

Limited Liability Company "Alternative environmental projects"(LLC AEP)

445351, Russia, Samara Region, Zhigulevsk Town, Gidrostroiteley Str., 19 INN: 6345027981 Account: 40702840354401000854 Sberbank, Povolzhsky head office Samara City Account With Institution SWIFT: SABRRUMMSE1 Tel: (8482) 664-644, Email: aep210316@gmail.com

Local treatment systems for municipal and industrial effluents

Principal of effluents treatment:

The complex is designed for continuous operation in industrial enterprises and municipal utilities for the processing of industrial and domestic municipal effluents, which divides effluents into neutral (disinfected, cleaned from contaminants) sludge and clean process water for reuse.

The use of this technology has shown its unique efficiency, high productivity, low costs and energy consumption, ease of operation, the ability to create closed-loop environmentally friendly systems, a small-occupied working area, and low investment. The proposed hardware and technology solution is the state-of-the-art development and has no analogues in this area. The treated effluents, through a gravity pipeline or pressure pipeline, enter the initial (receiving) tank.

In the receiving tank, they are homogenized to obtain a relatively uniform suspension (at least 97% humidity), which is fed to the KP-20 unit. At the same time, inexpensive and affordable reagents are supplied to the unit. In the case of household effluents treatment a solution of caustic lime (Ca(OH)2) is used as reagent. The percentage of reagent depends on the percentage of organic content in effluents.

The mixture received in KP-20 is dispersed at the atomic level. All molecular compounds are destroyed and for some nanoseconds, atoms with open covalent bonds are in an active redox field created by decaying water molecules. Water molecules decompose into atomic hydrogen H+, an active reducing agent, and OH- ions, which are active oxidizing agents. Moreover, part of OH-ions decomposes again into atomic hydrogen and free oxygen atoms, creating ozone in their compound, which is an additionally strong oxidizing agent.

Dispersion occurs in the working area, under the influence of a number of phenomena created by magnetic domains rotating in an electromagnetic field. Field saturation and its frequency are selected for a specific product and are a trade secret. In the free spaces between the randomly colliding magnetic fields of the domains, cavitation bubbles arise, some of which collapse, creating a powerful impact action on the surrounding particles of the flow with the release of significant heat, the other part of the cavitation bubbles, on the contrary, begin to narrow, emitting ultrasonic vibrations and ultraviolet radiation.

Additionally, many dynamic impacts occur in this zone, measured in tons / cm³, created by magnetostrictive changes of magnetic domains. Under the influence of completely described phenomena, almost all physicochemical and mechanochemical processes are accelerated.

As a result of such processing of the molecules of all substances that fell into the working zone with a stream, they decompose into free atoms with open covalent bonds, ready to enter any compounds.

A cloud formed by overlapping of microarcs, which arise from the interaction of working ferromagnetic bodies (domains)



Due to the lime, participating in the process, coagulation of organic and mineral substances occurs, which in the form of sludge is removed from the treated effluent. The emulsion obtained at the KP outlet has the properties to separate into layers very rapid (20-30 minutes), accelerated by the special design of the receiving tanks.

The water obtained after separation of the emulsion meets the requirements of maximum permissible concentration. The sludge obtained in the end of the process technology is conditionally sterile and is a highly effective growth activator.



The quality of municipal wastewater treatment by a multi-stage system and using different reagents. In order to prevent the creation of conditions for the rapid development of the pathogenic environment, colonies of friendly soil-forming microorganisms are immediately introduced into the obtained sludge, which once enter the nutrient medium that does not contain competing organisms, start to grow vigorously, creating powerful colonies that prevent the development of pathogenic flora.

The technology industrial effluents treatment is more complicated, as the process of removing heavy metals is added. As a result of processing of such fractions, in addition to pure water that meets the requirements of maximum permissible concentration, we obtain metal salts, which are already safe and suitable for recovery at process plants or as potting soil.

The productive capacity of the effluent treatment module provides at least 1.5 times the average statistical volume of the incoming stream.

In fact, **KP** - **20** is a disintegrator-activator of transformations that provides a high degree of activation, grinding the contents of effluents to any size, up to nanoparticles, **destroying pathogenic microflora**, perfect mixing, **converting heavy metals into water-insoluble salts**, which ensures high system efficiency - from several cubic meters up to hundreds of cubic meters per hour;



During the electromagnetic cavitation activation process in a short time (fraction of a second) when the water goes through the complex KP - 20, the following actions took place:

- the elimination of pathogenic bacterial flora and helminth eggs;
- decomposition of poisons, highly toxic compounds;
- multiple acceleration of separation of liquid and solid phases;
- release of heavy metals and iron;
- normalization of the redox potential of water;

The main advantages of KP over traditional devices:

- a high degree of process control and control of the parameters of the resulting product;
- low cost of the process;
- low energy intensity of the process;
- easy maintenance;
- no expensive reagents and filters requiring frequent replacements and special maintenance;
- no toxic waste requiring specialized disposal;

The cost of consumables based on the calculation of Rubles per 1 m³ of effluent for the "Efficient unit-converter KP of municipal and industrial effluents"

Domain (working components).

