sufficient dissipation must be ensured. (See table for max. immersion depth).

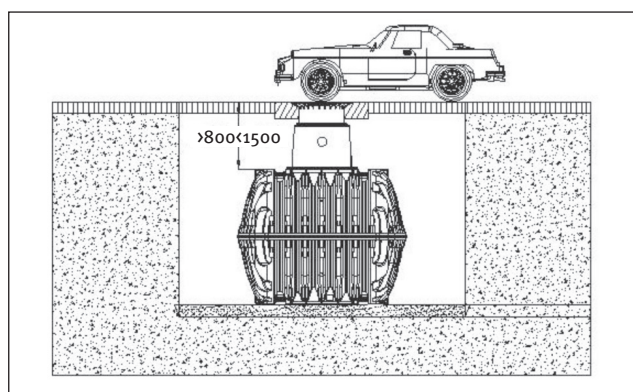
Dissipation of the drainage water (e.g. via an annular drainage system) is recommended in the case of cohesive, water-impermeable soils.



Tank	2700 litres 700 US-gallons	3750 litres 1000 US-gallons	4800 litres 1250 US-gallons	6500 litres 1700 US-gallons
Immersion depth	700 mm	795 mm	910 mm	1050 mm

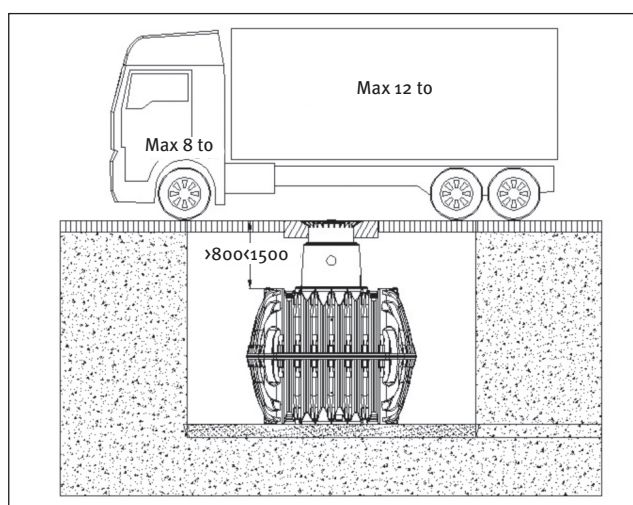
4.4.5 Installation below light-duty vehicle surfaces

Covering heights with cast telescopic dome shaft (with class B cast cover) in areas with car traffic (load up to 3.5 t).



4.4.6 Installation below heavy-duty vehicle surfaces

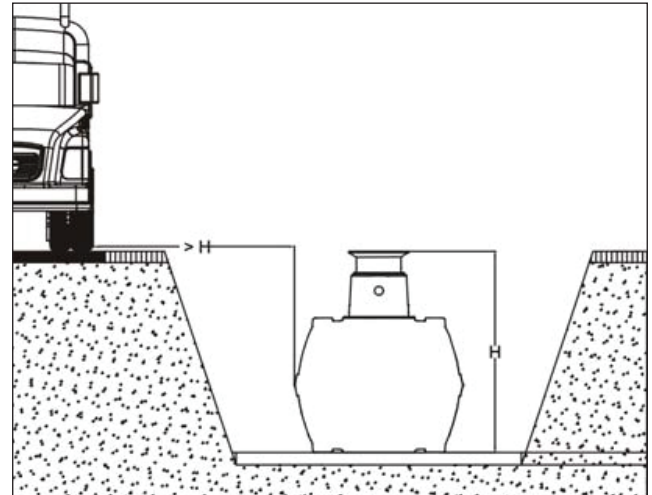
Coverage heights with Begu telescopic dome shaft (with cover class D – to be provided at construction site) in areas used by trucks with a max. weight of 12 to.



INSTALLATION & ASSEMBLY

4.4.7 Installation adjacent to surfaces used by vehicles

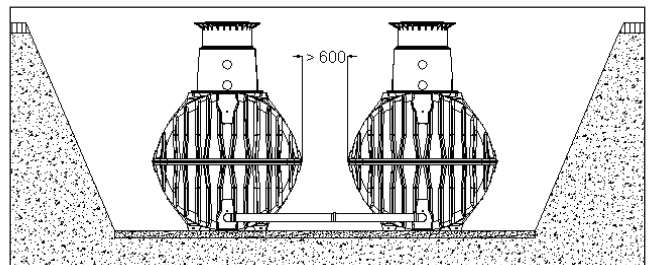
If the underground tanks are installed adjacent to surfaces which are used by vehicles heavier than passenger cars, the minimum distance away from these surfaces is at least the depth of the trench.



4.4.8 Connection of several tanks

Two or more tanks are connected via the assembly surfaces by means of GRAF special seals and basic pipes (to be provided at construction site).

