

KLARO product line

Sophisticated wastewater treatment plants

Advanced separation systems



No mechanical parts
in the wastewater



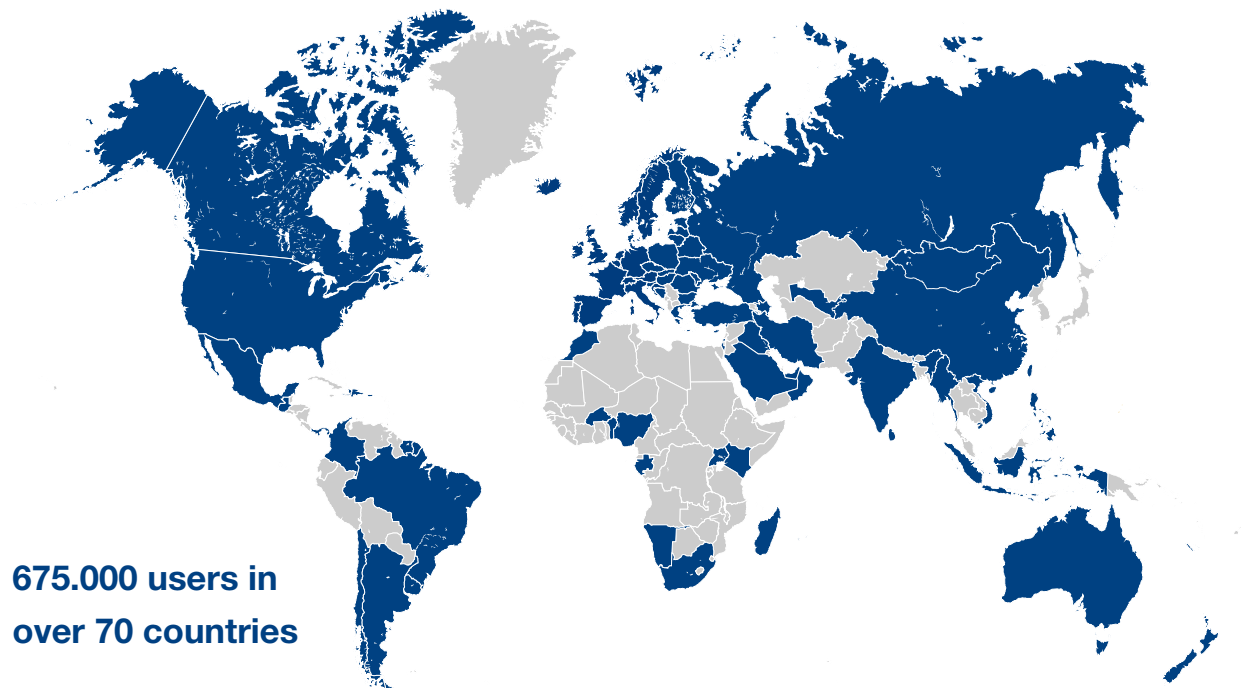
No pumps
in the wastewater



No electrical parts
in the wastewater



- Current European market leader for small wastewater treatment plants
- Experience since 2001
- Medium sized company in Germany
- KLARO is a company of the GRAF group since 2014
- German design and engineering
- Wastewater treatment plants from 0.6 m³ / day to 750 m³ / day (4 - 5,000 PE)
- Solutions for wastewater reuse
- Grease- and light fluid separators (NS 1 - 15)





... quality



German design and engineering and CE declaration.

... safety



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

... technology



State of the art technology, always one step ahead.

... flexibility



Adapted to customer requirements.

... variety



Our systems are flexible, easy adaptable and fast to assembly.

... development



Awarded with the R & D seal of approval.

... eco friendliness



Ecological awareness. Full biological treatment.

