

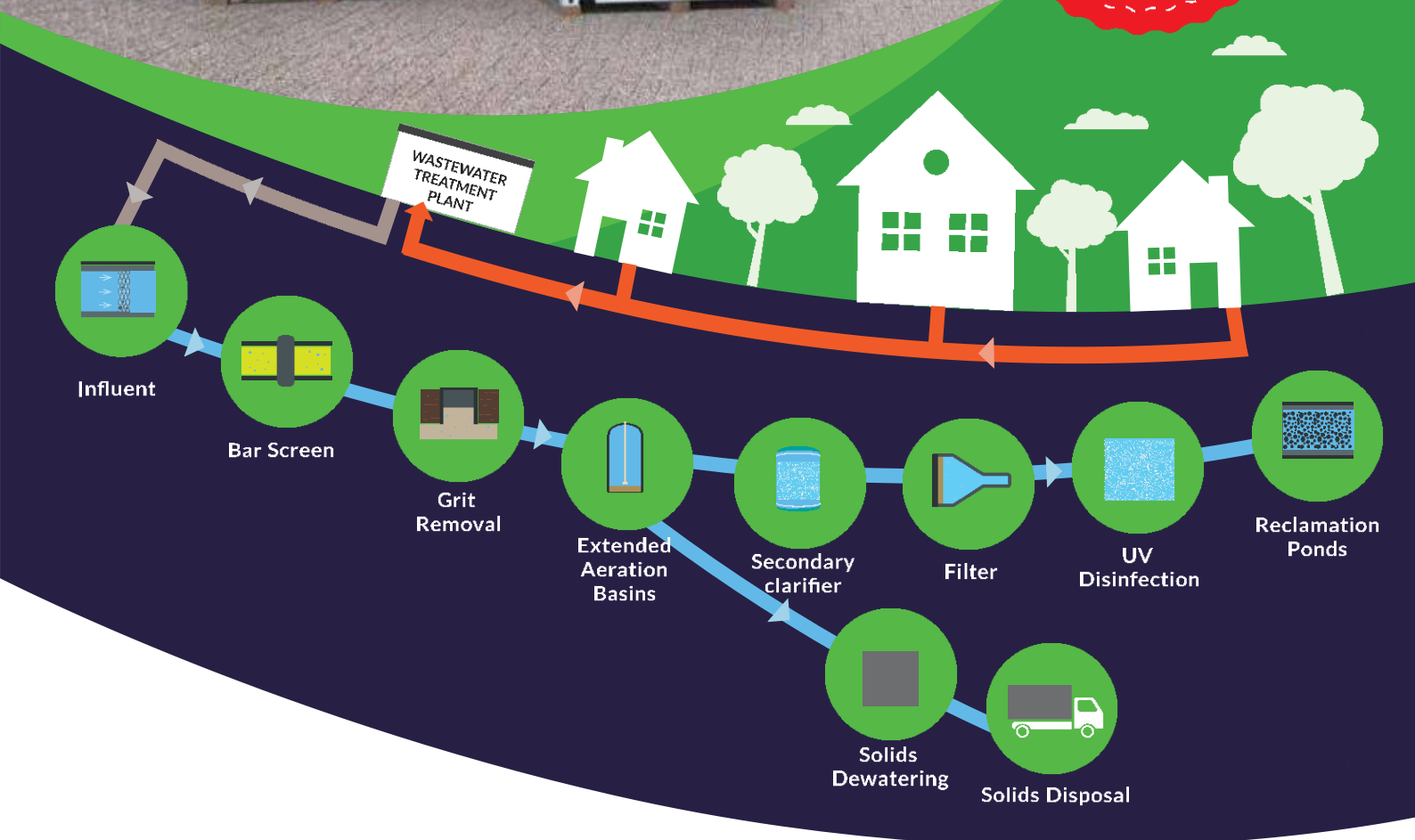


# Product Introduction.

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**Smart Eco-SBR system**





# Intelligent Waste Water Management Systems



# About Us

**ICC Smart Eco Solutions**, the newest division of the reputable general contractor, **International Construction Consortium (Pvt) Ltd** introduces a range of Sewage Treatment Plants using German and Chinese Technology to meet every need.