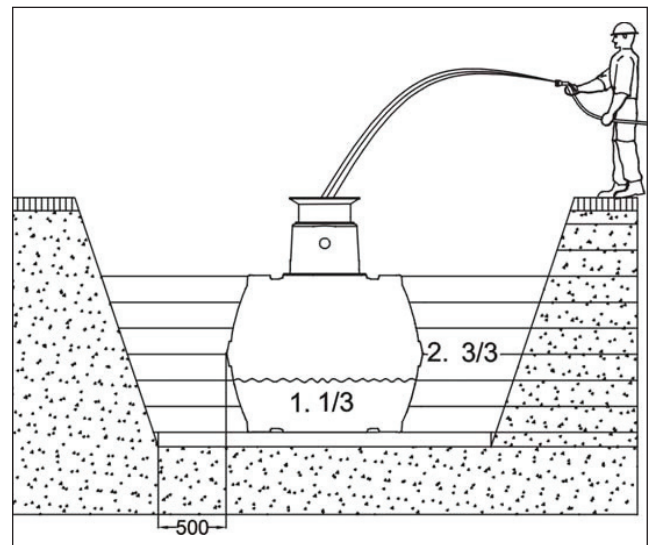
The apertures must be drilled to the corresponding size using only the GRAF special crown bit. It must be ensured that the distance between the tanks is at least 600 mm. The pipes must project at least 200 mm into the tanks.



4.5 Insertion and filling

The tanks must be inserted, impact-free, into the prepared trench using suitable equipment. The tank is filled with 1/3 water before filling in the tank surrounding.

Afterwards the surrounding (roundgrain gravel, max. grain size 8/16) is then filled in layers of max. 30 cm steps and is compacted. The individual layers must be well-compacted (manuel tamper). Damage to the tank must be avoided during compaction. Mechanical compaction machines must not be used under any circumstances. The surrounding must be at least 500 mm wide.

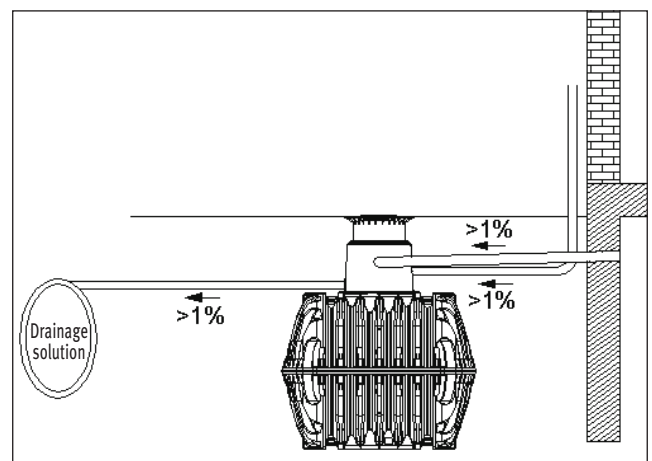


4.6 Routing connections

All feed and overflow pipes must be routed with a decline of at least 1% in the direction of flow (possible, subsequent settling must be taken into consideration in this case). If the tank overflow is connected to a public sewer, this must be protected against reflux by means of a lifting station (mixed sewer) or reflux seal (pure rainwater sewer) according to DIN 1986.

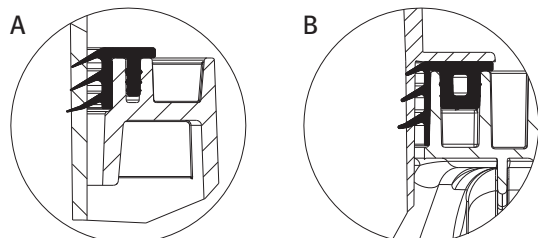
All suction, pressure and control lines must be routed in an empty pipe, which must be routed as straight as possible, without bending, to the tank with a decline. Necessary bends must be formed using 30° moulded sections.

Important: The empty pipe must be connected to an aperture above the max. water level.



5.1 Assembling the tank dome

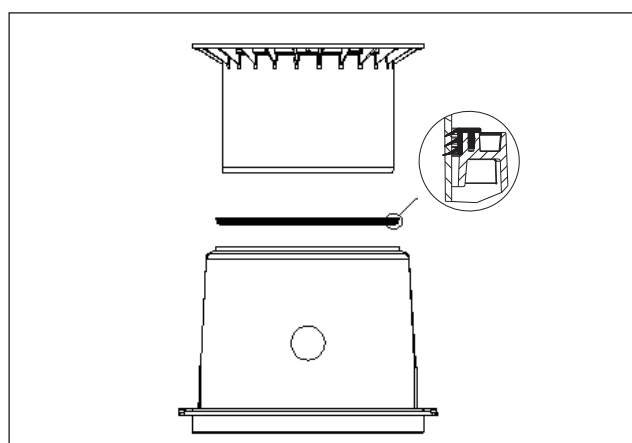
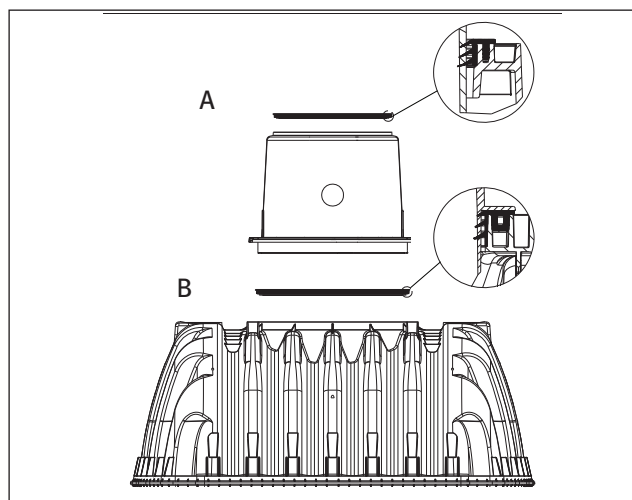
Prior to assembly, the enclosed seal is inserted into the tank domes' groove 'B'. The tank dome is then aligned with the piping connections and is locked to the tank neck. It is essential to make sure that the upper seal 'A' is correctly installed.



