



SAFECHEM (K) LTD

KLARO

The sophisticated technology for wastewater treatment

Advanced water systems



New in 2016

- Solutions for reuse
- Sludge dewatering
- Separation systems



No mechanical parts
in the wastewater



No pumps
in the wastewater



No electrical parts
in the wastewater

... quality



Quality products
Made in Germany with
CE certification

... security



NO mechanical parts, NO electrical parts and NO pumps in the wastewater.

... development



Constant further testing, research and development.

... fast delivery



The optimized KLARO Production System enables a very fast delivery of standard products.

... ecological awareness



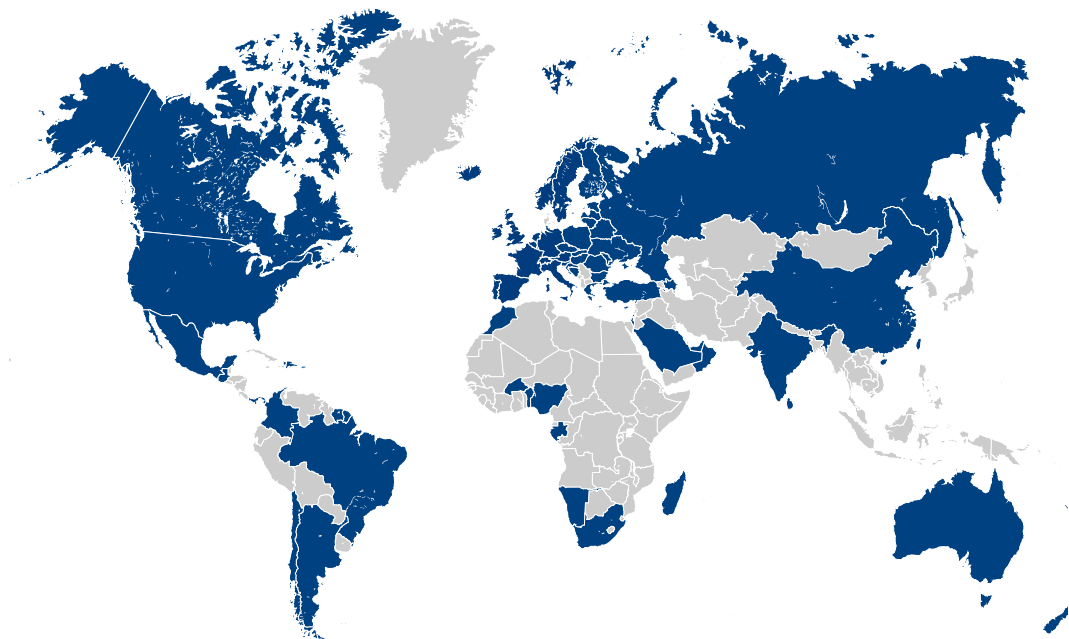
Full biological treatment.

... variety



Our systems are flexible, easy adaptable (concrete, plastic, GRP) and fast to assembly.

More than 350,000 user
of 50,000 plants in over 60 countries





KLARO GmbH in Bayreuth



KLARO Company in Bayreuth

Your provider of technology and expertise!

KLARO has been providing clear water since 2001. In a connection to the main sewage system not possible for financial reasons? Whether it's a family home, hotel or municipality – KLARO has the perfect small wastewater treatment plant for every application, up to 1,225 people. The KLARO modular construction principle means the highest levels of flexibility and sustainability for the future. 350,000 people have already put their trust in KLARO technology. With around 30 employees with a wide range of areas of expertise, we always create an optimal and practical solution for your requirements.



Test site

Research and Development

The KLARO development team is constantly working on intelligent waste water solutions. The goal is to explore new ways and to continuously improve tried and tested systems. New products are run under real conditions in the company's own test facilities in Bayreuth.



GRAF company in Teningen

Part of the GRAF group

KLARO has been part of the GRAF *group* since 2014. For more than 50 years, the GRAF brand has stood for high-quality plastic products in the field of water management. KLARO is familiar with GRAF as a long-term customer and supplier of plastic septic tanks. Thus, when you buy a KLARO purification plant you benefit from the expertise and quality of two established brands in decentralised wastewater management.



Wastewater solutions for all situations

Plants for private homes

Whether single family houses, holiday homes or weekend homes - KLARO systems always provide an optimum treatment performance. This is the case regardless of whether it is a new building or a retrofit, as our system can be integrated largely independent of the geometry and material of the tank.