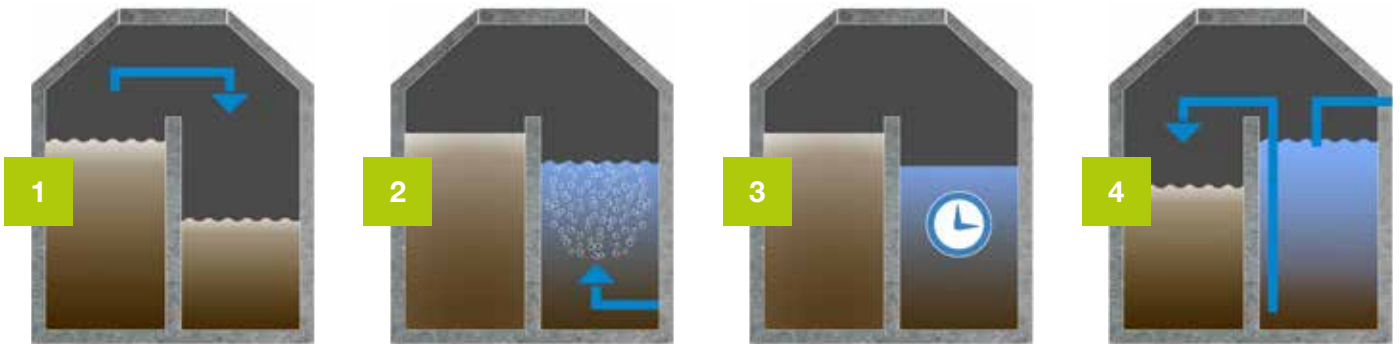
... fast production



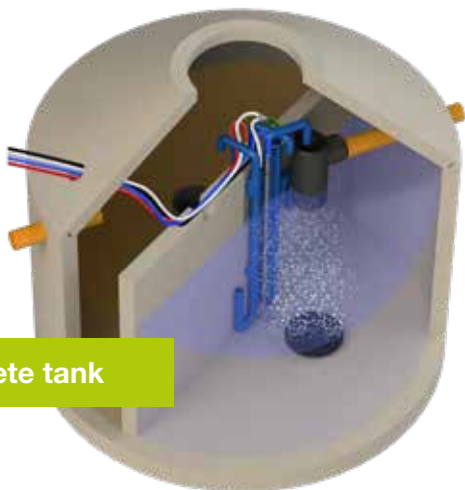
Standard systems are ready for delivery within 24h.

System KLARO

Process KLARO



Loading phase (1); Aeration phase (2); Sedimentation phase (3); Sludge removal and clearwater extraction (4)



Concrete tank

Advantages

- For tanks made of concrete, plastic, GRP, ...
- For installation in existing tanks or new systems
- Can be retrofitted to 2, 3 or 4 chamber pits
- Simply extendable with additional components (UV module, phosphate removal, ...)
- Remote control via WebMonitor® possible
- Verly low energy consumption
- Easy maintenance; durable and reliable
- Water reuse possible

Effluent values

Wastewater parameter	KLARO Easy Effluent values*	Efficiency*
COD (chemical oxygen demand)	48 mg/l	92.3 %
BOD ₅ (biochemical oxygen demand)	6 mg/l	97.5 %
NH ₄ -N (ammonium nitrate)**	8.3 mg/l	75.8 %
N _{tot} (total nitrogen)**	16 mg/l	67.5 %
P _{tot} (total phosphate)	3.1 mg/l	56.9 %
SS (suspended solids)	7 mg/l	96.7 %

