



Carat S underground tank

Carat S Underground tank

Versatile applications and outstanding stability



Carat S Underground tank

Versatile applications



- Rainwater
- Wastewater
- Drinking water
- Fire water
- Water for animal farms
- Carat S is extendable as desired (see large scaled reservoirs)

Carat S Underground tank

Versatile applications



Cesspool

- extremely strong thanks to Duralen® and unique production process



Large scaled reservoirs

- 195.000 litres at one lorry
- as fire water tank
- as retention tank



Septic tank

- for cottages
- for private houses
- flexible baffle position



Rain water harvesting and Retention tank

- to support municipal sewer system



Wastewater treatment plant

- GRAF Professional
- GRAF Professional L

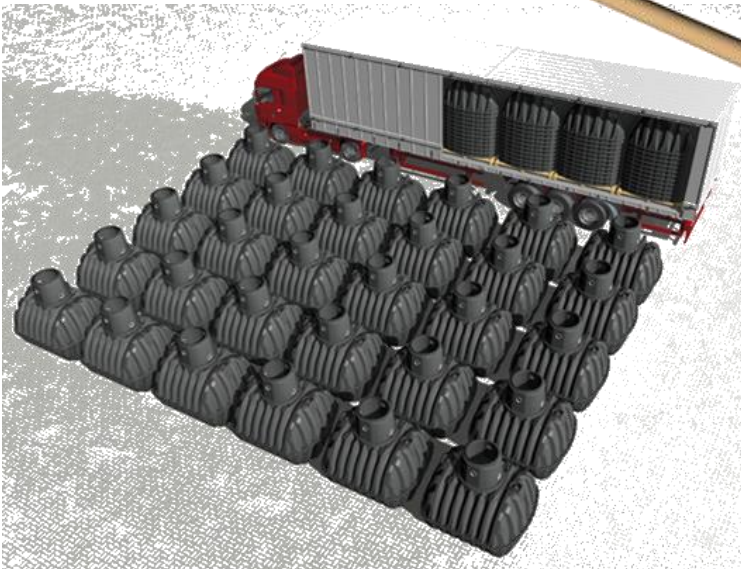


Drinking water reservoir

- for cottage colony
- dry locations (less rainfalls / ground water table)

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Large scaled reservoirs: 195.000 L volume per lorry



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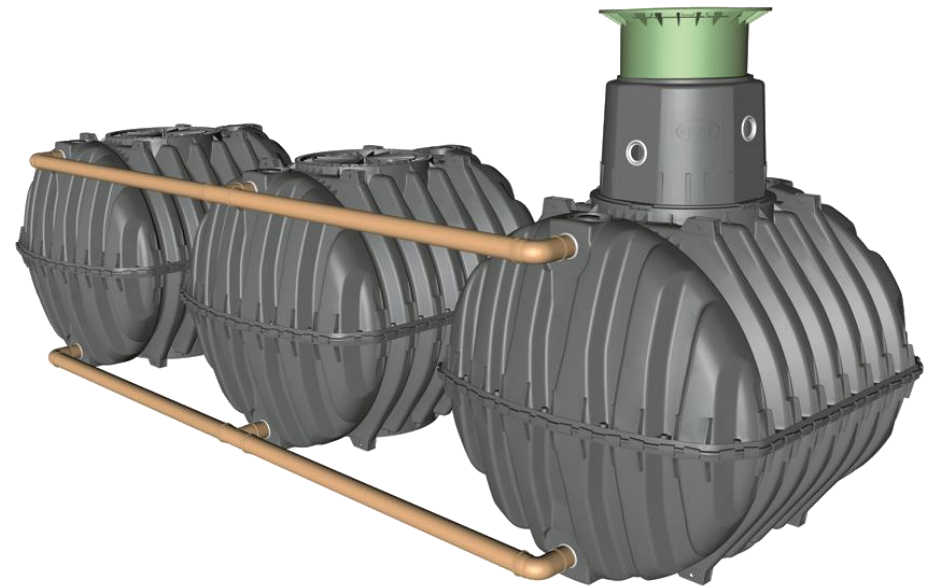
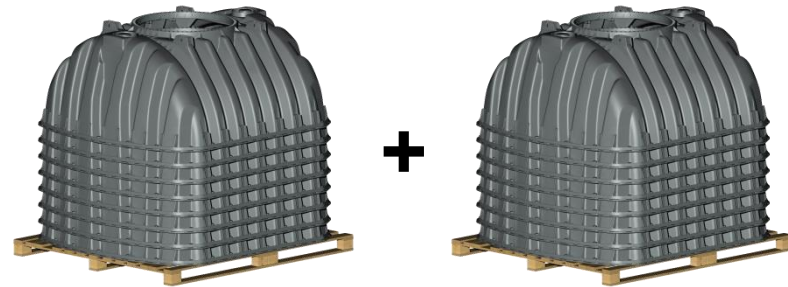
Large scaled reservoirs: 195.000 L volume per lorry



Example: 65.000 L reservoir

2x pallets Carat S 6500 L

- approx. 6 loading meter



Carat S Underground tank

Logistical advantage



Carat S Underground tank

Logistical advantage



Carat S [L / US-Gal.]	40' HC Container [Qty.]	Road-semi trailer [Qty.]	Road-tandem trailer [Qty.]
2.700 / 700	45	54	63
3.750 / 1.000	35	35	42
4.800 / 1.250	20	20	25
6.500 / 1.700	20	20	25

*Quantities [Qty.] are based on Tank +
Tank dome Maxi and Telescopic dome shaft Mini



Carat S Underground tank

Logistical advantage - Septic tank with two baffles



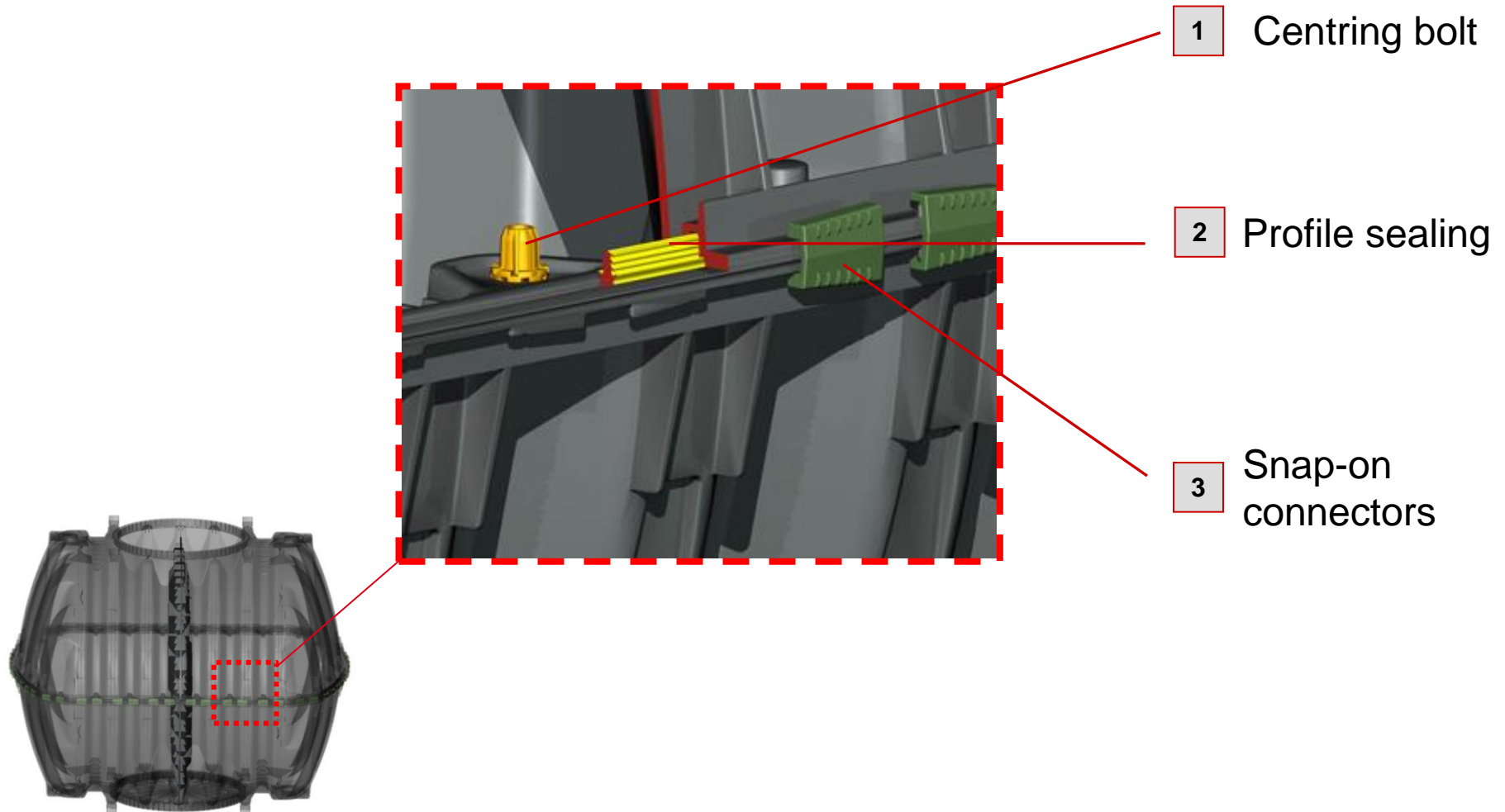
Carat S [L / US-Gal.]	40' HC Container [Qty.]	Road-semi trailer [Qty.]	Road-tandem trailer [Qty.]
2.700 / 700	36	36	36
3.750 / 1.000	21	28	28
4.800 / 1.250	15	20	25
6.500 / 1.700	15	15	20

*Quantities [Qty.] are based on Tank + Tank dome Maxi +
Telescopic dome shaft Mini + Baffle 1 + Baffle 2



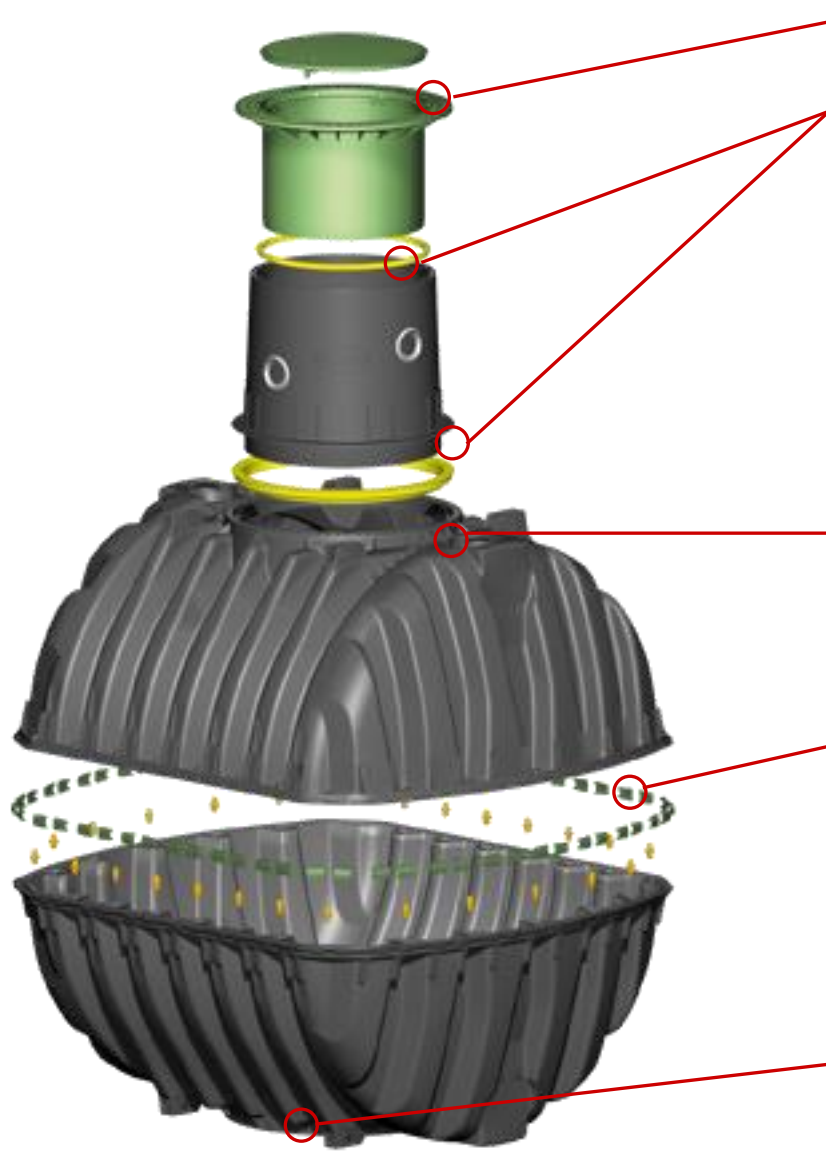
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Logistical advantage - The principle of sealing the two half shells



Carat S Underground tank

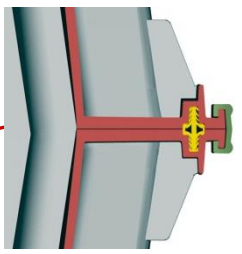
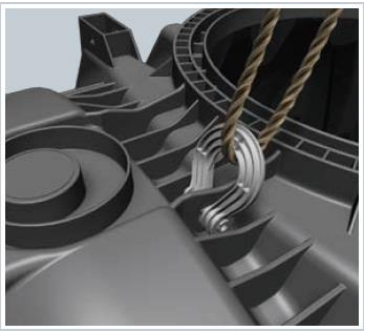
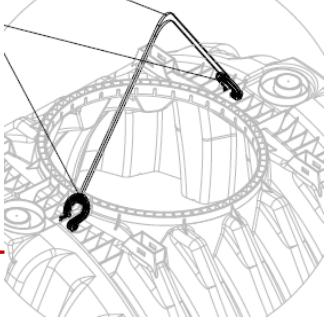
Further advantages



