

پکیج تصفیه و بازچرخانی فاضلاب بهداشتی به روش Advanced SBR
دارای گواهینامه استاندارد : EN-12566

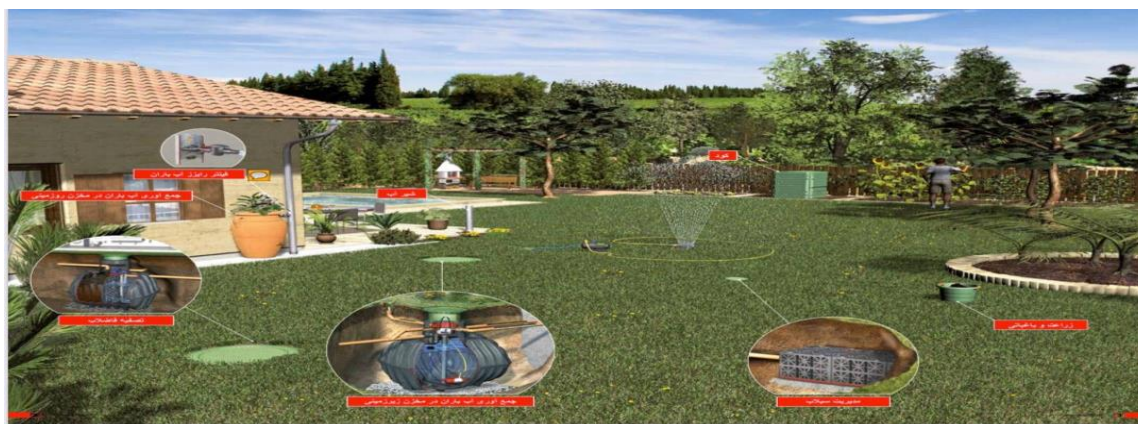


ارائه دهنده روشهای پیشرفته تصفیه آب و فاضلاب و بازچرخانی آب

منابع آب شیرین در جهان و به طور خاص در منطقه خاورمیانه محدود و رو به کاهش می باشد. این منابع دارای ارزش اقتصادی، اجتماعی و زیست محیطی هستند. بزرگ شدن شهرها و افزایش جمعیت آنها از یکسو و گسترش صنایع و کارخانجات از سوی دیگر، اهمیت مسئله آب و محیط زیست را بیش از پیش نمایان می سازد.

در حال حاضر کشور عزیزمان ایران با مشکلات عدیده ای در خصوص کم آبی و فاضلاب مواجه می باشد، از یک سو با کاهش ۵۰ درصدی بارشها در سال جاری، کم آبی تبدیل به بحران ملی شده و از سوی دیگر تخلیه فاضلاب به محیط زیست باعث از بین رفتن آب و خاک شده است. از نگاه متخصصان این علم یکی از اصلی ترین راهکارهای مقابله با بحران کم آبی استفاده از منابع جایگزین نظیر آب باران، آب سطحی و فاضلاب می باشد که از این میان فاضلاب بعنوان یک منبع جایگزین دائمی و در دسترس، از اهمیت و اولویت بالایی برخوردار می باشد، زیرا با تصفیه و بازچرخانی فاضلاب در پروژه های گوناگون می توان ضمن صرفه جویی قابل ملاحظه (حتی تا ۵۰ درصد) در مصرف آب، از آلودگی محیط زیست نیز جلوگیری بعمل آورد.

با همین نگرش طی ۳ دهه گذشته کمپانی های معتبر و پیشرو در صنعت تصفیه و باز چرخانی فاضلاب، با بهره گیری از دانش و تکنولوژی های نوین، سیستم هایی را طراحی و تولید نموده اند که علاوه بر افزایش راندمان تصفیه، در طیف وسیعی از پروژه های کوچک و بزرگ و کاربرهای مختلف کاربرد دارند، به گونه ای که با بکارگیری این پکیج های نوین می توان فاضلاب بهداشتی یک خانه ویلایی تا پساب صنعتی کارخانجات مختلف، را تصفیه و مجدداً استفاده نمود.



کمپانی **PPU Umwelttechnik GmbH** در سال ۲۰۰۷ توسط یک مهندس آلمانی به نام آقای ولفگانگ پوهنل (Dipl.-Ing (FH) Wolfgang Pöhl) به همراه دیگر متخصصان فاضلاب در شهر کمناث آلمان (Kemnath-Germany) تأسیس شد و تا کنون بیش از ۴۵۰۰۰ پروژه کوچک و بزرگ در اقصی نقاط دنیا اجرا نموده است. محصولات این کمپانی با برند **CLEAR FOX** در دنیا ارائه میشود.

از ابتدا تمرکز متخصصان این کمپانی بر طراحی و ساخت سیستمهای تصفیه فاضلاب و پلنت های تصفیه لجن بود و در ادامه با شراکت و همکاری با سایر کمپانی های اروپایی، موفق شدند طیف وسیعی از سیستمهای تصفیه آب و فاضلاب و لجن را بر اساس استانداردهای اروپایی طراحی و تولید نمایند. در همین راستا کمپانی **AQUAPLAST** از همان ابتدا با کمپانی **PPU** شریک تجاری بوده و همکاری داشته است و طراحی و ساخت قطعات پلاستیکی سفارشی را در این هلدینگ بر عهده دارد.

دلیل اصلی موفقیت خارق العاده محصولات **Clearfox** در دنیا، بکارگیری تخصص و تکنیک در کنار تجربه میباشد.

پروژه جدید این کمپانی، طراحی سیستمهای اکسیداسیون الکتروشیمیایی پیشرفته (AEO) است که در بهار ۲۰۲۱ به تولید انبوه رسیده است.



تاریخچه کمپانی PPU



2007/2008

PPU Umwelttechnik GmbH was founded in 2007-2008 by Dipl.-Ing(FH) Wolfgang Pöhl together with other wastewater specialists in Kemnath-Germany.



2008

In 2008 the PPU moved to Bayreuth. The reason was a specialisation in the construction of modular container sewage treatment plants, which are distributed worldwide by partners under the PPU own label Clearfox. The traffic connection became therefore a very important location factor. The Clearfox brand has always stood for modular solutions of the most diverse process technologies, which are adapted to the respective market conditions.



2009

In 2009 Clearfox nature – an absolute novelty on the sewage market – received all official approvals throughout Europe for market entry. In the following years, in addition to the Clearfox SBR plants and Clearfox Retrofit Kits, the domestic sewage treatment plant operated without electricity began an almost global triumphal march against conventional sewage plants.



2010

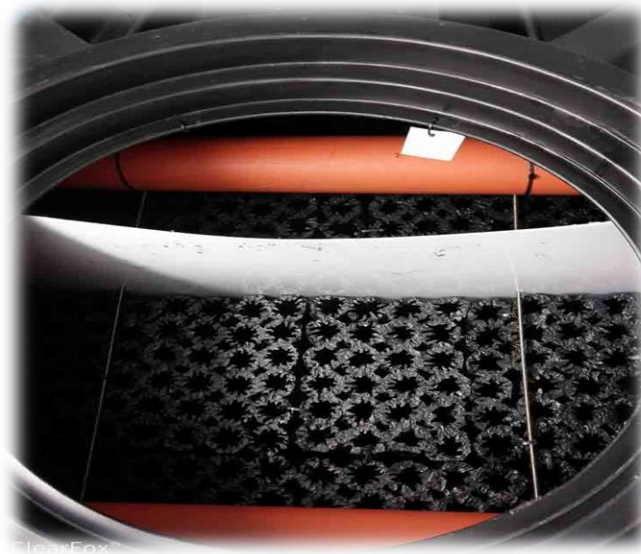
From 2010, the Clearfox flotation system with improved sludge discharge by means of an airlift was optimised in the production process. As a result, it could be sold as a patented OEM product to plant manufacturers worldwide.



2011

In 2011, the PPU wastewater laboratory was expanded for pilot tests, so that tailor-made solutions can be offered especially for industrial wastewater. Since then, the laboratory and pilot service has been managed by an internationally renowned wastewater specialist.

In the same year more and more parts of the standard production of Bayreuth were outsourced to contractually bound partner companies. The Clearfox contract manufacturers were provided with special aquaplast tools to increase quality and productivity.



2012

In 2012 the standardised production of FBR reactors and lamella separators in sea containers was started. For the watertight lining of the containers, hollow bodies (inlets) specially developed by aquaplast were used. Since then, the success of this construction method has been based on its high chemical resistance and the absence of any underwater welding seam.



2013

In 2013 a variant of the proven cascaded Clearfox fixed-bed stage was developed. Since then, this has been used for wastewater with high nitrogen loads, such as reducing the N content of liquid manure and fermentation residues. The required growth media are explicitly produced by a partner company for this application. Furthermore, the first Clearfox nature in prefabricated concrete tanks and by the end of the year the 5,000th Clearfox nature in aquaplast PE tanks had been delivered.



2014

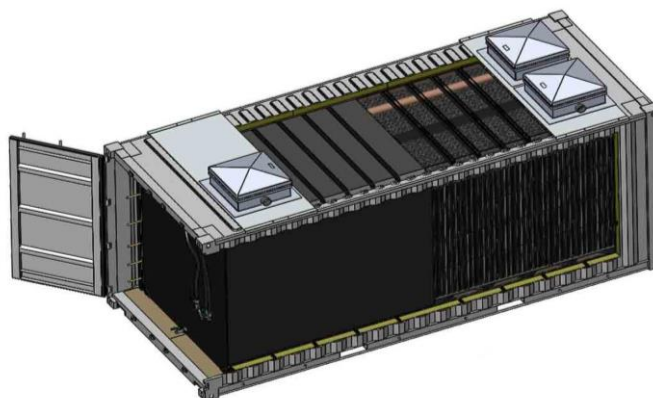
In 2014, the Bayreuth production facility was expanded to include the area of sample construction and test rigs. Here, the Clearfox wastewater modules, which had been tried and tested in practice, were tested, optimised and documented from a production engineering point of view. The reason for this was that the PPU contract manufacturing companies were able to ensure consistent quality for the end customer.

The area of waste water treatment especially for the food industry was focussed, it was now possible to cover the complete range (from pre-treatment to reuse of waste water) by means of prefabricated modules.



2015

Additional storage space was rented in Bavaria in 2015. The product range was expanded to include a leasing sector. Various prefabricated cleaning modules were stored especially for the German-speaking region (D-A-CH). These could be delivered and commissioned by PPU within a very short time. Since then, many plants composed of modules have performed well in Germany, Switzerland and Austria in the case of temporary (leasing contract) wastewater treatment.



ClearFox®

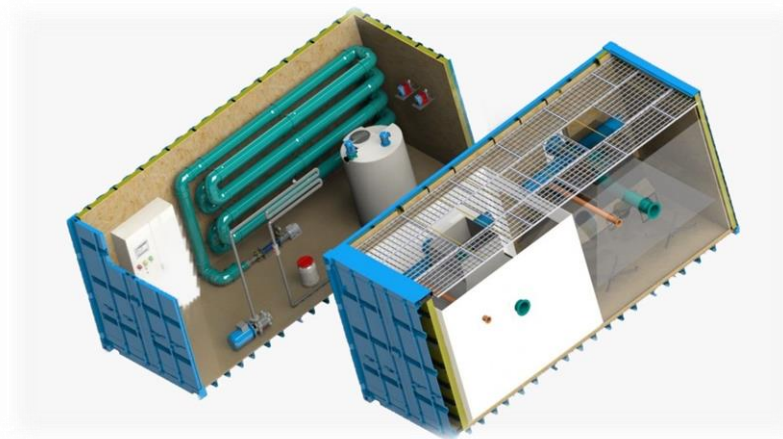
2016

In 2016, the Clearfox FBR (cascaded aerated fixed bed) bioreactor was successfully certified for COD degradation up to 150kg/(container x d) after one year of testing. This was the only high performance bioreactor in the world, in a sea container, which was ever certified by an independent testing institute. In the meantime, more than 80 of these high performance reactors are produced annually by PPU itself or by PPU contract manufacturers and delivered worldwide. Furthermore, an internationally successful sales manager joined the Clearfox team, who has since strengthened the international presence of partner companies, production facilities and local offices for Clearfox products.



2017

In 2017 the proven QuickQNE+ technology (single chamber SBR plant with sludge stabilisation) was also standardised for wastewater treatment plants with more than 5,000 population equivalents. This technology is now also being used worldwide through the global partner network and replaces conventional SBR plants. Since then, an average of more than 1,500 plug&play biotreatment plants per year have been built by PPU contract manufacturers and delivered directly to partner companies.



2018

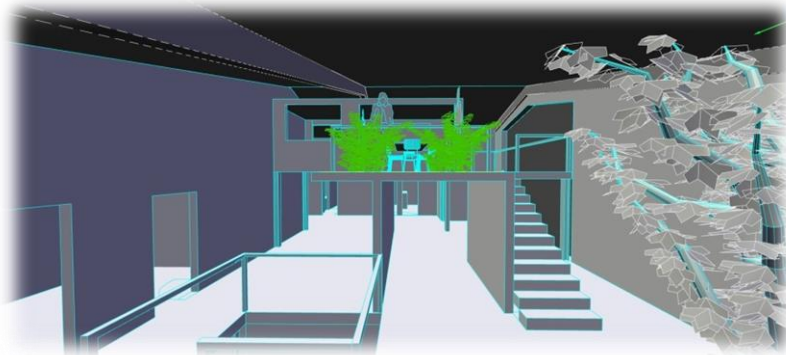
In 2018 the Clearfox DAF with Airlift sludge discharge was implemented as a rectangular version in HC sea containers. The size range $Q > 50 \text{ m}^3/\text{h}$ waste water could therefore be extended more easily to over $300 \text{ m}^3/\text{h}$ by connecting sea containers in parallel, daily waste water volumes of more than 5000 m^3 could now be realised much more easily.

Furthermore, the development of a biocomponent fibre as a growth medium for high-performance bacteria for nitrogen decomposition was started within the framework of a research project. (Project Biocomps, completion 2022)



2019

In 2019 the company moved to the new location in Bayreuth – Carl Kolb Strasse. Since then, the sample construction, engineering, laboratory, test stand as well as parts of the production and the entire technical processing are located on 4500 sqm.



2020/2021

In 2020/21, the office and production at the new Bayreuth location were expanded to include a visitor lounge and a room for sampling wastewater systems.

(Due to the corona situation, this construction will be slightly delayed, the provisional completion date is 01.04.2021).

With this extension, international customers will have the opportunity to get answers to all questions regarding Clearfox products in a pleasant atmosphere. It is also planned to train supervisors, operating personnel and partner companies for operation and maintenance on the property.



گواهینامه نمایندگی رسمی از کمپانی CLEAR FOX آلمان



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Bayreuth, the 4 November 2020

IRAN Official Partner for ClearFox®

We confirm that **Espid Ab Alborz Company** is considered as official distributor of PPU Umwelttechnik GmbH for the country of Iran. **Espid Ab Alborz Company** distribute the full range of innovative wastewater treatment solutions manufactured by PPU under the ClearFox brand name.

Signed: James Clarke – International sales manager – james@clearfox.com

Distributor details:

Espid Ab Alborz

Managing Director:

Mr. Ali jahanzadeh

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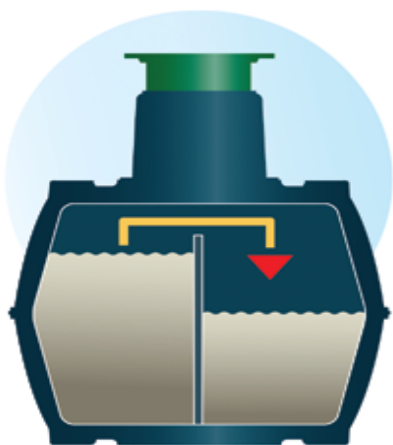
Bank account
Hydrotechnik Bayreuth
SWIFT-BIC: HYVEDE33
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معرفی پکیج های تصفیه فاضلاب به روش SBR :

در این روش تمام مراحل تصفیه فقط در دو حوضچه صورت میپذیرد و با توجه به مزیت‌های زیاد این روش، اکثر شرکت‌های معتبر دنیا، سیستم‌های خود را بر اساس این روش طراحی و تولید میکنند.

در تصفیه با روش SBR همواره سیستم دارای دو مخزن می باشد که مخزن اول محل ته نشینی و جمع آوری لجن است و مخزن دوم محلی است برای انجام عملیات تصفیه که به اصطلاح مخزن SBR نامیده می شود. بنابراین در این روش همواره دو محفظه و یا مجموعه مخازن اولیه و ثانویه جهت تصفیه وجود دارند. جهت واضح تر شدن موضوع، سیکل تصفیه با روش SBR در یک مخزن دارای دو محفظه به شرح زیر توضیح داده می شود:

سیکل تصفیه در روش SBR



۱- فاز پرشدن Charging phase

فاضلاب وارد محفظه اولیه شده و مواد جامد پس از طی مدت زمان لازم ته نشین می گردند. سپس لایه روئین از محفظه اولیه به محفظه SBR می ریزد.



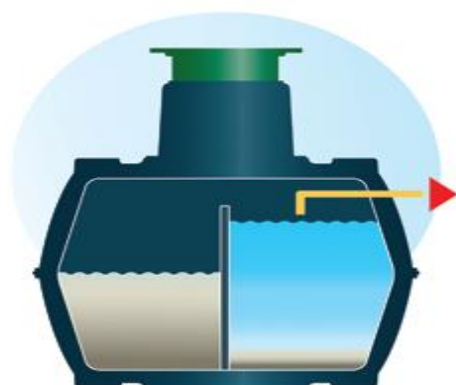
۲- فاز هوادهی Aeration phase

تصفیه بیولوژیکی میکروارگانیسم‌ها با شروع هوادهی در محفظه SBR آغاز می گردد. با یک هوادهی کوتاه مدت و طی شدن فاز استراحت (Rest phase)، ته نشینی و جداسازی بوقوع می پیوندد. حال این لجن فعال شده و در مخزن SBR با استفاده از میلیون‌ها میکروارگانیسم، عملیات شفاف سازی آب را به انجام می رساند.