5.2 Assembling the telescopic dome shaft

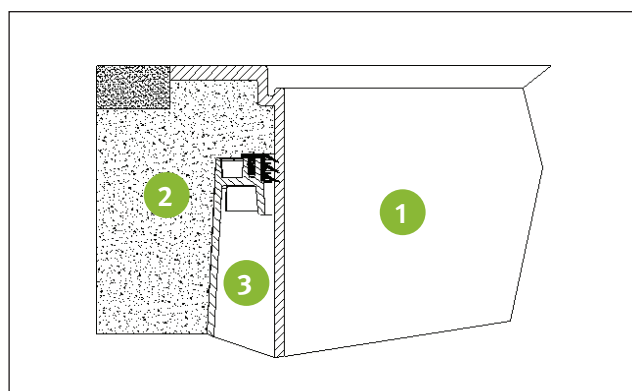
The telescopic dome shaft enables infinite adaptation of the tank to given site surfaces with earth coverage of between 750 mm and 950 mm (Mini telescopic dome shaft) or 750 mm and 1050 mm (Maxi telescopic dome shaft).

For assembly purposes, the enclosed profile seal (material EPDM) is inserted into the tank dome's sealing groove and is coated generously with soft soap (do not use mineral oil-based lubricants, as these attack the seal). The telescope is then greased, inserted and aligned with the surface of the site.



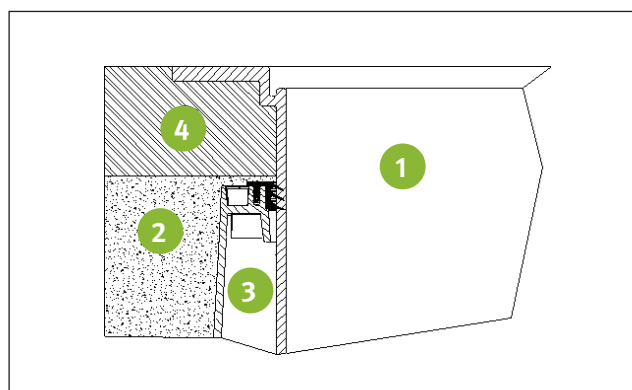
5.3 Telescopic dome shaft on which persons may walk

Important: To prevent loads from being transferred onto the tank, round-grain gravel **1** (max. grain size 8/16) is filled in in layers around the telescope **2** and is evenly compacted. Damage to the tank dome **3** and telescope must be avoided during this step. The cover is then positioned and is sealed to prevent entry by children. Tighten the threaded connection on the cover so tightly that it cannot be opened by a child!



5.4 Telescopic dome shaft over which passenger cars may drive

If the tank is installed under areas used by passenger cars, the collar area of the telescope **1** (colour anthracite) must be supported with concrete **4** (load class B25 = 250 kg/m²). The layer of concrete to be installed must be at least 300 mm wide and approx. 200 mm high all around. The minimum coverage above the shoulder of the tank is at least 800 mm (max. 1050 mm with telescope, coverage up to max. 1200 mm possible with intermediate section).



Attention: It is essential to use the cast telescopic dome shaft (with class B cast cover).

5

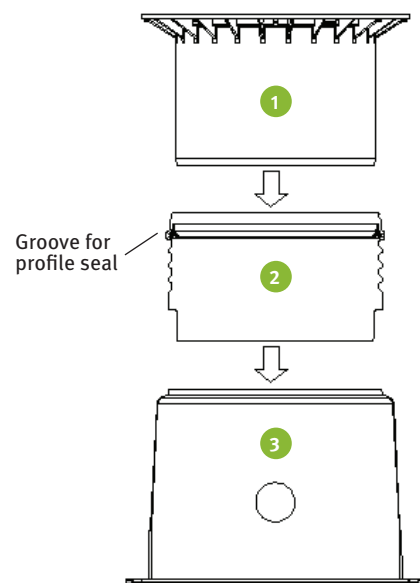
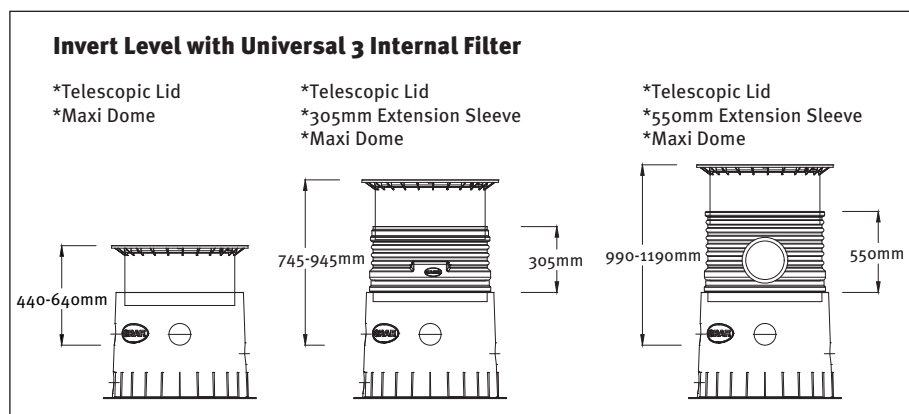
ASSEMBLING THE TANK DOME & TELESCOPIC DOME SHAFT

5.5 Assembling the extension

For larger coverage heights an extension is needed. To insert the extension into the tank dome, soft soap is needed. Into the highest groove of the extension the profile seal is inserted and greased generously. Afterwards push the telescopic dome shaft into the extension and adapt it to the planned area surface.