These units are modular in design and can cover a large range of populations to satisfy the needs of domestic, industrial, and municipal wastewater treatment needs.

As an example, the **Nature model** for domestic use, uses NO electricity or chemicals in the treatment process. It uses bacteria available in nature and is totally eco-friendly. The effluent discharged meets all discharge standards of the world and this is certified by many independent testing houses in Europe.

Larger commercial modular units are currently operated by condominium developers and hoteliers in Sri Lanka. These units carry warranties of 15 years or more. There are many modular MBBR/FBBR units currently in use in Sri Lanka. Our systems use the least amount of chemicals, electricity, floor space and labour in comparison to conventional systems.

Although over 70% of the world's surface is covered with water, only about 1% is available for human consumption. Water is precious and we need to safeguard every drop of it.

The wastewater treatment plants we market produce effluent that could be reused for gardening, toilet flushing, vehicle washing etc. saving many thousands of cubic meters of wasted water per day.

In addition to wastewater treatment we also reprocess organic waste to fertilizer using our "Quick composters" converting organic waste to compost in 24 hours. We market machines for domestic use, processing 2kgs per cycle to tons per day for commercial use.

There is a machine to suit your every need, contact us for further information.

*Save our Nation from GARBAGE pollution, convert to Compost in 24 hours.*

## **Vision**

Respect and leverage the planets' organic cycle by catalyzing the recycling process of organic waste and free the future generations of having to live on a polluted earth.

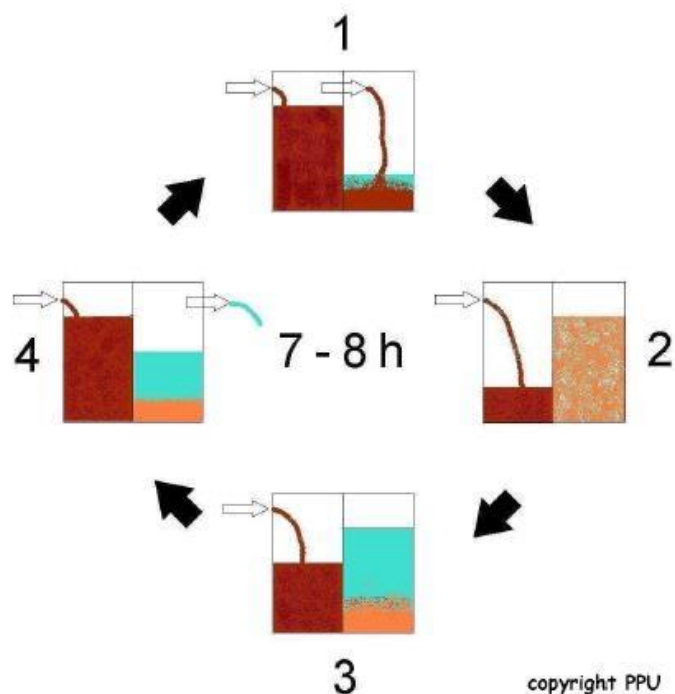
## **Mission**

ICC Smart Eco division provides the best available technology to every household & organization at an affordable price, and in doing so, makes every citizen responsible for disposing their waste in a manner beneficial to mother earth.