Larger systems

KLARO is a specialist in planning individual wastewater treatment solutions for large facilities. Plants from 51 PE to approximately 1,225 PE for businesses, restaurants, hotels, communities, camp-sites, etc. are the optimal fields of application for the KLARO technology.



For temporary operations

KLARO *container.blue*® is a mobile sewage plant in a standard 20 ft container. It is constructed for temporary operations and easy to set-up and take-down again. The system is suitable for working camps, mining camps, mobile construction sites, tourist camps, etc.





The KLARO System: Adaptable to nearly every situation of installation up to 50 PE due to the wide range of

optional add-ons. That makes it the all-rounder amongst the small wastewater treatment plants.

Flexible

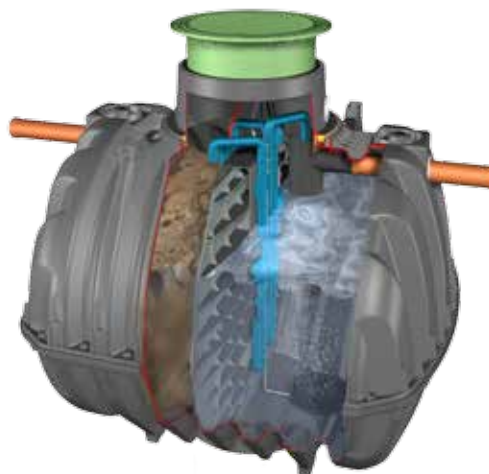
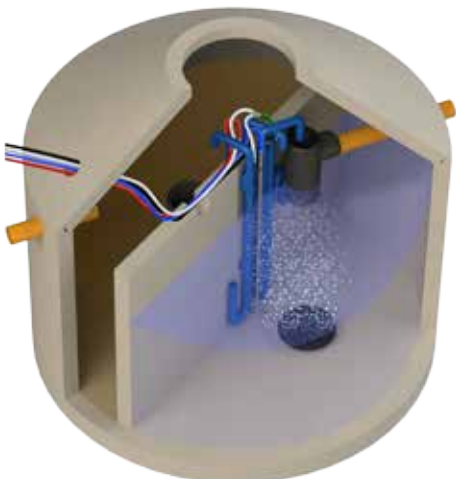
- For tanks made of concrete, plastic, GRP, ...
- For every tank geometry
- Retrofitting or new installation complete systems

Adaptable

- Additional components (UV module, metering pump, ...)
- Remote control via WebMonitor® (from page 18)

Approved

- Best possible performance since 2001 thanks to constant further development
- Separation of switch cabinet and sewage plant: no pumps, no mechanical and no electrical parts in the wastewater



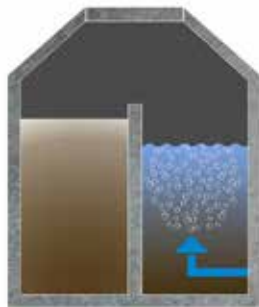
3.1. Process & effluent values

Put your faith in the SBR Process. SBR stands for Sequencing Batch Reactor. Sophisticated technology with great potential for the future. Every single person in Germany uses an average of 130 litres of water per day – water which then needs to be treated after use. KLARO small wastewater systems bring domestic wastewater back into nature without posing any kind of risk and therefore harmonising the natural cycle.



Loading phase

The wastewater is initially fed into the sludge tank (1st chamber) where solid constituents are removed. From here, the wastewater is then gradually led into the SBR tank (2nd chamber).



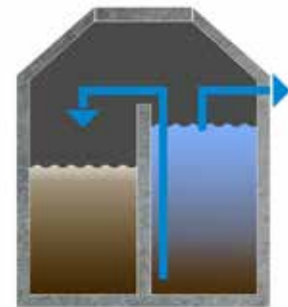
Aeration phase

The SBR tank is where the actual biological treatment process takes place. Here, short aeration and rest phases alternate with one another within the scope of a controlled cleaning process. This means that the so-called activated sludge with its millions of micro-organisms can develop and treat the water thoroughly.



Rest phase

During the 90-minute rest phase, the activated sludge settles on the bottom of the tank. A clear water zone forms in the upper part of the SBR tank.