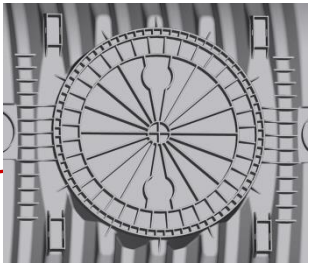
Adjustable cover

Sealed until top ground surface

Transport aid



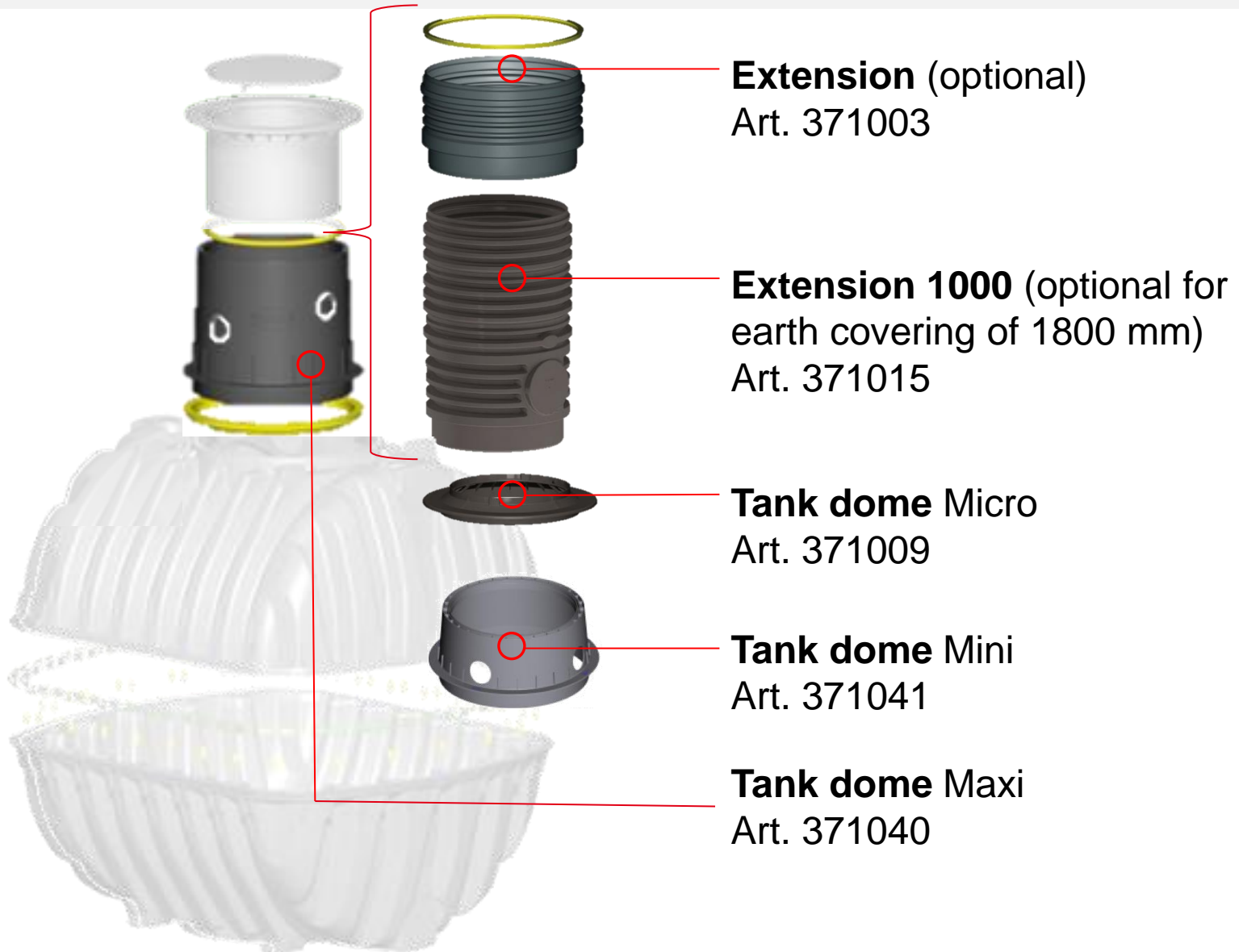
Circumferential stabilisation in unique H-profile / transport aid



Unique ribbing at the bottom of the tank

Carat S Underground tank

Further advantages – Cover Tank domes & Extensions



Carat S Underground tank

Further advantages – Cover Telescopic dome shafts



Telescopic dome shaft

Mini with cover Art. 371010

Telescopic dome shaft Cast Iron
(vehicle loading) Art. 371020

Telescopic dome shaft

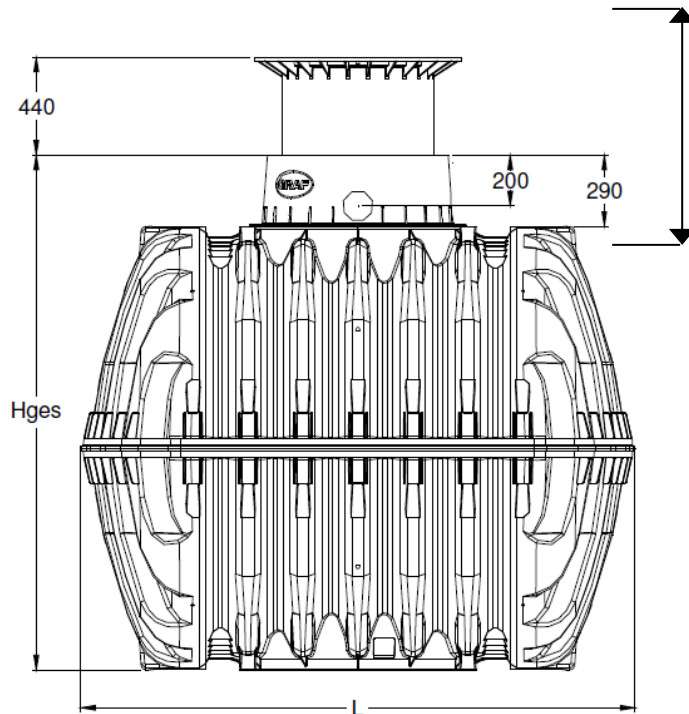
HGV without adaptor and cover
Art. 371021

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Cover – earth covering

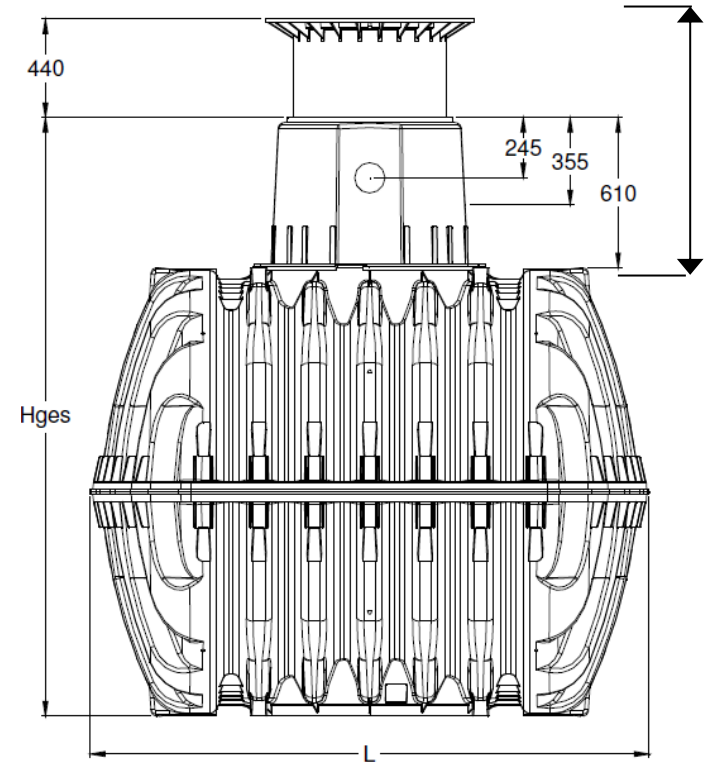


Tank dome Mini



Continuously variable
from 430 – 730 mm

Tank dome Maxi



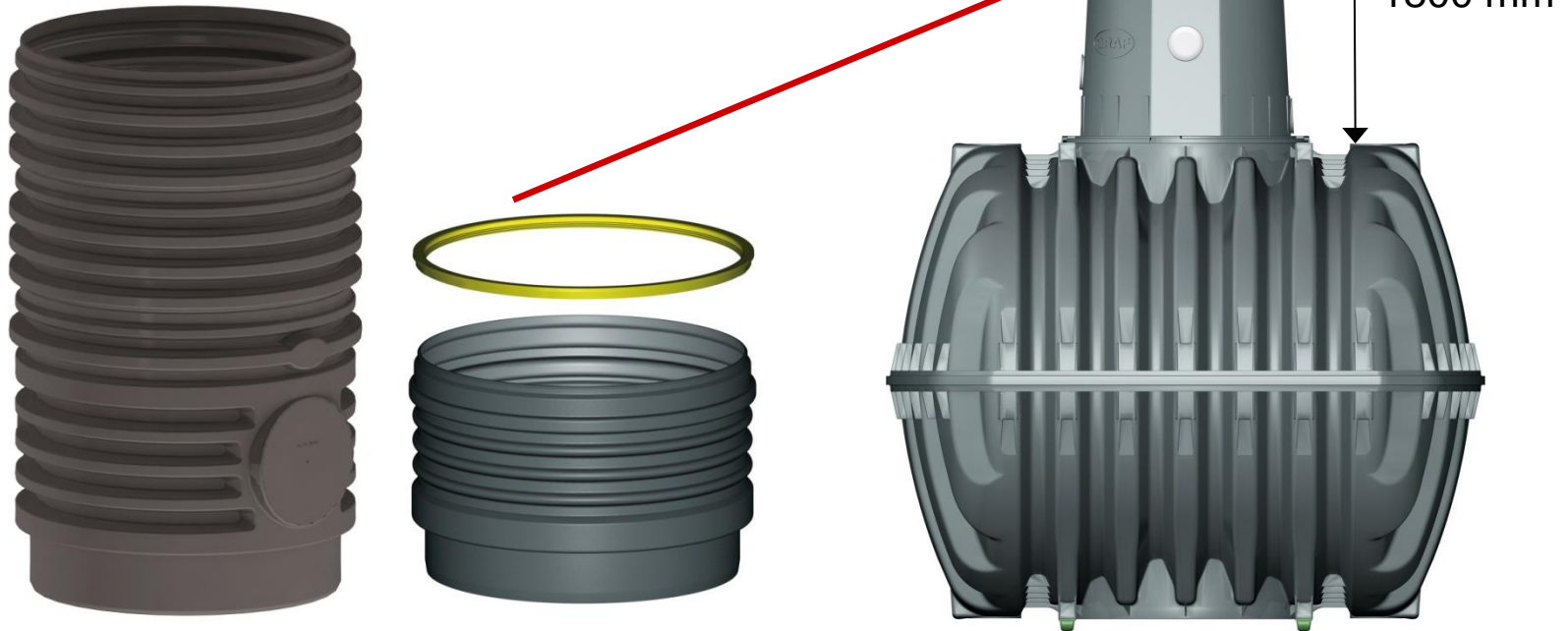
Continuously variable from
750-1050 mm

Carat S Underground tank

Cover – extensions

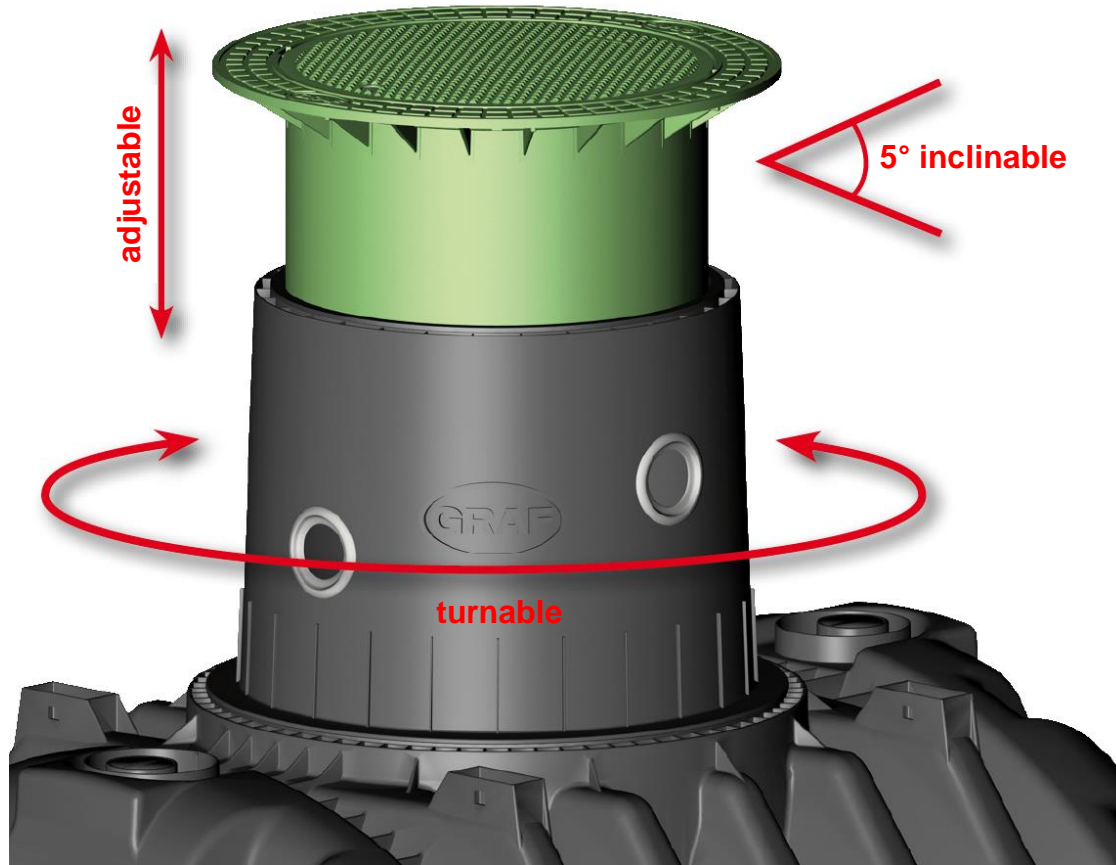


- Earth covering up to 1800 mm with GRAF Extensions



Carat S Underground tank

Further advantages - Cover



Tank with turnable dome!