## SBR – Technology

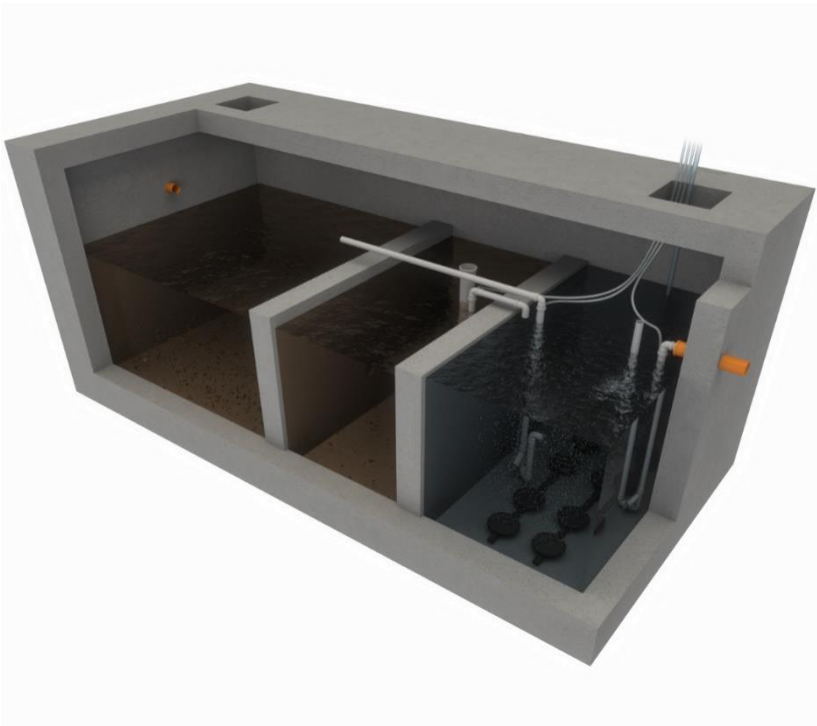
The Sequencing batch reactor process (SBR process) is a variation of the conventional activated sludge process. The SBR consists of a reaction chamber that initially serves as a biological reactor and then as a sedimentation tank. In contrast to continuous-flow reactors, the SBR is filled and emptied discontinuously. The traditional spatial separation of the biological processes and sedimentation is replaced by a temporal one. The interval betaken the beginning of the filling process and the end of the extraction of clearwater and a possible rest period is called a cycle.

The SBR cycle is characterized by a sequence of successive process phases. The hydraulic decoupling of the SBR process makes it possible to design the duration, frequency and order of the cycle phases variably. The cycle starts with the filling phase in which the initial breakdown processes begin under anaerobic or anoxic conditions. In the actual decomposition or reaction phase the reactor is aerated. Depending on the purification goal, non-aerated phases can also be introduced. Then comes the sedimentation phase in which the activated sludge settles and a layer of clearwater forms. The clearwater is extracted in the sedimentation phase. The cycle then starts over again. The SBR process does not require a secondary purification phase.

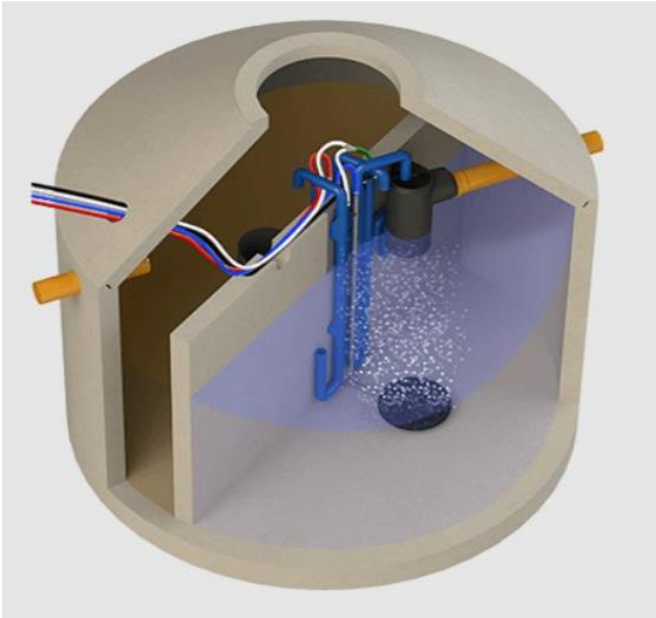


1. Filling phase (biological reactor)
2. Purification Phase
3. 60-minute sedimentation phase
4. Clearwater extraction phase