Clearwater extraction

The separated clear water is led from the SBR tank to the receiving water (stream, river or lake) or into a percolation system. Afterwards, the sludge is returned to the first chamber from the SBR tank and the process starts again from the beginning.

Effluent values

KLARO undercuts legal thresholds with regard to wastewater quality by up to 90%. This means sustainability for the future – even in the case of wastewater treatment regulations being tightened.

Wastewater parameter	KLARO Easy drainage values*	Degree of efficiency
COD (chemical oxygen demand)	39 mg/l	94.6 %
BOD ₅ (biochemical oxygen demand)	9 mg/l	97.3 %
NH ₄ -N (ammonium nitrate)	3.8 mg/l	89.9 %
P _{tot} (phosphate removal)	0.4 mg/l	95.0 %
SS (suspended solids)	15 mg/l	96.2 %

* Results of the practical test carried out by PIA (Prüfinstitute für Abwassertechnik GmbH), Aachen test number 2011-140B14



3.2. Product overview

3.2.1 Retrofit kits

- Suitable for installation into tanks made of plastic, concrete, etc.
- Suitable for all new installations and retrofits
- All transfer processes carried out using compressed air
- No wear, no blockages
- All components are made from wastewater-resistant plastic (HDPE) or stainless steel

Aerator mounting

The aerator tube can be easily stuck into the plastic clamps from ahead



Adjustable feed

The feed can be adjusted to the correct level according to the pit depth.



KLARO *airlift.* **blue**



Air connections

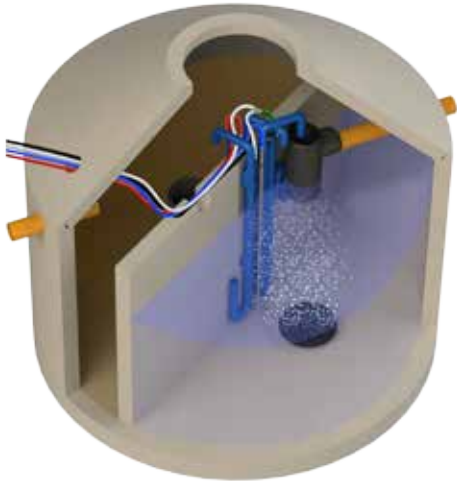
Coloured markings on the grommets indicate which pipe is to be connected and thus facilitate the assembly. All air connections are positioned above the water line.



Patented air barrier

Thanks to the patented air barrier, the discharge of suspended matter is enormously reduced for the first critical flushing surge

3.2.2. Tanks



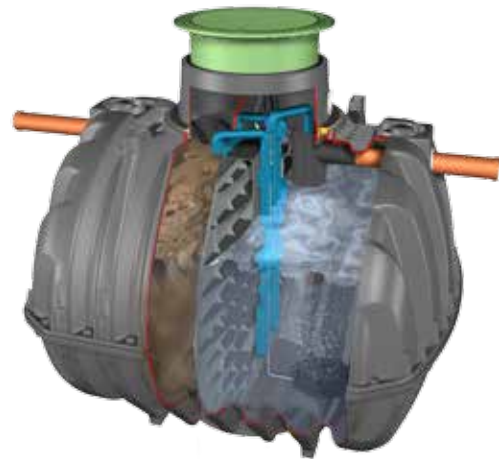
Concrete tanks

- Up to 20 PE in one tank
- Low-cost
- Variable sizes and designs for all types of use
- With or without uplift safeguards
- Monolithic reinforced concrete
- Pre-fabricated and ready-to-use when delivered to the building site



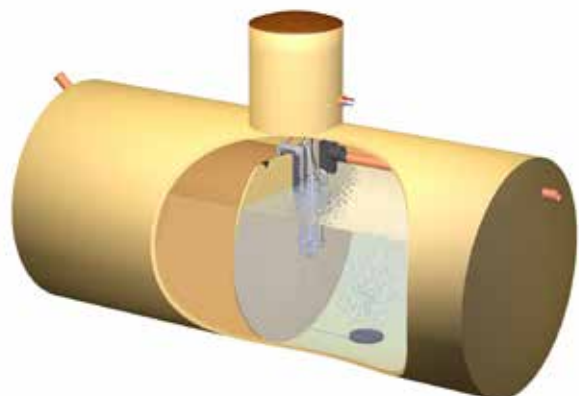
Onsite concrete

Particularly in case of sites difficultly accessible, it is advisable to pour rectangular concrete tanks on-site. A KLARO small wastewater treatment plant can also be installed in existing rectangular tanks.