۳- فاز استراحت Rest phase

در این فاز میکروارگانیسم های هوازی (موجودات زنده) در کف مخزن غرق می شوند و در حین ته نشینی، آب زلال در لایه روئین مخزن SBR قرار می گیرد.



۴- فاز تخلیه Sewage Water draw-off

پساب زلال به دست آمده در این فاز به بیرون مخزن SBR هدایت می شود (نهر، رودخانه، دریا) و یا امکان ریختن به چاه جذبی را پیدا می کند.

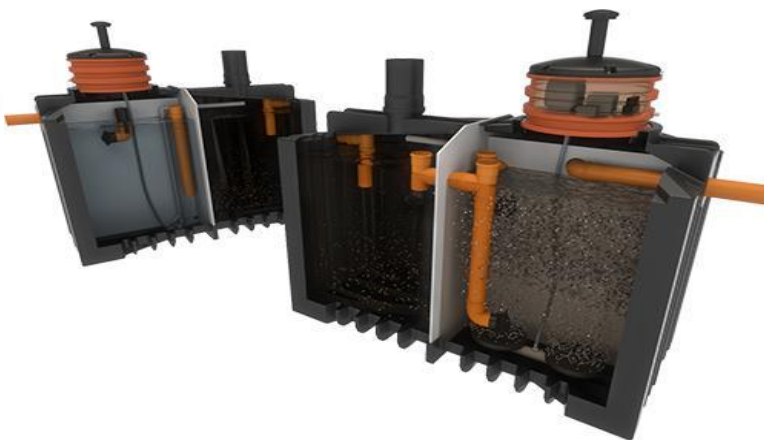
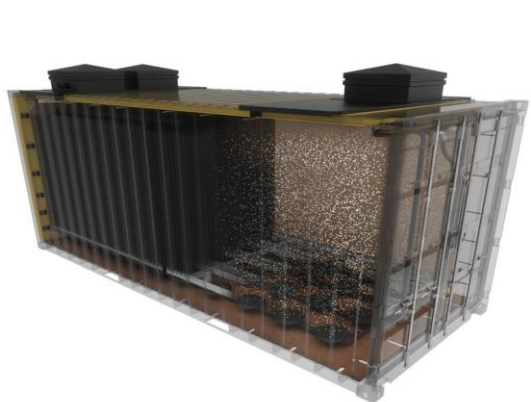
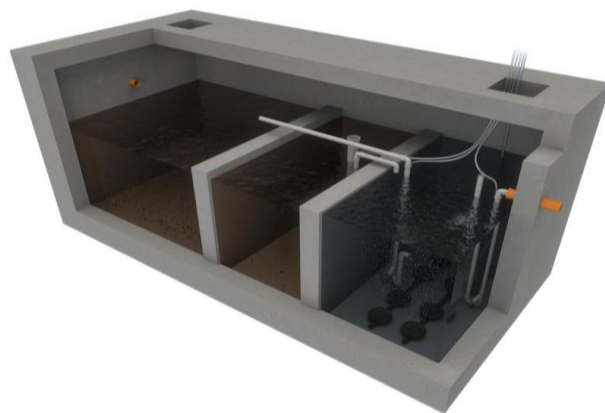
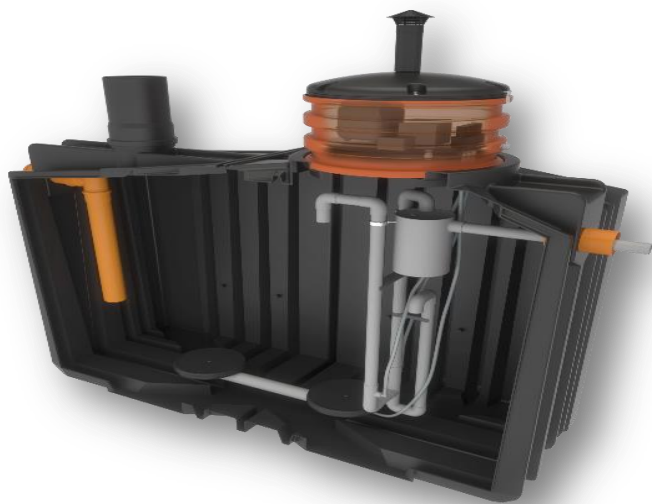


۵- به کارگیری لجن فعال Sludge Return

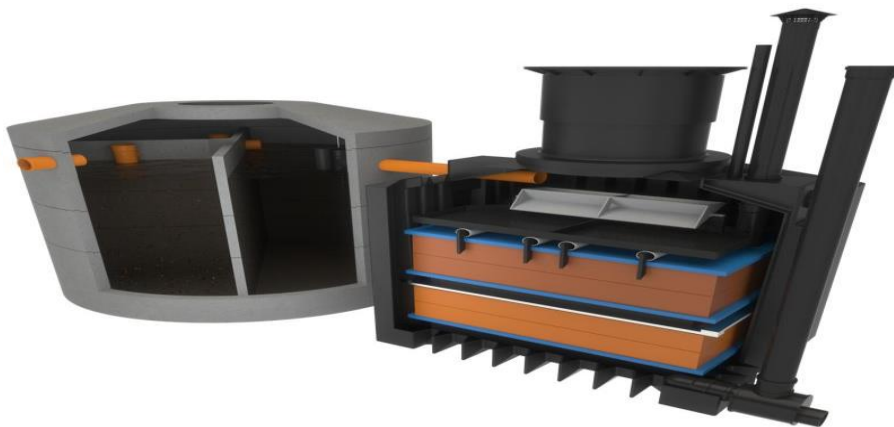
میکروارگانیسم های بارور شده با روش هوادهی عمقی، پس از خروج پساب تصفیه شده، از کف مخزن ثانویه به مخزن اولیه منتقل شده و عملیات تصفیه بی هوازی در مخزن اولیه آغاز می گردد.

پساب تصفیه شده به این روش حائز شرایط استاندارد محیط زیست میباشد و جهت آبیاری فضای سبز قابل استفاده است. BOD_5 این پساب بیش از ۹۵٪ کاهش میابد. لجن مازاد نیز طی سیکل های یکساله توسط ماشین لجن کش از مخزن اول میبایست تخلیه شود.

پکیج تصفیه فاضلاب Advanced SBR ساخت کمپانی ClearFox آلمان



www.clearfox.com



Everything clean:
treat sewage in a clean
and sustainable way!





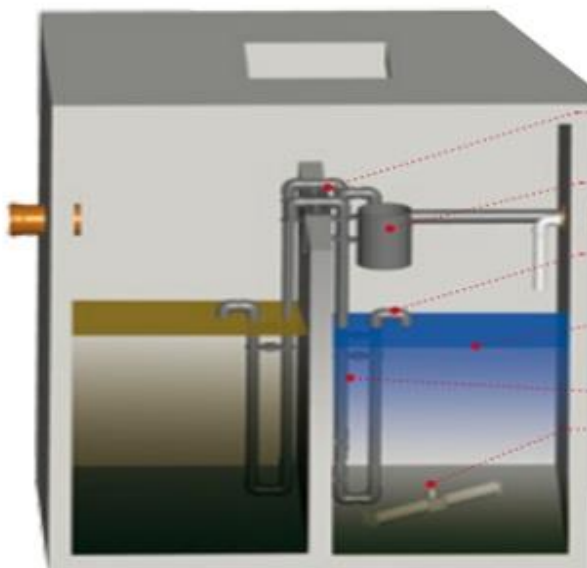
High quality components, thorough processing and sophisticated system:

Technically the best!



- easy...con Control with oxygen control O₂-Control (EP patented)
- Fully graphical illuminated display
- Stainless steel supports
- Coloured pressure hoses for easy and unambiguous assembly
- High quality GFK-control cabinet in series for inside and outside (IP 44)

Figure similar



- Adjustable holder for optimal adjustment to the partition wall
- Large sampling container for easy sampling including
- Wear-free air-lift pump of high quality industrial standard (instead of pumps)
- Exact, stepless measuring of water quantities without float
- Automatic surplus sludge removal
- Aerator removable also during operation

SBR process with stepless measurement of the water level via pressure sensor:



Filling

Incoming waste water will be collected in the left chamber. First, dirt particles settle out. The compressed air sensor controls the continuous transportation into the biological cleaning chamber (right chamber) according to requirement depending on the waste water quantity.



Venting

Waste water is biologically cleaned by oxygen supply and circulation. The automatic control optimises the venting time stepless and guarantees that always only the actually necessary energy is used ...



Settling out

The heavier bio mass sinks to the bottom during the settling out phase; a "clear water zone" with the cleared waste water forms in the upper region.



Separating

The reliably reacting air-lift pump takes the cleared water "into the open" – directly into a body of water or a leaching.



Sludge removal

The bio mass generated at the same time is however returned into the settling out chamber ... Than the cleaning process starts again ...

In focus:

Clear step ahead in technology



State of the art controls with measurable benefits

batchpur small sewage treatment plants are characterised by a newly designed intelligent easy...con control unit module. The whole construction is high quality. All connecting adapter are made of stainless steel and can be replaced quickly and easily in a service-friendly manner.

The advantages of the new control unit at a glance:

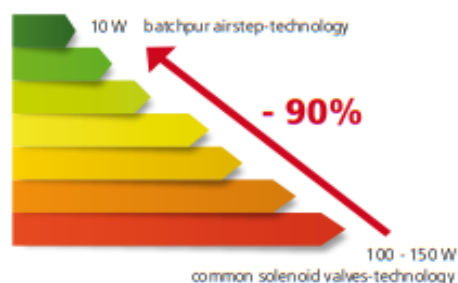
- sensationally low energy consumption in standby mode of under 1 watt
- illuminated display with graphic presentation
- comfortable 6 button control for easy use
- USB connection for simple software updates
- Electronic user manual which can be access as standard via the display, the USB interface or optionally online



Super silent air distributor system with long service life

What distinguishes the sophisticated but cost-saving differences of batchput plants from others?

- **90 % less energy consumption in the air distribution system:** batchpur plants operate in the Airstep air distribution system with stepped motors and not solenoid valves. Solenoid valves have the disadvantage that during opening they must be constantly supplied with energy. This means for you as a consumer, for example, that the solenoid valve must be powered throughout the aeration time. If the aeration time exceeds 15 minutes, then the solenoid valve requires power for 15 minutes. Usually between 10-15 watts. The calculation is quite a simple one: When the solenoid valves are open a total of 10 hours per day in a conventional sewage treatment plant, this means power consumption of 100 to 150 watts each day. **For the same period the batchpur stepped motor system requires less than 10 watts.**



- **Super silent technology:** Solenoid valves cause a typical noise with each gear change. Stepper motors are barely audible. **Gentle technology which goes easy on the material.**
- **Well-designed technology:** The stepper motors in the Airstep system are made of high quality material and being reversible – can therefore be easily replaced when necessary.

Further information see page 14.

ClearFox[®]
[be clever]



Comfortable remote monitoring

- The new easy...con control enables a user-friendly and logical remote monitoring of the system by modem connection. You log on to your secure access to the operational data of your system, you can control the parameters and print the instruction manual directly from a PC. When on the go you always have secure access to your treatment plant.
- The sewage treatment plant with the easy...con control has the technical approval should the operator controls fail: The operator does not have to check the plant since this control function is assumed by the easy...con control via a modem and logged automatically in the operations manual and, where appropriate, it informs the operator by email.

Further information see page 20/21.



Easy to assemble and maintain on the long term ...

- In the event of any failure with a easy...con control with Internet connection the customer service can immediately check from the office and if necessary rectify the problem inexpensively in this way. If there is a fault, the causes can usually be diagnosed and the service technician has a clear picture of the action or spare parts that are needed and can work efficiently on site.



Responsible and farsighted choice of materials and design

- batchpur small sewage treatment plants are designed and manufactured with care and foresight. These are fine technical details that are born from the commitment to sustainability and performance, such as quality, durable material of the individual components, production in accordance with high levels of industry standards, glued or welded joints in plastic pipes and sockets instead of using quick-fit joints etc. As a consumer you will realize these benefits as the plant ages. It is then that the individual components from batchpur can be fitted and replaced quickly and economically.



= real quality!

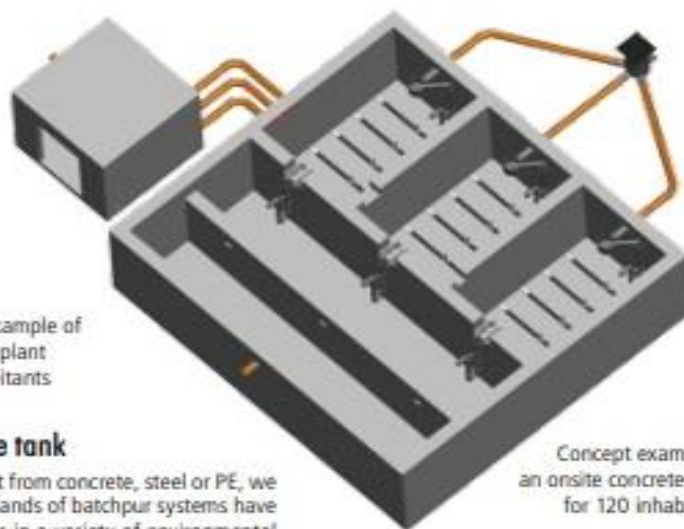


Ask us.
We find the solution!

Service & Know How



Concept example of
a concrete plant
for 6 inhabitants



Concept example of
an onsite concrete plant
for 120 inhabitants

Planning, technical advice and design of the tank

If you want to build the container of your batchpur plant from concrete, steel or PE, we put our experience at your disposal: For decades, thousands of batchpur systems have been running in containers of various sizes and designs in a variety of environmental and climatic conditions. Therefore, we know exactly what it takes to build a container and how to tackle such a project in an efficient and successful way. **From systems for small households to large batchpur treatment systems up to 1000 inhabitants.**

**We think ahead and we are happy
to share this knowledge with you.**

Wastewater solution for your holiday home

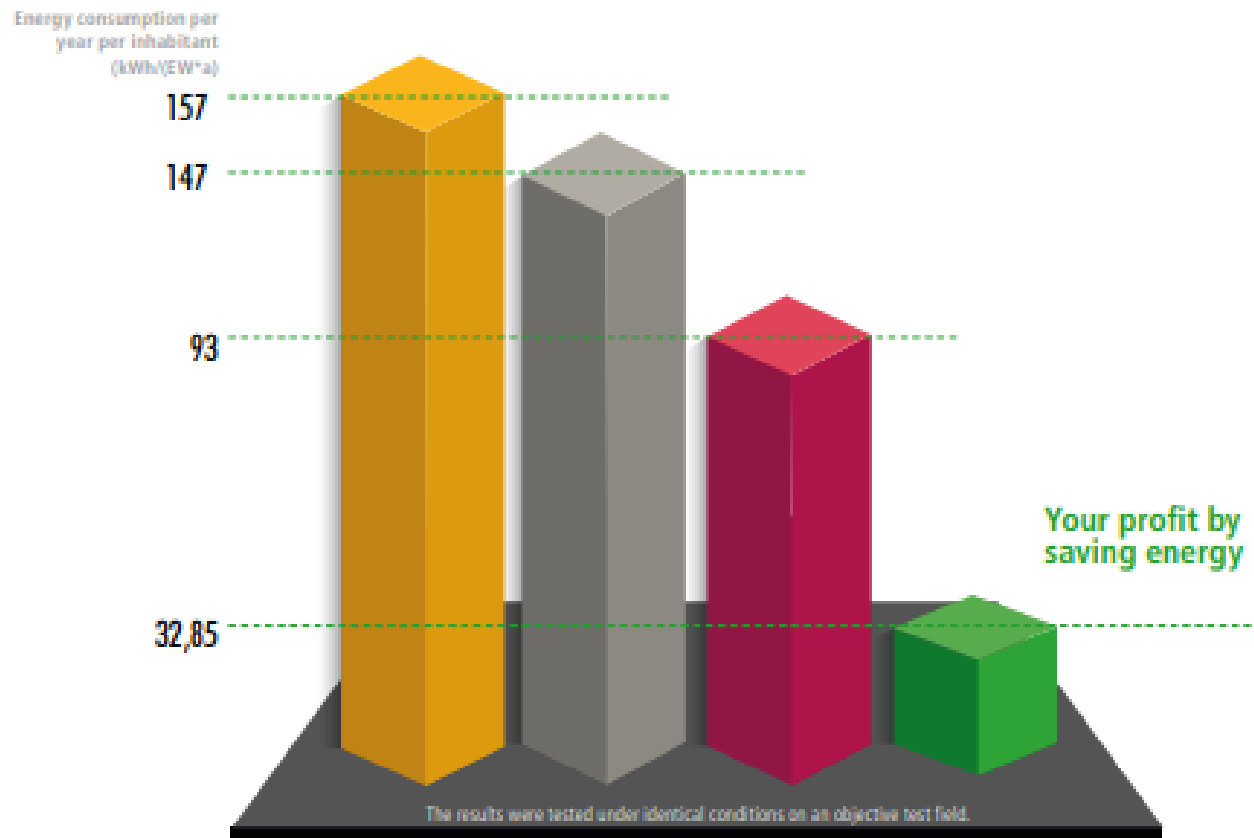


demonstrably best values
under extreme underload.
Therefore, the batchpur
plant is perfect suited for
your holiday home.

- Gastronomy, Hotels
- Single family houses / Multiple family dwellings
- **Holiday homes**
- Farms
- Businesses
- Camping sites
- Motorway service stations
- Sewage treatment plants for housing estates, villages and hamlets

Please contact us, we are happy to
provide information about the holiday test.

Clearfox performs better and is more economical!