1 Extension = max. earth-cover 1200 mm (in each case in connection with the telescopic dome shaft)

- 1 Telescopic dome shaft (can be inclined by 5°)
- 2 Extension
- 3 Tank dome (can be rotated by 360°)



6

CARAT-S GARDEN COMFORT PACKAGE

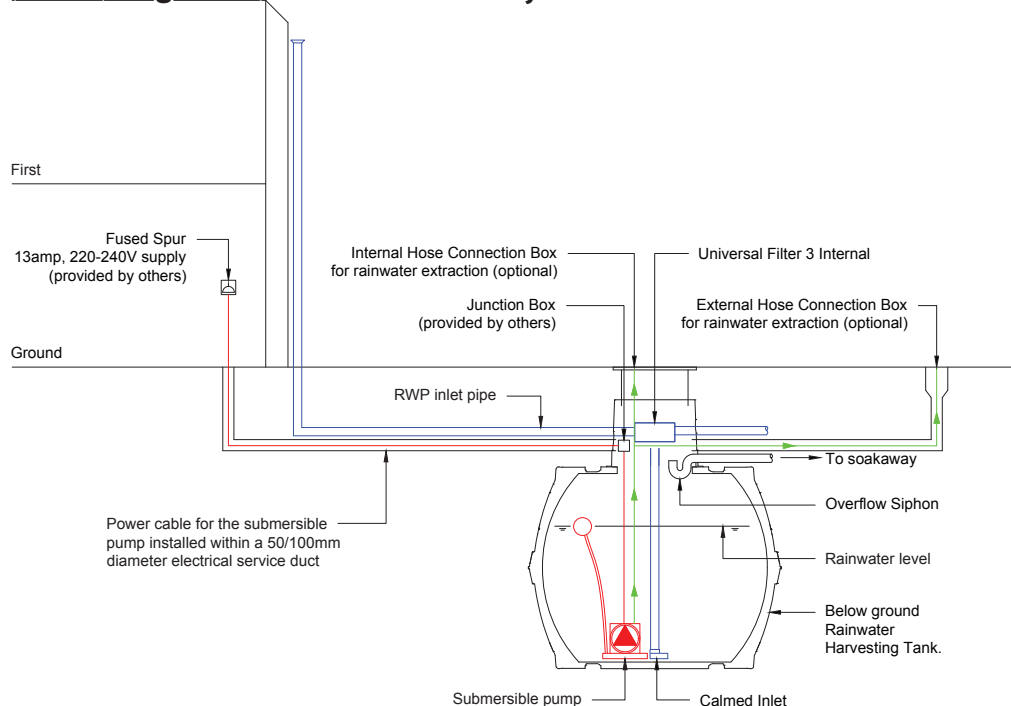
The simple garden solution with submersible pump system

**6.1 Scope of supply**

- 1 Underground tank (choice of tanks available, sizes vary according to property type)
- 2 Telescopic lid (choice of telescopic lid available, depending on tank location)
- 3 Filter (Basket filter supplied in accordance with type of tank)
- 4 Submersible pump with floating water intake
- 5 Internal hose connection box
- 6 External hose connection box

6.2 Supplied by others

- 7 100mm diameter duct pipe to contain; power cable for pump
- 8 100mm diameter drainage pipe connected from downpipes to the inlet at the top of the tank (all downpipes brought into one pipe for connection to the filter)
- 9 100mm diameter pipe for overflow from the tank to mains drainage network or soakaway