Plastic tanks

- Very good price/performance ratio
- Lightweight tank
- Installation possible without need for a crane
- Plastic tank waterproofness guaranteed for 25 years
- Long life span even in the case of frequent use
- Extremely stable – able to bear HGV load with suitable covering



GRP tanks *

- Single or multi container models from 4 PE to 200 PE
- Automobile accessible version is available
- Final clarification is not necessary
- Easy to transport and move
- No climbing into the container necessary

* container will be not delivered by KLARO

3.2.3. Switch cabinets



KLARO Indoor switch cabinet EPP

- Cabinet sizes from 4 to 8 PE
- Minimal space required: 40 cm x 54 cm x 29 cm (w x h x d)
- Silent air compressor – as quiet as a refrigerator



KLARO EPP Outdoor switch cabinet plastic

- Cabinet sizes from 4 to 8 PE
- Size 45 cm x 142 cm x 40 cm (w x h x d)
- Easy to install



KLARO Indoor switch cabinet metal

- Cabinet sizes from 4 to 125 PE
- System size starts at 50 cm x 50 cm x 30 cm (w x h x d)
- Various possibilities to equip



KLARO Outdoor switch cabinet plastic

- Cabinet sizes from 4 to 50 PE
- System size starts at 37 cm x 80 cm x 38 cm (w x h x d)
- Easy to install

3.3. Underload

Underload detection

The “KLplus“ control mechanism checks the fill level in the first chamber every 6 hours with an integrated pressure sensor. In the event of little or no inflow or low fill level, a purification cycle is not operated, but the system is merely marginally aerated. So electricity is saved and yet the batteries are preserved. The plant’s lifespan is independently adapted to the actual volume of wastewater with the automatic underload detection.

Recirculation

If no purification cycle has been operated three times in succession (i.e. a total break of 18 hours), the control mechanism activates the surplus sludge lifter and transports water from the SBR chamber back into the 1st chamber. The duration and quantity is adjustable. Through this recirculation the first chamber fills and a normal purification cycle is started afterwards. Consequently, the batteries are provided with “fodder“ once a day.

Examples of application

- Long-term under-occupancy (single family house)
- Very low water consumption
- Weekend houses
- Holiday homes
- Restaurants

Certificate



In a practical test conducted by the PIA over the course of 10 weeks, the system was tested and awarded the “Underload Certified“ certificate.

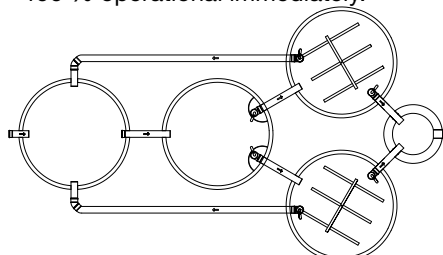
3.4. Seasonal fluctuations

“Additional feeding“

Feeding a highly concentrated nutrient solution to the bioreactor is additionally possible with only sporadic or seasonal volume of wastewater. The consumption of the agent is minimal. Moreover, this is completely harmless, cost-effective and easy to handle. An adequate quantity of activated sludge, which furthermore features excellent settling properties, can be kept available with this agent.

Multiple lines

In extreme cases the plants are installed redundantly with multiple lines. The tanks are then set up in such a way that the biological cleaning takes place in two separate SB reactors. In low-season one SBR tank remains shut down. This is re-commissioned when the high-season begins. Activated sludge is then fed through from the operational tank to the tank that was previously shut down. Therefore, it is 100 % operational immediately.



Examples of application

- Holiday homes
- Garden allotments
- Underload in connection with increased requirements

One is independent from volume of wastewater with this method. Consequently, a KLARO plant can also be employed in cases in which one merely considered a pit without outlet to be possible.

We already have several years of experience with the “additional feeding method“, and we will gladly demonstrate various reference objects to you in this connection.