*Source of the information: Journal "wvt", Issue 6/2007, "The small sewage treatment plant as a sustainable solution, page 15, table 3, practice data"

Fixed bed plants*

Fluidized bed plant*

SBR-plants*

Clearfox
SBR-plant*

All
inclusive

Cleaning class C

Cleaning class N

Cleaning class D



Cleaning System

ALC[®]-system for clear water pumps



Problem:
Sludge particles in the air
lift pump after aeration



Without ALC[®] technology:
The sludge is pumped
in the clear water tank



**Solution with
ALC[®] technology:**
The sludge is pumped
back in the pre-treatment



Result:
Purified waste water in
the clear water removal

This solution comes from batchpur:
perfect completely - completely perfect!

During aeration in all SBR plants, sludge particles enter in the clear water air lift pumps. Now, as the first supplier of small wastewater treatment plants, batchpur has the solution for this problem:

With the European patent application ALC[®] technology (Air Lift Cleaning), the pump for clear water discharge is rinsed with purified wastewater and the sludge particles entering the system are transported back to pre-treatment. The subsequent clear water removal is finally free of sludge particles that have entered the system during aeration. **An enormous advantage for plants with subsequent removal.**

This technology has been extensively tested in the accredited test laboratory of the PIA. **The cleaning performance is outstanding.**



Like a Grizzly

Strong as a bear through an ingenious concept

The newly developed Grizzly PE container is available exclusively for batchpur small sewage treatment plants. The high quality of materials, its specific design and its many advanced built-in qualities lead to considerable cost savings during installation and operation of the SBR plant.

Grizzly

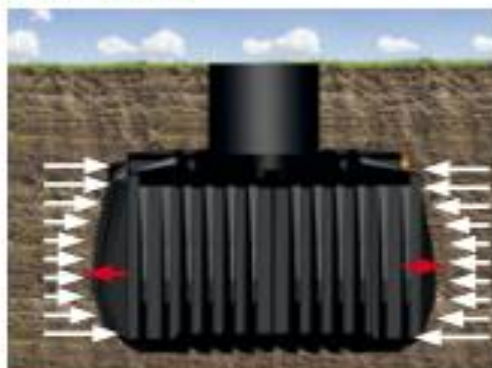
- Suitable for groundwater installation
- Integrated buoyancy safeguards
- Highest stability at normal and frost-proof installation depths
- Construction and design support the treatment process
- Cost-effective installation

Like an anchor in the ground

The Grizzly has a specially constructed design: Its lateral ribs widen downwards. This creates an effect similar to a dowel. It firmly seated in the soil. Even when the container is empty and ground water reaches the discharge pipe of the container. Without additional actions for buoyancy safeguards.

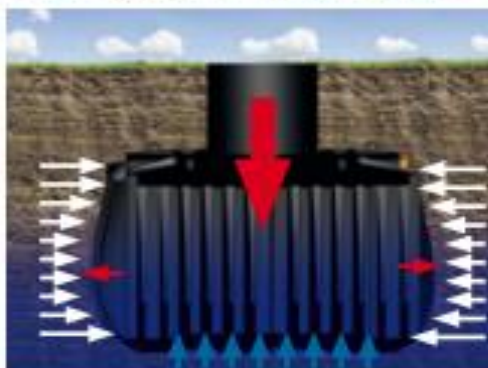
Dimensionally stable even in its empty state

The Grizzly withstands the pressure of lateral loads under the earth through its unique shape and its robust ribbed walls. Enormous dimensional stability and integrated buoyancy safeguards make the Grizzly unbeatable. This simplifies the installation considerably. You save the entire cost for the buoyancy safeguards. **Grizzly means: Purchase with no future expenses.**



Solid as a rock

The Grizzly is suitable for any installation in groundwater. Even if the tank is completely emptied and groundwater reaches the discharge pipe. **With the Grizzly you are always on the safe side.**



Technical approvals
Z-55.31-273 Class C
Z-55.31-272 Class D
available

Tank colour black;
for better illustration
different colours are
chosen.



Additional module

At additional cost

Plastic Material Container

Facilitate assembly
large manhole Ø 800 mm

Reducing the manhole
adapter ring reduces the opening
to Ø 600 mm



Secure hold in the container
through stable lateral guides ...



... and anchoring of the rib structure
in tank bottom



Retractable stable
double module wall

as a system carrier for waste
water treatment technology.
The batchpur treatment
system is always easily
accessible.



Integrated emergency overflow
in the module wall



"Slope" effect prevents
sludge deposits
In clear water discharge, dirt
particles from the partition can not
get into the outlet. **Ingenious to**
the last detail.

Efficient and energy cost saving



Basically, the Grizzly is a rectangular container.
Thus, the waste water has almost the same sur-
face height at each filling level. This has the ad-
vantage that the air lift pump works much more
efficiently and with less energy expenditure, in
transporting the water from the container.



PE tank suitable for a
6 persons batchpur system



PE tank suitable for a
4-8 persons batchpur system

various other
plastic container for
installation with
certificates C + D



PE tank suitable for a
4-12 persons batchpur system

Additional module

At additional cost

ClearFox[®]
[be clever]



Cleaning Class P



Quick and **clean**
assembly: Simply fit
it on to the separating wall



Practical: Large revision opening
and overfilling display

Phosphate elimination:

- **excellent** technology
- **easy** to install

Would you like to integrate a further phosphate elimination in your waste water treatment plant, then we can offer you also in this case a simple and safe solution. You can achieve best waste water values with the assembly set for phosphate elimination.

Tested according EU 12566 part 7 with German approval Z-55.71-645.

The **advantages**:

- Exact dosing **proportional** to the waste water quantity
- **Continuous** container **monitoring** and level indication at the display
- **Low costs**, no wear
- **5 years guarantee** on storage and dosing installation
- **Phosphate dosage individually adjustable**:
 - Dosing amount
 - Dosing time
 - Reliable monitoring

Brilliant:
The phosphate dosage
can now be monitored
via the easy...con
online portal!





ClearFox[®]

[be clever]



All advantages and facts

| High-quality standard configuration | Series | Option (Add. costs) |
|--|---|--|
| High-quality materials | ✓ | |
| Wear-proof air lift pumps | ✓ | |
| Proven low operating costs | ✓ | |
| Can be upgraded very easy and clean | ✓ | |
| No pumps in the waste water; therefore no blocking and wear of pumps in the small sewage treatment plant | ✓ | |
| Only lasting and high-quality plastic and stainless steel parts inside and outside of the sewage treatment plant container | ✓ | |
| Sampling container already included in the basic price | ✓ | |
| All cleaning classes available | Classes C, N and D included in basic price | <ul style="list-style-type: none"> • class P 😊 • class H 😊 |
| Sole plant with patented oxygen control O2 control | ✓ | |
| Patented filling level control | ✓ | |
| Automatic recording of the waste water quantity to be treated (patented) | ✓ | |
| Automatic and stepless adjustment of the compressor operating times to the actual plant load (patented) | ✓ | |
| Explosion safe plant as no electrical elements (pumps) are installed in the sewage treatment container | ✓ | |
| Compressed air lift pump of industrial standard (No pushed-in HT-tubes) | ✓ | |
| Low-noise energy-saving "airstep" stepped motors which show virtually no wear and tear. | ✓ | |
| Illuminated six-lines display | ✓ | |
| Electronic operation diary | ✓ | |
| USB interface | ✓ | |
| Modem interface | ✓ | |
| Modem | | 😊 |
| Online portal easy..can for remote monitoring | | 😊 |

مزیت های پکیج تصفیه فاضلاب SBR ساخت کمپانی ClearFox آلمان در مقایسه با سیستم های رایج به ترتیب اولویت:

***** عدم انتشار بو و آلودگی در محیط اطراف :**

یکی از مهمترین چالش ها در پروژه مختلف، انتشار بو و آلودگی در محوطه میباشد.

یکی از مهمترین مزیت های سیستم های تصفیه فاضلاب SBR عدم انتشار بو و آلودگی در محیط اطراف است.

عملیات هوادهی و تصفیه در مخازن کاملاً آب بند و هوا بند، صورت میپذیرد و هیچگونه بویی در محیط پخش نمیشود. با اتکا به همین مزیت مهم، امکان اجرا پکیج حتی در محیط رو بسته وجود دارد و تجربه این کار در چندین پروژه وجود دارد که در داخل ساختمان نصب گردیده و چندین سال است که از بهره برداری آن میگذرد و هیچ مشکلی در خصوص انتشار بو و آلودگی در این پروژه ها گزارش نگردیده است.

***** عدم اشغال فضا بر روی زمین :**

یکی دیگر از مزیت های این پکیج های تصفیه فاضلاب عدم اشغال فضا بر روی زمین است. مخازن این پکیج ها به صورت دفنی اجرا و بر روی زمین فقط دریچه های آن مشخص میباشد. بر روی مخازن میتوان فضای سبز اجرا نمود و چنانچه در مسیر عبور ماشین قرار گیرد با تمهیداتی این امکان وجود دارد.

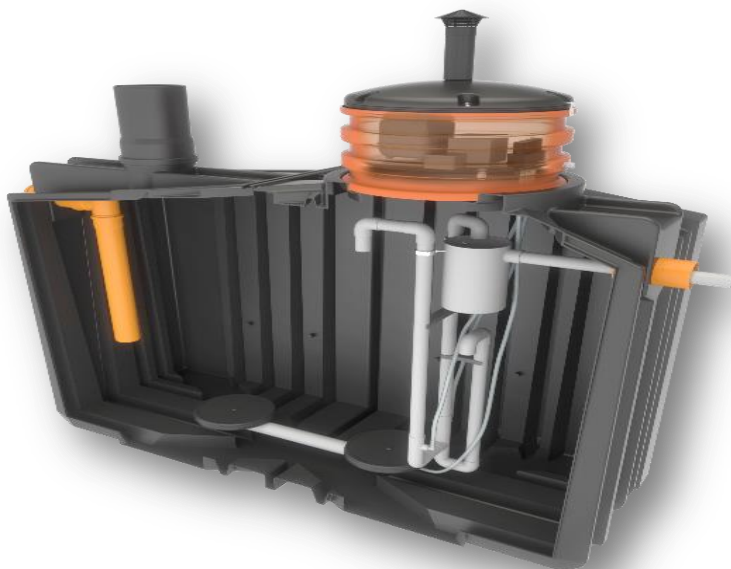


*** عدم خوردگی قطعات فلزی:

یکی از مهمترین نقاط ضعف پکیج های فلزی، مربوط به خوردگی مخازن است. علی الخصوص در مناطقی که رطوبت هوا بالا باشد میزان خوردگی و پوسیدگی نیز بسیار افزایش میابد به گونه ای که حتی با پوشش اپوکسی نیز شاهد خوردگی شدید میباشیم.



مخازن تصفیه از جنس پلی اتیلن تولید میگردد و در مقابل پوسیدگی بسیار مقاوم است از طرف دیگر به هدف کاهش استهلاک و خرابی پکیج، کلیه قطعات مکانیکی و پمپ ها و نیز قطعات الکترونیکی در مخازن تصفیه حذف گردیده است .



سایر مزیت های پکیج تصفیه فاضلاب Advanced SBR در ذیل آمده است:

*** راندمان تصفیه در این سیستم بالای ۹۰ درصد بوده و آب خروجی کاملاً بی رنگ و بی بو میباشد.

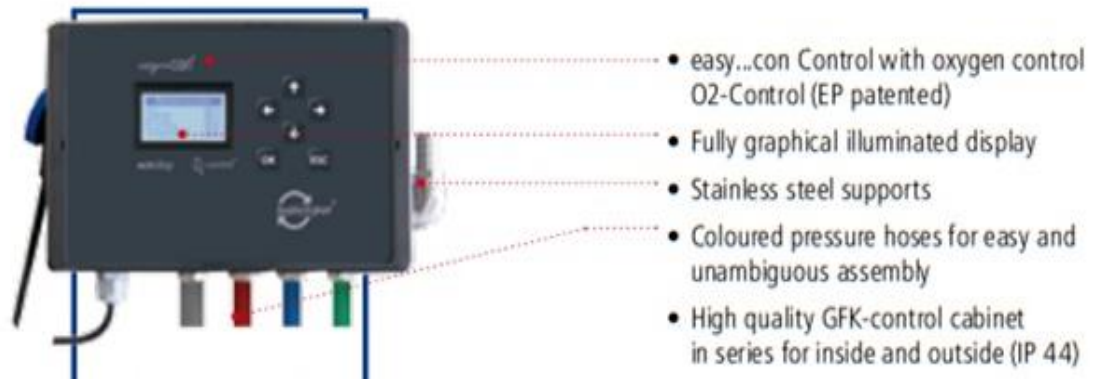
| Parameter | Efficiency | Concentration Effluent |
|----------------------------|------------|------------------------|
| COD | 96,1 % | 34 mg/l |
| BOD | 98,7 % | 5 mg/l |
| SS | 97,6 % | 10 mg/l |
| Enterococci | >99,9 % | 13 / 100 ml |
| E.coli | >99,9 % | 1 / 100 ml |
| Total coliforms | >99,9 % | 3 / 100 ml |
| 17-alpha-ethinyl estradiol | 97,8% | |
| Diclofenac | 94,6 % | |
| 1H-Benzotriazol | 94,5 % | |



*** بهترین دما برای تصفیه فاضلاب بین ۲۵ الی ۳۵ درجه سانتی گراد است . در مناطق سردسیر و گرمسیر راندمان تصفیه در سیستم های روباز به شدت کاهش یافته و ممکن است لجن فعال (میکروارگانیسم های زنده) از بین برود و پکیج از کار بیفتد و همچنین در هنگام بارندگی، شک حجمی به سیستم روباز وارد میشود. مخازن تصفیه در سیستم های SBR کاملاً بسته است و زیر عمق یخبندان اجرا میشود که این مهم باعث میشود نوسانات دما و یا بارندگی، تأثیری بر عملکرد سیستم نداشته باشند.



***کنترل از راه دور و ارسال اطلاعات



*** عملیات تصفیه در این سیستم ها توسط یک سامانه کنترلی مدیریت میشود. این سامانه توسط یک مودم اطلاعات سیستم را توسط شبکه و یا وای فای و حتی خط تلفن، انتقال میدهد و در این گونه موارد نیاز به حضور اپراتور بهره بردار و مقیم ندارد و میتوان از راه دور نیز این سیستم را کنترل کرده که در این صورت در هزینه های جاری بسیار صرفه جویی بعمل میاید.

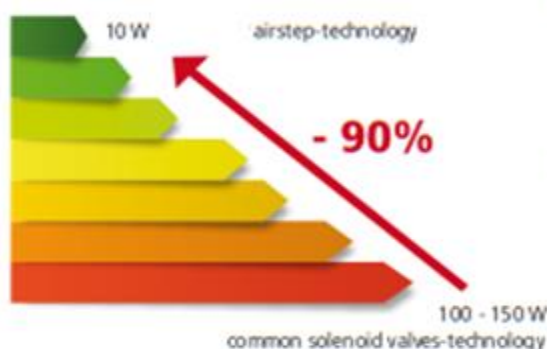
✓ Comfortable remote monitoring

- The new easy...con control enables a user-friendly and logical remote monitoring of the system by modem connection. You log on to your secure access to the operational data of your system, you can control the parameters and print the instruction manual directly from a PC. When on the go you always have secure access to your treatment plant.
- The sewage treatment plant with the easy...con control has the technical approval should the operator controls fail: The operator does not have to check the plant since this control function is assumed by the easy...con control via a modem and logged automatically in the operations manual and, where appropriate, it informs the operator by email.



*** در این سیستم با بکار گیری **Stepper motor** به جای شیر برقی در کلکتور توزیع هوا، مصرف برق ۹۰٪ کاهش یافته است. Stepper motor فقط در زمان استارت زدن به برق نیاز دارد و بر خلاف شیر برقی در طول مدت باز یا بسته بودن به برق نیاز ندارد.

- **90 % less energy consumption in the air distribution system:** Clearfox plants operate in the Airstep air distribution system with stepped motors and not solenoid valves. Solenoid valves have the disadvantage that during opening they must be constantly supplied with energy. This means for you as a consumer, for example, that the solenoid valve must be powered throughout the aeration time. If the aeration time exceeds 15 minutes, then the solenoid valve requires power for 15 minutes. Usually between 10-15 watts. The calculation is quite a simple one: When the solenoid valves are open a total of 10 hours per day in a conventional sewage treatment plant, this means power consumption of 100 to 150 watts each day. **For the same period the Clearfox stepped motor system requires less than 10 watts.**



- **Super silent technology:** Solenoid valves cause a typical noise with each gear change. Stepper motors are barely audible. **Gentle technology which goes easy on the material.**
- **Well-designed technology:** The stepper motors in the Airstep system are made of high quality material and being reversible – can therefore be easily replaced when necessary.

*** بعلت عدم بکارگیری پمپ و بکارگیری نسل جدید کمپرسورهای راندمان بالا، مصرف برق در مقایسه با سایر سیستم های تصفیه، کاهش یافته و در حدود ۶۰ درصد کمتر از آنها میباشد.



*** با توجه به دفنی بودن مخازن تصفیه، خطوط ورودی فاضلاب به صورت ثقلی به مخزن متصل میگردد و بر خلاف سیستم هایی که بر روی زمین نصب میگردند دیگر نیازی به ایستگاه پمپاژ برای انتقال فاضلاب به داخل سیستم نمیباشد که این مهم از آنجاییکه همواره خرابی و استهلاک پمپهای فاضلابی بالا میباشد، بسیار حائز اهمیت است.

*** بعلت عدم بکارگیری قطعات الکترونیکی و مکانیکی در مخازن تصفیه، هزینه استهلاک و همچنین تعمیرات و تعویض قطعات در مقایسه با سایر سیستم ها، بسیار کاهش میابد و از سوی دیگر عمر مفید سیستم افزایش میابد.



*** یکی از مهمترین اصولی که در طراحی این پکیج ها به آن توجه ویژه شده، راهبری و بهره برداری آسان و ساده نمودن ساختار پکیج است به گونه ای که در کاربری های خانگی نیز بتوان از این سیستم ها به راحتی استفاده نمود و در صورت نقص فنی، برای رفع آن نیاز به تکنسین ماهر نمیباشد.



