



# ECOFIL

Water purification:

- equipment
- components







## ABOUT US



Ecofil LLC was founded in 1993 by the experts in water purification. Ecofil LLC is currently an advanced research and production company operating at the water purification market for 21 years. The core of the company is formed of high performing PhDs in Engineering and Chemistry with the experience of work for 5-35 years including those participating in creation of the first in our country membrane elements and units on their basis.

Ecofil LLC has state-of-the-art research and production facilities. It consists of engineering and design departments, sections for manufacture of membrane elements and water purification systems, automation groups, commissioning and maintenance groups, procurement, marketing and sales departments, foreign economic activity group.

Ecofil LLC puts its main focus on the quality and reliability of manufactured products, their continuous improvement. The essential changes have been made for the last 5 years both to the design and technology for manufacture of membrane elements for reverse osmosis, nano- and ultrafiltration. Besides, their manufacture involves using only the materials from leading foreign companies, specially developed for membrane elements. Such changes enabled drastic improvement of the entire range of functional characteristics of the elements and primarily performance, selectiveness and service life. The manufactured membrane elements do not differ from the best foreign analogues by their characteristics. All membrane elements are subject to obligatory control at the test bench under standard conditions.

The quality and reliability of water purification systems are enshrined already at the design stage, which is underlain with calculation of separate process operations by special programmes and methods. Moreover, previously accumulated experience in designing and operation of similar systems is employed. Great attention is paid to selection of component

parts. The components from the leading foreign firms, which proved themselves as suppliers of high quality equipment, are used. The domestic parts and units that proved their reliability during operation in water purification plants are used too. Designing of water purification systems is carried out with regard to their "alignment" to a particular consumer's premises, with regard to ergonomics and requirements for automation.

Successful activities of the enterprise are ensured by highly skilled professionals with the work experience in water purification industry for 5-35 years. They include PhDs in Chemistry and Engineering. The results of their researches and developments are represented in over 50 publications. The working relations are established with many foreign firms. Our specialists participate in the national and international scientific and technical conferences and exhibitions. Combination of theoretical skills and practical experience represents an essential condition for operational excellence of the employees, without which the high-tech products cannot be created.

The experience, knowledge, expertise of the employees as well as advanced approaches to designing and manufacture of products, which underlay the activities of Ecofil LLC, allowed its successful and sustained operation at water purification market. Our consumers are over 200 enterprises of Russia and the near abroad countries. They include the enterprises of food, pharmaceutical, chemical, petrochemical, electronic industries, heat power industry, medicine, kindergartens and hospitals.

**Our mission is to meet the customers' needs completely while solving the water purification problems.**

**In order to accomplish the mission, we:**

- use state-of-the-art technologies in water purification, improve them continuously, possess a package of patents for invention;
- use only quality and highly reliable components;
- ensure prompt solution of the issues arising, always maintaining contacts with the consumers;
- have over 35-year experience of work in water purification industry.

**Our advantages guarantee Your success!**

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# Areas of application of Ecofil LLC

## 1) FOOD INDUSTRY:

- bottled water
- non-alcoholic beverages, juices
- brewing
- distilled beverages
- bakery and macaroni production
- confectionery
- meat processing, sausage manufacture
- dairy production, cheese and ice-cream manufacture
- manufacture of ketchup, sauces, mayonnaise, canned goods, jam, fruit preserves and other food products

## 2) PRODUCTION OF HIGH-QUALITY DRINKING WATER:

- industrial enterprises, organizations
- hotels, recreation centres, holiday centres, inns
- offices, shops
- schools, kindergartens, educational institutions
- hospitals and other health care facilities
- caf , bars, restaurants, canteens

## 3) WATER PURIFICATION FOR HOUSING AND PUBLIC UTILITIES:

- cities
- settlements
- separate living quarters
- cottage communities
- apartment buildings

## 4) HEAT AND ELECTRICAL POWER INDUSTRY:

- boiler houses
- heating systems
- steam generators
- combined heat and power plants, state district power plants, nuclear power plants
- treatment of supply and cooling water
- treatment of water from recirculation systems

## 5) CHEMICAL INDUSTRY:

- plastics, rubber, synthetic resins, synthetic rubber
- cellulose and paper production
- acids, alkalis, salts
- lacquers, paints and enamels
- chemicals and reagents
- fertilizers and pesticides
- household chemicals
- polishing agents, explosives, glues, inks and photo-preparations

## 6) PETROCHEMICAL INDUSTRY:

- water purification for cooling down of the products
- water purification for cooling down of process equipment
- water purification for preparation of mixtures
- water purification for steam generation