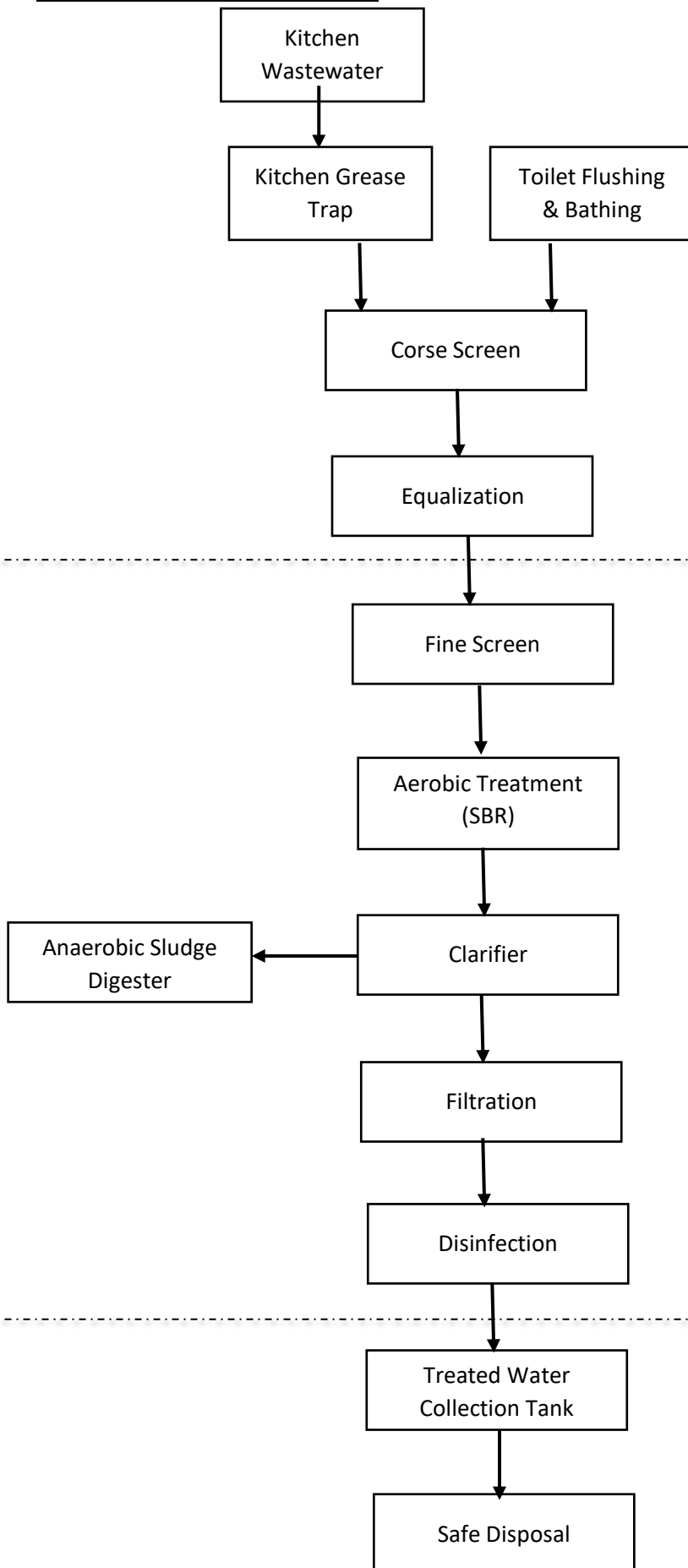
**Industrial Systems**



**Domestic Systems**



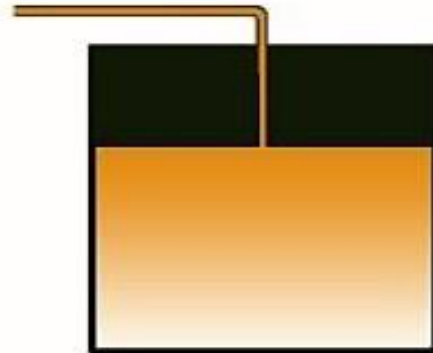
# PROCESS FLOW DIAGRAM



# SBR Process

## SBR-Prozess

1. **Filling:** Wastewater runs into the container



2. **Aeration:** Waste water is biologically cleaned by oxygen supply & circulation. Sludge degradation

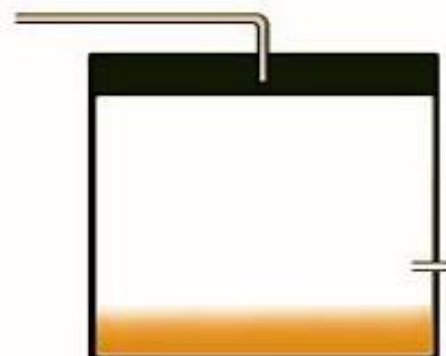


3. **Settling:** heavier bio mass sinks to the bottom & mud stabilization



4. **Backwashing of piping**

5. **Clear water separation**





## **Description/ scope of delivery:**

The scope of delivery (ClearFox-KIT) is every technical equipment, installed in a concrete based tank, to get a turnkey waste water treatment plant, as explained in the following description.

By means of the inlet duct, the waste water gets into the primary storage. The same fulfils two functions – the waste water is equalized relating to concentration and a certain volume (charge) is buffered. The charge volume is adjusted during continuous operation to the waste water amount in order to achieve an energy optimization of the waste water treatment plant. By means of a compressed-air lifting installation, the waste water gets from the primary storage to the biology which is executed as SBR-reactor. The scheduled sludge age amounts to 12 – 15 days.

The operating procedure is as follows:

The control system of the waste water treatment plant is able to distinguish between operating modes “normal load cycle” and “energy-saving cycle”.

The activation of the cycle is effected automatically and is depending on the demand of waste water supply. Load-dependently, to up to three cycles (processing of one charge volume) per day are carried out. The cycle sequence respectively phase sequence within one cycle is taking place according to a fixed and preset time schedule specified by the manufacturer which is saved in the control system by password protection.