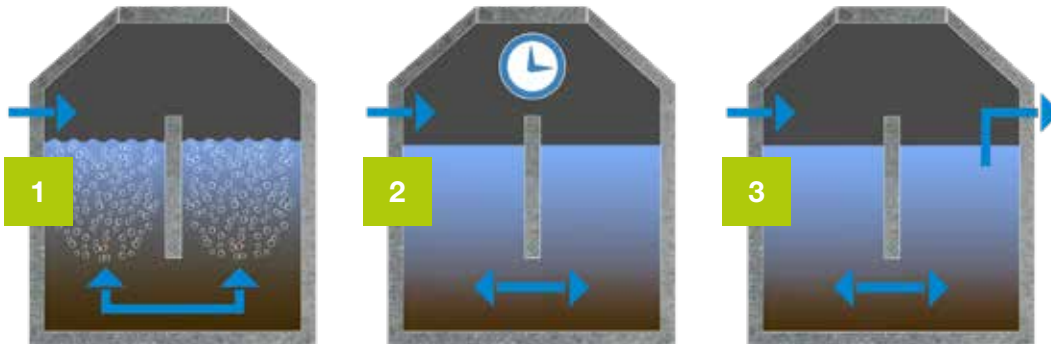


Results of the practical test carried out by PIA (Prüfinstitute für Abwassertechnik GmbH), Aachen test report number PIA2014-216B14.02

*average effluent values and efficiencies of the plant operation for nominal phases (100%)

** nitrogen characteristics for water temperatures of 12°C and more in the bioreactor

Process KLARO One

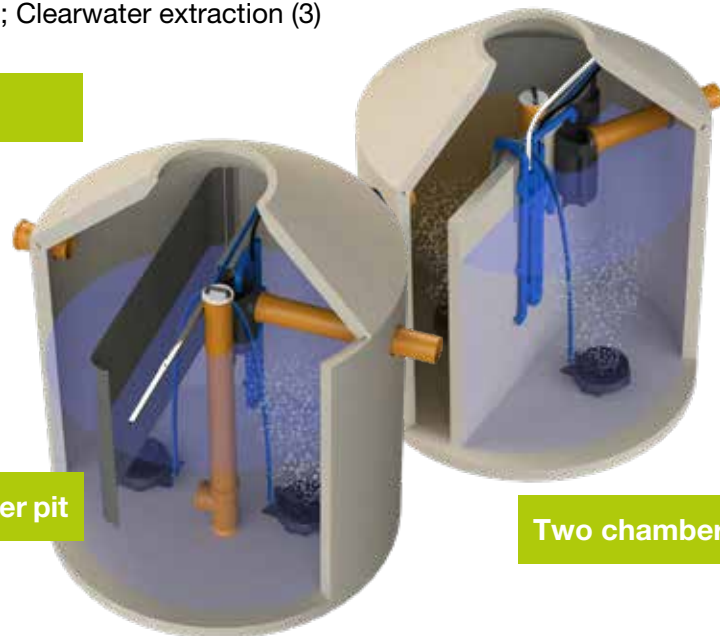


Aeration phase (1); Sedimentation phase (2); Clearwater extraction (3)

Advantages

- Can be installed in one chamber pits
- Longer non-desludging periods
- No odor
- Can be mounted by just one person
- Water reuse possible

Single chamber pit



Two chamber pit

Effluent values

Wastewater parameter	KLARO One Effluent values*	Efficiency*
COD (chemical oxygen demand)	41 mg/l	94.2 %
BOD ₅ (biochemical oxygen demand)	7 mg/l	96.0 %
NH ₄ -N (ammonium nitrate)**	0.5 mg/l	96.3 %
N _{tot} (total nitrogen)**	7.9 mg/l	87.0 %
P _{tot} (total phosphate)	1.6 mg/l	96.3 %
SS (suspended solids)	14 mg/l	96.3 %



Results of the practical test carried out by PIA (Prüfinstitute für Abwassertechnik GmbH), Aachen test report number PIA2014-216B14.02

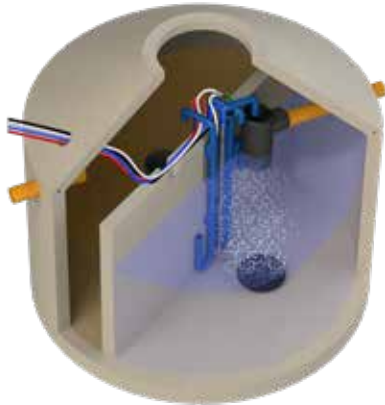
*average effluent values and efficiencies of the plant operation for nominal phases (100%)

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KLARO components

Tanks (not delivered by KLARO)