*** امروزه استانداردهای معتبری برای ساخت پکیج های تصفیه فاضلاب وجود دارد. در این استانداردها تمامی مشخصات فنی آمده است. در ذیل گواهینامه اخذ استاندارد در خصوص ساخت پکیج های تصفیه فاضلاب کوچک **Advanced SBR** ساخت کمپانی **ClearFox** آمده است:



PERFORMANCE RESULTS

PPU Umwelttechnik GmbH
Bernecker Str. 73, 95448 Bayreuth, Germany

EN 12566-3, Annex B

Small wastewater treatment systems for up to 50 PT

Small wastewater treatment system ClearFox® quickONE+
Completely aerated SBR treatment process in a one-chamber tank

Test report PIA2016-273811

This certificate is prolonged until 31 Mai 2023.

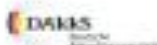
| | | |
|--|------------------------|-----------------|
| Nominal organic daily load | 0.23 kg BOD/d | |
| Nominal hydraulic daily load | 0.75 m ³ /d | |
| Material | Polyethylene | |
| Treatment efficiency (nominal sequences) | Efficiency | Effluent |
| | COD | 93.7 % 48 mg/l |
| | BOD ₅ | 98.1 % 6 mg/l |
| | NH ₄ -N* | 99.4 % 0.2 mg/l |
| | SS | 95.8 % 17 mg/l |
| Electrical consumption | 0.52 kWh/d | |

*determined for temperatures > 12°C in the bioreactor

Performance tested by:

PIA – Prüfinstitut für Abwassertechnik GmbH
(PIA GmbH)
Hergenrather Weg 30
52074 Aachen, Germany

This document releases neither the declaration
of performance nor the CE marking.



PIA - Sustainable Certification
[Signature]
Gerhard - tested until
March 2023

EN- 12566-3 Small Waste water treatment systems

*** عملکرد مطلوب سیستم در زمان قطع جریان ورودی فاضلاب تا مدت زمان ۶ ماه

بر اساس تست های صورت پذیرفته، این سیستم میتواند تا ۶ ماه بدون جریان ورودی فاضلاب، لجن فعال را زنده نگه داشته و با ورود مجدد فاضلاب، کیفیت پساب خروجی حائز شرایط استاندارد خواهد بود.

*** در پروژه های تفریحی توریستی نظیر اودیما یا ویلایی، اداری و تجاری گاهی جریان فاضلاب کاهش داشته و یا قطع میشود که در این شرایط میکروارگانیسم ها به دلیل نرسیدن مواد مغذی، از بین خواهند رفت.

راه حل: در پکیج های تصفیه فاضلاب Advanced SBR ساخت کمپانی ClearFox آلمان سیستم کنترلی به گونه ای طراحی گردیده که علاوه بر تشخیص اتوماتیک این شرایط، قابلیت برنامه ریزی را نیز برای شرایط کم باری یا قطع جریان ورودی دارد. در این شرایط، سیستم کنترلی به صورت اتوماتیک جریان خروجی را قطع کرده و هوادهی را به حداقل میزان ممکن میرساند به گونه ای که فعالیت میکروارگانیسم ها به حداقل رسیده و به خواب روند و همچنین جهت جلوگیری از ته نشینی لجن فعال و سفت شدن آن، دائما بین مخزن اول و دوم، فاضلاب موجود را انتقال میدهد. با این شرایط تا ۱۸۰ روز لجن فعال را میتواند زنده نگه دارد. بدیهی است با برقرار شدن جریان ورودی فاضلاب، سیستم به شرایط معمول تصفیه باز میگردد.

Wastewater solution for your holiday home



demonstrably best values
under extreme underload.
Therefore, the batchpur
plant is perfect suited for
your holiday home.

- Gastronomy, Hotels
- Single family houses / Multiple family dwellings
- **Holiday homes**
- Farms
- Businesses
- Camping sites
- Motorway service stations
- Sewage treatment plants for housing estates, villages and hamlets

Please contact us, we are happy to
provide information about the holiday test.

***** سیستم کنترلی هوشمند دارای سنسور تشخیص دبی جریان ورودی و تغییر برنامه تصفیه متناسب با تغییرات جریان ورودی و سامانه عیب یابی اتوماتیک**

در پکیج های تصفیه فاضلاب Advanced SBR ساخت کمپانی ClearFox آلمان سیستم کنترلی به گونه ای طراحی گردیده که **بدون بکارگیری سنسور و یا قطعه الکتریکی در مخازن تصفیه** (در صورت بکارگیری هر گونه قطعه الکترونیکی و مکانیکی درون مخازن تصفیه، استهلاک و خرابی آن قطعه به دلیل مجاورت با فاضلاب بسیار زیاد خواهد بود) بوسیله سنسورهای فشار هوا بر روی کلکتور و شیربرقی های نصب شده در بیرون مخازن تصفیه، با سنجش فشار هوای ایرلیفت ها و دیفیوزرها، ارتفاع ستون فاضلاب درون مخازن را محاسبه نموده و بر اساس شرایط موجود، زمان و میزان هوادهی و زمان و میزان تخلیه پساب و برگشت لجن را برنامه ریزی و مدیریت میکند.

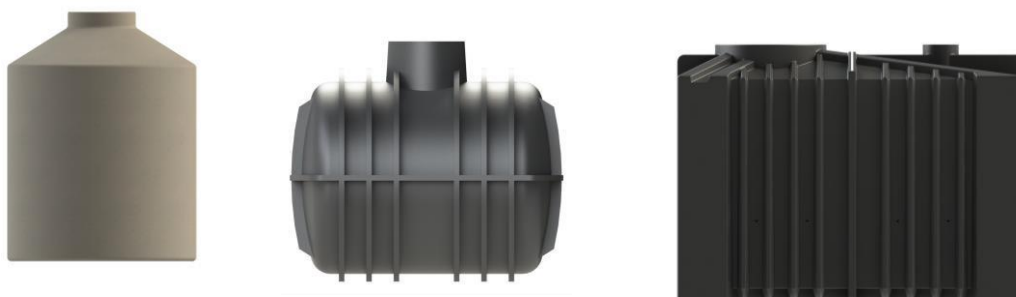


سامانه کنترلی هوشمند

Description SBR Q1+ Kits

Clearfox SBR Q1+Kits operate according to the SBR-Process (Sequencing batch reactor) with integrated aerobic sludge stabilisation.

There are different stages of the treatment process (buffer, biological treatment, sludge treatment with storage) integrated within one tank. The system operates regardless of the tank material or shape. That process flexibility means that any type of tank can be used for the SBR Q1+.



Only a partial baffle is needed to retain large inorganic particles in the first chamber. This baffle can be open at the bottom.

Certifications

- Certificate of accredited test field on the cleaning performance after a 52 weeks sludge test without intermediate desludging
- Certificate of accredited test field on the cleaning performance with 6 months holiday operation without waste water feed
- Evidence from an accredited test institute that the small sewage treatment plant was not de-sludged during the 38 weeks test according to EN 12566 Part 3
- Small wastewater treatment plant expandable with module tested according to EN 12566 Part 7 for UV sterilization (at extra cost), proof of performed test required
- Small sewage treatment plant expandable with module for phosphate elimination tested according to EN 12566 part 7 (against surcharge), proof of performed test required
- Small wastewater treatment plant expandable with module tested according to EN 12566 Part 7 for sterilization and elimination of trace-resistant trace substances (at an extra charge), proof of performed test required

Additionally equipped against surcharge with C4C® module tested in accordance with EN 12566 part 7 for sterilization and elimination of trace-resistant trace substances, without building inspectorate approval, with certificate for the test carried out according to EN 12566 part 7 and manufacturer's declaration. Proof of the same or higher cleaning performance on an accredited test field with the following effluent values/ efficiencies of the parameters shown below (total cleaning performance of the small sewage treatment plant in combination with the C4C® module) required:

| Parameter | Efficiency | Concentration Effluent |
|----------------------------|------------|------------------------|
| COD | 96,1 % | 34 mg/l |
| BOD | 98,7 % | 5 mg/l |
| SS | 97,6 % | 10 mg/l |
| Enterococci | >99,9 % | 13 / 100 ml |
| E.coli | >99,9 % | 1 / 100 ml |
| Total coliforms | >99,9 % | 3 / 100 ml |
| 17-alpha-ethinyl estradiol | 97,8% | |
| Diclofenac | 94,6 % | |
| 1H-Benzotriazol | 94,5 % | |

Scope of delivery

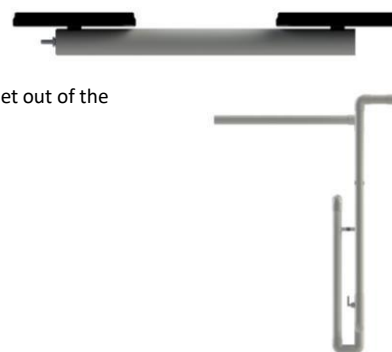
Clearfox SBR Q1+Kits consist of an aeration system, airlift pumps, an air compressor, an air distribution manifold with electronic/magnetic valves and a control unit.

➤ **Maintenance free disc diffuser mounted on a PE manifold pipe; amount of diffusers and size of manifold according to plant design**

- EPDM Membrane; A = 0,55m²; d=275 mm; chemical resistance

➤ **Maintenance free airlift for clearwater**

- Special pre-cleaning function for clearwater airlift to ensure that no solids get out of the system
- PVC with plug connection
- Free ball passage from 50 up to 150 mm
- Mounting material

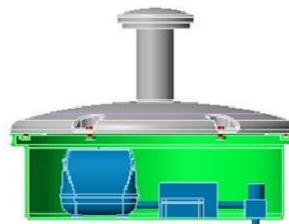


➤ **Control unit installed in a cabinet**

- Pressure sensor controlled microprocessor technology
- Stepless automatic ventilation according to actual wastewater
- display, illuminated, 2 lines
- Electronic operating log, with 52 weeks storage
- optional
 - Expandable for UV sterilization
 - Expandable for phosphate elimination
 - Expandable for elimination of trace-resistance trace substances

➤ **Standard cabinet for the top of the tank for systems up to 24 PE.**

- Rotomoulded PE Cabinet with cover and ventilation



➤ **standard cabinet for systems up to 50 PE.**

- Powder coated steel cabinet 600x600x250 mm
- Ip 55

➤ **Membraneairblower up to 36 PE**

- Compact design
- Low energy consumption
- High quality metal housing



➤ **Maintenance free two stage sidechannel blower up to 50 PE**

- Capacity according to dimensioning
- Associated silencer
- Corrosion protection

➤ **Solanoid valve manifold separat for system > 24 PE**

- 2/2 way, G3/4 – G 1
- EPDM Membrane -10 to + 140°C
- 230 VAC, 12 W, 100% ED

| PE | hydraulic Loading m³/day | organic Loading KG BOD/day | tankvolume m³ | max. water depth m | Compressor size KW | dimension airlift pumps Mm | power consumption KWh/day | diameter connecting tube mm | kits per palett no. |
|----|-----------------------------|-------------------------------|------------------|-----------------------|-----------------------|-------------------------------|------------------------------|--------------------------------|------------------------|
| 4 | 0,6 | 0,24 | 2,40 | 1,50 | 0,04 | 50 | 0,48 | 13 | 3 |
| 6 | 0,9 | 0,36 | 3,60 | 1,50 | 0,05 | 50 | 0,60 | 13 | 3 |
| 8 | 1,2 | 0,48 | 4,80 | 1,50 | 0,075 | 50 | 0,90 | 13 | 3 |
| 10 | 1,5 | 0,60 | 6,00 | 2,00 | 0,095 | 50 | 1,14 | 13 | 3 |
| 12 | 1,8 | 0,72 | 7,20 | 2,00 | 0,095 | 50 | 1,14 | 13 | 3 |
| 14 | 2,1 | 0,84 | 8,40 | 2,00 | 0,115 | 50 | 1,38 | 13 | 3 |
| 16 | 2,4 | 0,96 | 9,60 | 2,00 | 0,115 | 50 | 1,38 | 19 | 2 |
| 18 | 2,7 | 1,08 | 10,80 | 2,00 | 0,18 | 50 | 2,16 | 19 | 2 |
| 20 | 3 | 1,20 | 12,00 | 2,00 | 0,225 | 50 | 2,70 | 19 | 2 |
| 22 | 3,3 | 1,32 | 13,20 | 2,00 | 0,225 | 50 | 2,70 | 19 | 2 |
| 24 | 3,6 | 1,44 | 14,40 | 2,00 | 0,225 | 50 | 2,70 | 19 | 2 |
| 26 | 3,9 | 1,56 | 15,60 | 2,00 | 0,23 | 50 | 2,76 | 19 | 1 |
| 28 | 4,2 | 1,68 | 16,80 | 2,00 | 0,23 | 50 | 2,76 | 19 | 1 |
| 30 | 4,5 | 1,80 | 18,00 | 2,00 | 0,36 | 50 | 4,32 | 19 | 1 |
| 32 | 4,8 | 1,92 | 19,20 | 2,00 | 0,36 | 50 | 4,32 | 19 | 1 |
| 34 | 5,1 | 2,04 | 20,40 | 2,00 | 0,36 | 50 | 4,32 | 19 | 1 |
| 36 | 5,4 | 2,16 | 21,60 | 2,00 | 0,45 | 50 | 5,40 | 19 | 0,5 |
| 38 | 5,7 | 2,28 | 22,80 | 2,00 | 0,45 | 50 | 5,40 | 19 | 0,5 |
| 40 | 6 | 2,40 | 24,00 | 2,00 | 0,45 | 50 | 5,40 | 19 | 0,5 |
| 42 | 6,3 | 2,52 | 25,20 | 2,00 | 0,45 | 75 | 5,40 | 25 | 0,5 |
| 44 | 6,6 | 2,64 | 26,40 | 2,00 | 0,45 | 75 | 5,40 | 25 | 0,5 |
| 46 | 6,9 | 2,76 | 27,60 | 2,50 | 0,75 | 75 | 9,00 | 25 | 0,5 |
| 48 | 7,2 | 2,88 | 28,80 | 2,50 | 0,75 | 75 | 9,00 | 25 | 0,5 |
| 50 | 7,5 | 3,00 | 30,00 | 2,50 | 0,75 | 75 | 9,00 | 25 | 0,5 |

Benefits for Clearfox SBR Q1+ Kits

| | |
|---|---|
| No odor | Easy installation and handling |
| Low running costs | Sludge stabilization/sludge treatment |
| High performance with high quality, Made in Germany | Stable and very robust process technology |

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Additional equipment

The **Clearfox SBR Q1+** system can be upgraded to any required effluent standard. No matter if it is a phosphorous elimination, hygienisation or even trace-resistance trace substances must be eliminated.

- **GRP outdoor column for up to 24 PE**
 - Stable design with integrated buried base for ground installation
- **Red Warninglight**
 - Complete set with red lamp housing 230 V
- **Connection tube 1/2"**
 - 50 m roll
 - Pressure hose
 - Size 1/2" (13mm) 13,2x3,2mm
 - Stainless steel hoseclamps
- **Connection tube 3/4"**
 - 50 m roll
 - Pressure hose
 - Size 3/4" (19mm) 19x3,2mm
 - Stainless steel hoseclamps
- **Connection tube 1"**
 - 50 m roll
 - Pressure hose
 - Size 1" (25mm) 25x4,3mm
 - Stainless steel hoseclamps



➤ **Phosphorous elimination**

At the end of the cleaning process a precipitant is added to the reactor. This takes the phosphate out and store it in the activated sludge.

- Peristaltic dosing pump 0,2 – 4,5 l/h
 - 230 V +/- 10%, 50/60 Hz; 5 VA
 - IP65
 - Capacity adjustable via potentiometer
- Suction lance with level control

➤ **Chlorine disinfection**

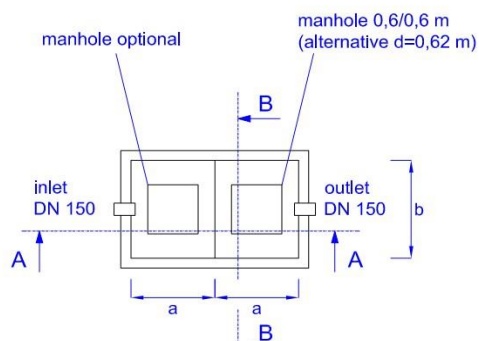
The chlorine disinfection also will be handled with a dosingpump.

The cleaned water will be pumped by the airliftsystem to a retention tank. During the filling is also the dosing of the chlorine to this tank.