- The Graf underground tank Carat S has a turnable tank dome. Therefore the tank dome can be adjusted easily to the piping. This means a big ease when installing the tank!

 Facilitation by installation

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Cover - Flush fitting to the top edge of the ground



- Telescopic dome shaft for pedestrian



- Telescopic dome shaft for vehicle loading

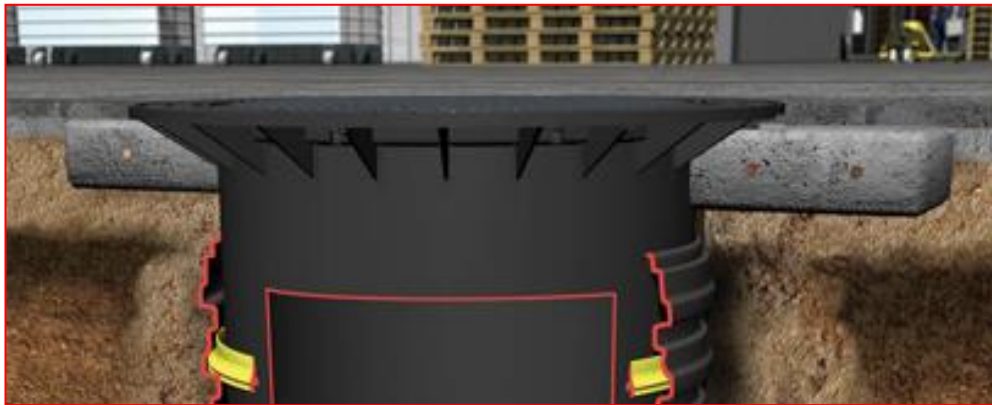
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Cover – Vehicle loading up to 3,5 to

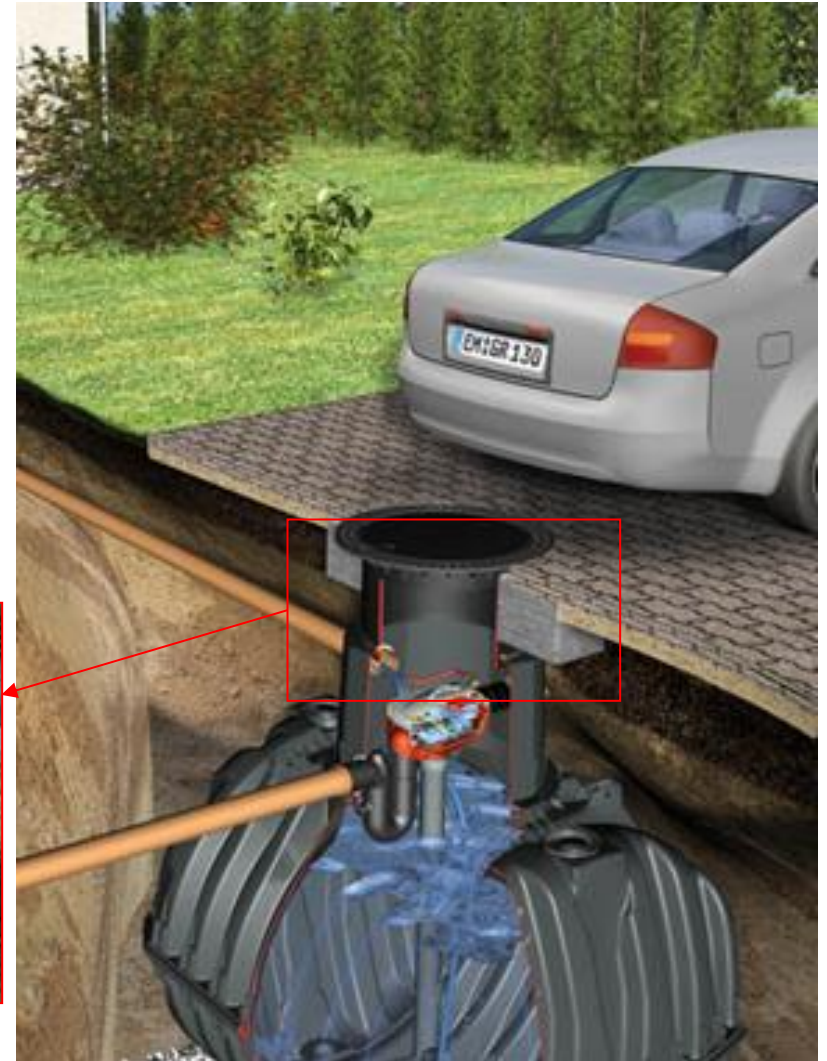


Telescopic dome shaft vehicle loading Art. 371020

- Installation in front of the house (parking space)
- Easy emptying of cesspools
- Easy access for service company
- Customers garden remains unaffected



Telescopic dome shaft with cast iron lid



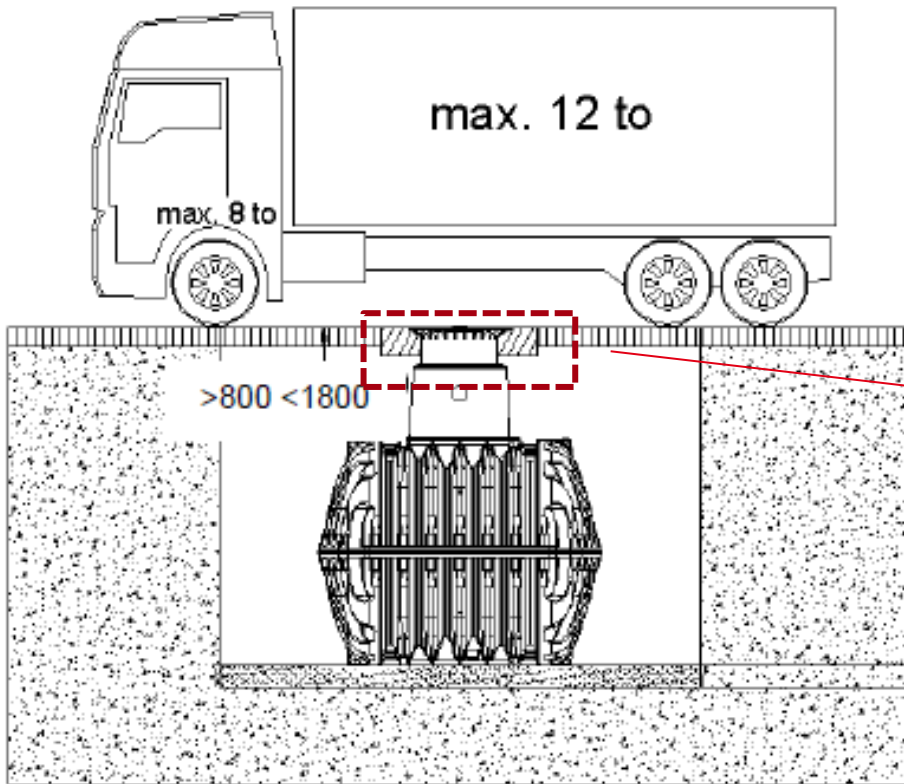
Carat S Underground tank

Cover – HGV loading up to 12 to



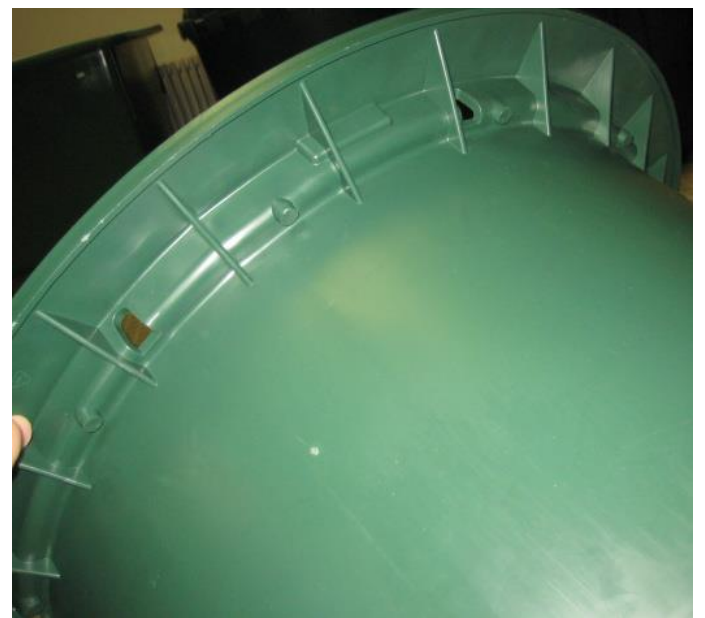
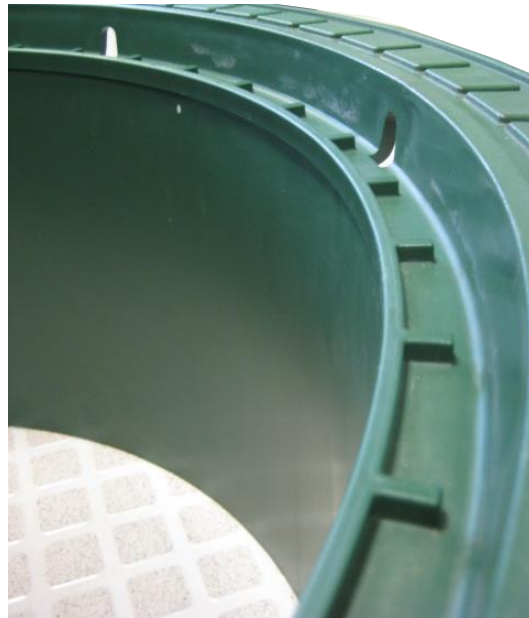
Telescopic dome shaft HGV

Art. 371021



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Cover - Drainage gully for excess water



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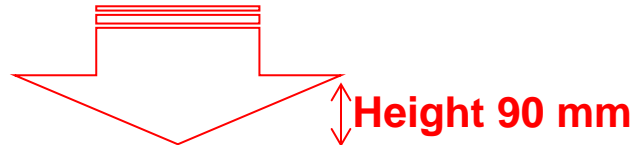
Cover – shallow excavation



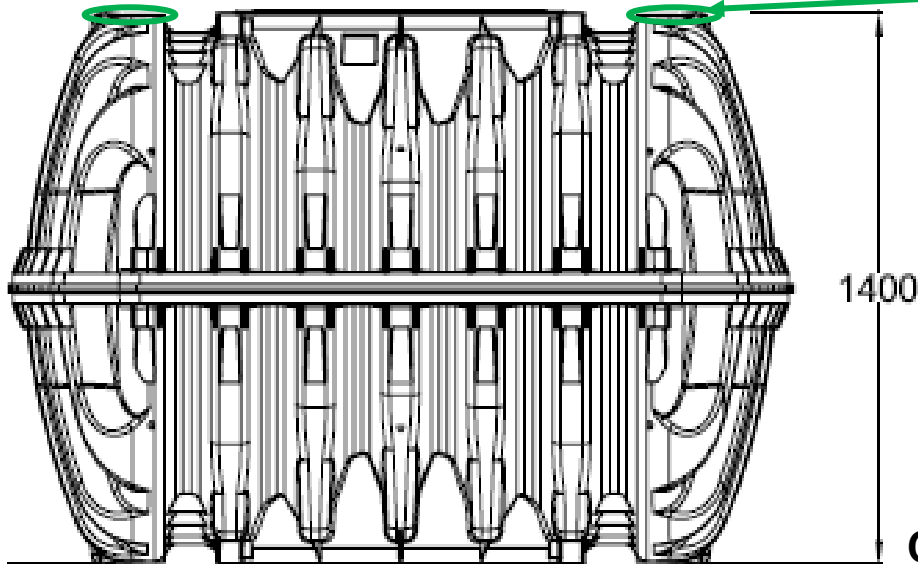
Option a)