Examples of application

- Camping
- Hotels



Individual projects

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



Aeration unit



Sampling point



Air lifts

7.1. Product overview



Outdoor cabinet 3

- Metal
- Size 80x 88x 67,5 cm (bxhxt)
- Empty weight: 70 kg



Indoor cabinet 4

- Metal
- Size: 114x 120x 75 cm (bxhxt)
- Empty weight: 142 kg



Outdoor cabinet 4

- Metal
- Size: 120x 111 x 80cm (bxhxt)
- Empty weight: 140 kg



Outdoor cabinet 5

- Metal
- Size: 206x 110x 90cm (bxhxt)
- Empty weight: 300 kg

Machine technology

As an alternative to a conventional control cabinet, the technical components can be installed in a dedicated room or machine house. This guarantees sufficient space for all the necessary components and maximum flexibility.



Mountain village 1,000 PE

Avers

The municipality of Avers in the Swiss canton of Graubünden lies at a height of 2,126 m and is thus the highest settlement in Europe that is inhabited all year round.

Due to the location, which is difficult to access, the concrete tank required for the 200 PE plant was cast on site.

This approach shows that we find a customised and suitable solution for the tank even for places that are difficult to access.



Project data

Location: Avers, Switzerland

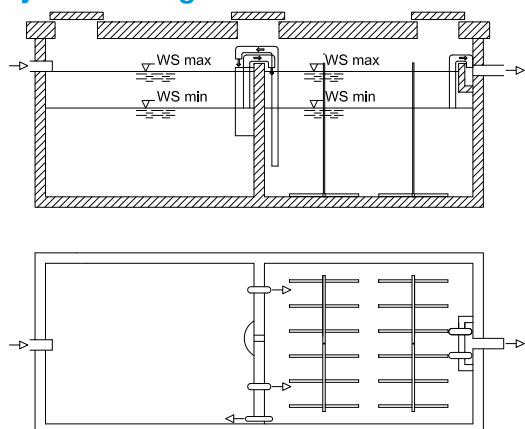
Size: 200 PE

Construction: 2011

Extra: Onsite concrete tank



Project drawing



200 PE Concrete tank, Avers, Kanton Graubünden



Shipyard 1,000 PE

Stord

A KLARO 1,000 PE plant works for Aker Kværner, Norway's largest shipyard, in Stord. The largest oil platforms in the world were constructed and equipped here.

The plant, which is located right at the bank of the fjord, treats all the wastewater for offices, canteens and the worker flats.

The septic tank was manufactured in a rectangular shape from cast-in-place concrete, with approximately half of it rising out of the ground. The biological level is divided onto two basins, which can be driven independently of each other.



Project data

Location: Stord, Norway

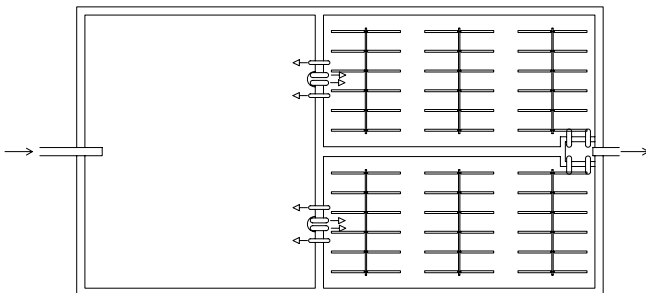
Size: 1.000 PE

Construction: 2009

Extra: Phosphate precipitation, two-line



Project drawing



1.000 PE Stord, rectangular concrete tank





Systems up to 1,225 PE


In Hungary, we built a 1,225 PE plant for a village. The tank required for this plant was specially manufactured according to our specifications.



 1.225 PE Village - Rád

More examples from 350 PE



 350 PE Holiday village - Eggedahl




 400 PE Community - Dörpstedt



 600 PE Hotel & Congress center - Altmadlitzer Mühle



 1,000 PE Shipyard - Stord

KLARO

GRAF group



SAFECEM (K) LTD

KLARO GmbH
Spitzwegstraße 63
95447 Bayreuth

Telephone: +49(0)921 16279-0
Fax: +49(0)921 16279-100
E-Mail: info@klaro.eu

Further information under
www.klaro.eu



Technical hotline
+49 (0) 921 16279-330

Authorized Dealers:
SAFECEM (K) LTD
P.O. Box 1364 - 00606
Nairobi, Kenya

Tel: +254-20-8011593
+254-711-155697
+254-722-791314
E-Mail: info@safechem.co.ke

For further information under
www.safechem.co.ke

Photo copyrights: KLARO GmbH

© KLARO GmbH Bayreuth 2016 / Item.-No. 101-EN-0516