In order to reduce operating costs and to guarantee minimum waste water quantities in the respective filling charges, the cycle selection is effected as individually needed by means of a continuous control of the fill level in the primary treatment. The same is adjusted to a minimum charging quantity which complies with the cycle quantity in the reactor. If this defined waste water quantity, which is depending on the number of inhabitants, is not prevailing, the control system works in the energy saving cycle without any time restriction.

The volume of the reactor is periodically circulated and aerated. The aeration takes place by means of aeration discs which are installed at the tank bottom. By using a dryly positioned compressor, the necessary air quantity is generated in order to aerate the waste water efficiently and with microbubbles. By means of the excess sludge lifter also cyclically cleaned water is supplied to the primary treatment (circuitry). Provided that not additional hydraulic load (holiday) is given, the operation takes place in cycles without clear water removal. The primary treatment reaches at the latest after approx. two days of energy-saving cycle (or earlier during new waste water inflow) the filling mark, whereas the cycle is interrupted immediately.

A new cycle in normal charge load starts with the step of sedimentation phase.

Normal charge cycle:

The cycle period amounts to 7 hours which are preset by the manufacturer. Exclusively after reaching of the maximum filling mark in the primary treatment, the cycle starts with the **sedimentation phase**.

During the sedimentation phase of one hour, the reactor volume is dividing horizontally into a sludge zone and a clear water zone. Incoming waste water is buffered in the storage of the primary treatment. After firmly predetermined 60 minutes of sedimentation, the **clear water removal phase** starts.

The cleaned water is added to the discharge of the waste water treatment plant by means of a compressed-air lifter.