Tank dome Micro



Height 90 mm



1400

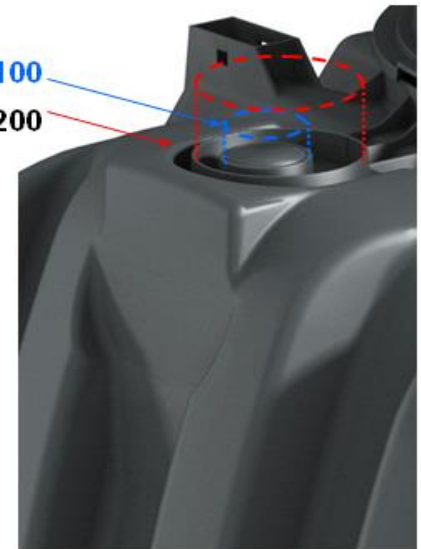
Carat S 2700 L

Option b)

Connections via pipes

DN 100

DN 200

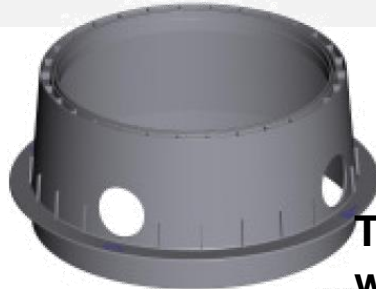


Carat S Underground tank

Further advantages - Connections



Tank dome Maxi
with 5 pre drilled
holes



Tank dome Mini
with 3 pre drilled
holes

DN 100/200

(DN 200 only at
Carat S 4800 + 6500 L)

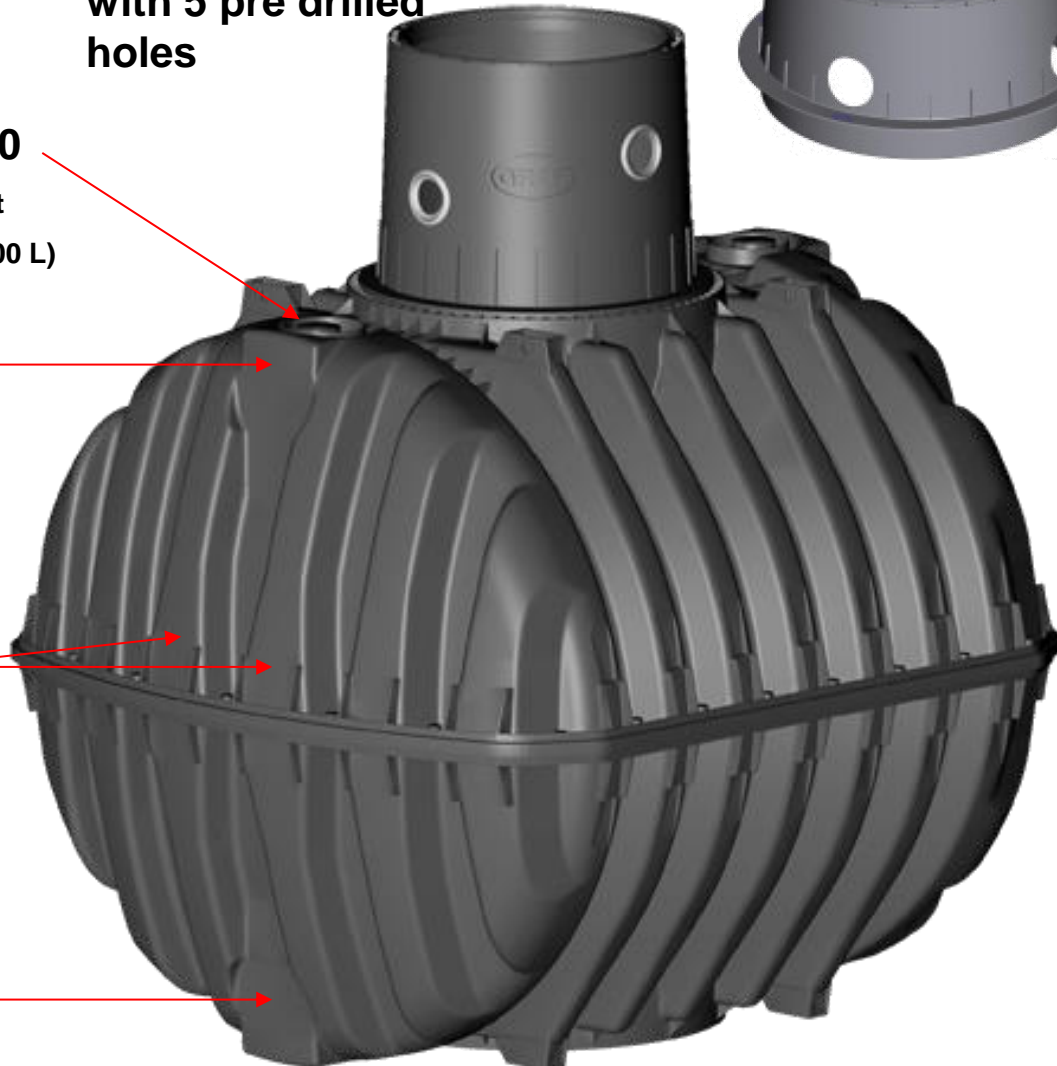
DN 100/150

DN 100

(Carat S 6500 L)

Tank dome Micro

DN 100/150



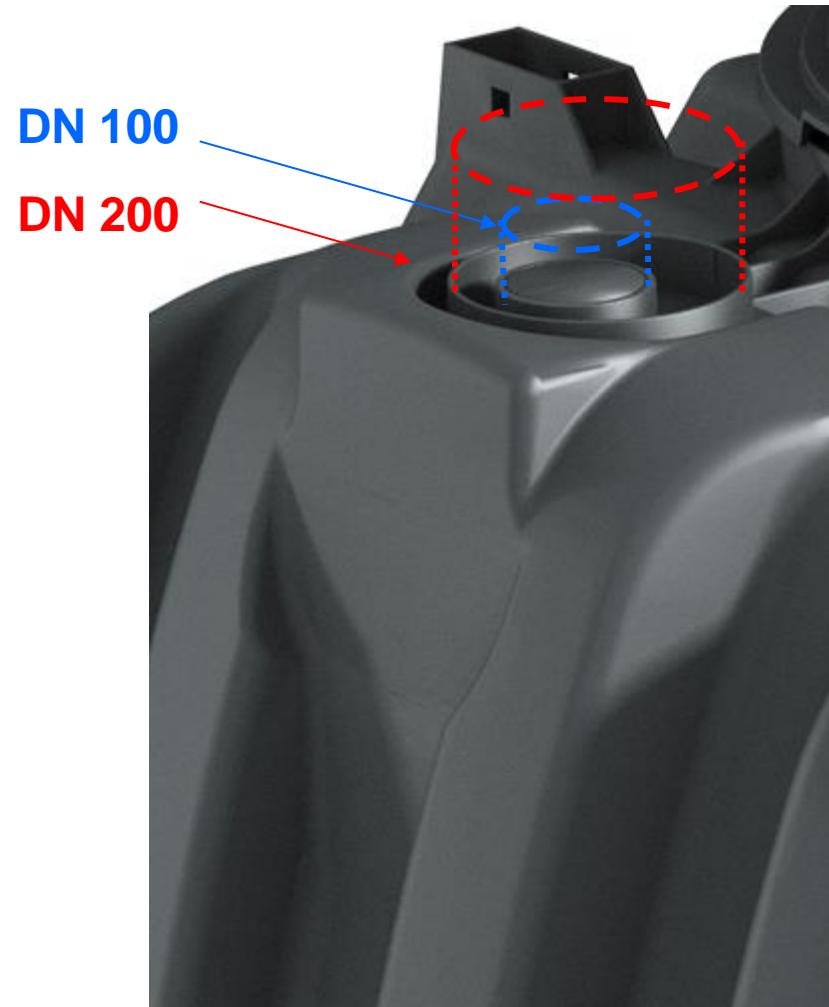
Carat S Underground tank

Further advantages - Connections



Drill dimension:

- DN 100 use a drill with < DN 100 drill diameter or a saw (pipe can be connected on top of the tank)
- For Carat S 4800 + 6500 L additional DN 200: cut / drill inside the (red) ring



Carat S Underground tank

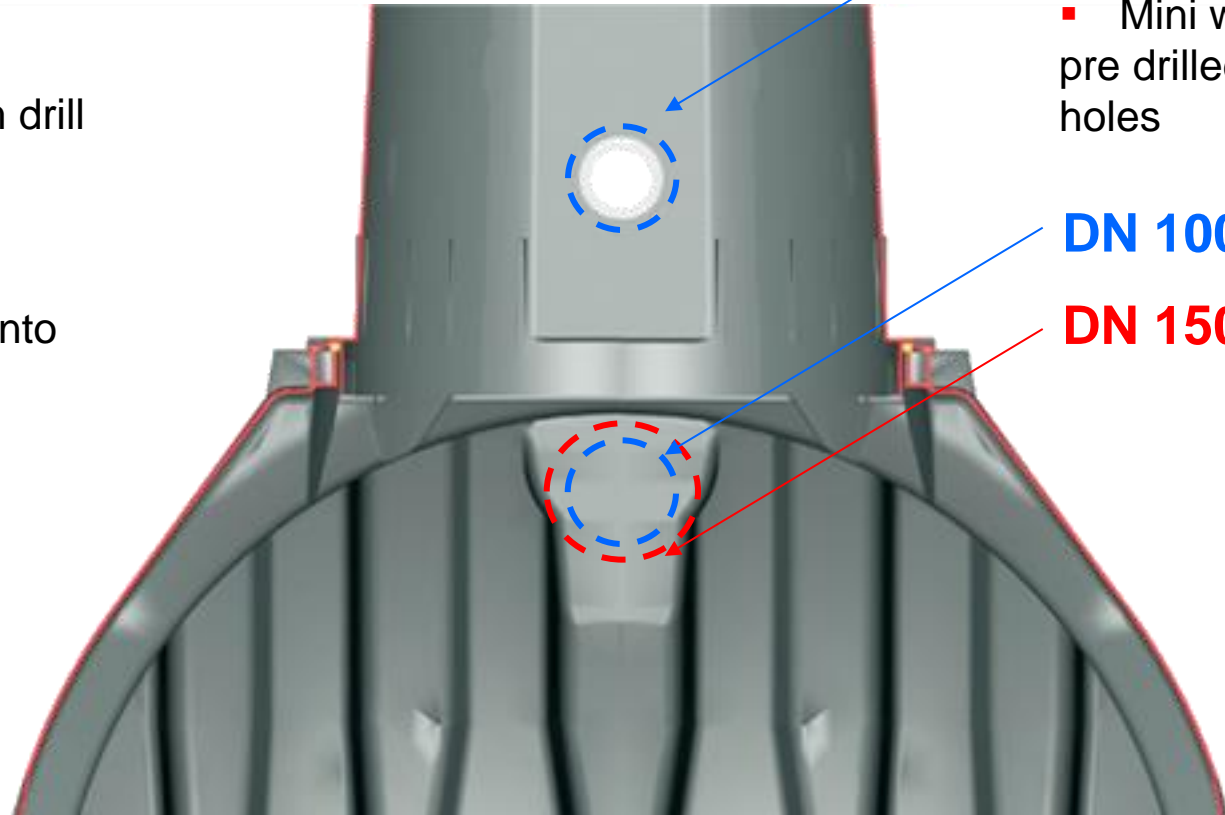
Further advantages - Connections



Drill dimension:

- DN 100 = 124 mm drill diameter
- DN 150 = 175 mm drill diameter

Pipes will be insert into the Graf sealing



DN 100

Tank dome

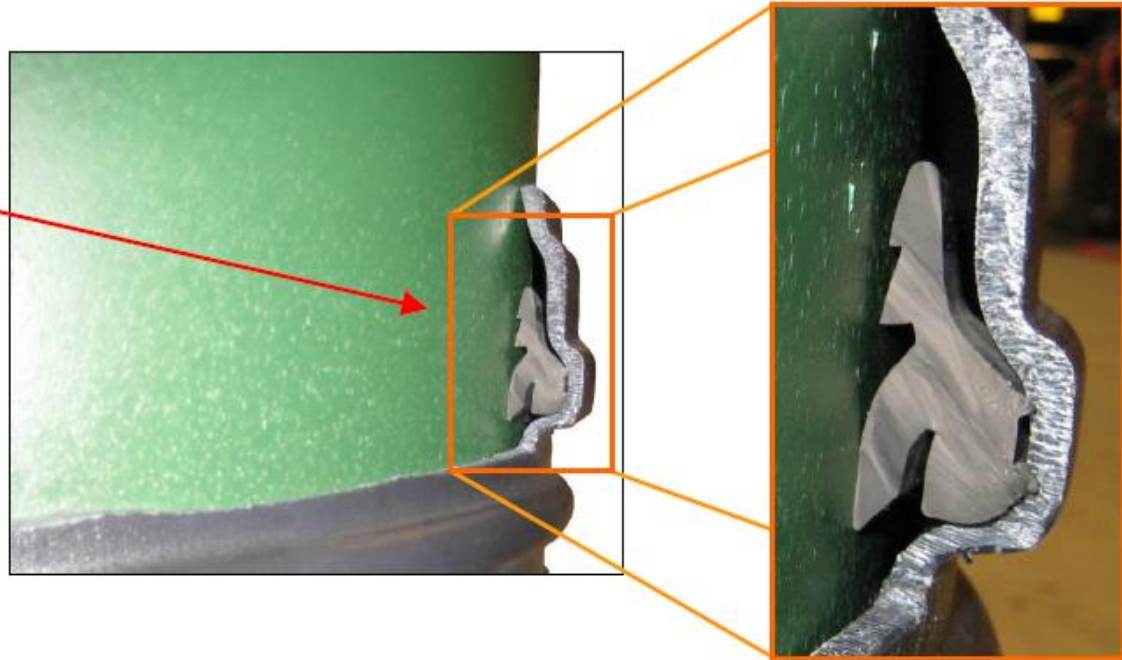
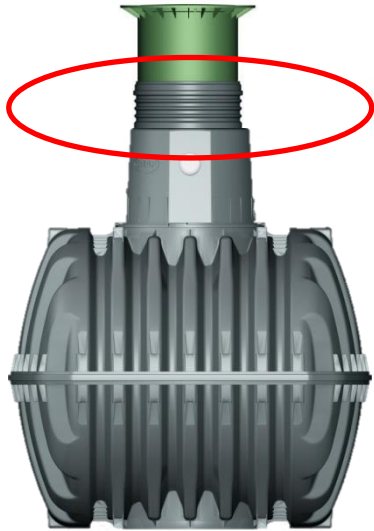
- Maxi with 5
- Mini with 3 pre drilled holes

