Hydrodynamic plant for non-chemical treatment and purification of drinking water

The hydrodynamic continuous circulation treatment method is offered for decontamination of heavily contaminated, artesian and river water, providing faster and less expensive water treatment.

The hydrodynamic method is intended for decontamination of treated liquids, quick aggregation of deposited water suspensions and water desalting by modifying its pH level throughout a wide range. The developed equipment provides a significant increase of speed and level of treatment of communal waste water and contaminated water.

Using this plant for preparation of drinking water from heavily contaminated water at the initial treatment stage allows excluding the use of chemical reagents and increasing the productivity of existing water treatment systems. Operation of the plant in flow mode is characterized by low level of energy consumption, and does not require intermediate reservoirs and contact devices.

PURPOSE. The hydrodynamic plant MTK is used for decontamination and purification in flow mode of contaminated natural and technical water.

TECHNICAL CAPABILITIES. The MTK plant represents a small-size module and can be easily integrated into virtually any water preparation and treatment system.

Depending on the degree of contamination and solid residue content the average daily production capacity of one plant is 500÷1400 m^3.

For the purpose of excluding the process of long-term water precipitation and purification from suspended mechanical admixtures of more than 1 micrometer the water is infiltrated through fluoroplastic fine purification filters. The scope of delivery includes two sets of filters providing continuous process of water treatment. The plant is equipped with the system of regeneration (purification) of the filtering elements.

The degree of disinfection (%) according to the class of contaminants, minimum value:

- Ova and larvae of parasites 100,0
- Bacteria 99,99
- Viruses 99,96

For comparison, waste water treatment with liquid chlorine provides the level of disinfection of 91%, ozone treatment - 96,4%, ultraviolet treatment - 43,7%.

Parameters of bacterial contamination of waste waters after treatment using MTK plant comply with the Sanitary Regulations and Norms of surface water protection from contamination SanPiN 4630-88П, as well as the requirements of DSTU 3959-2000.

ADVANTAGES:

- Compatibility with any types of water purification facilities;
- Operation in flow mode does not require intermediate reservoirs and contact devices;
- Possibility of adjustment of decontamination level and productivity;
- Decontamination without using chemical reagents;
- High cost-efficiency: energy consumption for waste water dehelmintization is two orders of magnitude less compared to thermal decontamination.

TECHNOLOGICAL FEATURES. Decontamination in flow mode is performed by means of intensive hydrodynamic oscillations, resulting in the local temperature in liquid micro volumes during the phase transitions reaching up to 2000°C, and the pressure equaling hundreds of atmospheres. Besides, in the moments of creation and collapse of micro-cavities powerful impulse electric and magnetic fields are generated. As a result of these processes the treated liquid is repeatedly exposed to combined thermobaric and electromagnetic effect, resulting in

- Transition of dissolved compounds into insoluble or gaseous compounds
- Decontamination;
- Floatation;
- Degassing;

- Decoloration;
- Reduction of odor;
- Decomposition of oxidation of residues of bio stimulators and medical preparation;
- Decomposition and binding of surface active substances, toxic and high-molecular substances;
- Binding of heavy metal salts, pesticides and herbicides into non-toxic complexes.
- Granulation and intensive mixing of colloidal molecular complexes, as well as bacterial and vegetable components in the liquid.

Non-chemical water treatment method ensures deep purification of water, retaining biological microelements vital to human organism: calcium, magnesium, potassium, fluorine, etc.

The hydrodynamic technology does not require construction of cumbersome floatators and extensive sedimentation basins, requiring allocation of significant land resources and huge capital investments for both construction and operation. The present technology allows reducing loads on existing water treatment systems, providing water treatment directly before the water withdrawal point, or, in case of significant wear of communal pipelines – directly at the consumer's location.

According to the estimates, the use of hydrodynamic water decontamination and subsequent water treatment method provides 2-3 times reduction of economic expenditures.