6.3 Schematic drawing of Graf Garden Comfort System

7.1 Scope of supply main components



Submerged and suction pump

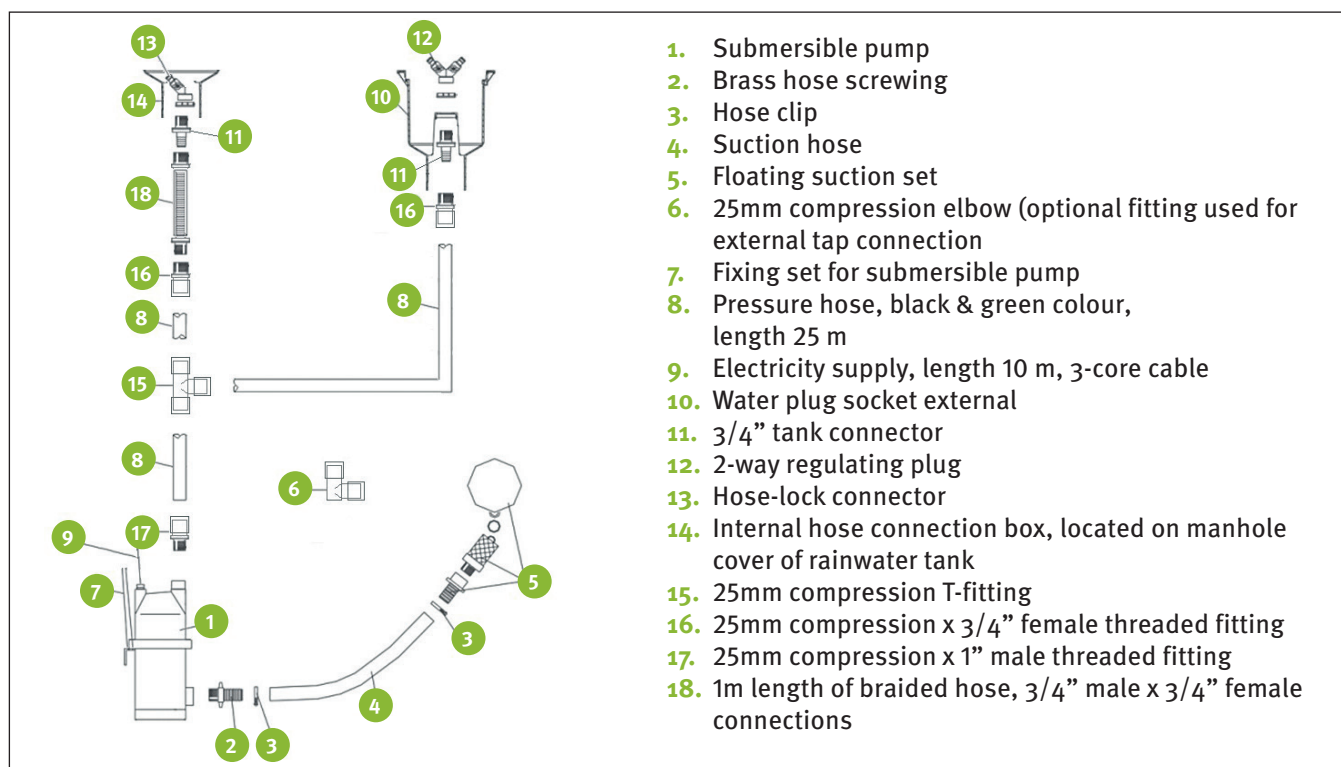
Floating water extraction unit

Water plug socket - Version Extern / Version Intern

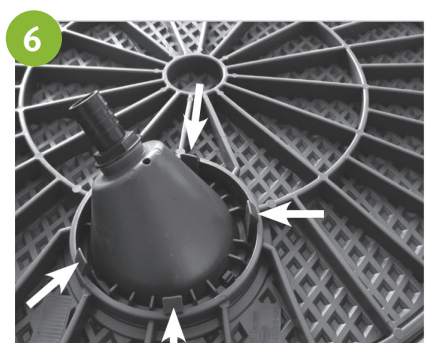
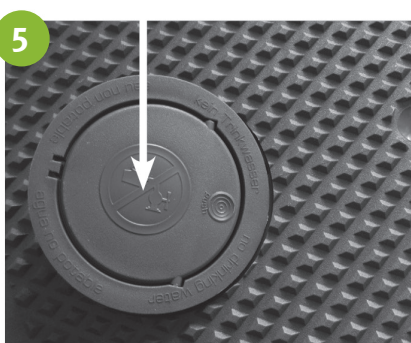
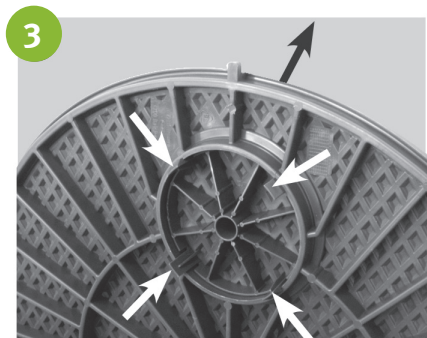
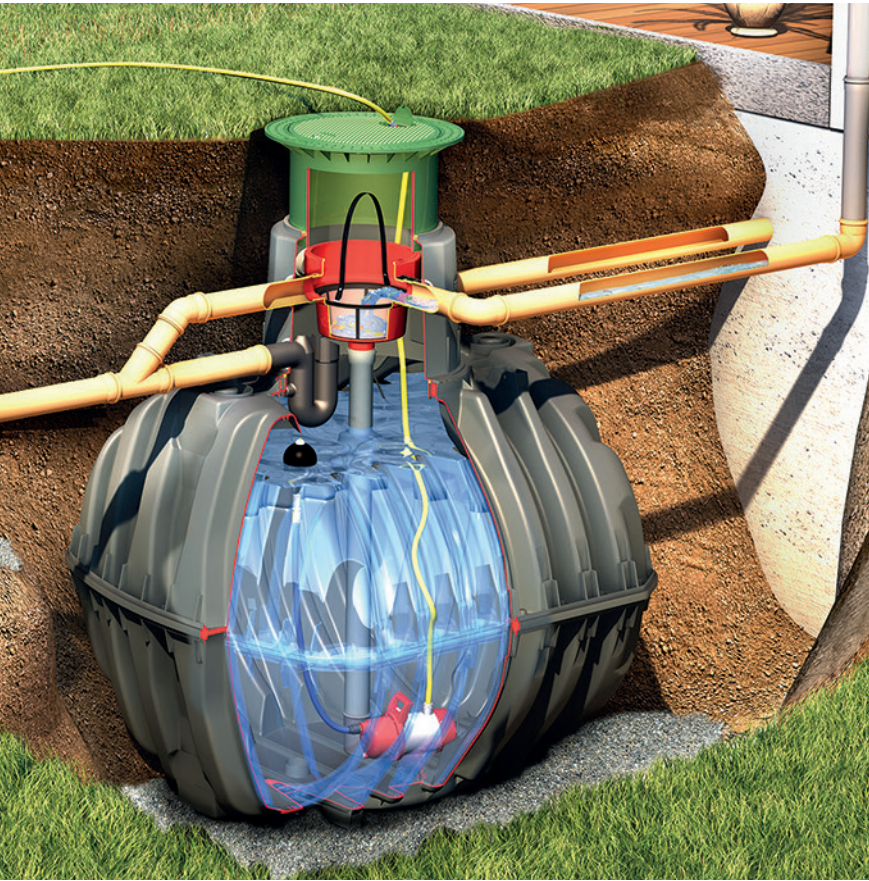
25m roll of HDPE pipe, 25mm diameter, black/green, labelled as Rainwater