DN 100

DN 150

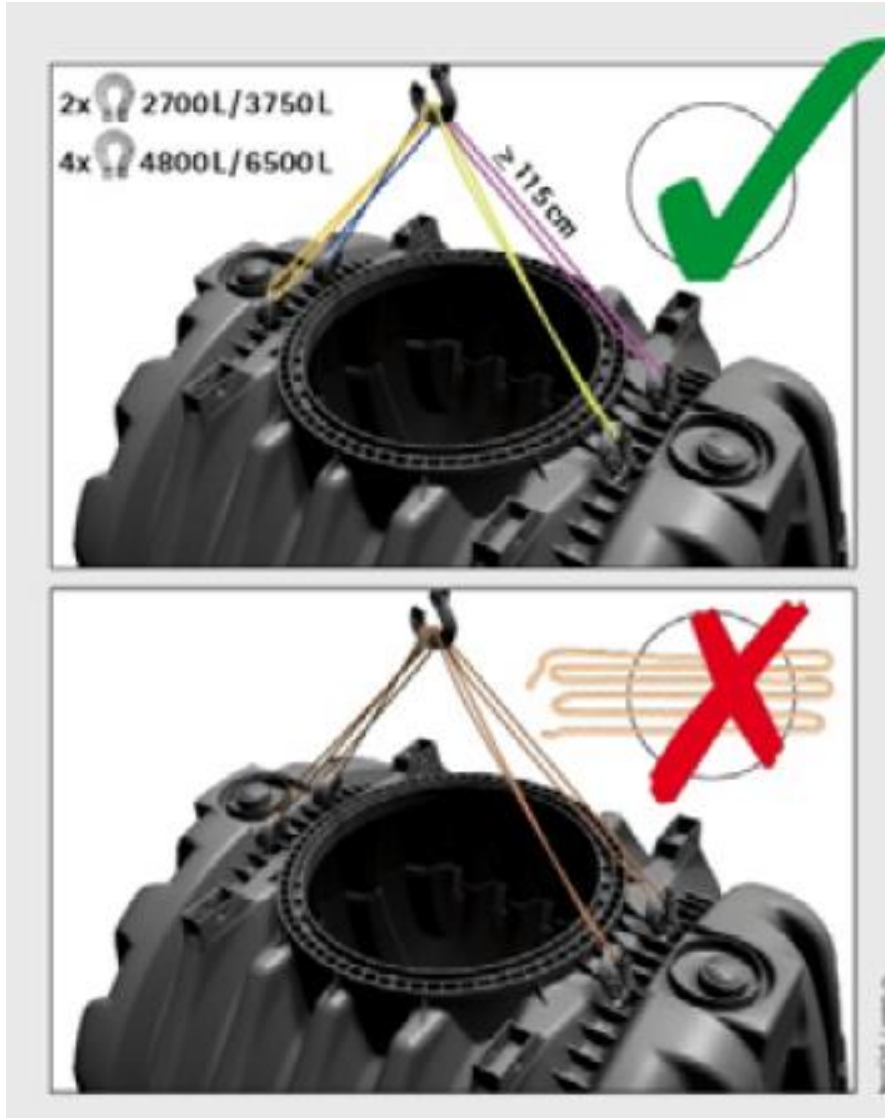
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Cover – extension



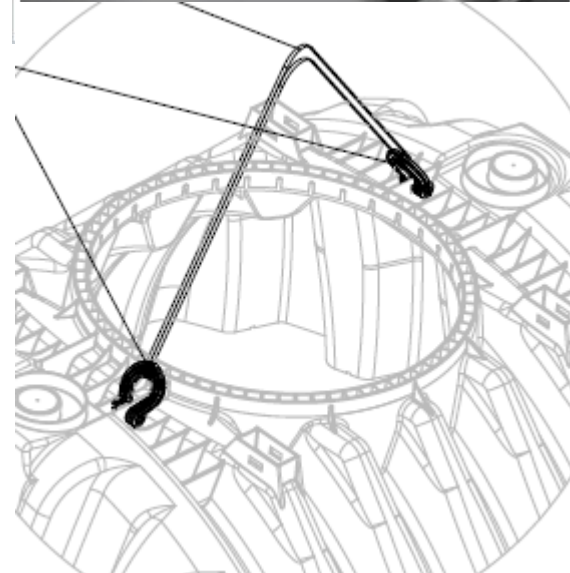
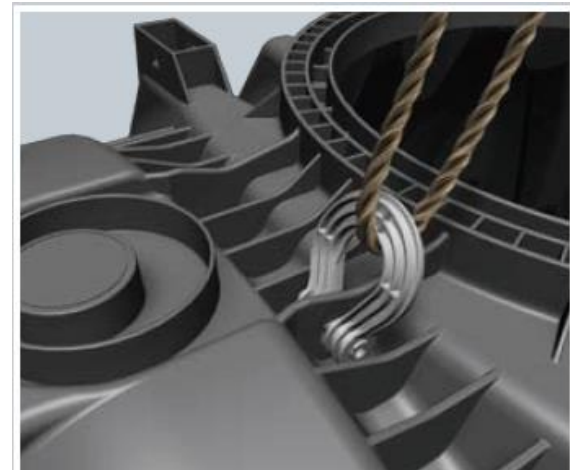
Carat S Underground tank

Further advantages – Transport aid



Carat S Underground tank

Further advantages – Transport aid



Carat S Underground tank

Further advantages - outstanding stability



Three reasons for the outstanding stability

- **Production processes**

→ Injection compression

- **Material Duralen®**

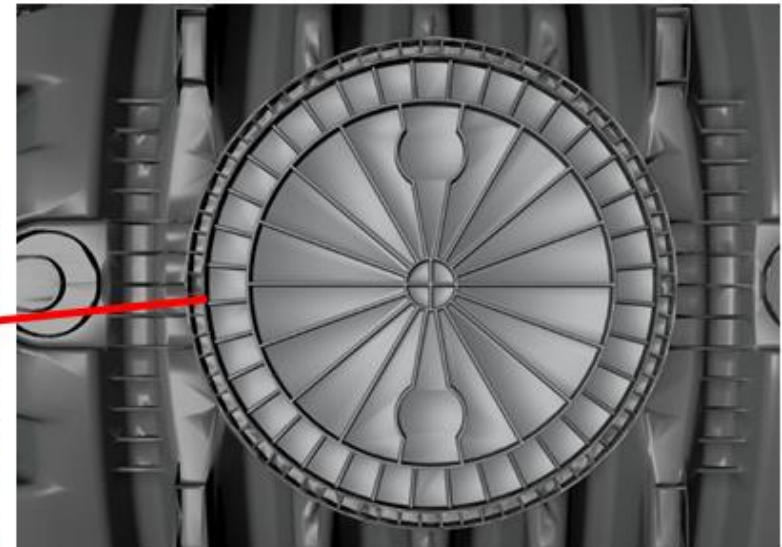
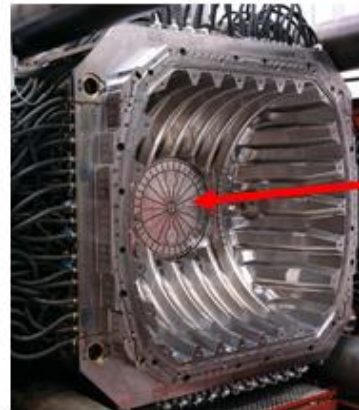
→ extremely stiff and impact resistant raw material

- **Tank design**

→ ribbing all around the tank



Production Video



Carat S Underground tank

Manufacturing process



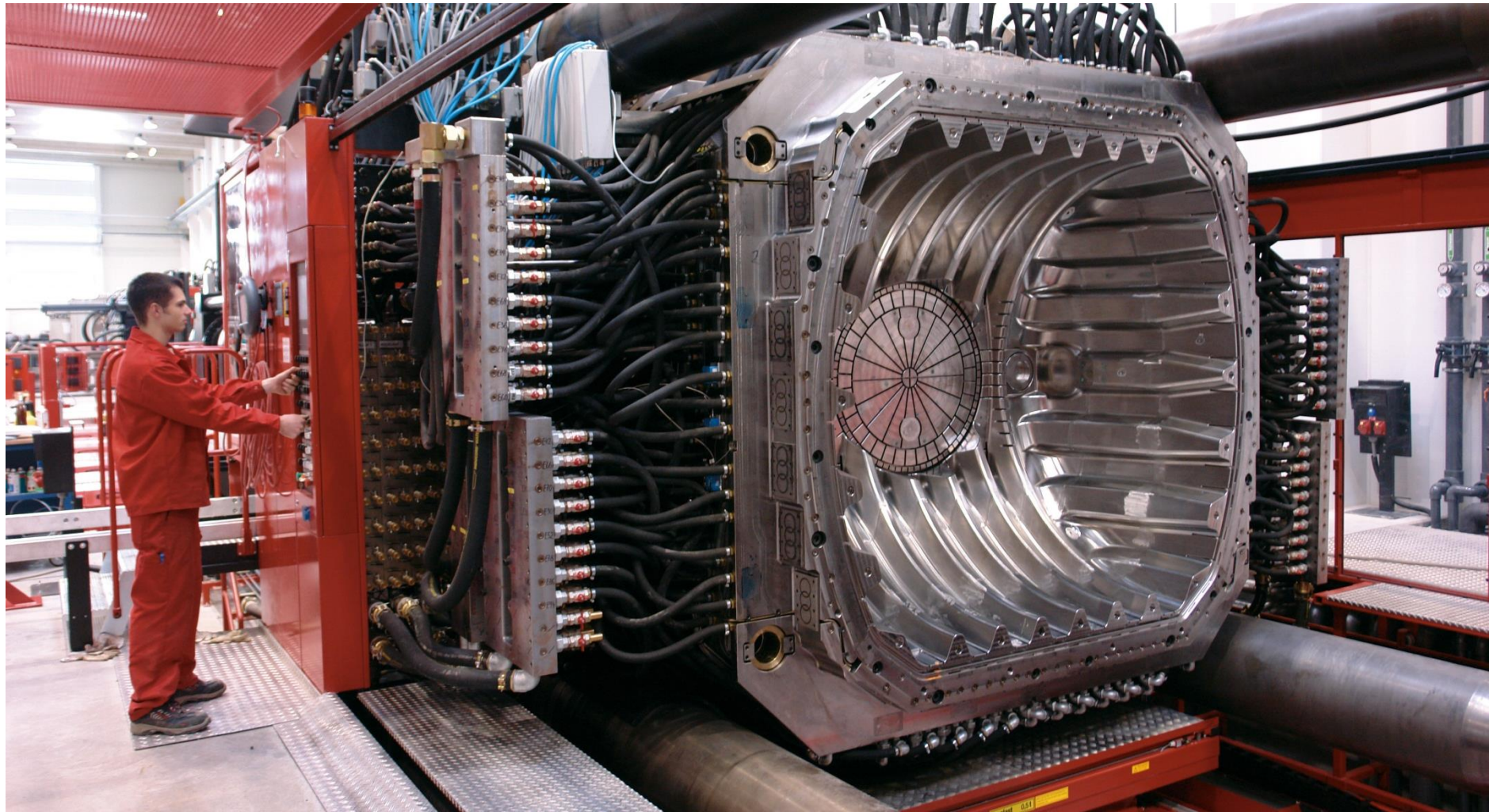
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Manufacturing process - fully automated handling



Carat S Underground tank

Manufacturing process - Injection compression



Carat S Underground tank

Mould Carat S 6500 L - total weight 170 tons



Carat S Underground tank

Further advantages - outstanding stability



Notified Body number : 1739 

Carat S Underground tank

Further advantages - outstanding stability



CE Declaration of Conformity



Manufacturer Name: Otto Graf GmbH Kunststoffzeugnisse
Street: Carl-Zeiss-Str. 2-6
City: 79331 Teningen
Country: Germany

Represented by the signatory, declares that the following product

SBR-small sewage treatment plants
Klaro Easy
From 4 – 53 Inhabitants

corresponds to all requirements of the construction material guideline 89/106/EWG.