TECHNICAL CHARACTERISTICS

Nominal power , kW	not exceeding 25
Production capacity, m^3/h	20
Dimensions, m	1,7 x 1,7 x 2;
Weight of the plant, kg	350
Weight of complete module, kg	1100
Operational mode	continuous
Specific electric energy consumption, $kW \cdot h/m^3$	1,0÷1,4
Mains voltage	380V, 50 Hz
Level of decontamination	minimum 10^4

The plant does not require foundation for installation. Connection to storage reservoirs is made by flexible hoses.

The plant complies with the requirements of TU U 29.5-24670716-001:2005 and GOST 26582 for treatment of liquid phase materials in climatic version UKhL of deployment category 1 according to GOST 15150.

The price of the plant including two sets of filters is 300 thousand Euro. Term of delivery is 3 months upon 70% advance payment.

Hydrodynamic wastes and wastewater sediment decontamination plant deployed at treatment facilities in Kharkov

PTFE (fluorocarbon polymer) filtropakety
filter drinking water from mechanical impurities

Справки о результатах анализов

при проведении испытаний кавитационной установки на Безлюдовских очистных сооружениях ГП "Харьковкоммуночиствод"

Міністерство охорони здоров'я
України
Найменування закладу
Харківська ОблСЕС
Бак.лабораторія
Свідоцтво про атестацію
100 – 2462/ 2007 від 28.03.07

Код форми за ЗКУД
Код закладу за ЗКПО
Медична документація
Форма № 205 /о
Затверджена наказом МОЗ

04.01.2001 р. № 1

Р Е З У Л Ь Т А Т № 139 – 142

Місце відбору зразка: НВП "НТІ"
Мета дослідження : мікробіологічні показники
НД на методи дослідження : МВ 1446 -76
Дата надходження матеріалу в лабораторію: 20. 11. 07 р.
Дата посіву : 20. 11. 07 р.

№ п/п	Реєстра-ційний номер	Назва зразка	Результат
1.	139	Стічна вода, проба №1	Титр ЛКП > 0, 1
			Індекс ЛКП< 1 х 10^4
			Шигели, сальмонели не виявлені.
2.	140	Стічна вода, проба №2	Титр ЛКП - 0,00001
			Індекс ЛКП - 1 х 10^8
			Шигели, сальмонели не виявлені.
3.	93	Стічна вода, проба №3	Титр ЛКП > 0,1
			Індекс ЛКП < 1х 10^4
			Шигели, сальмонели не виявлені.
4.	94	Стічна вода, проба №4	Титр ЛКП - 0,00001
			Індекс ЛКП - 1х 10^8
			Шигели, сальмонели не виявлені.

/ Відповідає НД, не відповідає НД, НД відсутня /

Дата видачі : 24.11.07 р.
Прізвище лікаря: / З.І.Яковлєва /

Міністерство охорони здоров'я України
Харківська обласна санітарно-епідеміологічна станція
м. Харків

Certificates of the results of analyses

of cavitational plant testing at Bezlyudovka treatment facilities of State Enterprise "Kharkovkommunochistvod"

Ministry of Public Health of Ukraine Name of institution: Kharkov region sanitary-epidemiologic department Bacterial laboratory Attestation certificate 100-2462/2007 of 28.03.07	Form code ZKUD Institution code ZKPO Medical documentation Form 205/0 Approved by the Decree of the Ministry of Public Health of Ukraine 04.01.2001 №1

TEST RESULTS № 139-142

Sample probing location: Scientific Production Enterprise "NTI"
Test purpose: microbiological indicators
Normative document for the test methods: MV 1446-76
Date of reception of the material in the laboratory: 20.11.07
Date of inoculation: 20.11.07

№	Reg. number	Name of sample	Results
1	139	Waste water, probe #1	LKP titre >0.1 LKP index < $1x10^4$ No shigella or salmonella bacteria revealed
2	1340	Waste water, probe #2	LKP titre -0.00001 LKP index - $1x10^8$ No shigella or salmonella bacteria revealed
3	93	Waste water, probe #3	LKP titre >0.1 LKP index < $1x10^4$ No shigella or salmonella bacteria revealed
4	94	Waste water, probe #4	LKP titre - 0.00001 LKP index - $1x10^8$ No shigella or salmonella bacteria revealed

(Corresponding to normative data, not corresponding to normative data, no normative data available)

Date of issue: 24.11.2007
Name of medic: (Signature) Z.I. Yakovleva

Stamp: Ministry of Public Health of Ukraine, Kharkov region sanitary-epidemiologic department

Украинский научно-исследовательский институт экологических проблем (УкрНИИЭП)

г.Харьков. ул.Бакулина,6

ПРОТОКОЛ № 19

Исследования воды поверхностных водоемов, подземных вод, прибрежных зон морей и сточных вод от «20» мая 2008 г.