Upon termination, immediately the **Excess sludge removal** starts

The duration of this phase is present - depending on the conveying height. The compressed air lifter is conveying the arisen excess sludge for storage in the sludge storage. The removal area is specified due to the design of the removal opening. Afterwards the cycle proceeds continuously without interruption with the filling phase.

### **Mixing and reaction phase**

By means of a membrane disc which is fixed in the center of the reactor bottom, air is blown in at regular intervals.

The ascending bubbles generate turbulences which are mixing the content of the tank, consisting of activated sludge and waste water.

Furthermore, the tank content is enriched with oxygen which is necessary for degradation of pollutants.

After the preset duration of this phase, the cycle in normal charge ends.

**All pumps in the waste water treatment plant, which are used for sludge respectively waste water conveyance are basically without moving parts and are centrally supplied with air from dryly positioned compressors. If possible, we use Airlift principles.**

### **Control system**

The control system is working fully automatically, with included ventilation and temperature monitor. The complete control engineering is included in one switchboard cabinet in the operating plant. Occurring disturbances are registered here and forwarded (if necessary) by modem or by mobile phone (optionally). This service is integrated ready for use and programmed.

All functions for a save operation of the waste water treatment plant are realized by means of a stored program control (SPC). This is of the advantage that possible further upgrading's or changes can be integrated later without problems. However, all consumer loads can be activated easily by manual hand switches.

## Data Sheet

### SBRQ1+ Kit 4 – 50 PE



#### Sequencing Batch Reactor (SBR)

##### Description SBR Q1+ Kits

Clearfox SBR Q1+Kits operate according to the SBR-Process (Sequencing batch reactor) with integrated aerobic sludge stabilization. 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+. A partial baffle would be advantageous to retain large inorganic particles in the first chamber. This baffle could 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 desludged 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



## Data Sheet

### SBR Kit 60 – 500 PE



#### Sequencing Batch Reactor (SBR)

##### Description SBR Kits

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

The plant consists of two areas: the pre-sedimentation and the bioreactor. the pre-sedimentation consists of a sedimentation chamber, a sludge storage tank and a buffer. The system is designed dimensioned according to the guidelines of the DWA-A 131 and DWA-A 222 for domestic wastewater.

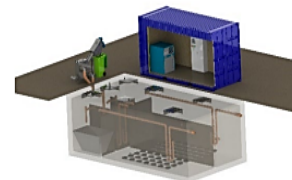
##### Cleaning efficiency

The cleaning performance is split into classification "C" and "N"

- classification "C"
  - o COD < 150 mg/l
  - BOD < 40 mg/l
- classification "N"
  - o COD < 90 mg/l
  - o BOD < 10 mg/l
  - o NH4-N < 10 mg/l

##### **Benefits for Clearfox SBR Kits**

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



## SBRQ1+Kit 4 - 50 PE

PE	hydraulic Loading m <sup>3</sup> /day	organic Loading KG BOD/day	tankvolume m <sup>3</sup>	max. water depth m	Compressor size KW	dimension airliftpumps 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

### Benefit of Clearfox SBR Q 1+ Kits

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

# Data Sheet

## SBR Kit 60 – 500 PE

Classification "C"