7.2 Rainwater storage tank Carat / set up of internal and external hose connection box

Caution: The distance between the external hose connection box and the underground tank is limited by the pressure hose – length of the pressure hose is 25 m. This is the standard length in the supply, more hose can be supplied on request.

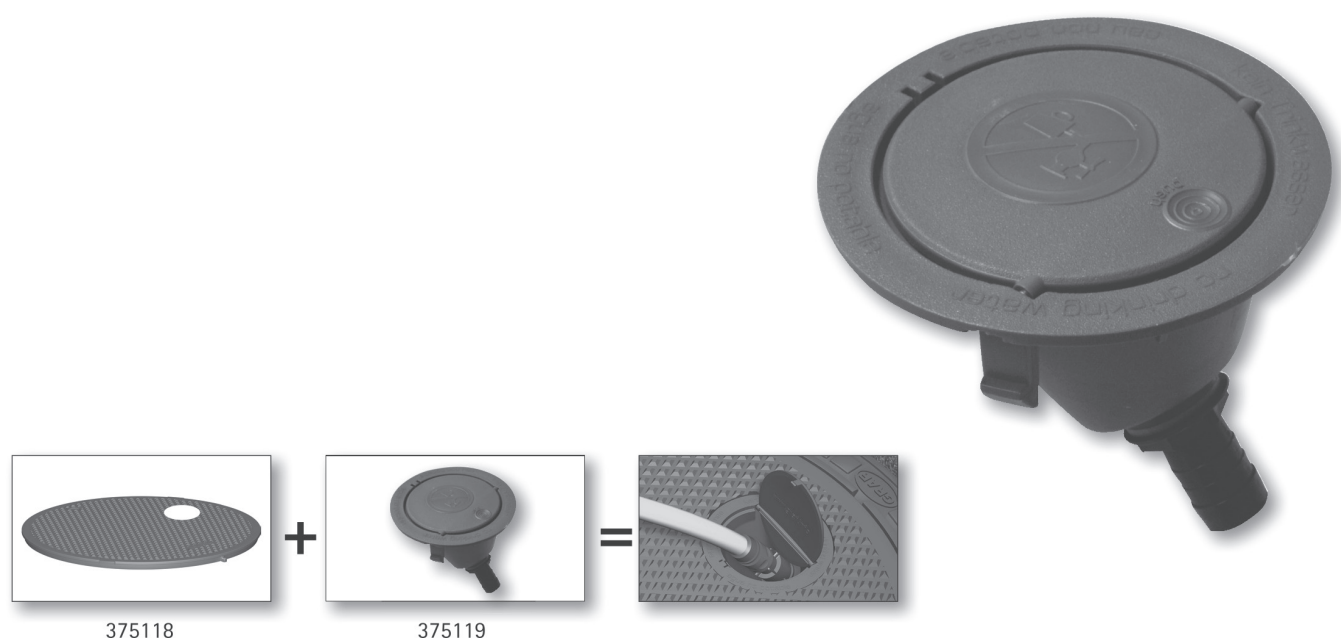
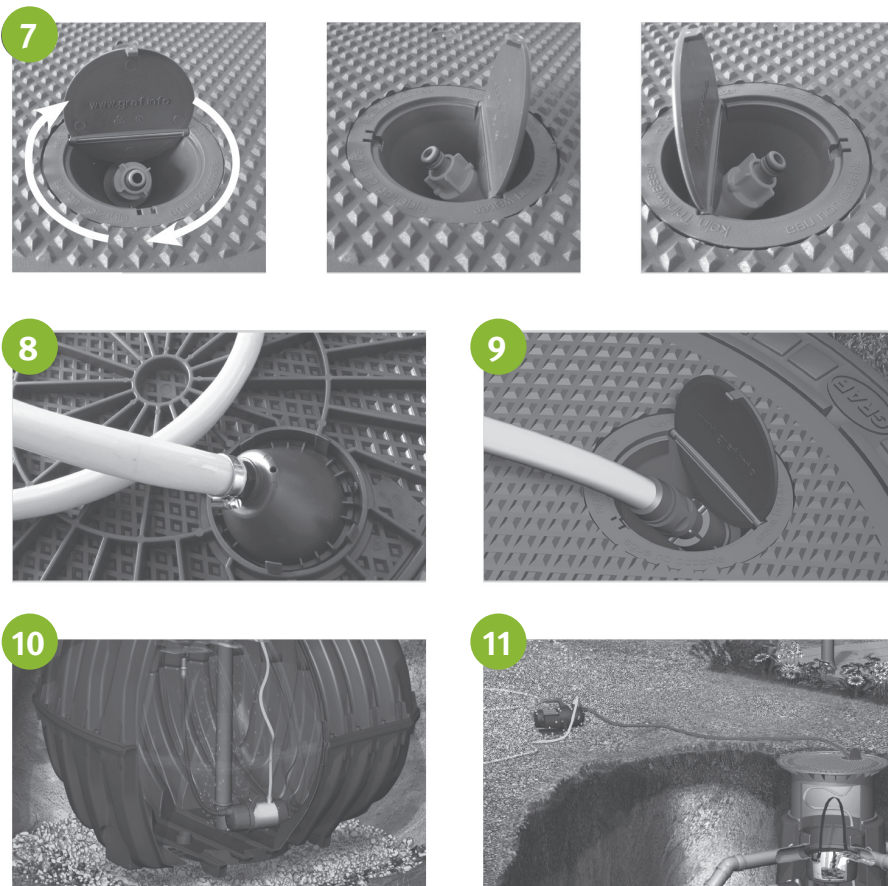