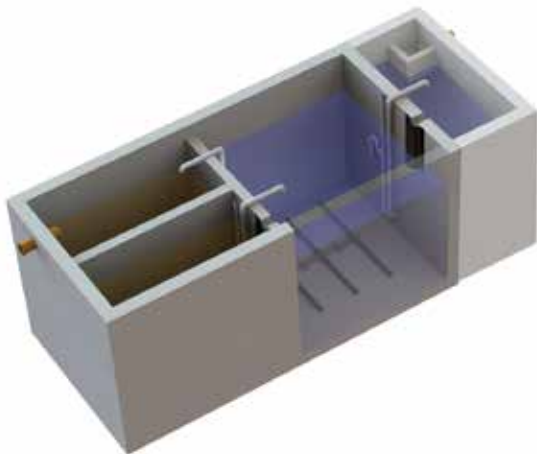
Concrete tanks



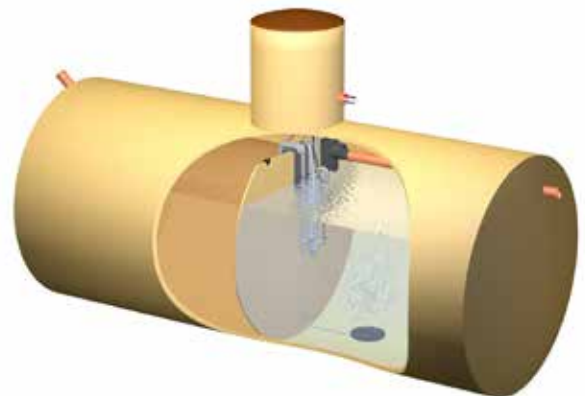
Plastic tanks



Onsite concrete



GRP tanks



Advantages

- Installation in new or existing tanks
- Various materials (concrete, plastic, GRP ...)
- For every tank geometry (round, rectangular ...)
- Retrofitting for 1-, 2-, 3- or 4-chamber pits

Examples of switch cabinets

KLARO Indoor switch cabinet EPP

- Cabinet sizes from 4 to 10 PE
- Minimal space required: 40 cm x 54 cm x 29 cm



KLARO Outdoor switch cabinet plastic

- Cabinet sizes from 4 to 10 PE
- System size starts at 37 cm x 80 cm x 38 cm



Retrofit kits

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

1 Air connections

2 Patented air barrier

3 Adjustable feed

4 Inflow chicane



KLARO *airlift.*blue

Plants from 50 PE / 7.5 m³ - 5,000 PE / 750 m³

Individual projects

Systems for more than 50 inhabitants / 7.5 m³ 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 / 7.5 m³ are planned as individual projects. Our experienced team of engineers and technicians will help you to plan your project. We take all local circumstances into account from the concept planning phase to implementation.



Machine technology

- Alternative to a conventional control cabinet
- Technical components can be installed in a dedicated room or machine house
- Sufficient space for components
- Maximum flexibility



Outdoor cabinet 4

- Size:
120 x 111 x 80 cm
- Empty weight:
140 kg

1



Stepping motors replace solenoid valves

- Nearly maintenance free
- Control with 24V DC
- Almost noiseless
- Minimum power consumption

Additional components

Remote monitoring

WebMonitor



The KLARO WebMonitor® comes in useful whenever highest level of operational reliability and stress-relief of the operator are desired at the same time, . The plant can be monitored by a maintenance firm via a remote diagnostic system. In the event of a fault, intervention is possible immediately from home via internet.

The KLARO WebMonitor® offers many advantages for the operator and for our partners!