Depending on the brand of metal, the resource of domains can be from 0.1 mgr/m³ up to 0.25 mgr/m³. The operation state of the domain decreases when run-out more than 30% of its initial size. Therefore, it is required to replace the entire batch of worn domains with a new batch of domains.

One batch of domains is capable to treat from 1600 m³ to 4000 m³ of effluents, depending on the steel grade of the domains. Expenditures measured in monetary terms from **0.05 Rub/m³ to 0.04 Rub/m³** based on 60-120 Rub/kg.

Reagents.

As a reagent, a 10% solution of caustic limestone CaO is used based on the percentage of CaO in the volume of powder.

The flow rate of the working solution (lime milk) is 10 liters per 1m³ of effluent.

Expenditures measured in monetary terms are within 7 Rub/m^3 based on 7000 Rub/ton for caustic limestone CaO.

Electricity.

"KP - 20" consists of two IAN-10 inductors operating cyclically. Power consumption (active) of each from 6 kW up to 8 kW. The specific electric energy consumption of each is 0.5-0.6 kW h/m3 if you take into account the start-up and idle times during scheduled stops or technological switching.

Pumps.

Several types of pumps are used in the proposed project:

The fecal pump - with a productivity of 10³/h and capacity of **1.3** kW/h (not more).

The number of pumps 2 pieces (depending on the features of the object).

The operation of the pumps is cyclic and interconnected with the operation of inductors.

Dosing pump - with a productivity of 0.1 m³/h and a capacity of **0.5 kW/h** (not more).

Mixer for the preparation of "lime milk" - 0.5 kW/h (not more).

Total electricity costs are **within 0.8 Rub/m³** based on 4.73 Rub kWh.

Summary: The total cost of processing 1m³ of effluent is less than 8 rubles.

Costs were calculated on the basis of Russian prices and tariffs, as well as the parameters of technological equipment and reagents, not including salary costs for maintenance personnel, lighting, heating and other additional things.

System specification	
Productivity (water)	from 20 m ³ /h
Number of inductors	from 2
Operating voltage / frequency, 3 phase	380/50
Watt consumption, kWt	min. 14 (active 44 kWt)
Specific electric energy consumption, kWt h/m ³	0.6-0.9
Average lifetime	10 years
Dimensions taking into account service passages, m	from 50 m ²
Type of effluent receiving	pressure/gravity pipeline
Installation location	to avid moisture entering inside
Maintaining the temperature inside the installation	from +5°C up to +40°C

The main advantages of the proposed effluent treatment processes are the following:

- 1. The lack of huge sediment tanks occupying large areas.
- 2. High performance of process.
- 3. Uniquely low energy costs, up to 0.8 kW/h $/m^3$ per water-sludge mass.
- 4. Environmental safety of the process. The entire treatment process takes place in closed containers and pipelines; there is no danger of secondary pollution of treated water.
- 5. At the request of the customer, the sludge obtained as a result of water treatment are sent for processing in order to isolate all types of metals, for the intended use and production of potting soil and organic fertilizers.

Permissible parameters of the polluting components and their guaranteed values after the effluent treatment in the proposed system

Nº	Parameter	UM	Permissible values on system inlet	Permissible MPC values	Permissible values on system outlet (+/- 20%)
1.	Hydrogen ion concentration, PH	mg/l	10	6.5 – 8.5	6 -8
2.	BOD total	mgO ₂ /l	5 000	5.4	3.5
3.	COD	mg/l	50 000	90	30
4.	Suspended substance	mg/l	5 000	16.28	15.00
5.	Solid residue	mg/l	1000	950.35	600.00
6.	Chlorides	mg/l	500	198.82	38.00
7.	Sulphates	mg/l	500	246.35	210.00
8.	Nitrogen ammonium	mg/l	500	0.70	0.06
9.	Nitrite ions	mg/l	500	0.08 (3)	0.05
10.	Nitrate ions ions	mg/l	500	38.65	28.00
11.	Phosphates to phosphorus	mg/l	500	0.361	0.250
12.	Ferrum (total)	mg/l	1 000	0.23	0.16
13.	Mineral oils	mg/l	1 000	0.1	0.1
14.	Synthetic Surfactants	mg/l	1000	0.57	0.06
15.	Хром 6-ти валентный	mg/l	100	0.05	0.01
16.	Zink	mg/l	100	0.1	0.1
17.	Cooper	mg/l	150	1.0	0.85
18.	Nickel	mg/l	120	0.1	0.05
19.	Aluminium	mg/l	150	0.5	0.01
20.	Fats	mg/l	5 000	3.0	1.5

The final cost of the equipment of the complex depends on the complexity of the facility, the volume of processed effluent and the complexity of pollution. The working module KP-20 (20m³/h) without additional equipment costs 100000 Euro (at the moment of proposal issue). The price may change (depending on the economic situation in the country associated with changes in the prices of components).