## 7) MACHINE BUILDING AND METALLURGY:

- removal of colloid and particulate pollutants
- water purification for recycling water supply
- treatment of process, boiler and flushing water
- water purification for oil emulsions and moistening

## 8) INSTRUMENT ENGINEERING AND ELECTRONICS:

- manufacture of radio components
- manufacture of instruments
- manufacture of printed circuit cards and other electronic components
- manufacture of microchips

## 9) GLASS INDUSTRY:

- purification of back water
- purification of demineralized water

## 10) PERFUME AND COSMETIC PRODUCTION, MANUFACTURE OF HOUSEHOLD CHEMICALS:

- manufacture of cosmetics
- manufacture of perfumes
- manufacture of household chemicals

## 11) PHARMACEUTICAL INDUSTRY:

- manufacture of medicinal preparations
- manufacture of dietary supplements
- manufacture of preparations for animals

## 12) WATER PURIFICATION FOR WASH HOUSES AND DRY CLEANERS

## 13) WATER PURIFICATION FOR GREENHOUSE AND OTHER FACILITIES

# Integrated water purification systems

## Consumers:

- food industry
- heat and electrical power industry
- chemical and petrochemical industry
- housing and public utilities, drinking water supply
- electronic industry
- pharmaceutical industry
- glass industry
- perfume and cosmetic production
- machine building and metallurgical industry

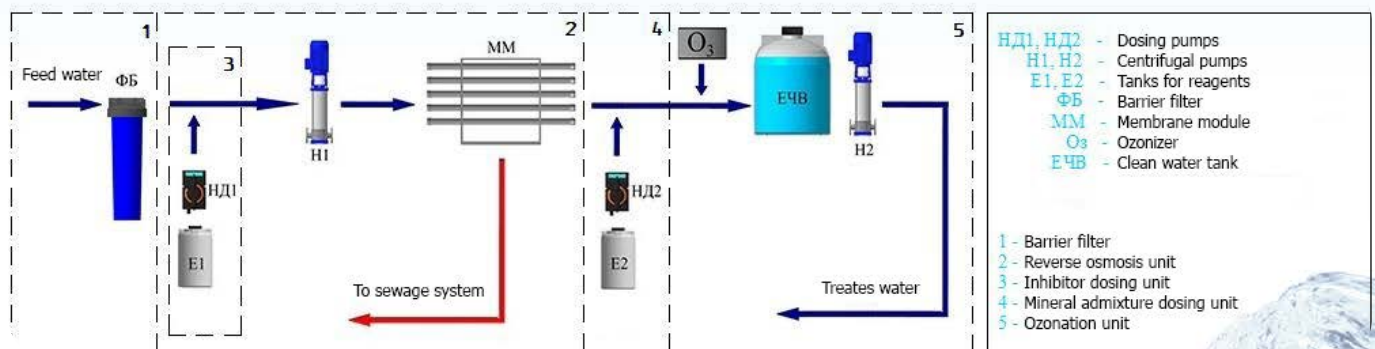


The integrated water purification systems are intended to solve the tasks in water purification, which may arise at the enterprises from various sectors, housing and public utilities, pharmaceuticals as well as advanced treatment or production of drinking water. We supply such systems as turnkey solutions and they include the entire range of necessary equipment, automation, piping as well as training of maintenance personnel, warranty and post-warranty maintenance.

A distinctive feature of our water purification systems is their manufacture with industrial design. The industrial design of equipment of our company assumes a certain procedure for its development and manufacture:

- 1) using 35-year experience of our employees during development,
  - 2) performance of engineering with a visit to the customer's site for authorization and optimization of engineering solutions,
  - 3) performance of engineering design using a software suite validated with hundreds of completed projects,
  - 4) development of design documentation,
  - 5) manufacture under workshop conditions,
  - 6) hardware debugging,
  - 7) development of the package of technical operational documentation,
  - 8) delivery of equipment to Customer's site, performance of installation and commissioning operations, training of the personnel, performance of acceptance testing, warranty and post-warranty maintenance.
- All that ensures continuous reliable operation of equipment.

Process flow diagram of one of the water purification systems of Ecofil LLC



All supplied equipment is certified.