Product description: Full biological small sewage treatment plant with SBR technology (Sequencing Batch Reactor) for domestic waste water

Applied harmonized standard: EN 12566-3
Small wastewater treatment systems for up to 50 PT -
Part 3: Packaged and/or site assembled domestic wastewater treatment plants

Notified organisation: PIA
Prüfinstitut für Abwassertechnik GmbH
Hergenerather Weg 30
D-52074 Aachen
NB 1739

Test report No. PIA 2006-009

Teningen, May 2008


Otto P. Graf
Chief Executive Officer



Tested for:

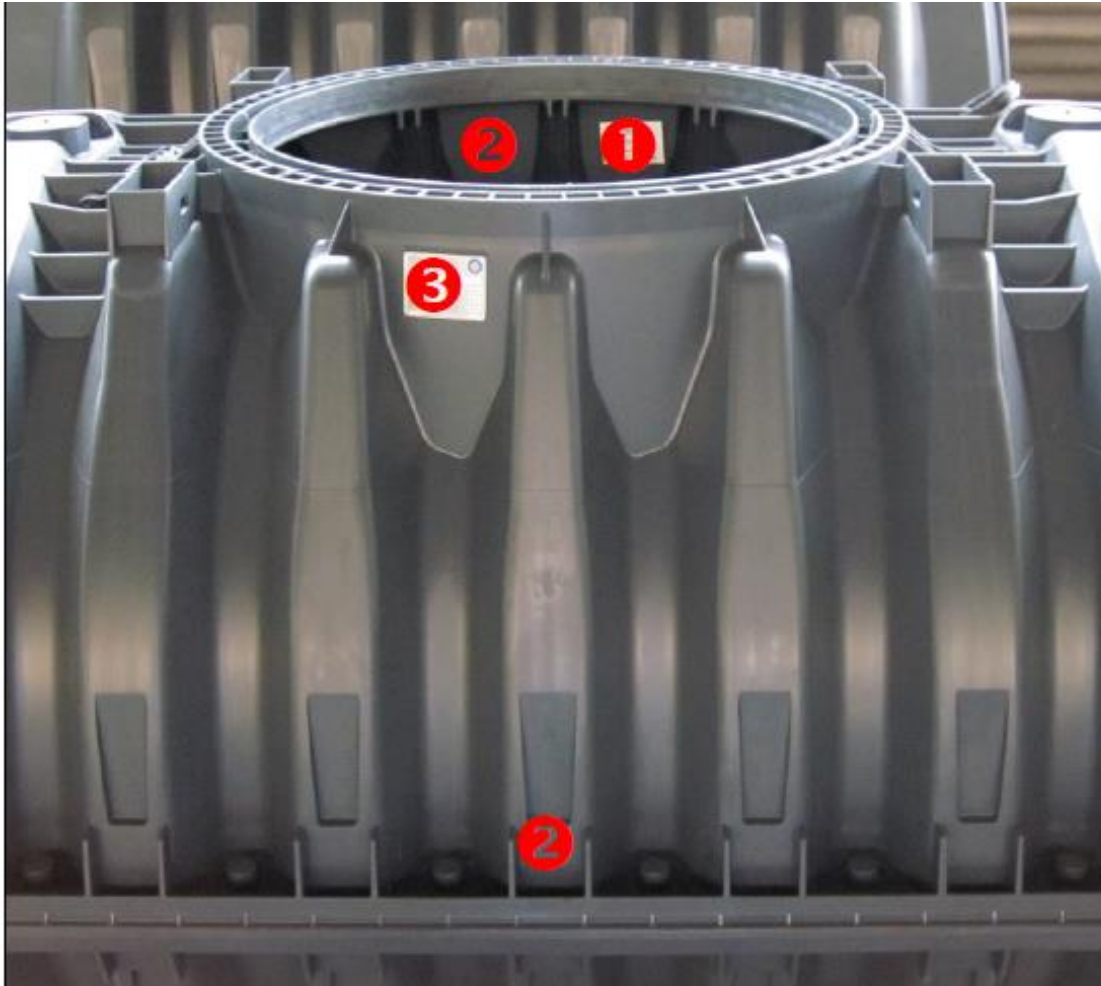
- Structural stability
- Effectiveness of treatment
- Water tightness

Otto Graf GmbH
Kunststoffzeugnisse
Carl-Zeiss-Straße 2-6
D-79331 Teningen

Telefon: +49(0)76 41/5 89-0
Telefax: +49(0)76 41/5 89-50
info@graf-online.de
www.graf-online.de

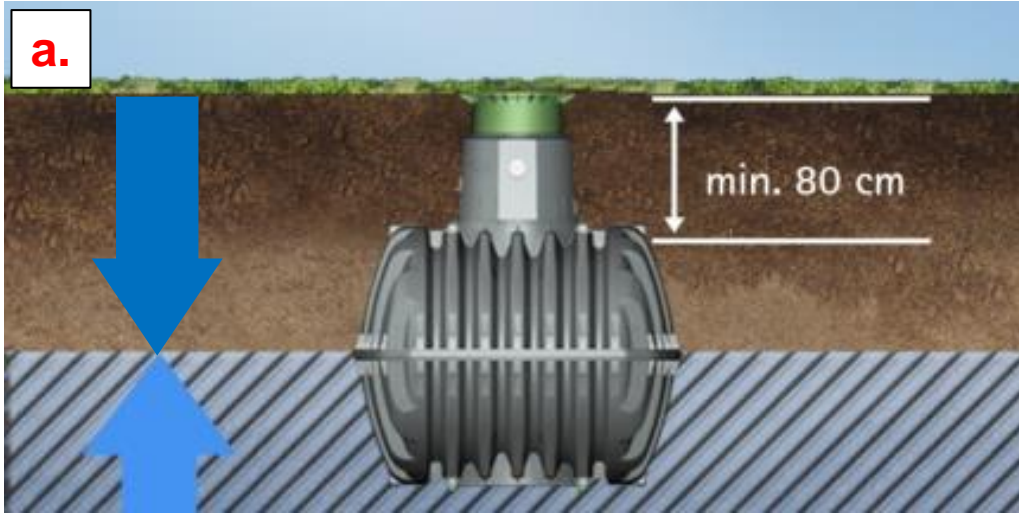
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Further advantages - Quality management



Carat S Underground tank

How we deal with groundwater



Risks

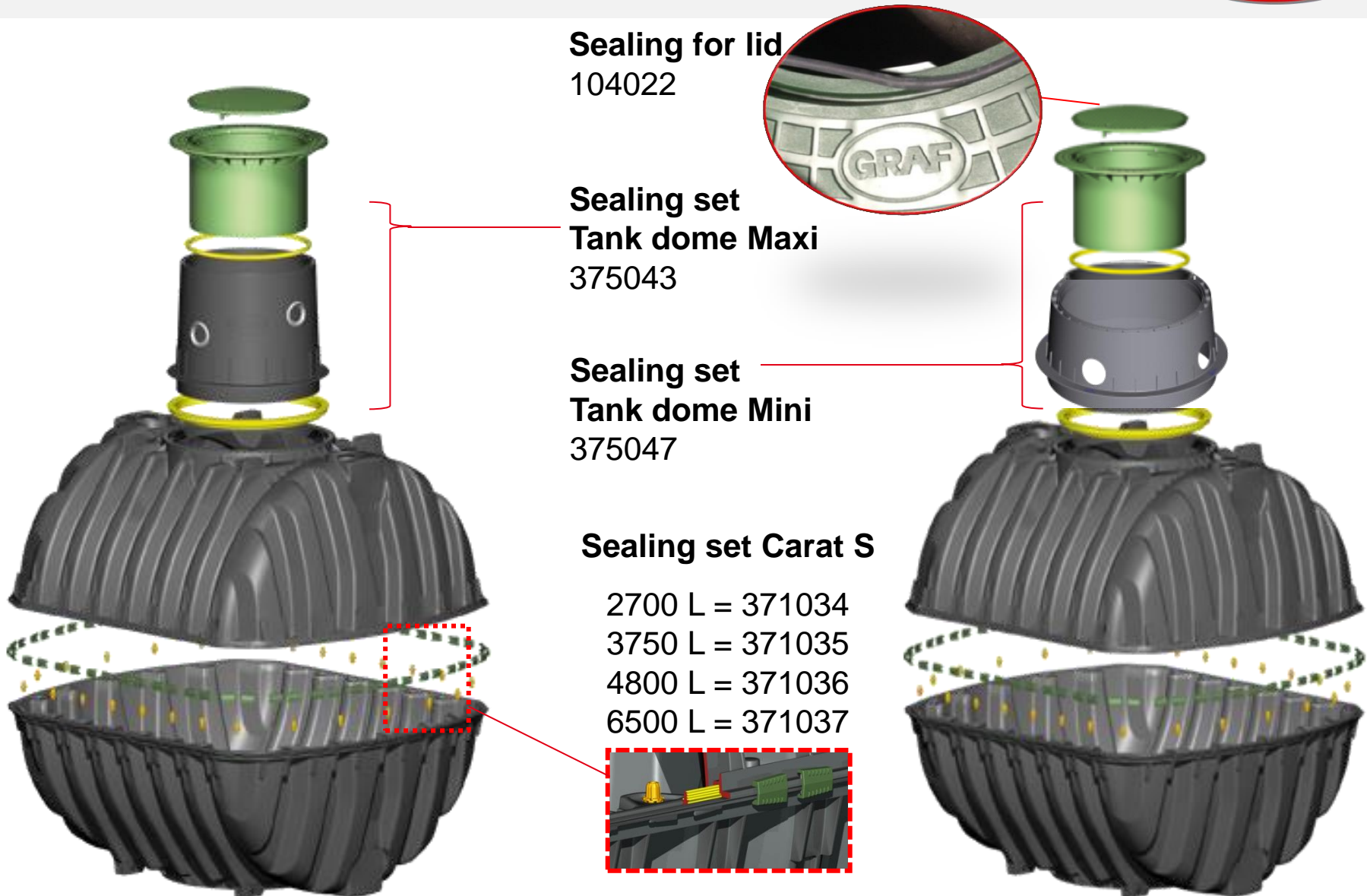
- Groundwater may push the tank to the surface, if there is not enough earth-pressure from above
- Rise and fall of the groundwater higher than the tank middle may lead to stress-cracking of the tank

Solutions

- a. Self anchoring - Earth cover of min. 80 cm will provide enough pressure to keep the tank at the bottom
- b. Dissipation of the drainage water (e.g. via an annular drainage system)

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Cover – Sealing sets (Art. No.)