- higher customer benefit due to monitoring service
- cost-effective remote diagnosis in the event of a fault
- higher effectiveness and higher operational reliability
- optimised service intervals

UV module

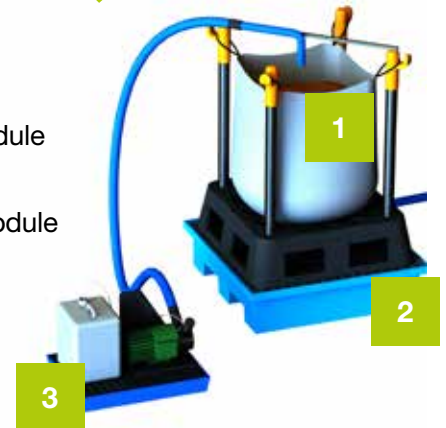
- For disinfection
- For sensitive zones with high requirements
- Simple, retrofittable
- Low operating costs
- Can be integrated into a tank



Sludge dewatering

- Dewatering of excess activated sludge
- Reduction of sludge mass, volume and disposal costs
- Simple and save handling; 10 m³ sludge in one filter bag
- Good for remote places with no availability for desludging
- Dried sludge can be used for composting
- For KLARO One and KLARO container.blue®

- 1 Filter bag
- 2 Filter module
- 3 Pump module



Pumping unit



Remaining solids

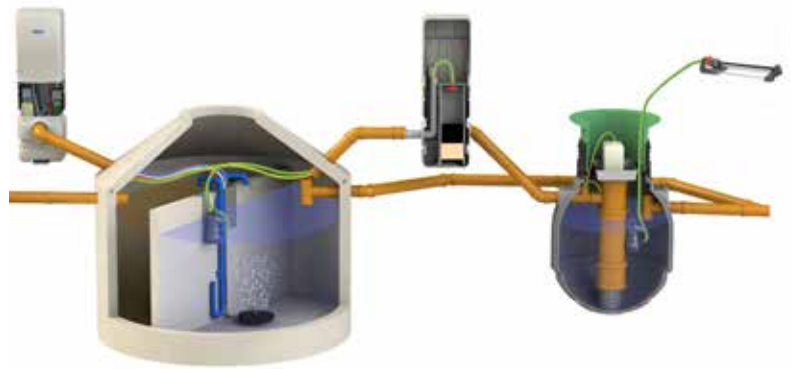
Phosphate pump

- For phosphorous elimination
- Supplementary component
- Long life span
- Easy to maintain



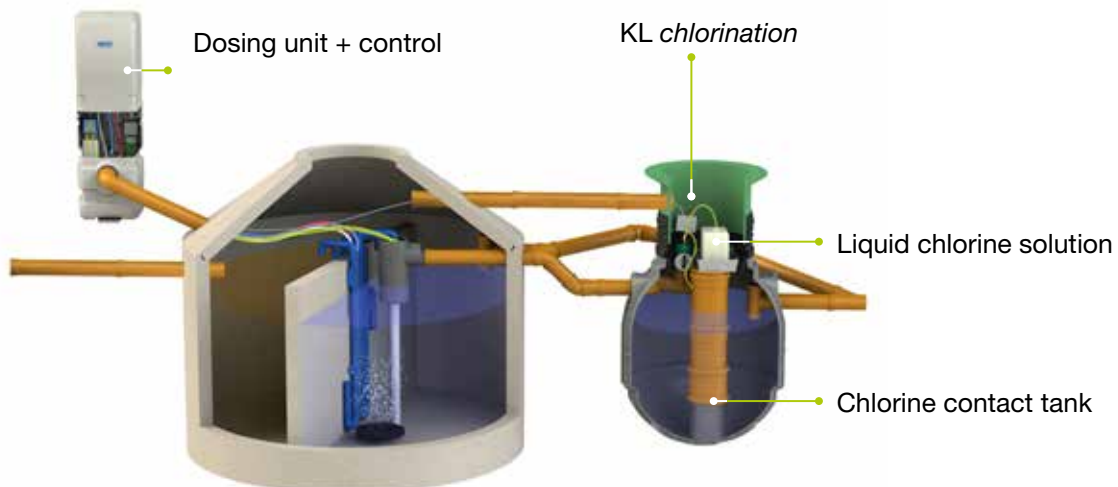
KL reuse

- Further reduction of COD and BOD followed by chemical disinfection; prevention of pathogen regrowth through long term effect of chlorine; disinfection by fluid chlorine
- Very small non harmful doze of chlorine, chlorine dosing timed with batch arrival
- Recycled water safe for handling (e.g. car washing)
- Automatic backwash system for sand filter
- Possible up to 30 PE or 60 PE (with two-lines)