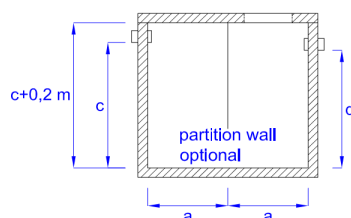
- Peristaltic dosing pump 0,2 – 4,5 l/h
 - 230 V +/- 10%, 50/60 Hz; 5 VA
 - IP65
 - Capacity adjustable via potentiometer
- Suction lance with level control
- Size of the retention tank (customer side)
50% of the daily amount of wastewater

| PE | a m | b m | c m | d m | e m | f m |
|----|--------|--------|--------|--------|--------|--------|
| 4 | 0,80 | 1,00 | 1,60 | 1,50 | 0,75 | 1,70 |
| 6 | 1,20 | 1,00 | 1,60 | 1,50 | 0,75 | 1,70 |
| 8 | 1,30 | 1,25 | 1,60 | 1,50 | 0,75 | 1,70 |
| 10 | 1,20 | 1,25 | 2,10 | 2,00 | 1,00 | 2,20 |
| 12 | 1,40 | 1,25 | 2,10 | 2,00 | 1,00 | 2,20 |
| 14 | 1,40 | 1,50 | 2,10 | 2,00 | 1,00 | 2,20 |
| 16 | 1,60 | 1,50 | 2,10 | 2,00 | 1,00 | 2,20 |
| 18 | 1,80 | 1,50 | 2,10 | 2,00 | 1,00 | 2,20 |
| 20 | 1,50 | 2,00 | 2,10 | 2,00 | 1,00 | 2,20 |
| 22 | 1,70 | 2,00 | 2,10 | 2,00 | 1,00 | 2,20 |
| 24 | 1,80 | 2,00 | 2,10 | 2,00 | 1,00 | 2,20 |
| 26 | 2,00 | 2,00 | 2,10 | 2,00 | 1,00 | 2,20 |
| 28 | 2,10 | 2,00 | 2,10 | 2,00 | 1,00 | 2,20 |
| 30 | 1,80 | 2,50 | 2,10 | 2,00 | 1,00 | 2,20 |
| 32 | 1,90 | 2,50 | 2,10 | 2,00 | 1,00 | 2,20 |
| 34 | 2,00 | 2,50 | 2,10 | 2,00 | 1,00 | 2,20 |
| 36 | 2,20 | 2,50 | 2,10 | 2,00 | 1,00 | 2,20 |
| 38 | 2,30 | 2,50 | 2,10 | 2,00 | 1,00 | 2,20 |
| 40 | 2,40 | 2,50 | 2,10 | 2,00 | 1,00 | 2,20 |
| 42 | 2,50 | 2,50 | 2,10 | 2,00 | 1,00 | 2,20 |
| 44 | 2,60 | 2,50 | 2,10 | 2,00 | 1,00 | 2,20 |
| 46 | 2,00 | 2,75 | 2,60 | 2,50 | 1,25 | 2,70 |
| 48 | 2,10 | 2,75 | 2,60 | 2,50 | 1,25 | 2,70 |
| 50 | 2,20 | 2,75 | 2,60 | 2,50 | 1,25 | 2,70 |

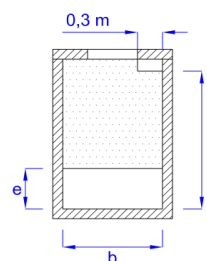
ground view



cut drawing A - A



cut drawing B - B





Description SBR Q1+ Kits

Clearfox SBR Q1+Kits operate according to the SBR-Process (Sequencing batch reactor) with integrated aerobic sludge stabilisation.

There are different stages of the treatment process (buffer, biological treatment, sludge treatment with storage) integrated within one tank. The system operates regardless of the tank material or shape. That process flexibility means that any type of tank can be used for the SBR Q1+.

Only a partial baffle is needed to retain large inorganic particles in the first chamber. This baffle can be open at the bottom.

If there is a mechanical or manual screen at the SBR system inlet, then a baffle is not necessary. A Screen should be used for any system if the system is bigger than 500 PE.

The system is designed dimensioned according to the guidelines of the DWA-A 131 and DWA-A 222.

The PIA GmbH proofed, tested and certified the system by a 38 weeks cleaning efficiency test equal to the 12566-3 test for small wastewater treatment plants.

Cleaning efficiency

The cleaning efficiency was approved and certified at the PIA GmbH in Aachen over 38 weeks (according to the 12566-3 38 weeks test for small waste water treatment plants). It was tested with domestic waste water.

- COD < 50 mg/l
- BOD < 10 mg/l
- NH4-N < 1 mg/l
- SS < 20 mg/l

Scope of delivery

Clearfox SBR Q1+Kits consist of an aeration system, airlift pumps, an air compressor, an air distribution manifold with electronic/magnetic valves and a control unit.

➤ Maintenance free disc diffuser mounted on a PE manifold pipe; amount of diffusers and size of manifold according to plant design

- EPDM Membrane; A = 0,55m²; d=275 mm; chemical resistance
- Mounting material



➤ Maintenance free airlift for clearwater

- Special pre-cleaning function for clearwater airlift to ensure that no solids get out of the system
- PVC with plug connection
- Free ball passage from 50 up to 150 mm

➤ Control unit installed in a powder coated cabinet

- Sizes of the cabinet depends on the plant size
- Pressure sensor controlled microprocessor technology
- Stepless automatic ventilation according to actual wastewater
- Graphic display, illuminated, 6 lines
- Electronic operating log, with 52 weeks storage
- USB interface for reading operating data
- Automatic commissioning test
- optional
 - Expandable for UV sterilization
 - Expandable for phosphate elimination
 - Expandable for elimination of trace-resistance trace substances



➤ Maintenance free, two stage side channel air compressor

- Capacity according to the dimensioning of the system size
- Associated silencer
- Corrosion protected
-

| P E | hydraulic Loading | organi c Loadin | tankvolum e | max · water r ate | Compress or size | dimension airliftpum ps | power consumptio n | diameter connecti ng tube | paletts for transpor |
|--------|----------------------|-----------------------|----------------|-------------------------------|---------------------|-------------------------------|--------------------------|---------------------------------|----------------------------|
| 100 | 1 | 6 | 4 | 2,00 | 1, | 7 | 13, | 2 | 2 |
| 150 | 22,5 | 9 | 6 | 2,50 | 1, | 10 | 1 | 2 | 2 |
| 200 | 3 | 1 | 8 | 2,50 | 1, | 10 | 1 | 2 | 2 |
| 250 | 37,5 | 1 | 10 | 2,50 | 3 | 10 | 3 | 3 | 3 |
| 300 | 4 | 1 | 12 | 2,50 | 3 | 10 | 3 | 3 | 3 |
| 350 | 52,5 | 2 | 14 | 3,00 | 4, | 15 | 5 | 4 | 3 |
| 400 | 6 | 2 | 16 | 3,00 | 4, | 15 | 56,25 | 4 | 3 |
| 450 | 67,5 | 2 | 18 | 3,00 | 5, | 15 | 6 | 4 | 4 |
| 500 | 7 | 3 | 20 | 3,00 | 5, | 15 | 68,75 | 4 | 4 |
| 550 | 82,5 | 3 | 22 | 3,00 | 6 | 15 | 7 | 4 | 4 |
| 600 | 9 | 3 | 24 | 3,00 | 6 | 15 | 7 | 4 | 4 |
| 650 | 97,5 | 3 | 26 | 3,00 | 9 | 15 | 10 | 4 | 5 |
| 700 | 10 | 4 | 28 | 3,00 | 9 | 15 | 10 | 4 | 5 |
| 750 | 112,5 | 4 | 30 | 3,00 | 9 | 15 | 112,5 | 4 | 5 |
| 800 | 12 | 4 | 32 | 3,00 | 9 | 15 | 112,5 | 4 | 5 |
| 850 | 127,5 | 5 | 34 | 3,00 | 1 | 15 | 13 | 4 | 6 |
| 900 | 13 | 5 | 36 | 3,00 | 1 | 15 | 13 | 4 | 6 |
| 950 | 142,5 | 5 | 38 | 3,00 | 1 | 15 | 137,5 | 4 | 6 |
| 1000 | 15 | 6 | 40 | 3,00 | 1 | 15 | 137,5 | 4 | 6 |

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Benefits for Clearfox SBR Q1+ Kits

| | |
|---|---|
| No odor | Easy installation and handling |
| Low running costs | Sludge stabilization/sludge treatment |
| High performance with high quality, Made in Germany | Stable and very robust process technology |

Additional equipment

The **Clearfox SBR Q1+** system can be upgraded to any required effluent standard. No matter if it is a phosphorous elimination, hygienisation or even trace-resistance trace substances must be eliminated.

➤ **Phosphorous elimination**

At the end of the cleaning process a precipitant is added to the reactor.

This takes the phosphate out and store it in the activated sludge

- Peristaltic dosing pump 0,2 – 4,5 l/h
 - 230 V +/- 10%, 50/60 Hz; 5 VA
 - IP65
 - Capacity adjustable via potentiometer
- Suction lance with level control

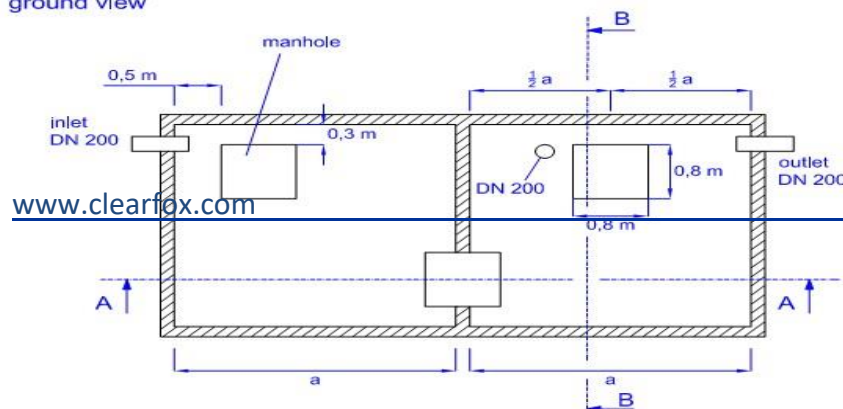
➤ **Chlorine disinfection**

The chlorine disinfection also will be handled with a dosingpump.

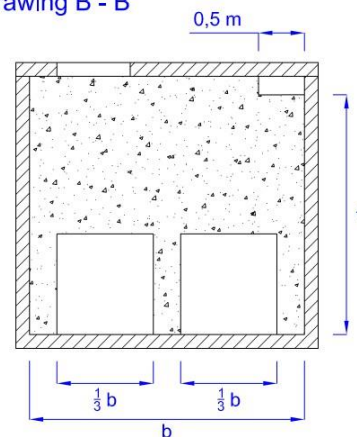
The cleaned water will be pumped by the airliftsystem to a retention tank. During the filling is also the dosing of the chlorine to this tank.

- Peristaltic dosing pump 0,2 – 4,5 l/h
 - 230 V +/- 10%, 50/60 Hz; 5 VA
 - IP65
 - Capacity adjustable via potentiometer
- Suction lance with level control
- Size of the retention tank (customer side)
50% of the daily amount of wastewater

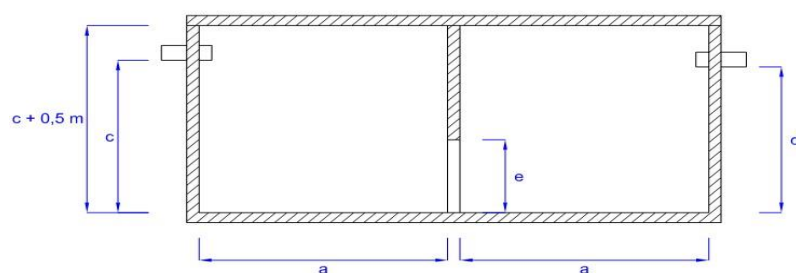
ground view



cut drawing B - B



cut drawing A - A



| PE | a | b | c | d | e | f |
|------|------|------|------|------|------|------|
| 100 | 3,30 | 3,00 | 2,20 | 2,10 | 1,00 | 2,30 |
| 150 | 3,40 | 3,50 | 2,70 | 2,60 | 1,25 | 2,80 |
| 200 | 4,00 | 4,00 | 2,70 | 2,60 | 1,25 | 2,80 |
| 250 | 4,40 | 4,50 | 2,70 | 2,60 | 1,25 | 2,80 |
| 300 | 4,80 | 5,00 | 2,70 | 2,60 | 1,25 | 2,80 |
| 350 | 4,70 | 5,00 | 3,20 | 3,10 | 1,50 | 3,30 |
| 400 | 5,30 | 5,00 | 3,20 | 3,10 | 1,50 | 3,30 |
| 450 | 5,50 | 5,50 | 3,20 | 3,10 | 1,50 | 3,30 |
| 500 | 5,60 | 6,00 | 3,20 | 3,10 | 1,50 | 3,30 |
| 550 | 6,10 | 6,00 | 3,20 | 3,10 | 1,50 | 3,30 |
| 600 | 6,20 | 6,50 | 3,20 | 3,10 | 1,50 | 3,30 |
| 650 | 6,70 | 6,50 | 3,20 | 3,10 | 1,50 | 3,30 |
| 700 | 6,60 | 7,00 | 3,20 | 3,10 | 1,50 | 3,30 |
| 750 | 7,10 | 7,00 | 3,20 | 3,10 | 1,50 | 3,30 |
| 800 | 7,10 | 7,50 | 3,20 | 3,10 | 1,50 | 3,30 |
| 850 | 7,50 | 7,50 | 3,20 | 3,10 | 1,50 | 3,30 |
| 900 | 7,50 | 8,00 | 3,20 | 3,10 | 1,50 | 3,30 |
| 950 | 7,90 | 8,00 | 3,20 | 3,10 | 1,50 | 3,30 |
| 1000 | 8,30 | 8,00 | 3,20 | 3,10 | 1,50 | 3,30 |



Description:

ClearFox® UV treatment modules are characterized by an extraordinarily high disinfection performance with a compact design and low energy consumption. They are designed in accordance with applicable laws, standards and guidelines. They consist of a stainless steel pipe reactor where the pretreated wastewater passes an highly efficient UV lamp. The water flows by gravity or can be pumped. The reactor is included. Downstream after Clearfox DAF, FBR,SBR

Technical Specifications:

| hygienic module | UV500 | UV2000 | UV2500 | UV3500 | UV4000 | UV5000 | UV8000 |
|-----------------------------------|-------------------------------------|------------------|------------------|----------|----------|----------------|----------------|
| max. flowrate l/h - wastewater | 300 | 2000 | 2500 | 3500 | 4000 | 5000 | 8000 |
| Power in W | 10 | 36 | 36 | 90 | 90 | 2x36 | 2x90 |
| Measures (l/d in mm) | 320x42 | 928x42 | 928x42 | 928x42 | 928x42 | 928x42 (2x) | 928x42 (2x) |
| connection thread | ½ " | 1 " | 1 " | 1 " | 1 " | 1 " | 1 " |
| voltage | 12V/24V/ 110-230V | 24V/ 110-230V | 24V/ 110-230V | 110-230V | 110-230V | 110-230V | 110-230V |
| operation pressure in bar | 10 | | | | | | |
| Type of lamp / lifetime | UV / > 8000 hours | | | | | | |
| Transmission / intensity UV-dose | (254 nm, 1 cm) 70 %, / > 400 (J/m²) | | | | | | |
| Water-temperature in C° | 2-40 | | | | | | |
| Reactor material | stainless steel 1.4571 | | | | | | |

The systems are connected in parallel to treat higher flow rates.

Optional: with OTC operation time counter

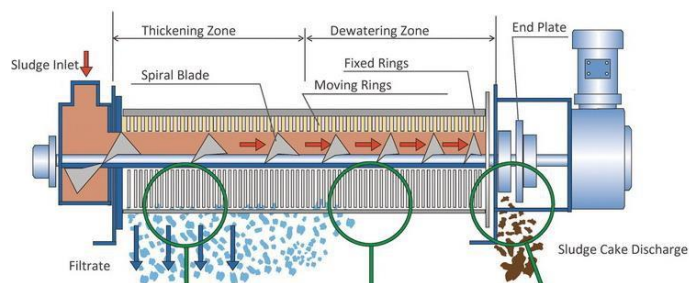
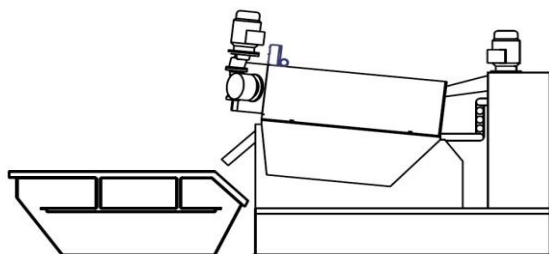
Optional: with OPD operating power detection

Application:

The compact design allows easy and tool-free lamp removal and replacement, for example at the end of the lamp's service life. For cleaning purposes, the quartz immersion tube can also be dismantled or mounted without tools. The water to be treated flows through the housing and is directed along the quartz immersion tube in which the lamp is mounted. The low water film thickness of only 2 mm, i.e. the distance between the UV light exit at the quartz surface and the inside wall of the housing, guarantees optimum penetration of the water by the UV light.

Advantages for Clearfox® UV treatment modules:

- fast startup, cost saving in installation, small footprint, no chemicals
- modular system, adaptable at every application
- high performance with high quality, Made in Germany, approval DVGW
- flexible against underload and overload
- industrial as well as municipal wastewater
- stable and very robust process technology



Description:

Sludge from DAF (dissolved air flotation) and FBR, SBR (biological aerobic treatment) produces liquid sludge; the solids in the sludge have to be removed in order to reduce the totally liquid volume. This mini sludge press is especially designed to handle small flowrates out of our systems. It can be widely applied to municipal sludge (such as primary, secondary and mixed sludge), dewatering of slurry and digestate as well as sludge from industry. As standard preinstalled in a container there are 3 modules: the press, flocculation system, bypass, storage for dried sludge,

The screw press consists of three dewatering zones: The processes there are thickening, filtration and compression. In the thickening zone of the dewatering drum the solids are separated and the liquid is discharged. The dewatering zone follows where the pressure rises due to the decreasing pitch of the screw and smaller gaps between the rings. Finally dry sludge cake is discharged. The sludge is continuously conveyed by means of a screw shaft inside the device. The cooperation of fixed and moving rings ensures self-cleaning preventing clogging. The sludge can initially be conditioned with polymers in a flocculation reactor including an agitator. Therefore better results for dewatering are achieved. The drained water is led back into the buffer (pump sump) of the treatment system by gravity. The dried sludge - removed out of the system - is not more pumpable. A skip (as in picture above) could be in our calculation we give an advice how many volume of this sludge is per day, for bigger systems will be conveyor screws to another storage place the choice

Technical Specifications (listed here the standard mini presses, bigger on request):

| Module | SCP 051 | SCP 101 | SCP 131 | SCP 132 | SCP 202 |
|---|-----------|----------|----------|----------|----------|
| Capacity sludge from DAF (DM 5%) | 0,08 m³/h | 0,2 m³/h | 0,4 m³/h | 0,8 m³/h | 1,6 m³/h |
| => dried sludge capacity | 4 kg/h | 10 kg/h | 20 kg/h | 40 kg/h | 80 kg/h |
| capacity raw wastewater, biological sludge (DM 0,2%-0,5%) | 0,25 m³/h | 1,0 m³/h | 2,0 m³/h | 4,0 m³/h | 8,0 m³/h |
| => dried sludge capacity | 0,5 kg/h | 2,0 kg/h | 4,0 kg/h | 8,0 kg/h | 16 kg/h |
| screw shaft | 1 | 1 | 1 | 2 | 2 |
| screw shaft diameter | 100 mm | 100 mm | 130 mm | 130 mm | 200 mm |
| equipment length | 1130 mm | 1820 mm | 1980 mm | 2082 mm | 2515 mm |
| equipment width | 520 mm | 758 mm | 758 mm | 913 mm | 938 mm |
| equipment height | 640 mm | 1050 mm | 1050 mm | 1050 mm | 1285 mm |
| net weight | 100 kg | 205 kg | 225 kg | 310 kg | 525 kg |
| power | 0,2 kW | 0,2 kW | 0,2 kW | 0,3 kW | 0,8 kW |

Application:

The standard application for this mini press of PPU is the treatment of sludge from the DAF (20 - 40 L/h (per each 1 m³ floated wastewater) with

DM 3 - 5% and secondary sludge from the biological treatment with DM 1%.