Наименование	Результат исследования		ПДК (коммунально -бытовая)*	Ед.изм.
	Без обработки	Кавитационная обработка с продувкой воздуха		
1		2	3	4
Наименование источника	Сточные воды свинокомплекса			
Дата и время отбора пробы	20.05.2008 г.			
Общее микробное число	Не опр.	Не опр.	До 100	КОЕ/дм^3
Индекс БГКП	Не опр.	Не опр.	Не более 3	КОЕ/дм^3
Индекс коли-фагов	Не опр.	Не опр.	Отс.	БОЕ/дм^3
Число кишечных гельминтов	18	Не обн.	Отс.	Шт/ 25 дм^3
Шигеллы	Не опр.	Не опр.	Отс.	КОЕ/дм^3
Простейшие	Не опр.	Не опр.	Отс.	КОЕ/дм^3
Патогенная кишечная палочка	Не опр.	Не опр.	Отс.	КОЕ/дм^3
Сальмонеллы	Не опр.	Не опр.	Отс.	КОЕ/дм^3
Грибы	Не опр.	Не опр.	Отс.	КОЕ/дм^3

НТД на методы исследования: СЭВ «Унифицированные методы исследования качества вод.М.1987.ч.1.ч.4,т.1

- - ПДК - предельно-допустимые концентрации.
- Відомчі нормативні акти. Наказ Міністерства охорони здоров'я України від 23.12.96 №383

Анализ выполнил

МІНІСТЕРСТВО ЕКОЛОГІЇ ТА ПРИРОДНИХ РЕСУРСІВ УКРАЇНИ * УКРАЇНСЬКИЙ НАУКОВО-ДОСЛІДНИЙ ІНСТИТУТ ЕКОЛОГІЧНИХ ПРОБЛЕМ (УКРНДІЕП) * КАНЦЕЛЯРІЯ №01018083

Мельник Л.В.

Ukrainian Scientific-Research Institute of Ecological Problems
(UkrNIIEP)
6, Bakulina str., Kharkov

PROTOCOL №19

Testing of surface waters, underground waters, nearshore waters and waste waters of May 20, 2008

Name	Test results		Maximum permissible concentration (communal and domestic)*	Units of measurement
	Without treatment	Cavitational treatment with air purging		
1	2		3	4
Name of source	Waste waters of pig-breeding farm			
Date and time of probing	20.05.2008			
Total microbe number	Not determined	Not determined	Up to 100	CFU/dm^3
Coliform index	Not determined	Not determined	Not exceeding 3	CFU/dm^3
Coliphage index	Not determined	Not determined	n/a	PFU/dm^3
Number of helminths	18	Not revealed	n/a	Pcs./25 dm^3
Shigella	Not determined	Not determined	n/a	CFU/dm^3
Protozoa	Not determined	Not determined	n/a	CFU/dm^3
Colibacillus	Not determined	Not determined	n/a	CFU/dm^3
Salmonella	Not determined	Not determined	n/a	CFU/dm^3
Fungi	Not determined	Not determined	n/a	CFU/dm^3

Normative technical documentation for testing methods: Sanitary-epidemiological norms “Unified methods of water quality testing”. M.1987. part 1, part 4, volume 1

- MPC - Maximum permissible concentration
- Departmental normative acts. Decree of of the Ministry of Public Health of Ukraine of 23.12.96 №383

Analysis performed by (signature) Melnik L.V.

Stamp: Ministry of Ecology and Nature Conservation of Ukraine, Ukrainian Scientific-Research Institute of Ecological Problems, Chancellery № 01018083