PE	hydraulic Loading m <sup>3</sup> /day	organic Loading KG BOD/day	Primary treatment		Classification "C"	max. water depth m	Compressor size KW	dimension airlift pumps Mm	power consumption KWh/day	Calculated Sludge production		Cleaning cycles		diameter connecting tube mm	paletts for transport no.
			Sludge storage time							COD = 150 mg/l BOD = 40 mg/l	No./day	max. m <sup>3</sup> /cycle			
			3 month*	1 year*	V <sub>Bio</sub> [m <sup>3</sup> ]										
			V <sub>tot</sub> [m <sup>3</sup> ]	V <sub>tot</sub> [m <sup>3</sup> ]											
60	9,00	3,60	10,50	17,40	6,60	2,00	1,50	75	18,00	61,20	198	3	3,00	25	2
75	11,25	4,50	13,10	21,80	8,30	2,00	1,50	75	18,00	76,50	248	3	3,80	25	2
100	15,00	6,00	17,50	29,00	11,00	2,00	1,50	75	18,00	102,00	330	3	5,00	25	2
125	18,75	7,50	21,90	36,30	13,80	2,00	2,20	100	26,40	127,50	413	3	6,30	32	2
150	22,50	9,00	26,30	43,50	16,50	2,50	2,20	100	26,40	153,00	495	3	7,50	32	2
200	30,00	12,00	35,00	58,00	22,00	2,50	2,20	100	26,40	204,00	660	3	10,00	32	2
250	37,50	15,00	43,80	72,50	27,50	2,50	3,00	100	36,00	255,00	825	3	12,50	38	3
300	45,00	18,00	52,50	87,00	33,00	2,50	3,00	100	36,00	306,00	990	3	15,00	38	3
350	52,50	21,00	61,30	101,50	38,50	2,50	3,00	100	36,00	357,00	1155	3	17,50	38	3
400	60,00	24,00	70,00	116,00	44,00	3,00	3,00	100	36,00	408,00	1320	3	20,00	35	3
450	67,50	27,00	78,80	130,50	49,50	3,00	4,00	150	48,00	459,00	1485	3	22,50	50	4
500	75,00	30,00	87,50	145,00	55,00	3,00	5,50	150	66,00	510,00	1650	3	25,00	50	4

# Data Sheet

## SBR Kit 60 – 500 PE

### Classification "N"

PE	hydraulic Loading m <sup>3</sup> /day	organic Loading KG BOD/day	Primary treatment		Classification "N"	max. water depth m	Compressor size KW	dimension airlift pumps Mm	power consumption KWh/day	Calculated Sludge production		Cleaning cycles		diameter connecting tube mm	paletts for transport no.
			Sludge storage time							COD = 90 mg/l BOD = 10 mg/l SS = 10 mg/l NH4-N = 10 mg/l	Kg/month	l/day	No./day		
			3 month*	1 year*											
			V <sub>tot</sub> [m <sup>3</sup> ]	V <sub>tot</sub> [m <sup>3</sup> ]	V <sub>Bio</sub> [m <sup>3</sup> ]										
60	9,00	3,60	10,50	17,40	9,00	2,00	1,50	75	18,00	61,20	198	3	3,00	25	2
75	11,25	4,50	13,10	21,80	11,25	2,00	1,50	75	18,00	76,50	248	3	3,75	25	2
100	15,00	6,00	17,50	29,00	15,00	2,00	2,20	100	26,40	102,00	330	3	5,00	32	2
125	18,75	7,50	21,90	36,30	18,75	2,00	2,20	100	26,40	127,50	413	3	6,25	32	3
150	22,50	9,00	26,30	43,50	22,50	2,50	2,20	100	26,40	153,00	495	3	7,50	32	3
200	30,00	12,00	35,00	58,00	30,00	2,50	3,00	100	36,00	204,00	660	3	10,00	38	3
250	37,50	15,00	43,80	72,50	37,50	2,50	3,00	100	36,00	255,00	825	3	12,50	38	3
300	45,00	18,00	52,50	87,00	45,00	2,50	4,00	150	48,00	306,00	990	3	15,00	50	4
350	52,50	21,00	61,30	101,50	52,50	2,50	4,00	150	48,00	357,00	1155	3	17,50	50	4
400	60,00	24,00	70,00	116,00	60,00	3,00	5,50	150	66,00	408,00	1320	3	20,00	50	4
450	67,50	27,00	78,80	130,50	67,50	3,00	5,50	150	66,00	459,00	1485	3	22,50	50	4
500	75,00	30,00	87,50	145,00	75,00	3,00	5,50	150	66,00	510,00	1650	3	25,00	50	4



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