The inlet sludge concentration can vary from 2 g/L up to 50 g/L.

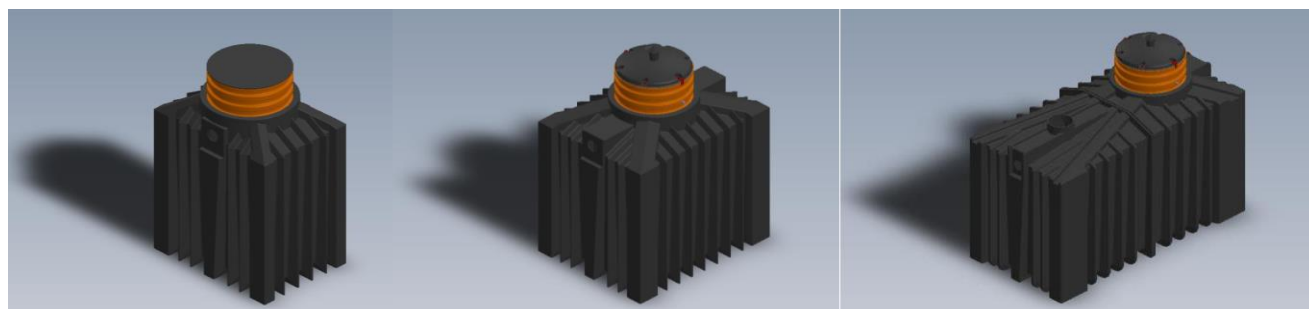
The outlet sludge can have a DS up to 30-40%

Advantages:

Continuous load over 24h, German HP motor supplies with a 100% duty cycle! No clogging, due to ring space principle

Stable treatment capacity, due to step by step zones

Easy to maintain --> unique technology which needs every day maximum 10 minutes service, this cannot be achieved with any other press



Description fixed bed reactor (FBR) modul

Clearfox FBR modules are fully equipped bioreactors with a high quality PE shape. All equipment is preinstalled in a cubical tank, such as aeration membranes, distributor system, blank holders and all support for positioning grid tube blocks in order to get a high performance bioreactor for waste water treatment.

The shape of the tank and most of the equipment is made by rotomoulding in one piece, out of high resistible polyethylene or stainless steel 1.4571. The modules are designed for installation in client's tank (concrete chambers, steel frame systems, HC seacontainers (i.e. Clearfox containerised container modules). Interfaces to client are designed for a fast and simple plug&play connection onsite.

Two modules can be connected for a water flow in series, for a parallel installation the water has to be splitted. Included in the scope is a blower and airsplitters (pro rata), which are suitable to the number of units and the kind of connection. Client must provide mechanical screened wastewater ($\leq 3\text{mm}$). In order to reduce TSS a clarifying unit after the modules is advised.

According to client's requirements (inlet concentration, effluent requirement, carbon and/or nitrogen removal) inside the modules there are different bio carriers implemented. The design is according to DWA guidelines, the cleaning efficiency is approved in field tests, made by external waste water institutes. Test reports and certificates for static, performance, origin, DWA guidelines are available on request

- **optional** with a – **outside horizontal around** - steel frame for **onfloor** installation of the tank in steel bar 80 mm x 40 mm (underground **inside** reinforcement is standard)
- **optional** domeshaft access
- in-/ outlet connection, DN100
- Water depth about 1,40 cm

Equipment parts:

| Module | FBR1250 | FBR2250 | FBR3500 |
|---|---------------------------------|---------------------------------|---------------------------------|
| Tank: | 1250 I Tank | 2250 I Tank | 3500 I Tank |
| Measures: (l,w,h) in cm (with outside frame) | 90/122/171 (106/138/171) | 154/122/171 (170/138/171) | 243/122/171 (259/138/171) |
| Required space: | 1,25 m ³ | 2,25 m ³ | 3,5 m ³ |
| Transport weight: | 130 kg | 200 kg | 250 kg |
| Max. operation weight: | 1300 kg (with water filling) | 2300 kg (with water filling) | 3550 kg (with water filling) |
| Inlet connection: | DN 100 | DN 100 | DN 100 |
| Outlet connection: | DN 100 | DN 100 | DN 100 |
| blower: | 115 W | 250 W | 350 W |
| Entry: | Lid (60 cm diameter) | Lid (60 cm diameter) | Lid (60 cm diameter) |

performance rate per tank @ 20 hours equilised feeding

carbonreduction

| performance specific surface area of media 100-150 [m ² /m ³] | 1250 l | 2250 l | 3500 l |
|--|--------|--------|--------|
| max. feedrate [m ³ /d] | 6,6 | 11,1 | 18,3 |
| p.e. | 44 | 74 | 122 |
| carbon reduction (COD) [kg/d] | 4,4 | 7,4 | 12,2 |

carbonreduction and nitrification

| performance specific surface area of media 100-150 [m ² /m ³] | 1250 l | 2250 l | 3500 l |
|--|--------|--------|--------|
| max. feedrate [m ³ /d] | 2,7 | 4,6 | 7,6 |
| p.e. | 18 | 31 | 51 |
| carbon reduction (COD) [kg/d] | 1,8 | 3,1 | 5,1 |
| nitrification (NH ₄ -N) [kg/d] | 0,18 | 0,31 | 0,51 |

(50g BOD/p.e.; 100g COD/p.e.; 10g N/p.e.)

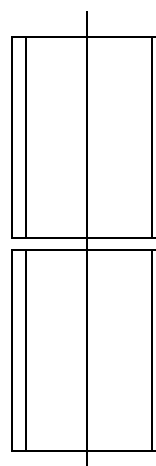
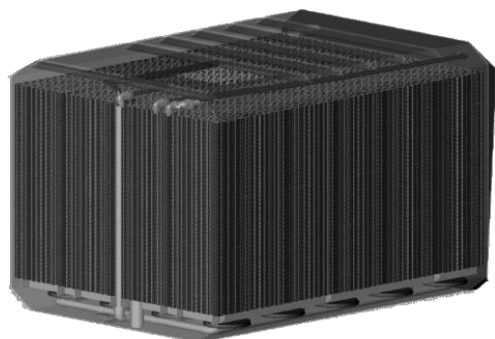
The specific surface depends on the concentrations of the inflow. The degradation is calculated for municipal/domestic concentrations; higher concentration, as for industrial applications will give higher performance rates.

Units in series are working with an higher treatment efficiency, that results in an higher degradation per day.

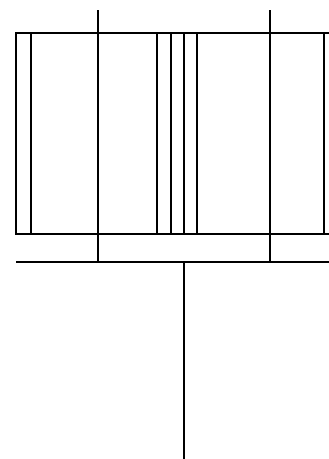
Nitrification requires COD reduction in advance. It must be secured, that after every reactor the TSS are reduced by clarifying.

Benefits for Clearfox FBR modules

| | |
|--|--|
| fast startup, cost saving in installation, small footprint | flexible against underload and overload |
| modular system, adaptable at every application | industrial as well as municipal wastewater |
| high performance with high quality, Made in Germany | stable and very robust process technology |



in seria



parallel

Description fixed bed reactor (FBR) modul

Clearfox FBR modules are fully equipped bioreactors with a high quality PE shape. All equipment is preinstalled in a cubical tank, such as aeration membranes, distributor system, blank holders and all support for positioning grid tube blocks in order to get a high performance bioreactor for waste water treatment. The typical application is reduce carbon and nitrogen concentration from any kind of pretreated (removed solids) wastewater industrial or municipal nature.

The shape of the tank and most of the equipment is made by rotomoulding in one piece, out of high resistible polyethylene or stainless steel 1.4571. The modules are designed for installation in client's tank (concrete chambers, steel frame systems, HC seacontainers (*i.e. Clearfox containerised container modules*)). Interfaces to client are designed for a fast and simple plug&play connection onsite.

Two modules can be connected for a water flow in series, for a parallel installation the water has to be splitted. Included in the scope is a blower and airsplitters (pro rata), which are suitable to the number of units and the kind of connection. Client must provide mechanical screened wastewater ($\leq 3\text{mm}$). In order to reduce TSS a clarifying unit after the modules is advised. According to client's requirements (inlet concentration, effluent requirement, carbon and/or nitrogen removal) inside the modules there are different bio carriers implemented.

The design is according to DWA guidelines, the cleaning efficiency is approved in field tests, made by external waste water institutes. Test reports and certificates for static, performance, origin, DWA guidelines are available on request.

specification:

| | | | |
|------------------------------------|---------------------|------------------------------------|-----------------------|
| 1 unit biomodule: | 50% of HC Container | max. operation weight: [kg] | 15.000 (water filled) |
| number of chambers: | 1 | inlet connection@height: | DN 100@2.40 m |
| measures: (l,w,h) / unit [m] | 2.74 x 2.10 x 2.57 | outlet connection@height: | DN 100@2.40 m |
| footprint: [m²] | 5.75 | inlet aeration tube: | DN50@ 2.74 |
| max. transport weight: [kg] | 650 empty | roofopening: | 60 cm x 60 cm |
| Power connected for blower class C | 1.350 Watt | Power connected for blower class N | 1.500 Watt |

performance rate per module @ 20 hours

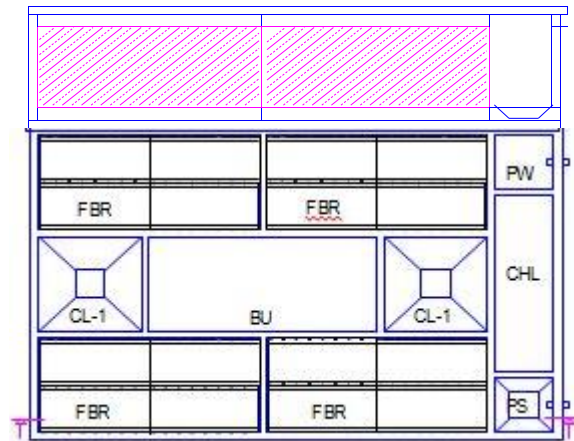
| performance | max. feedrate [m³/h] | | | | degradation per day [kg] | | | | specific surface area of media [m²/m³] |
|------------------------|-------------------------|---|-------------------|---|--------------------------|----|-------------------|-----|---|
| | units (parallel) | | units (series) | | units (parallel) | | units (series) | | |
| number of units | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | |
| carbon reduction (COD) | 2 | 4 | 2 | 5 | 40 | 80 | 40 | 100 | 100-150 |
| nitrification (NH4-N) | 2 | 4 | 2 | 5 | 8 | 16 | 8 | 20 | 150-300 |

The specific surface depends on concentration of the inflow. The degradation is calculated for municipal/domestic concentrations; **higher concentration, as for industrial applications will give higher s will give higher performance rate**
Units in series are working with an higher treatment efficiency, that results in an higher degradation per day Nitrification requires COD reduction in advance. It must be secured, that after every reactor are the TSS reduced by clarifying.

application



biomodule installation into a seacontainer



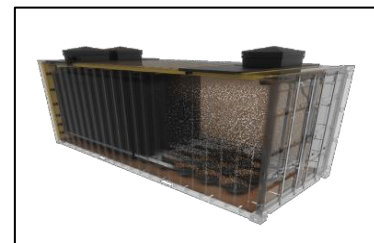
treatment system 8.000 p.e in concrete with FBR-biomodules

PPU version: seacontainer HighCube 20 feet

PPU Umwelttechnik installs 2x FBR modules in reinforced seacontainer. The two Biomodules are switched in seria. The container has ready installed flanges IN:DN80-PN10, OUT:DN 100-PN6,@height = 2.45m, first

Biomodule is cascade Nr.1

The second Biomodule is cascade Nr. 2 -3. the seacontainer is including an airsplitter for all cascades individuell aeration and optional backflush@high load, 3 access holes 600x600 mm with lids and a foam discharge tube



Benefits for Clearfox FBR modules

| | |
|--|--|
| fast startup, cost saving in installation, small | flexible against underload and overload |
| modular system, adaptable at every application | industrial as well as municipal wastewater |
| high performance with high quality, Made in | stable and very robust process technology |

Description

The ClearFox Container DAF plant is fully automated . Feedwater is supplied to the DAF module via non-clogging cavity pump from client`s balancing tanks or ClearFox buffer tanks. Pre-aerated buffers are advisable for certain applications, also hard solids > 3 mm must be removed by any screening device upstream.

The wastewater firstly passes through a pH-controlled inline pipe system where the pH is automatically adjusted if necessary. Then it is divided hydraulically into 2 reactor cells. In a polymer-mixing module, conditions are created that support the flocculation and flotation process. These polymers are automatically added to the inflowing wastewater flocculators. By utilizing a multiphase pump, the flow of water is continuously saturated with air, then returned via a recirculation into the reactor. The pressure release causes an uplift of the floatable material (sludge) by fine air bubbles in a conical top of every reactorcell. . Inside this compression zone the sludge is collected and thickened. By reducing the clearwater flowrate in certain intervalls the water level rises (airlift effect) inside the DAF. This causes an overflow of the sludge into a discharge pipe. . The clean water is drawn off from several points in the center of the reactor and can be discharged as clean water or to the next treatment step. The thickened sludge is discharged by gravity to a sludge press or any other dewatering device. For special application the sludge discharge device is cleaned automatically by cleaning nozzles, feeded with pressurized Clearwater

Operation

Depending on the inflowing water consistency, a high treatment efficiency rate is achieved. The ClearFox DAF has extremely low O&M costs. The operator must ensure the consumables [chemicals] are replenished, and the disposal of the flotation sludge. The system should be checked daily for the wastewater composition, chemical storage volumes, and the air pressure can be adjusted. We do not use and mechanical clearing device with movable chains (lubricant use, etc.). The units are robust and used in the food industry for years. Due to the unique construction the consumption of chemicals is low. The daily time requirement for controlling this simple compact unit is approximately 0.25 hours by trained staff per day. All our technical parts are approved and certified.

Cleaning efficiency

The process removes solids, fat, oil and some biodegradable materials, pH is adjusted to 7 ,temperature is not changed, the effluent quality is suitable for biological treatment. Typical parameters achieved for food/oil industry in the INLET / OUTLET are detailed below in mg/l.

COD IN :3000-7000 / OUT :1000-1500

BOD IN: 2000-3500 / OUT :700-1000

TSS IN: 500-1500 / OUT :5-50

Jar Tests are advised for correct chemical selection and can be offered by PPU laboratory services. 5 ltr sample required.

Residues

In the flotation fats and oils are removed from the wastewater. The removed residues are called flotation sludge. The resulting amount depends on the concentration of oil/solids and the precipitated/flocculated wastewater. The flotation sludge must be collected and can then be disposed or, dewatered or used for agriculture. At an average concentration, you can expect 40-60 liters of thickened flotation sludge per m^3 of wastewater. This corresponds to an amount of about 4 to 6 percent by volume in relation to the daily feed waste water. The amount of sludge depends on TSS +FOG, as well as on flocculated/precipitated solids (oil/TOC/COD concentrations).

Please see datasheets for Clearfox sludge treatment options e.g. sludge presses

Construction and content of HC Containers

The Clearfox DAF consists out of 2 technical parts

- a) technical container (inside is preinstalled the suction line with feedpump, dosing pumps, injection points, static mixers, chemical storage, polymer preparation, multiphase systems, control unit, insulated walls, room aeration and/or air condition
- b) dissolved air cell container (including waterproof PE lining, conical reactor cells, discharge tubes for clearwater, settled solids, floated sludge, air release system)

The system can be operated

as one line (=1 technical container & 1 x DAF container)

or

as two line (=1 technical container & 2x DAF container parallel) with double flowrate

The containerized system is totally plug &play due to the preinstallations, including air compressor and a ventilation system for the odor exchange: The 2 or 3 containers must be positioned onsite by crane, then the technical tubes between the containers are connected easily.