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Installation in 6 steps

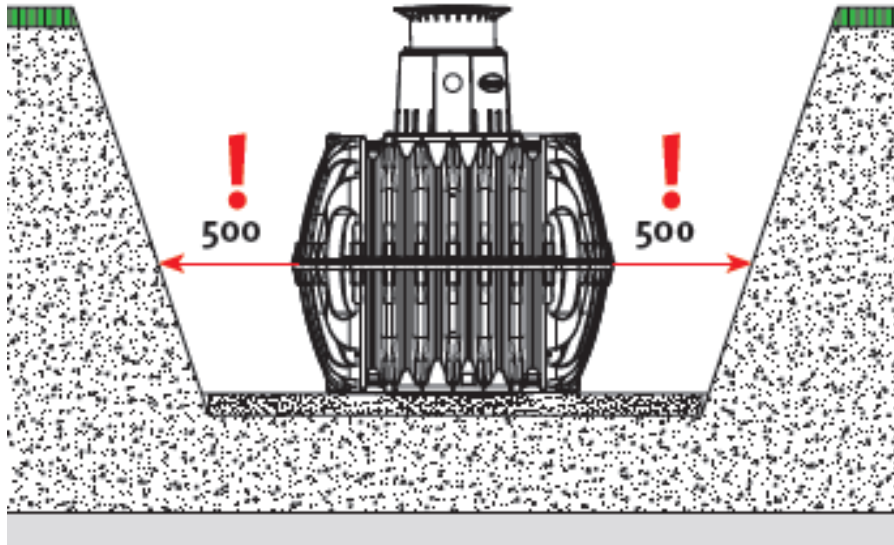


Carat S Underground tank



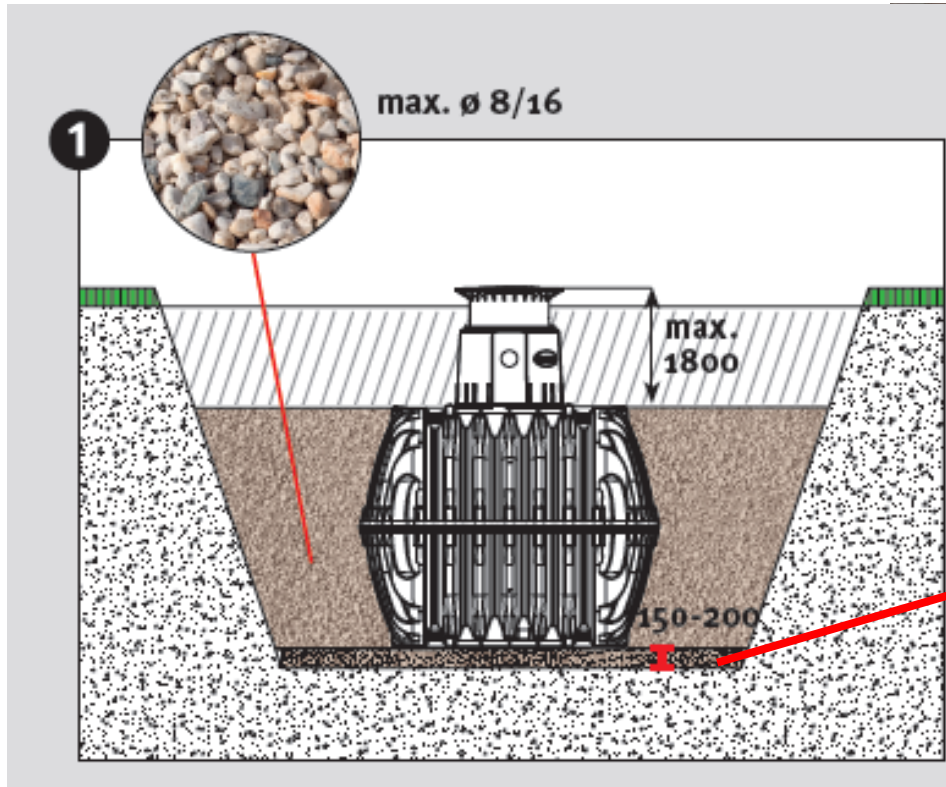
1. step: Prepare Excavation

surrounding around tank must be at least 500 mm wide



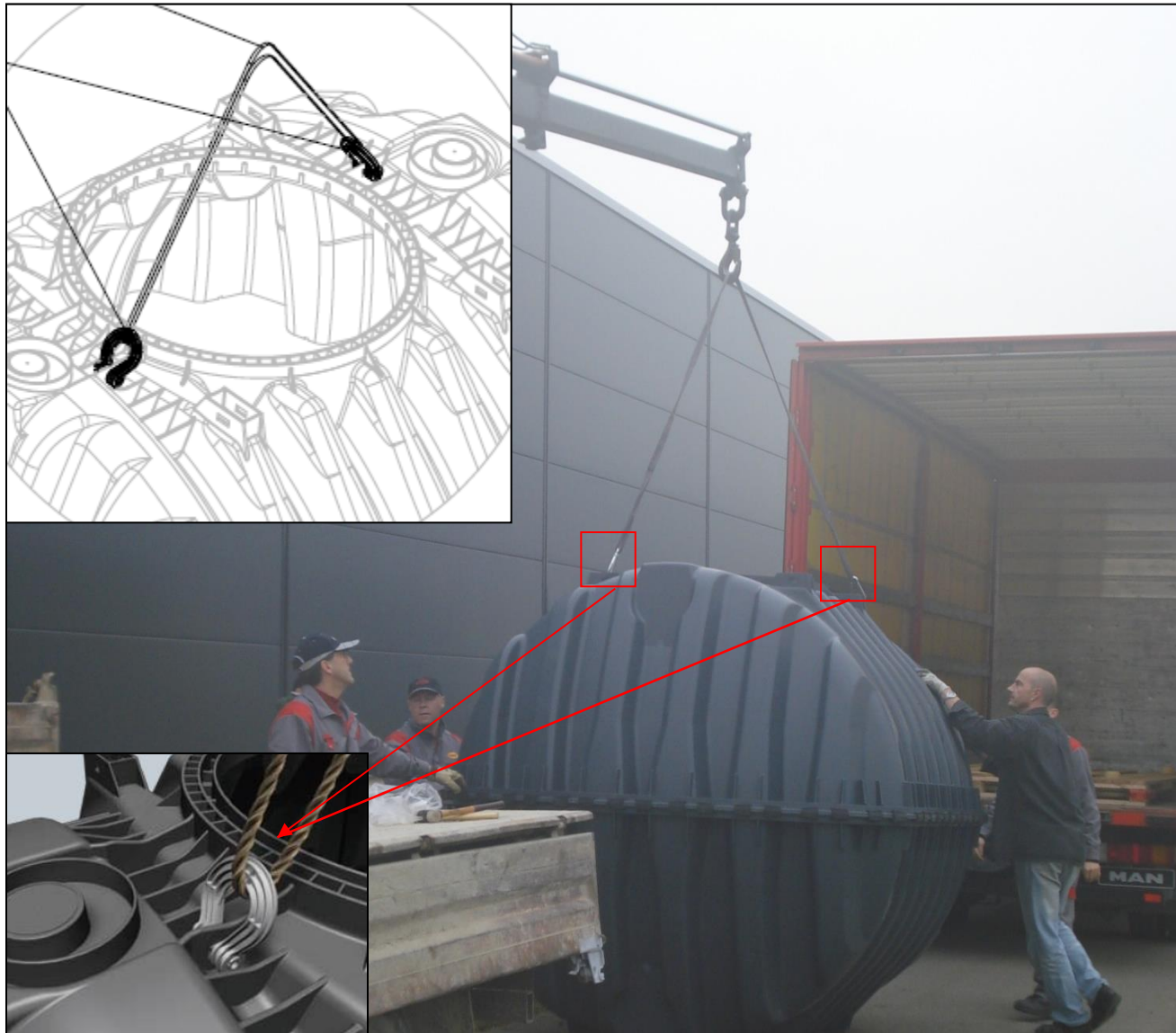
Carat S Underground tank

2. step: Prepare Basement of excavation



Carat S Underground tank

3. step: Lift the tank into the excavation



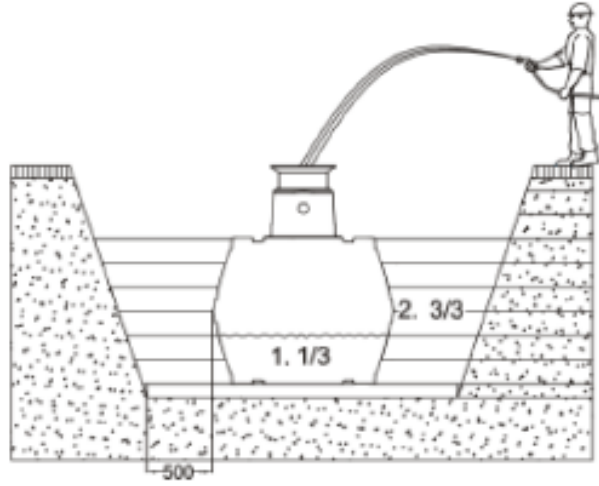
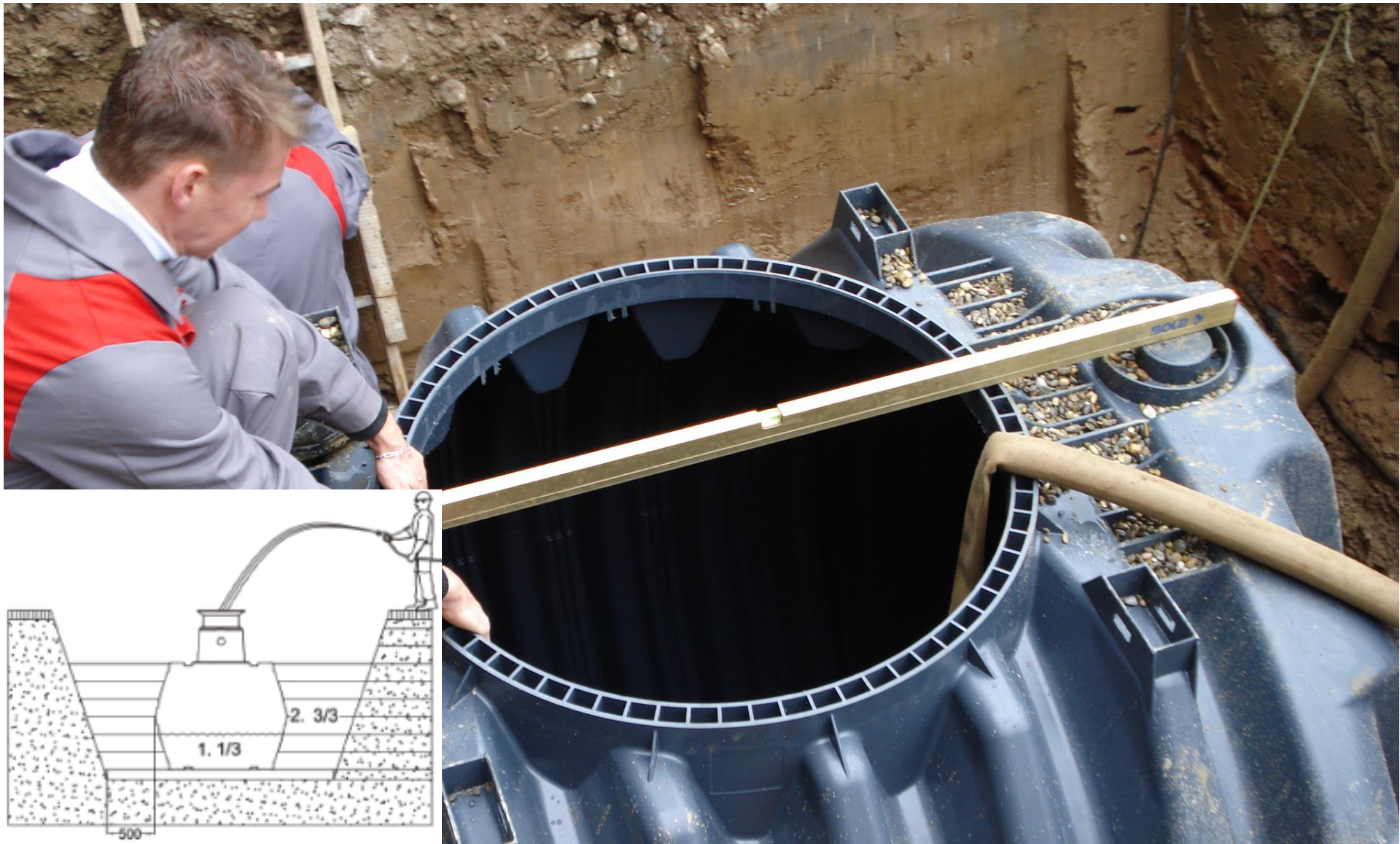
Carat S Underground tank

3. step: Lift the tank into the excavation



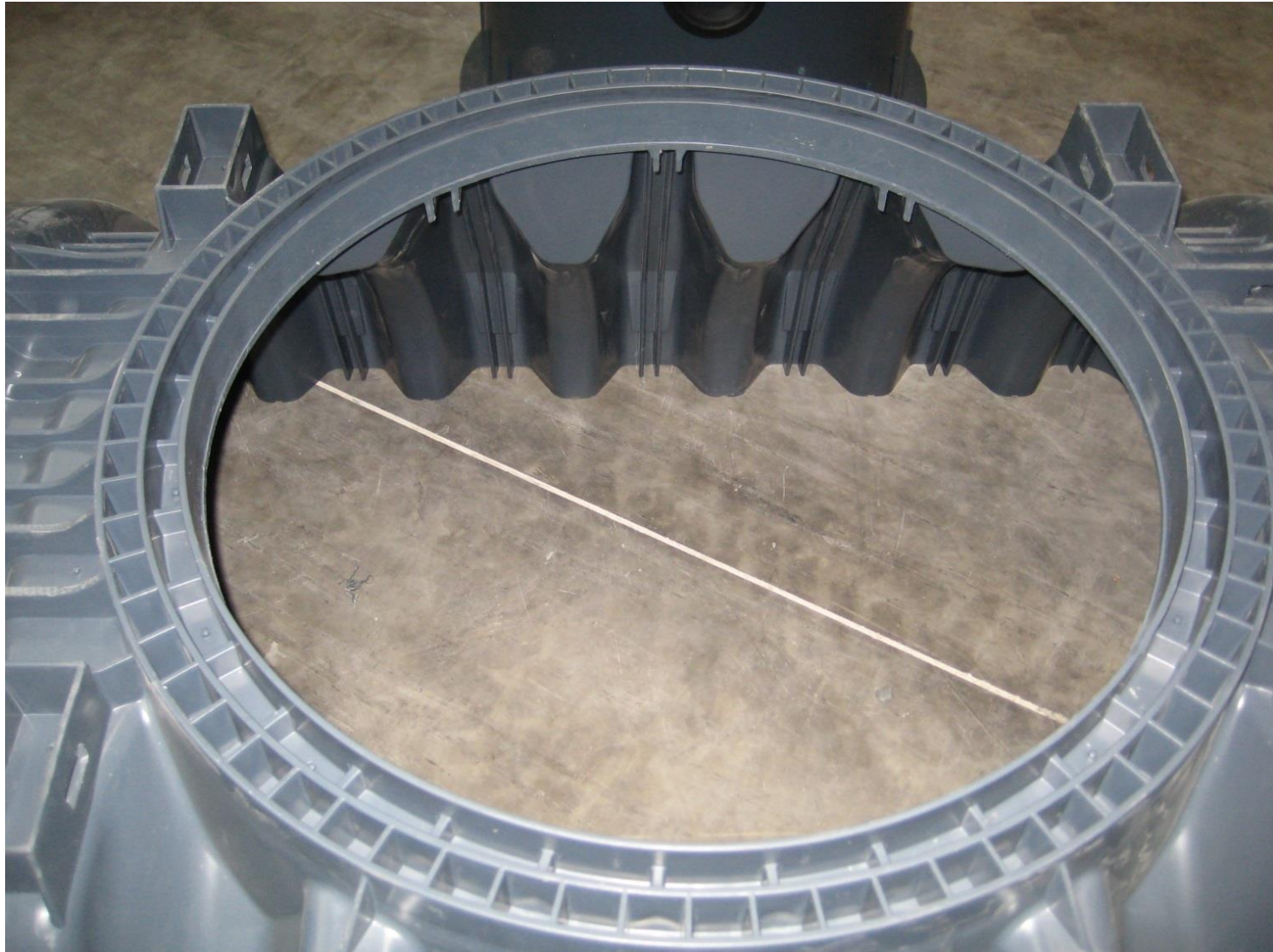
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4. step: Fill the tank up to 1/3 with water