7.3 Installation of internal hose connection box



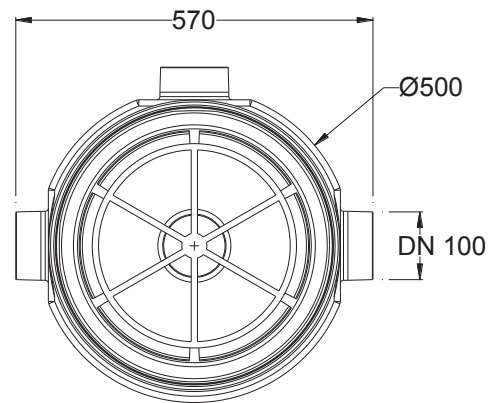
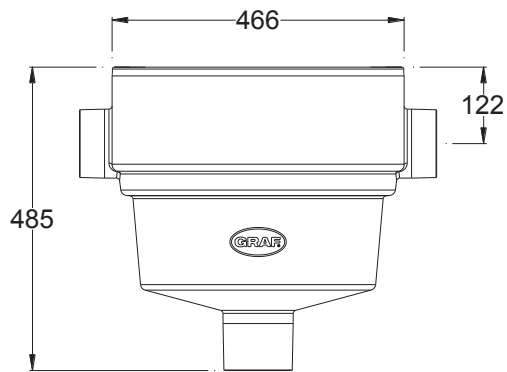
7 GARDEN SUBMERGE SET - INSTALLATION OF TECHNICAL PARTS

7.3 Installation of internal hose connection box (continued)

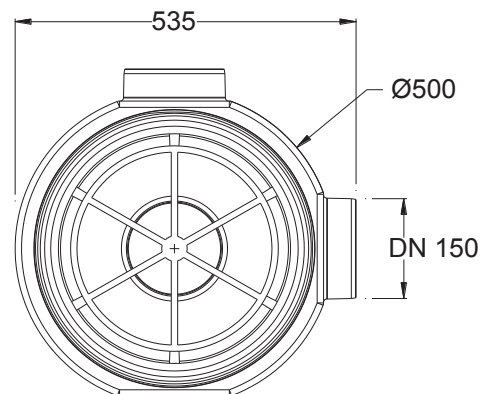
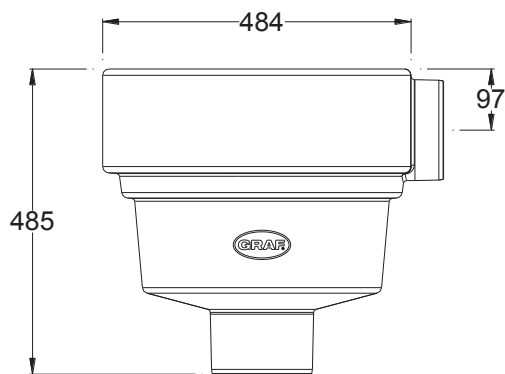


8.1 Technical data

Universal-Filter 3 internal - Connection DN 100



Universal-Filter 3 XL internal - Connection DN 150



8 UNIVERSAL-FILTER 3 PACKAGE

8.2 Assembly & installation of the Universal-Filter 3 Internal

8.2.1 Universal Filter 3 internal DN 100 / Universal Filter 3 XL internal DN 150

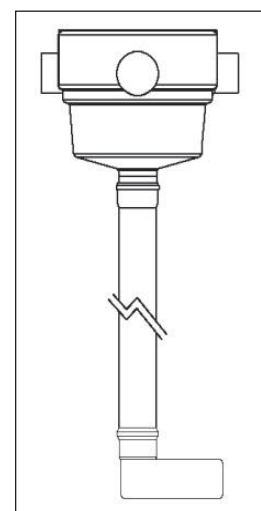
- The filter is suitable for installation in a pilot shaft or in a cistern.
- The difference in height between the supply pipe and outlet is 275mm
- The filter may not be installed directly in the earth.
- Roof areas provided with a pipe connection of DN 100 = 350m² and for DN 150 = 500m²