PPU gives support by layout drawings according to site requirements

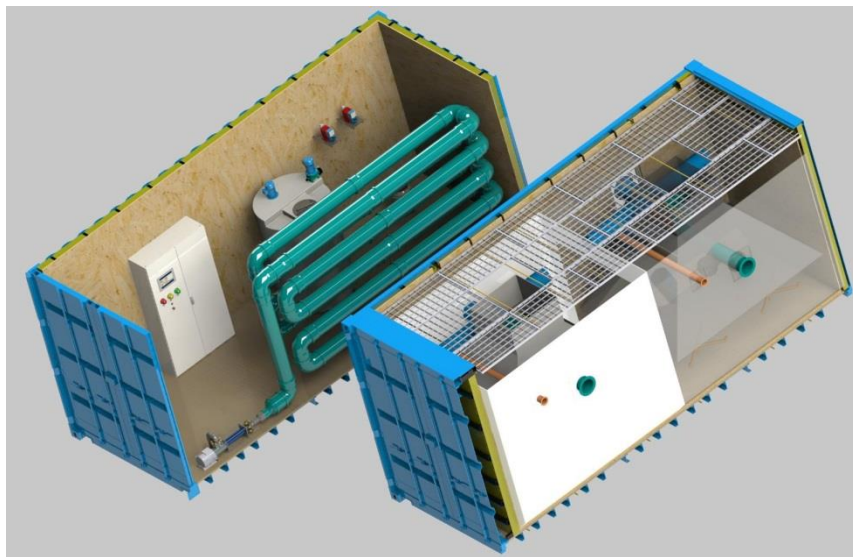
Data sheet: ClearFox® DAF

container series with airlift principle [$Q_d > 400 \leq 1300 \text{ m}^3 / \text{day}$]

Intelligent Dissolved air flotation in ISO- container with sludge thickening



Picture shows



Right container: Container open roof with DAF Cell, for $65 \text{ m}^3/\text{hou}$
(with a second Cell it gives $130 \text{ m}^3/\text{hour}$) Left container: Technical container

control cabinet on technical container

Reference / pictures



polymers, thicken



adjustment switch
cabinet
dosing pump



control DAF unit



compressor unit incl. filter



polymer prepare station



saturation, mixing, aeration



cavity pumps



feeding / standard ISO container installation $10.0 \text{ m}^3/\text{h}$

inlets DAF



(top left: polymers, down left: unit from DAF container, top middle: switch cabinet, down middle: devices in technical container, top right: dosing system, down right: sludge pumps)

The plant series is characterized by an extremely robust, space-saving design. The great success of the system technology is based, on a simple and cost effective operation. Systems are installed in many major European food producers, as well as in Eastern Europe in action.

Technical data for selection & site preparation:

Sizes/equipments

3 sizes available for different application, (high loaded, normal or less loaded DAF)
each consisting out of 2 x 20 ft Container (40-65m³/hour)
each consisting out of 3 x 20 ft Container (80-130m³/hour)
container nr. 1 machine house, mixing devices, chemicals, precipitation, flocculation etc.
container nr. 2 DAF Cell-1 (reactor) with sludge discharge, inlet, outlet
container nr. 3 DAF Cell-2 (reactor) with sludge discharge, inlet, outlet (only with 80-130m³/hour)

Data of one DAF Cell:

| Max. flowrate of DAF design flow [m³/h] | DAF/42 | DAF/52 | DAF/65 | DAF/84 | DAF/104 | DAF/130 |
|---|--|--|--|--|--|--|
| 3 sizes available for different application | extreme load/low NTU | normal load | less load | extreme load/low NTU | normal load | less load |
| nr. of container | 2 X 20 ft Container | 2 X 20 ft Container | 2 X 20 ft Container | 3 X 20 ft Container | 3 X 20 ft Container | 3 X 20 ft Container |
| Max. daily amount of wastewater [m³/d] | 840 | 1.040 | 1.300 | 1.680 | 2.080 | 2.600 |
| Recyclestream [%] | > 40 | > 30 | > 20 | > 40 | > 30 | > 20 |
| Power consumption Kilowatt/ Ampere, 400 Volt, 50Hz, | 16/25 | 18/25 | 20/30 | 32/25 | 36/30 | 64/25 |
| Sludge discharge with airlift out of DAF unit by: | sludge compression zone airliftprinciple, discharge by gravity DN 200 mm intervals free adjustable (DS of sludge) | sludge compression zone airliftprinciple, discharge by gravity DN 200 mm intervals free adjustable (DS of sludge) | sludge compression zone airliftprinciple, discharge by gravity DN 200 mm intervals free adjustable (DS of sludge) | sludge compression zone airliftprinciple, discharge by gravity DN 200 mm intervals free adjustable (DS of sludge) | sludge compression zone airliftprinciple, discharge by gravity DN 200 mm intervals free adjustable (DS of sludge) | sludge compression zone airliftprinciple, discharge by gravity DN 200 mm intervals free adjustable (DS of sludge) |
| Sludge storage/-treatment on site advised [@4-6% DS flotat] | minipress | minipress | minipress | minipress | minipress | minipress |
| sludge removal support /with foam Jet | yes | yes | yes | yes | yes | yes |

Technical specification (PPU standard Pre-supplier/manufacturer, Note: indication is without commitment, changes due to seasonality and deliverytime):

| Max. flowrate of DAF design flow [m³/h] | | DAF/42 | DAF/52 | DAF/65 | DAF/84 | DAF/104 | DAF/130 |
|---|------------|------------|--------|--------|--------|---------|---------|
| Max. daily amount of wastewater [m³/d] | | 840 | 1.040 | 1.300 | 1.680 | 2.080 | 2.600 |
| diameter of DAF reactor [cm] | PPU | On request | | | | | |
| Polyethylen, welded | | | | | | | |
| feed pump eccentric screw DN [mm] / P [kW] / flowrate [m³/h] | Netsch | | | | | | |
| multiphase pumps totally | | | | | | | |
| DN [mm] / P [kW] / flowrate [m³/h] | Edur | | | | | | |
| dosing pumps polymer | Calpeda | | | | | | |
| flowrate [ltr/h] | Iwaki | | | | | | |
| dosing pumps flowrate [ltr/h] | ProMinent | | | | | | |
| splitting/caustic soda/totally | | | | | | | |
| air compressor (containerized) P [kW] / flowrate [ltr/min] | Iwaki | | | | | | |
| | Einhell | | | | | | |
| | Scheppach | | | | | | |
| tank polymer with stirrer (1 Cell) 4200 liter | Anicon | | | | | | |
| polymer preparation (2 Cells) 3000 liter | PPU | | | | | | |
| stirrers | Sewa | | | | | | |
| drain 2x thread female [inch] | HTI | | | | | | |
| sludge discharge d _{out} [mm] | PPU | | | | | | |
| clear discharge d _{out} [mm] | | | | | | | |
| mixing line / saturation PVC | PPU | | | | | | |
| mixing tank PE / static mixer | Anicon | | | | | | |
| controlcabinet HxW [cm] L35 | Rittal | | | | | | |
| Mitsubishi/Siemens SI 7 | Mitsubishi | | | | | | |
| level sensor buffer 4-20 mbar | BD Sensor | | | | | | |
| air pressure / Dryrun Recy | Bamo | | | | | | |
| air pressure monitoring DAF | Festo | | | | | | |
| Dry run / thermo protection | Netsch | | | | | | |
| level indicator chemicals digi | Elobau | | | | | | |
| pH | Schott | | | | | | |
| pneumatic sludge lifter DN [mm] | PPU | | | | | | |
| scraper device [Watt/rpm/min] | PPU | | | | | | |

Technical equipment /scope of delivery

The Clearfox DAF version installed in a sea container is designed for plug&play. With the startup guide and the operational manual, non skilled clients are able to operate the equipment. The technical equipment is complete for a simple installation onsite and also the installation and mounting materials are included.

The Clearfox DAF version installed on racks can be made ready for operation, by connecting the devices P,F,D & control unit, pipe connections, mounting materials are on demand or clients requirements.

Part lists as well as wear/spare are included in the design documents 3-4 weeks after ordering and after beginning of manufacturing. Please note, that we design for every application: dosing quantity, recycling rate, surface load, oxygen load,

so every technical device can be specified i.e power/volume/flow etc.

typical client requirement (basic data) typical taken as standard design parameter (Clearfox airlift DAF) typical efficiency rates expected

| | | | |
|---|----------|---|---------------------------------------|
| dry matter of sludge (flotate) | %DS | dry matter in sludge (flotate thickening) | % => 4 < 6 |
| concentration SS in clearwater | mg/l | total surface load liquid phase | [m ³ /h] = 3-6 (1 step) |
| C elimination (CODin-CODout) /CODinx100 | % | surface load solids | [kg/m ² h] = 5-20 (1 step) |
| same for heavy metals/oil/SS | % | air/solids ratio | [g air/kg solids *)]= 10-50 |
| effluent concentration of any parameter | mg/l | average50-bubble size@5-6 bar | micron = 30-60 |
| branch/production/ | products | saturation rate during operation | % >80< 98 |
| peak flow | m3/h | recycling rate internal for D/H>1.5 | % =>25<40 (1 step) |
| | | operational saturation pressure | bar = > 3 < 6 |
| | | air volume per liquid in multiphase operation | % > 5 < 20 |

note for standard design parameter: that they are in close correlation and influence each other, standard valid taken without any clients basic data

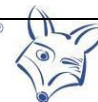
2- step DAF are only possible after piloting a system or upgrading former projects with same ww characteristics

clients service

how to startup-short version:

install feed suction line in buffer, connect sludge outlet pipe to sludge treatment, connect clearwater outlet, connect power supply in c startup, operation and maintenance according to site conditions (photo documentation)

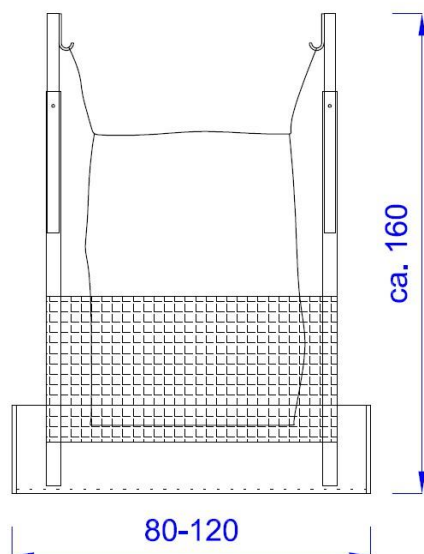
| Abwasserart | Rohabwasser | | | Klarwasser | | | Abscheidegrad | | |
|--------------------|---------------------|---------------------|-------------------------|---------------------|---------------------|-------------------------|------------------|------------------|----------------------|
| | susp. Stoffe [mg/L] | etherl. Fett [mg/L] | BSB ₅ [mg/L] | susp. Stoffe [mg/L] | etherl. Fett [mg/L] | BSB ₅ [mg/L] | susp. Stoffe [%] | etherl. Fett [%] | BSB ₅ [%] |
| Speisefabrik | 230 | 460 | 2.900 | 20 | 25 | 94 | 91,3 | 94,6 | 96,8 |
| Margarinefabrik | 5.000 | 3.900 | - | 200 | 40 | - | 96,0 | 99,0 | - |
| Kosmetikfabrik | 15.000 | 5.405 | 25.400 | 1.800 | 485 | 5.880 | 88,0 | 91,0 | 76,0 |
| Wollwäscherei | 4.000 | 2.100 | 970 | 60 | 30 | 90 | 98,5 | 98,6 | 90,7 |
| Schlachthof | 700 | 892 | 1.900 | 10 | 32 | 39 | 98,6 | 96,4 | 97,6 |
| Geflügelbearb. | 874 | 3.139 | 1.136 | 40 | 18 | 100 | 95,4 | 99,4 | 91,2 |
| Tierkörperbeseit. | 5.353 | 4.614 | - | 780 | 775 | - | 95,4 | 83,2 | - |
| Gerberei | 5.093 | 462 | 2.221 | 384 | 43 | 547 | 92,5 | 90,7 | 75,4 |
| Sojabonenverarb. | 1.656 | - | 3.000 | 42 | - | 800 | 97,5 | - | 73,4 |
| Kartoffelverarb. | 2.600 | - | 2.760 | 60 | - | 260 | 97,7 | - | 90,6 |
| Faserplattenfabrik | 1.700 | - | 6.170 | 127 | - | 3.000 | 92,6 | - | 51,4 |



www.clearfox.com

Description of ClearFox sludge big bag dewatering system

simple and economic sludge dewatering i. e. for small Clearfox DAF applications, up to 10-15% dry matter, drain water back to system. Alternately fed (one bag filled - second bag meanwhile dewatering phase)



Specification:

Size steel construction: approx. 80-120/120/160 cm (l/w/h)

Big bags:

The big bags are made of PPU - textile fabric with 4 loops (60 cm free length) for fixing to the steel frame. The bag material is extremely permeable to water resulting in filtration rates.

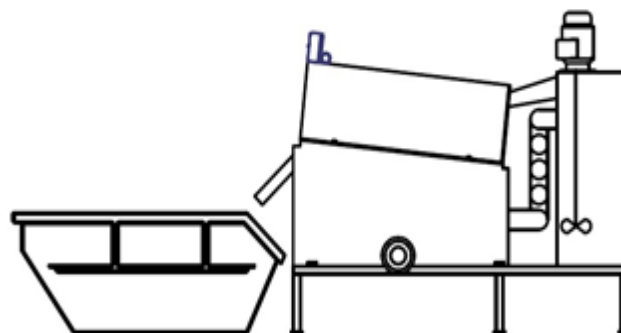
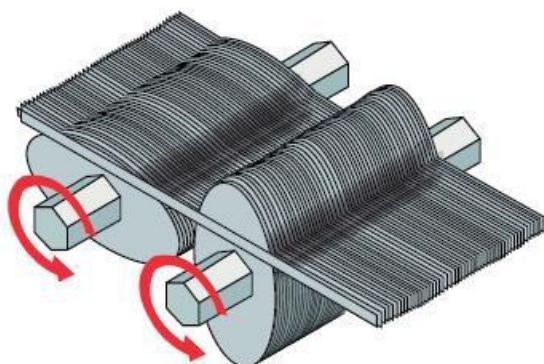
We recommend 2 devices for an automatic operation. While filling the first big bag in the meantime the disposal of the second big bag is possible.

The filter bags are suitable for dewatering sludge of different origin:

| | |
|------------------------|---------------------------------|
| Biological sludge | Ceramic and glass industry |
| Chemical industry | Municipal wastewater treatment |
| Food production | Corrugated cardboard processing |
| Gravel filters | Ion exchanger |
| water jet cutting | pharmaceutical production |
| textile industry | tanneries |
| petrochemical industry | galvanic plants |
| agriculture | |

Benefits for Clearfox moduls

- Modular system, adaptable at every application
- High performance with high quality
- Made in Germany
- Fast startup, cost saving in installation, small footprint
- Stable and very robust process technology



Description:

The clearfox® sludge treatment system consists of a thickener and a solid-liquid separator. Oval rotating plates transport the sludge forward. Between the rotating plates a grit (gap size 1 mm) is assembled. The fluid phase passes the grid, sludge and solids are transported further on, compressed by a press plate and finally dewatered by an air cylinder which puts pressure on it. A static mixing device ensures a steady delivery of polymers. A sludge storage tank put beneath the thickener receives the separated dry solids. Furthermore a self-cleaning process included. Due to the slits opposite the continuous rotation and the oval shape of the plates a waving transport and consequently a self-cleaning effect occurs. As a result clogging is avoided and flushing is not necessary.

The treatment process is stable, there is no reduction in capacity

Technical Specifications:

| Module | ST 411D | ST 611D | ST 811D |
|---------------------------------|---------------|---------------|---------------|
| dried sludge capacity | 40-60 kg/h | 60-80 kg/h | 80-120 kg/h |
| volume of storage tank | up to 200 L | 300 L | 500 L |
| oval disk column number | 11 | 11 | 11 |
| gap size | 1 mm | 1 mm | 1 mm |
| equipment length | 2800 mm | 2900 mm | 3000 mm |
| equipment width | 1200 mm | 1400 mm | 1650 mm |
| equipment height (plus storage) | 1600 mm | 1600 mm | 1600 mm |
| net weight | 670 kg | 720 kg | 980 kg |
| power (thickener + mixing) | 0,4 + 0,25 kW | 0,4 + 0,25 kW | 0,4 + 0,25 kW |

Materials:

| | |
|------------------|--|
| frame and body | stainless steel 304 |
| oval discs | stainless steel 304/ tungsten carbide coating |
| grids | stainless steel 304 |
| collection tank | stainless steel 304 |
| connection tubes | PVC |
| cables | standard |

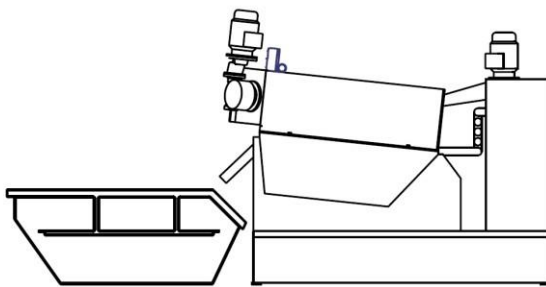
Application:

The rotating disk thickener and dewatering unit can be widely applied to municipal sludge (such as primary, secondary and mixed sludge), dewatering of slurry and digestate as well as sludge from industry.

The standard application of PPU is the thickening of sludge from the DAF (20 - 40 L/h (per each 1 m³ floated wastewater) with DM 3 - 5% and secondary sludge from the biological treatment with DM 1%.

Advantages:

| | |
|---------------------------|----------------------|
| Self-Cleaning | large transport load |
| no clogging | no odor |
| no backwash | easy maintenance |
| stable treatment capacity | |



Description:

Sludge from DAF (dissolved air flotation) and FBR, SBR (biological aerobic treatment) produces liquid sludge; the solids in the sludge have to be removed in order to reduce the totally liquid volume. This mini sludge press is especially designed to handle small flowrates out of our systems. It can be widely applied to municipal sludge (such as primary, secondary and mixed sludge), dewatering of slurry and digestate as well as sludge from industry. As standard preinstalled in a container there are 3 modules: the press, flocculation system, bypass, storage for dried sludge. The screw press consists of three dewatering zones: The processes there are thickening, filtration and compression. In the thickening zone of the dewatering drum the solids are separated and the liquid is discharged. The dewatering zone follows where the pressure rises due to the decreasing pitch of the screw and smaller gaps between the rings. Finally dry sludge cake is discharged.

