

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 centre 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 realised by means of a stored program control (SPC). This is of the advantage that possible further upgradings or changes can be integrated later without problems. However, all consumer loads can be activated easily by manual hand switches.

Processing of error messages

- visual indication with light emitting diodes or clear text at the operator panel
- warning, external via buzzer or warning light at the control cabinet or as option in outside on the wall
- option of error message transmission by automatic phone connection or GSM (D1 or D2)

Construction of a standard drive system:

- motor protection switch
- operating hours meter
- visual indication for “drive system: operation”
- visual indication for “drive system: error”

Error switch-over

In case that for one function two units are at disposal, then during an error of the currently operated drive, the system immediately switches over to the failure-free unit in order to maintain an undisturbed operation.

Alternating operation

In order to charge both units as constant as possible, they are controlled by alternating operation. However, this is only possible if both units are ready for operation.

- Selection switch in position “automatic”
- Motor protection switch is not released

Technical kit for SBR:

consisting of:

SBR-kit for preparation of a fully biological small waste water treatment plant
Innovative technical setting-up set according to SBR–processing (Sequencing Batch Reactor)

- Technical SBR setting-up set, ready-for-use
- Design capacity: 1500 inhabitants, consisting of:
 - Two stage side channel blower
 - Power consumption 2 x 6,0 KW
 - Load-dependent daily operating time
 - Machine cabinet with integrated control system, protection switches
 - Air-insulated and structure borne sound insulated
 - Protection class IP 54
 - Control unit with possibility for double control of the air compressor, preset working cycles, selectable manual or automatic operation, operating hour meter, visual system control, error indication
 - Control system complies with regulations according to VDE 0113 part 1 and VBG 4
 - Unit for optimization of operating costs

- Level sensor for control of vacation operation resp. low load operation (15 m floater cable) incl. integration into plant control system
- Solenoid valve manifold 40 mm
 - 230 V
- Membrane aeration unit, completely with down pipe for air supply in the waste water treatment plant
 - EPDM Membrane
- **Maintenance-free compressed-air lifter for conveyance of secondary sludge made of PVC / HT DN150**
- Charging unit completely with mounting material
- **Maintenance-free compressed-air lifter for conveyance of filling raw water made of PVC / HT DN150**
- **Maintenance-free compressed-air lifter for clear water removal made of PVC / HT DN150**
- 75 m connecting tube DN40 for connection of manifold and waste water treatment plant

Power consumption.

As a first estimation can be taken (depending on various facts):
for totally amount at this plant:

| designation | power | h/day | consumption/d |
|-----------------------|----------------------------|-------|------------------|
| airblower tot. estim. | 2 x 6,0 kW (or 1x12 KW) | 8-16 | 96 kWh – 192 kWh |

From 35.000 kWh up to 70.000 kWh per year

Depending on amount of water, when lower than energysafing mode, when bigger fully load