KL e-chlorination

Health considerations as well as legal regulations often lead to the need of a safe and reliable disinfection of secondary effluent. Chlorination is the worldwide most established method for the effective kill of pathogens in the wastewater. The KL e-chlorination module works with liquid chlorine and prevent a recontamination with its storage effect. The module uses electrodes, which activates the chlorine dosing if it's needed. The system has no connection to the control and is mounted in the contact tank. This allows a big flexibility, so the KL e-chlorination can be installed after a SBR-plant or a continuous running system.



Advantages

- Disinfection with a widely available sodium hypochlorite solution
- Safe and easy handling of the chlorine
- Plant-specific dosing with the chlorine dosing pump
- Module runs without a control connection – easy retrofitting
- No electric parts in the bio reactor necessary
- Modular principle: one module up to 500 PE – easy upsca-ling with parallel connection
- Total coliforms will be nearly completely killed

Facts

- For plants up to 500 PE / 75m³/d
- No electric parts in the bio reactor necessary
- No submersible pump needed
- Expandable and easy maintenance
- The system is independent of the plant control
- Resistant electrodes

Light fluid separator class I & II

In sites where wastewater containing oil and petrol accumulates, the wastewater must be cleaned through a light fluid separator before it can be discharged into the drain. The system consists of a separation zone, an oil collector, a sludge trap and a sampling point. The light fluid separators are available as petrol separators or as coalescence separators from NS 3 to 15.

The system is suitable for:

Car wash facilities and workshops, Petrol stations and vehicle fleets, Hazardous goods stores

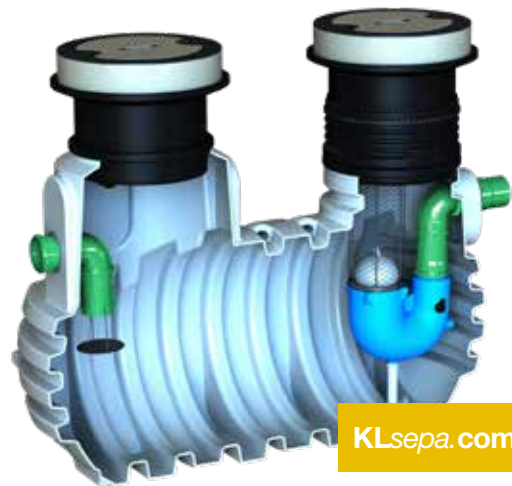
Potential accessories:

Optional sludge collector, Warning systems, Optional integrated sampling port

KLsepa.compact+



Effectiveness according to EN 1825 tested by the TÜV Rheinland.