Carat S Underground tank

5. step: Assemble the tank dome and telescopic dome shaft



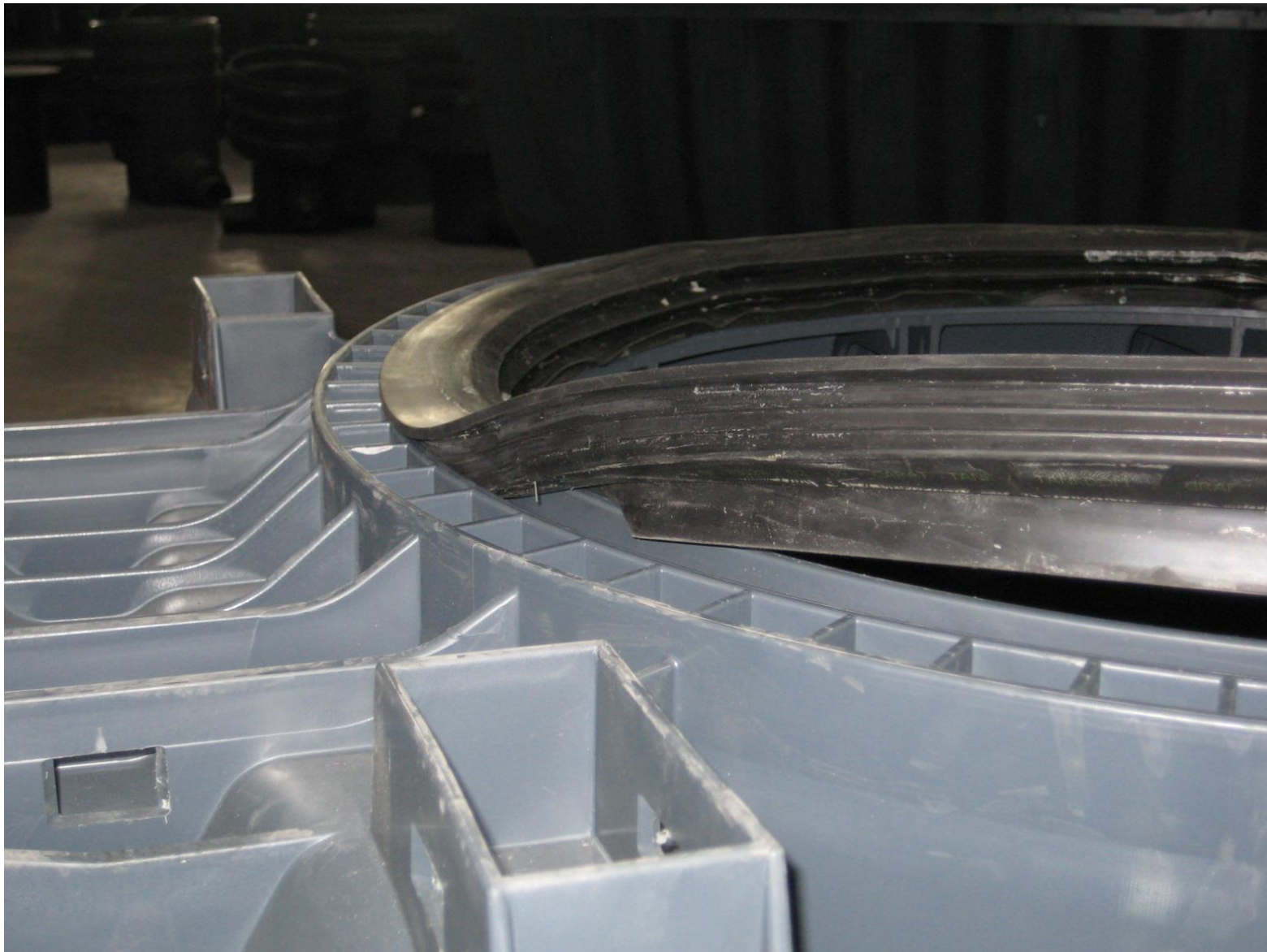
Carat S Underground tank

5. step: Assemble the tank dome and telescopic dome shaft



Carat S Underground tank

5. step: Assemble the tank dome and telescopic dome shaft



Carat S Underground tank

5. step: Assemble the tank dome and telescopic dome shaft



Carat S Underground tank



5. step: Assemble the tank dome and telescopic dome shaft



Here: Carat S
tank dome maxi

Use industrial soap
additional to the
sealing also at the
border of the dome
(make assembly
easier)

Carat S Underground tank

5. step: Assemble the tank dome and telescopic dome shaft



Carat S Underground tank

6. step: Correct backfill



Backfill material	Suitability
Split (Type B) consisting of max. 16 mm stone particles capable of solid compaction	✓ (recommended)
Round grain gravel to the top of the dome, top soil to the top of the shaft and lid (max. grain size 8/16)	✓ (recommended)



Carat S Underground tank

6. step: Correct backfill



Wrong backfill



Sand

Correct backfill



Split / crushed rocks / gravel 8/16

Carat S Underground tank

6. step: backfill - filling the excavation with gravel



Drainage

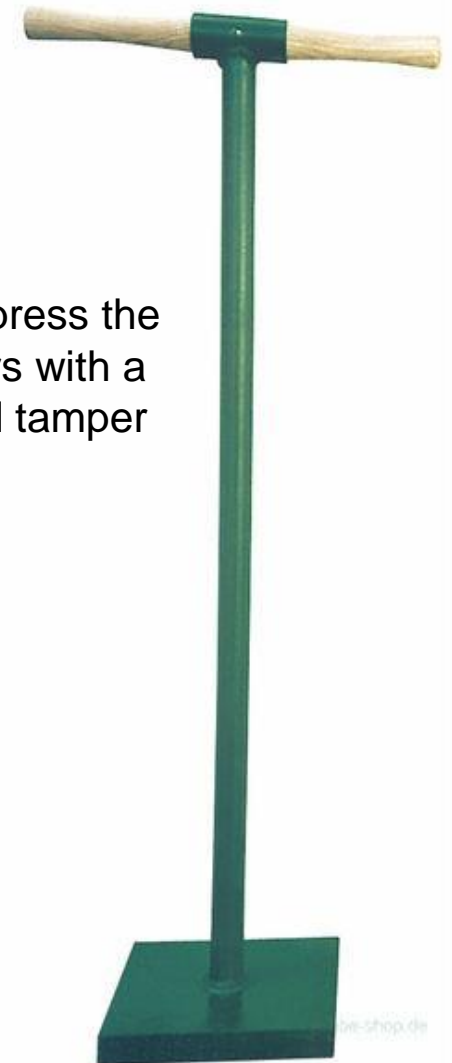
Carat S Underground tank

6. step: backfill - filling the excavation with gravel



(in layers of max. 30 cm)

Compress the
layers with a
hand tamper



Carat S Underground tank

6. step: backfill - filling the excavation with gravel



Installation Video

Carat S Underground tank

6. step: backfill - filling the excavation with gravel



Carat S Underground tank

6. step: backfill - filling the excavation with gravel



Carat S Underground tank

6. step: backfill - filling the excavation with gravel

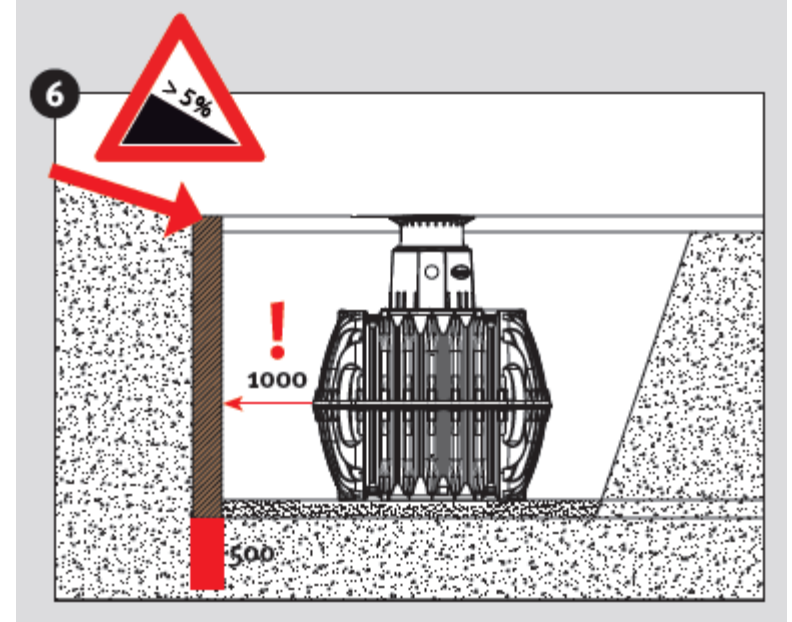


Carat S Underground tank

Typical mistake – tank underneath a slope (without static wall)



Static wall required for installation below Slopes / hills:



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Proper installation



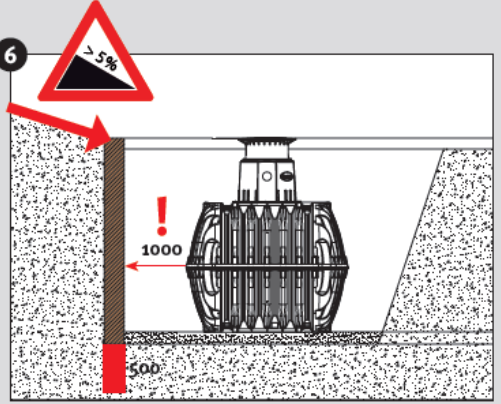
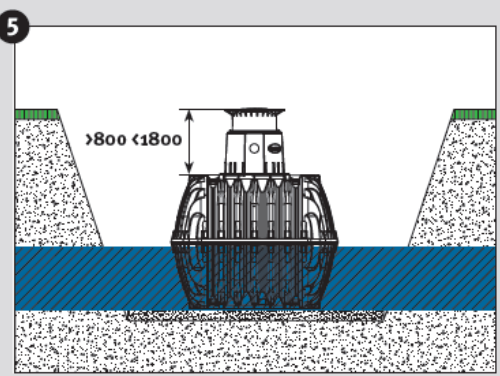
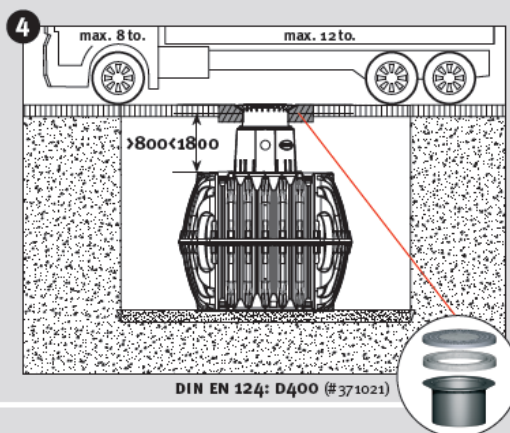
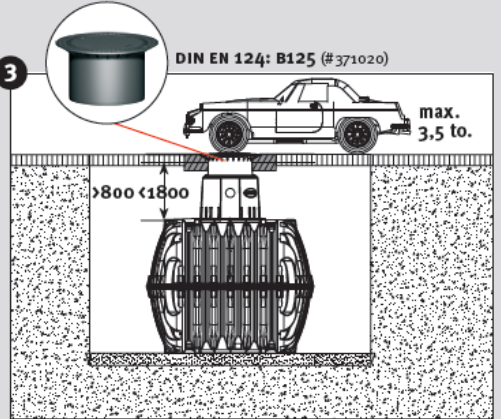
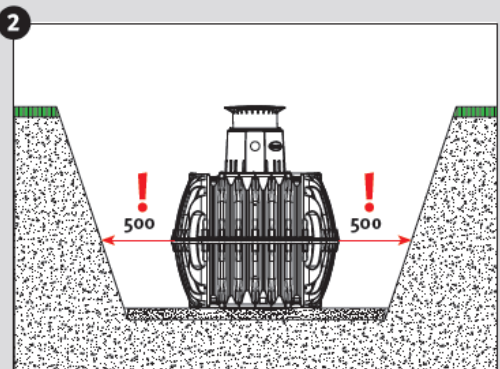
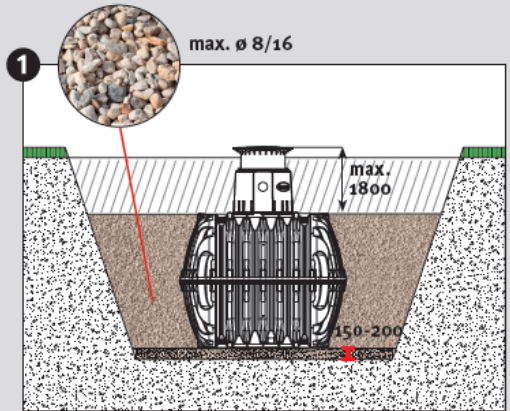
Carat S



max. ø 8/16



Montageanleitung
Notice d'installation
Installation Instruction
Instrucciones para montaje
Introduzione d'installazione



www.graf.info

Carat S Underground tank

Reference -Australia



Carat S Underground tank

Reference - Germany



Carat S Underground tank

Reference - Latvia



Carat S Underground tank

Reference - Bulgaria



Carat S Underground tank

Reference - Faroe Islands



Carat S + Carat S Extension tanks



Any questions?