8.2.2 Filter preparation

Before the installation in the tank, the filter must be prepared as shown in the adjacent depiction.
Length of the HT/canalisation pipe – connections (completed on site) from the filter to the inflow pot:

Carat volume (litre)	Universal-Filter 3 Connection DN 100*	Universal-Filter 3 XL Connection DN 150*
2700	1274 mm	1308 mm
3750	1454 mm	1498 mm
4800	1684 mm	1728 mm
6500	1974 mm	2008 mm
8500	1957 mm	1991 mm
10000	2157 mm	2191 mm
from 16000	2417 mm	2451 mm

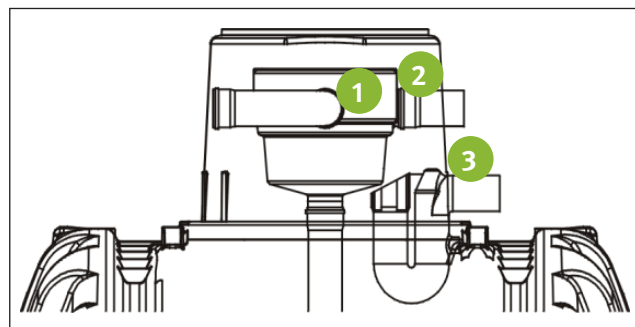
* (+ / - 10 mm)



8.2.3 Preparation on the tank

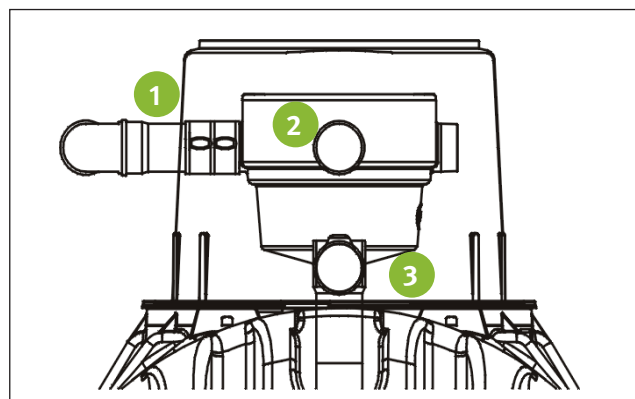
The siphon is installed in the lowest seal **3** of the tank dome. The inlet pipe is mounted on the side opening **1** the pipe is inserted from the outside. The emergency overflow **2** is installed above the siphon **3** and is installed by pushing through from the inside.

Important: The sealing ring from the HT – pipe coupling of the emergency overflow **2** must be removed.



8.2.4 Installing the Filter

The fixing collar is pushed over the inlet pipe that is mounted on the tanks' dome. Finally the prepared filter assembly is placed into the tank dome from above then connected with the emergency overflow and inlet pipe using the fixing collar. In this case it is a butt joint that requires no collar.



8

UNIVERSAL-FILTER 3 PACKAGE**8.2 Assembly & installation of the Universal-Filter 3 Internal (continued)****8.2.5 Assembly of the extraction mechanism**

Remove the seal from the filter basket and push the metal angle of the lift out mechanism over the rim as shown in the picture.

Finally place the seal over the rim and pull back the metal angle.



9

COMMISSIONING & SERVICE

Before commissioning and at every inspection, the lifting out mechanism must be positioned at 90° to the inlet so that no large objects such as leaves and twigs can catch on the handle. The straining filter is re-moved for cleaning and the basket must be thoroughly cleaned with water until all the pores are open. It is advised to clean every 4 to 5 weeks (more often in autumn due to more leaves and twigs) or according to requirements.

The filter strainer basket must be lightly pressed into place taking care that the seal sits precisely after every cleaning.

At the occasion of each inspection, the overflow siphon must be checked and flushed in necessary.

INSTALLATION AND MAINTENANCE INSTRUCTIONS FOR THE GRAF RAINWATER HARVESTING SYSTEM

The system must be checked for leaks, cleanliness and stability at least every year.

The entire system should be serviced at intervals of approx. 5 years. In this case, all parts of the system must be cleaned and their function checked. Servicing should be carried out as follows:

- Drain the tank completely
- Clean surfaces and internal parts with water
- Remove all dirt from the tank
- Check that all internal parts are firmly seated.

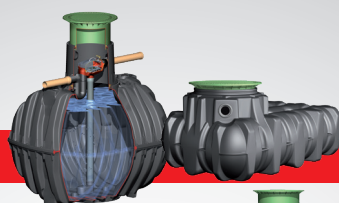
The points described in these instructions must be observed under all circumstances. All warranty rights are invalidated in the event of non-observance. Separate installation instructions are enclosed in the transportation packaging for all additional articles purchased from GRAF.

The components must be checked for any damage prior to installation under all circumstances.

Missing instructions can be downloaded on www.graf.info or can be requested from GRAF.



RAINWATER HARVESTING



WASTEWATER MANAGEMENT



STORMWATER MANAGEMENT



WATER BUTTS & COMPOSTERS



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