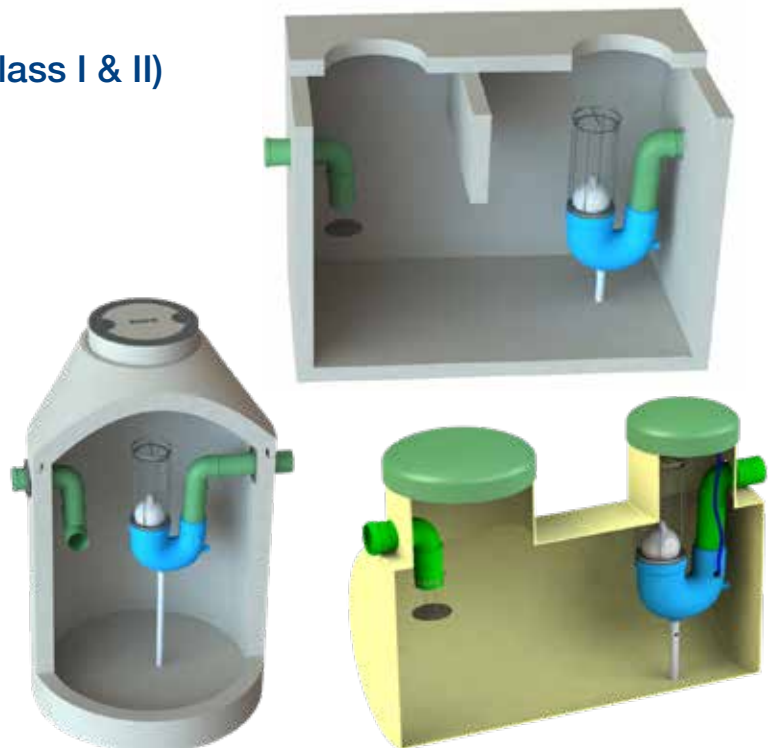
KLsepa.compact+

KLARO light fluid separation unit (class I & II)

KLsepa.blue (Class II) and KLsepa.blue+ (Class I) is the separation unit we are using in our KLsepa.compact light fluid separators. Caused by the flexibility of the KLARO separation technology, it can also be used for prefabricated concrete and GRP-tanks as well as for on-site concrete tanks.

With this separation unit, we are able to meet the requirements of customers, who already have the necessary tank for their separator.

Therefore we offer the KLsepa.blue retrofit-kit, which can fit in round and rectangular tanks observing a few parameters.



Grease separator

In sites where wastewater containing fat accumulates, the wastewater must be cleaned through a grease separator before it can be discharged into the drain or a KLARO wastewater treatment system. A grease separator operates according to the principle of phase separation. It consists of a separation zone, a fat collector, a sludge trap and a sampling point.



The system is suitable for:

- Kitchen enterprises and canteen kitchens, e. g. restaurants, hotels, motorway services, ...
- Refineries for cooking oil
- Butcher shops and slaughterhouses

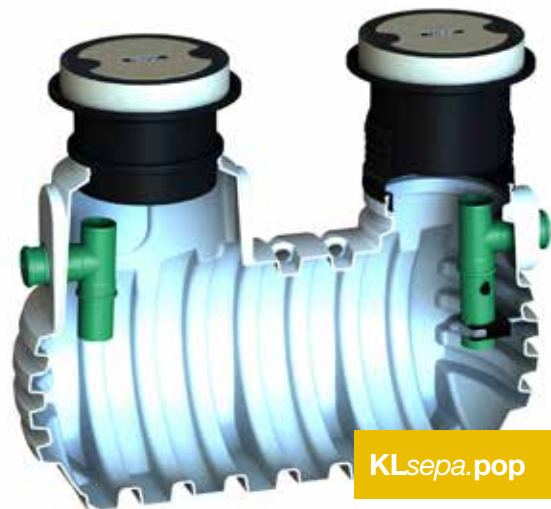
Potential accessories:

- Optional with an internal sampling port or an integrated sampling point

KLsepa.pop



KLsepa.pop



Effectiveness according to EN 858 tested by the TÜV Rheinland.

References for wastewater and separators

Walchensee

- Holiday region at lake “Walchensee”, Germany
- More than 150 plants (4 PE/8 PE) installed for a village
- 200 PE system for a hotel
- Phosphate precipitation and hygienisation (UV)



Commercial wastewater

- 80 PE wastewater treatment system for winery at Lake Geneva, Switzerland
- Three different types of wastewater (domestic, industrial, commercial)
- Wastewater from wine press, household and public room
- Strong fluctuations
- Plant was scientifically monitored



Reuse system

- 30 PE reuse system for wedding venue and tea farm, Australia
- Peak flows on the weekend with very high requirements for effluent
- Recycled wastewater is used for tea plant irrigation



Systems up to 1,225 PE

- 1,225 PE plant for village in Hungary
- Tank manufactured according to our specifications
- Multiple line system



Multiple lines

- 160 PE (2 x 80 PE) two-line wastewater treatment system for campsite in Givrand, France
- Biological treatment in two SB reactors
- During high season all lines are activated
- One line can be shut down during low season



Grease separator

- Separates the grease from a small restaurant's wastewater
- Separator NS 4 with 500 l sludge storage
- Using a small SAPHIR tank



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