

RECONSTRUCTION OF LEITGIRIAI PILOT WWTP

„AUGUST IR KO” wastewater treatment technology and biological reactor

The biological process includes anaerobic, anoxic, aeration chambers and final clarification chambers. The whole system is designed to fit in one cylinder shaped compact tank, which allows minimizing the construction costs. Although the process is odorless the reservoir is equipped with a cover, depending on the climate specifics number of options can be provided that will meet the demands.



Biological reactor and the excess sludge tank ready for dispatch from the factory

- The unit is made from the highest quality polypropylene.
- Because of its durability it is the most widely used type of plastic.
- Polypropylene is resistant to corrosion, acids and differences in temperatures.
- It is known for its longevity, strength, flexibility and lightweight qualities.

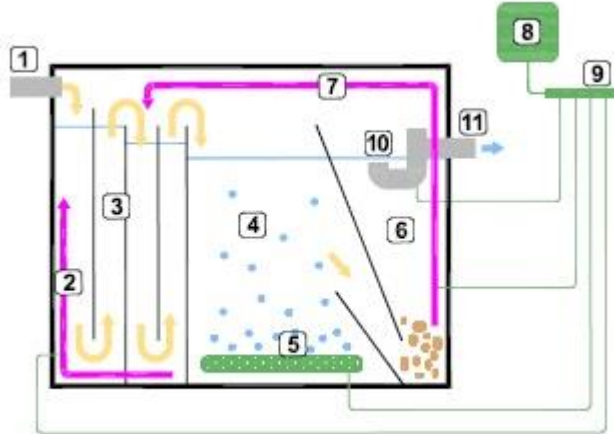
Description of the treatment process

The anaerobic and anoxic chambers are divided by a series of overflowed and under flowed baffles into compartments. The inflow of wastewater and circulation of the active sludge as well as the particular arrangement of the baffles (patented Vertical Flow Labyrinth system) creates an upward and downward flow in the compartments, which ensures an effective mixing of the content in each compartment. In these chambers nitrogen and phosphorus removal takes place.

The activated sludge-wastewater mixture from the anoxic chamber flows to the aeration chamber. At the bottom of the aeration chamber air diffusers are installed. The diffusers provide fine-bubble aeration ensuring the content is in suspension and the amount of oxygen necessary for biological processes is dissolved, perforated elastic membrane is used in the air diffusers, which allow a long-term operation.

After the aeration chamber the activated sludge-wastewater mixture flows to the final clarification chamber. The operation is based on vertical settling process. The active sludge flows through an opening above the bottom of the tank and filters through a thickened sludge layer. That is when the particles of the active sludge are separated and the treated water flows through the collection system to the outlet.

Technological scheme of the biological reactor



1. Inflow
2. Airlift No.1
3. Non-aerated chambers (anaerobic/anoxic)
4. Aerated chamber (oxic)
5. Aeration system
6. Final clarification chamber
7. Airlift No.2
8. Air blower
9. Air distribution system
10. Flow Regulator
11. Outflow

Installation and startup of Leitgiriai WWTP



Placing on the foundation



Backfilling of the reactor



Installed WWTP

The tanks of the biological reactors are designed to be installed partly below ground. The tanks of the WWTP are placed on a compacted gravel filling, on which is placed a reinforced concrete basement. The thickness of the gravel filling and reinforced concrete basement, as well as the type of concrete and way of re-enforcement are designed based on the local foundation circumstances. The tank of the biological reactor should be backfilled with sorted material, for example with coarse sand. An embankment with a necessary slope around the tank should be made. The width of the top of the embankment should allow a free walkway around the tanks.

After all the construction and installation works are done the startup of the WWTP can be commenced. Startup is conducted by AUGUST IR KO specialists. The plants are set to work by bringing the activated sludge from already running biological wastewater treatment plants (best to take already mature sludge from AUGUST IR KO units). The aeration and sludge circulations systems are adjusted for optimal performance according to the actual conditions (inflow, contamination load). Treatment process starts immediately after the start up and reaches its optimal efficiency shortly. So the environmental effect during the startup is minimal.