The sludge is continuously conveyed by means of a screw shaft inside the device. The cooperation of fixed and moving rings ensures self-cleaning preventing clogging. The sludge can initially be conditioned with polymers in a flocculation reactor including an agitator. Therefore better results for dewatering are achieved. The drained water is led back into the buffer (pump sump) of the treatment system by gravity. The dried sludge - removed out of the system - is not more pumpable. A skip (as in picture above) could be used for our calculation we give an advice how many volume of this sludge is per day, for bigger systems will be conveyor screws to another storage place the choice.

Technical Specifications (listed here the standard mini presses, bigger on request):

| Module | SCP 051 | SCP 101 | SCP 131 | SCP 132 | SCP 202 |
|---|-----------|----------|----------|----------|----------|
| Capacity sludge from DAF (DM 5%) | 0,08 m³/h | 0,2 m³/h | 0,4 m³/h | 0,8 m³/h | 1,6 m³/h |
| => dried sludge capacity | 4 kg/h | 10 kg/h | 20 kg/h | 40 kg/h | 80 kg/h |
| capacity raw wastewater, biological sludge (DM 0,2%-0,8%) | 0,25 m³/h | 1,0 m³/h | 2,0 m³/h | 4,0 m³/h | 8,0 m³/h |
| => dried sludge capacity | 0,5 kg/h | 2,0 kg/h | 4,0 kg/h | 8,0 kg/h | 16 kg/h |
| screw shaft | 1 | 1 | 1 | 2 | 2 |
| screw shaft diameter | 100 mm | 100 mm | 130 mm | 130 mm | 200 mm |
| equipment length | 1130 mm | 1820 mm | 1980 mm | 2082 mm | 2515 mm |
| equipment width | 520 mm | 758 mm | 758 mm | 913 mm | 938 mm |
| equipment height | 640 mm | 1050 mm | 1050 mm | 1050 mm | 1285 mm |
| net weight | 100 kg | 205 kg | 225 kg | 310 kg | 525 kg |
| power | 0,2 kW | 0,2 kW | 0,2 kW | 0,3 kW | 0,8 kW |

Application:

The standard application for this mini press of PPU is the treatment of sludge from the DAF (20 - 40 L/h (per each 1 m³ floated wastewater) with

DM 3 - 5% and secondary sludge from the biological treatment with DM 1%.

The inlet sludge concentration can vary from 2 g/L up to 50 g/L. The outlet sludge can have a DS up to 30-40%

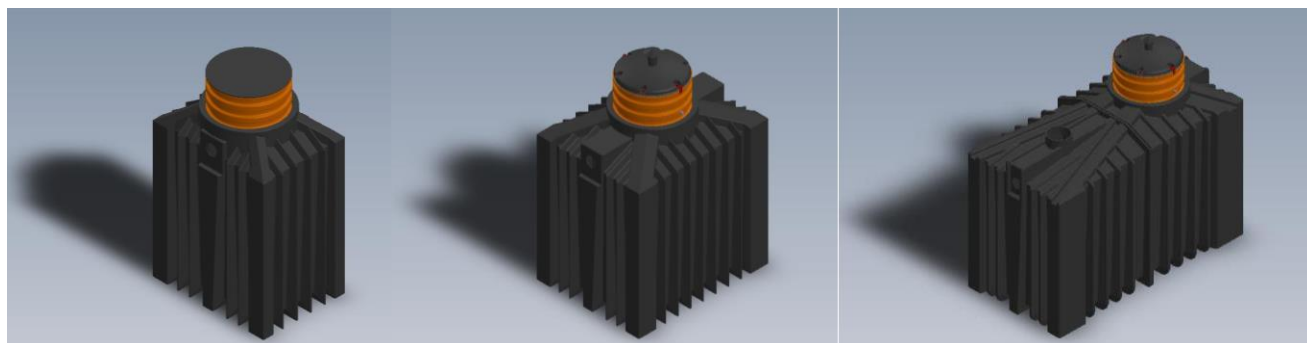
Advantages:

Continuous load over 24h, German HP motor supplies with a 100%

duty cycle! No clogging, due to ring space principle

Stable treatment capacity, due to step by step zones

Easy to maintain --> unique technology which needs every day maximum 10 minutes service, this cannot be achieved with any other press



Description lamella separator

The lamella separator is a non pressure system. Main application is behind biological treatment in order to remove the secondary sludge. But also water with solids after chemical treatment could be treated. The water (with solids) is pumped or flows by gravity or as pumped feeding line into the inlet channel of the lamella clarifier where it flows downwards. Below the lamella package the flow is guided to be reversed and streams upwards through the lamellas. The solids (heavier as water) settle down countercurrently on the lamellae.

The clarified water flows further upwards and via a special overflow weir to the outlet. The solids slide down along the lamellae and accumulate in the sludge funnel (ending in a pump sump). Depending on the subsequent process steps the sludge can continuously or discontinuously removed. Complete installed in a plastic tank with required size. The inletpart also consists of a seamless PE sump. The sludge will removed with a sludge pump (optional) from there, which can be by a submersible pump (hanging on a lifting rope /liner directly in the sludge sump) or by connecting a sludge pump dry installation outside the tank to a sludge outlet opening (thread connection on tankside near bottom to a soaking liner) . We offer 3 different sizes and lamella packages depending on application and/or flowrate.

- **optional** with a – **outside horizontal around** - steel frame for **onfloor** installation of the tank in steel bar 80 mm x 40 mm (underground **inside** reinforcement is standard)
- **optional** domeshaft access to adapt the accesshole to the top of terrain/surface when tank is installed underground
- **optional sludge outlet** connection (welded thread DN 25 to connect a liner for dry installation pump)
- **optional with pump** (submersible or dry installation) flowrate circa. 0.5 l/s – 1.0 l/s
- in-/ outlet connection, DN100 @ 140 cm from floor
- Water depth 140 cm

Lamella clarifier

- Material: PPTV
- Slope: 60°
- Sedimentation area: 8 – 11 m²/m³

Equipment parts:

| Tank: | 1250 l Tank | 2250 l Tank | 3500 l Tank |
|--|---|---|---|
| Measures: (l,w,h) in cm (with outside frame) | 90/122/171 (106/138/171) | 154/122/171 (170/138/171) | 243/122/171 (259/138/171) |
| Required space: | 1,25 m ³ | 2,25 m ³ | 3,5 m ³ |
| Transport weight: | 130 kg | 200 kg | 250 kg |
| Max. operation weight: | 1300 kg (with water filling) | 2300 kg (with water filling) | 3550 kg (with water filling) |
| Inlet connection by gravity or feed pump pressure line: | DN 100 | DN 100 | DN 100 |
| Outlet connection by gravity: | DN 100 | DN 100 | DN 100 |
| Feed pump secondary sludge: (optional) | Sludge water pump with 1" connection | Sludge water pump with 1" connection | Sludge water pump with 1" connection |
| access: | Lid (60 cm diameter) | Lid (60 cm diameter) | Lid (60 cm diameter) |

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Application:

Clarifier behind biological fixed film processes, aquaculture, stormwater

| Module | CI1250/1,0 | CI2250/2,5 | CI3500/5,0 |
|-------------------------|------------|------------|------------|
| size | 1250 l | 2250 l | 3500 l |
| flowrate (m³/h) | 1,0 | 2,5 | 5,0 |
| sedimentation area (m²) | 2,6 | 6,87 | 13,46 |

Clarifier behind high loaded biological fixed film processes; flocculated water

| Module | CI1250/0,5 | CI2250/1,0 | CI3500/1,5 |
|-------------------------|------------|------------|------------|
| size | 1250 l | 2250 l | 3500 l |
| flowrate (m³/h) | 0,5 | 1,0 | 1,5 |
| sedimentation area (m²) | 1,82 | 4,81 | 9,4 |

Benefits:

| | |
|--|---|
| fast startup, cost saving in installation, small footprint | predesigned acc. ATV/DWA guidelines ww treatment |
| modular system, adaptable at every application | industrial as well as municipal wastewater clarifying |
| high performance with high quality, Made in Germany | tanksystem approved by EN 12566 and ISO 9001/3 |

برخی از پروژه های اجرا شده:

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عکسهای فوق مربوط به ایستگاههای انتقال گاز خاوران و جهرم در فارس میباشد و رنگ پساب تصفیه شده مشخص میباشد.

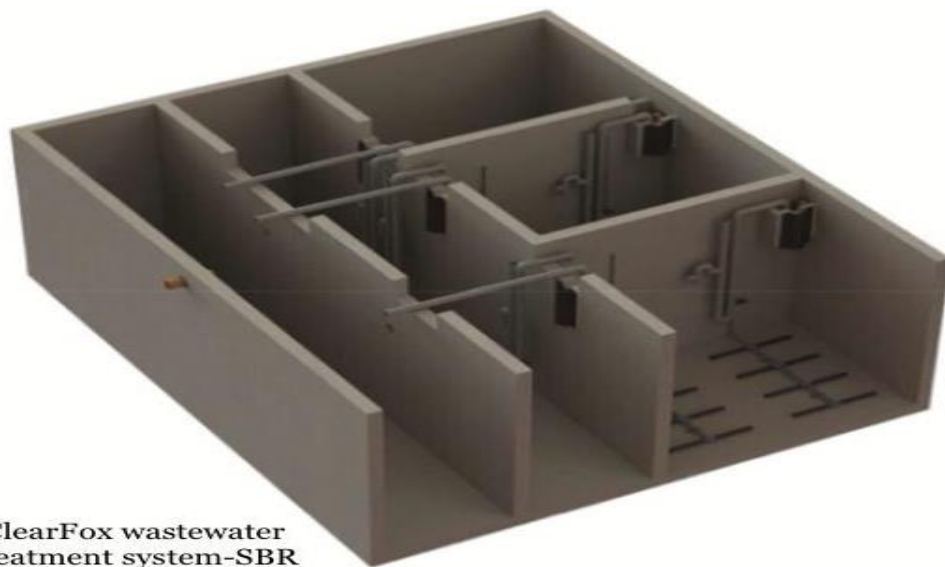


پروژه مجتمع ویلایی - کرمان



پروژه ویلایی دیزین

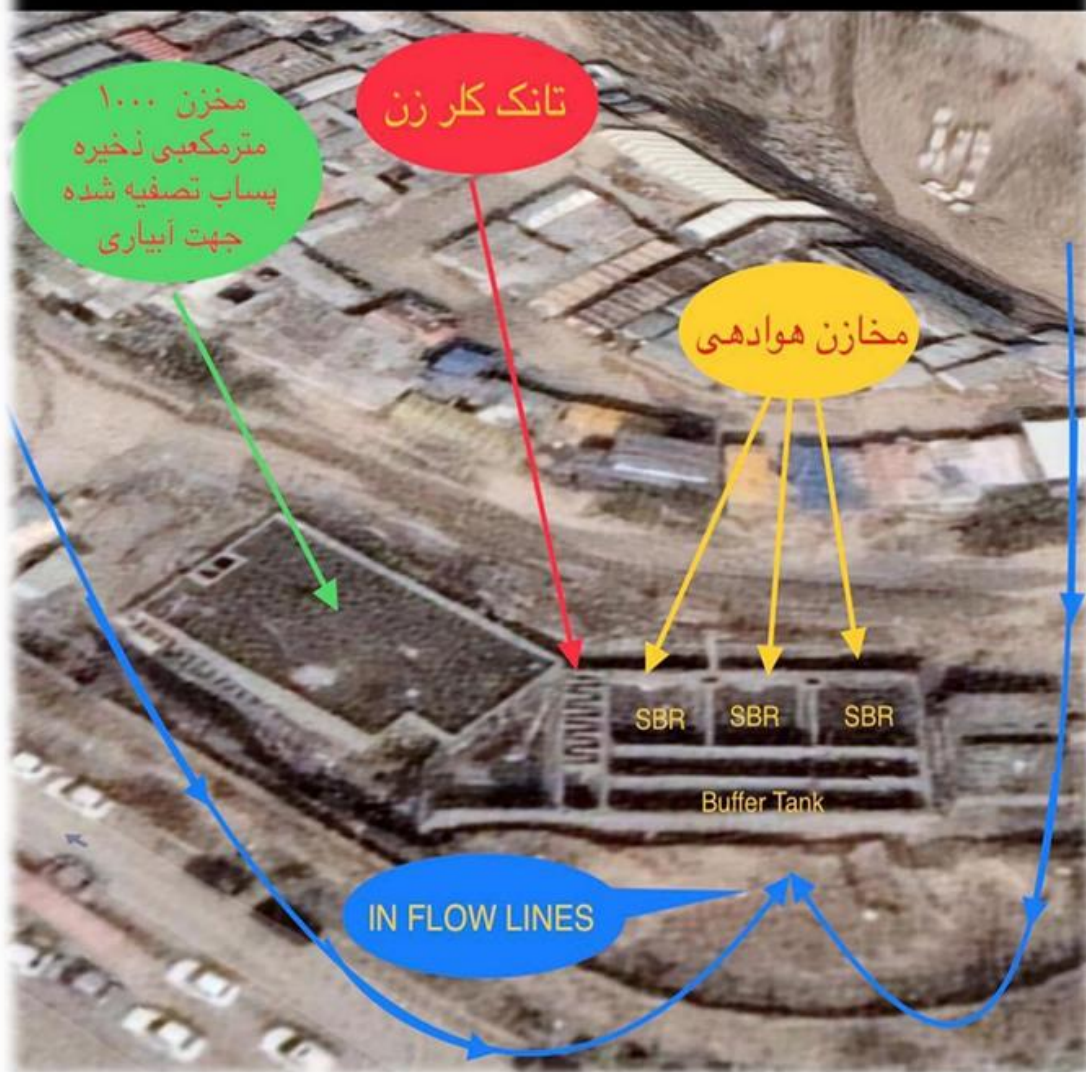
اجرای بزرگترین پکیج تصفیه فاضلاب بهداشتی به روش SBR در تهران



ClearFox wastewater
treatment system-SBR

پروژه باغ موزه بانک مرکزی جمهوری اسلامی ایران - تهران اتوبان حقانی

پکیج تصفیه فاضلاب Advance SBR به ظرفیت تصفیه ۲۵۰ متر مکعب در شبانه روز
ساخت کمپانی Clearfox آلمان - پروژه باغ موزه بانک مرکزی ایران ، تهران - اتوبان حقانی
مجری : کنسرسیوم کمال صنعت ، اسپید آب









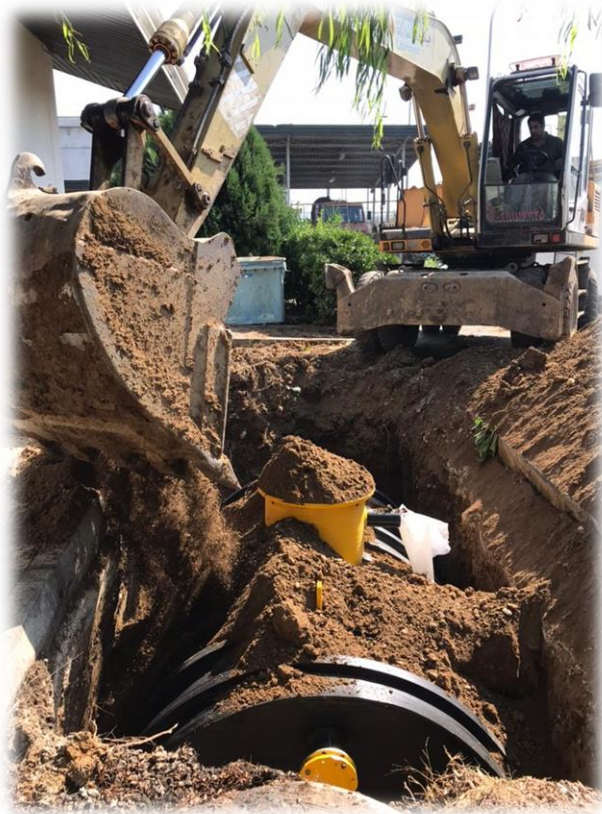
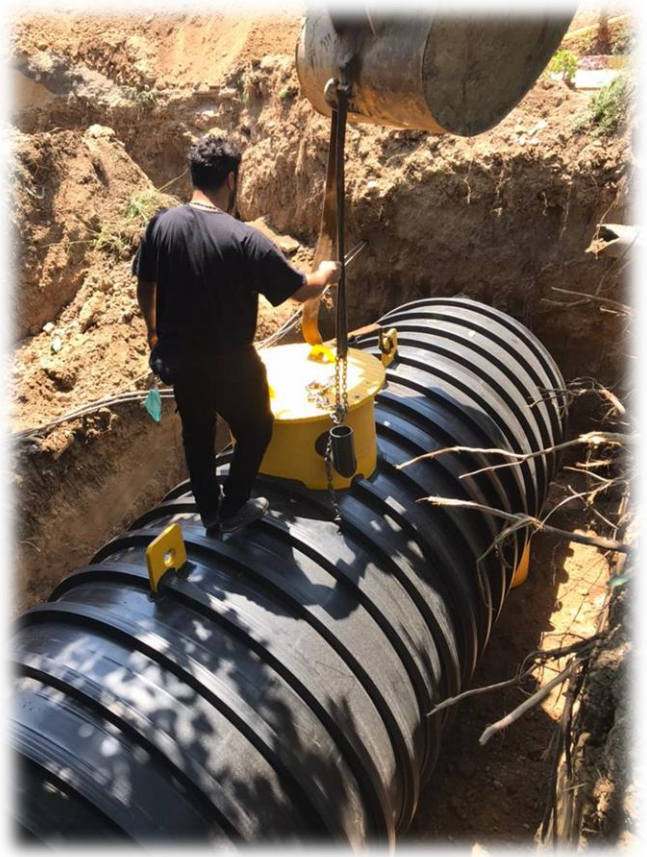
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