Condition and performance of the biological reactor immediately after the start up



Inlet



Denitrification, aeration



Effluent

Overall system improvements/scope of work

- **Renovation of the pre-treatment step; equalization tank**

The existing pre-treatment step was morally and technologically outdated and physically damaged from the long years of use. Old installations were dismantled and new hand skimmed screen for screenings and a sand/grit separator were installed. Also a pumping station was designed for distributing wastewater flow during the wet periods when the inflow increases drastically. In these specific circumstances part of the wastewater is directed into the old reactor which is reconstructed into an equalization tank. After the excessive inflow is over the accumulated wastewater is returned to the treatment process.



Previous pre-treatment step



New installation

- **Renovation of the biological treatment step**

In place of the old biological step reservoir a completely new bioreactor was installed with its air blowers and excess sludge tank.

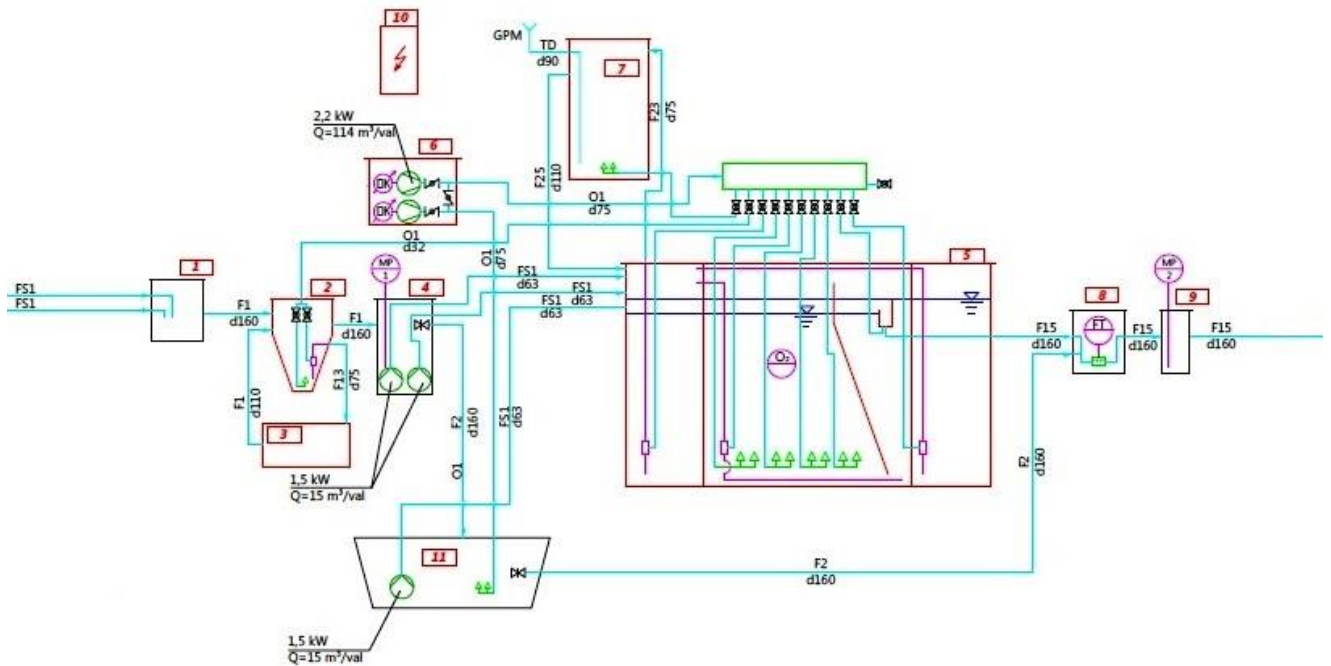


Old biological step reservoir



New biological treatment step

Overall technological scheme of the reconstructed Leitgiriai WWTP



1- Hand skimmed screen; 2- Sand/grit separator; 3- Sand grit removal tank; 4- Pumping station; 5- Biological reactor; 6- Air blower tank; 7- Excess sludge tank; 8- Flow meter; 9- Sampling well; 10- Control panel; 11- Equalization tank.