# Integrated water purification systems

## 1. Water purification systems for food industry

Water purification systems of Ecofil LLC are applied in various sub-sectors of food industry:

- bottled water
- non-alcoholic beverages, juices
- brewing
- distilled beverages
- bakery and macaroni production
- confectionery
- meat processing, sausage manufacture
- dairy production, cheese and ice-cream manufacture
- manufacture of ketchup, sauces, mayonnaise, canned goods, jam, fruit preserves and other food products



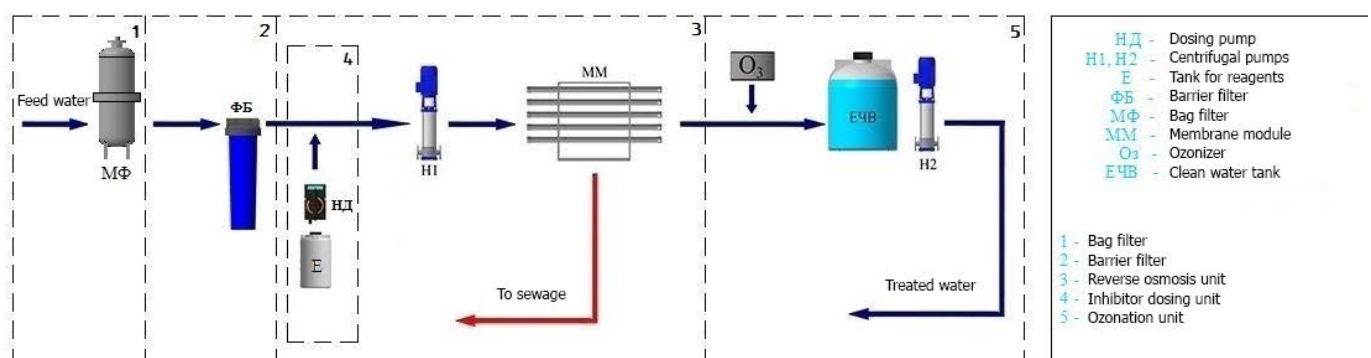
Water purification systems of Ecofil LLC used in food industry

## Water purification systems for manufacture of bottled water

Various requirements are set to the process water for food production. One of the strictest requirements is set to the quality of bottled water. Careful consideration of water purification technology, precise calculation of membrane circuit are especially important in this case. The use of reverse osmosis technology in combination with filtration on automatic pressure filters is in many cases the most optimum for treatment of bottled water.



Process flow diagram of one of the water purification systems of Ecofil LLC for production of bottled water



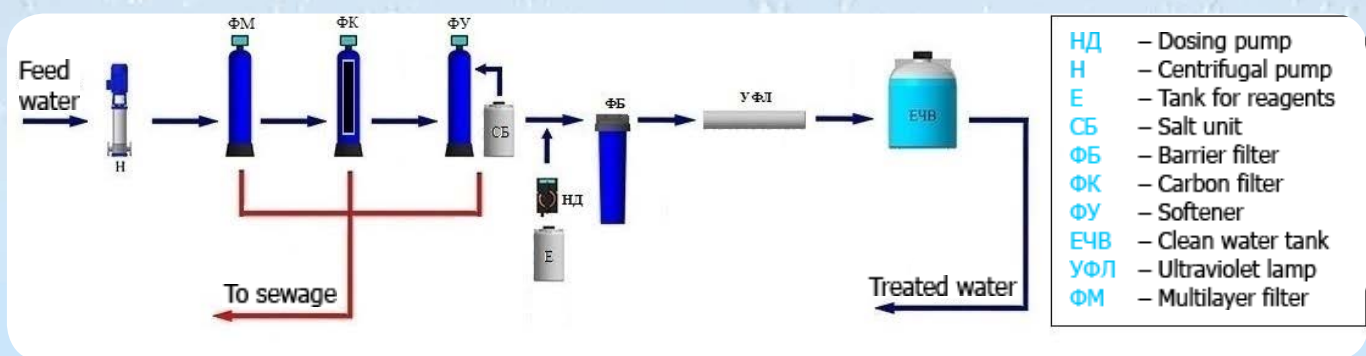
# Integrated water purification systems

## Water purification systems for production of beer and non-alcoholic beverages

Brewing and production of non-alcoholic beverages involves the use of water meeting the requirements of technical instruction TI-10-5031536-73-90 "Process instruction for water purification for production of beer and non-alcoholic beverages, micronutrient content in water". The main indicators include total hardness, alkalinity, content of calcium, magnesium, pH, which assumes the use of ion-exchange technologies. In recent years along with conventional ion-exchange technologies of water purification, the membrane technologies, i.e.: nanofiltration, reverse osmosis, have widespread application.



Process flow diagram of one of the water purification systems of Ecofil LLC for brewing



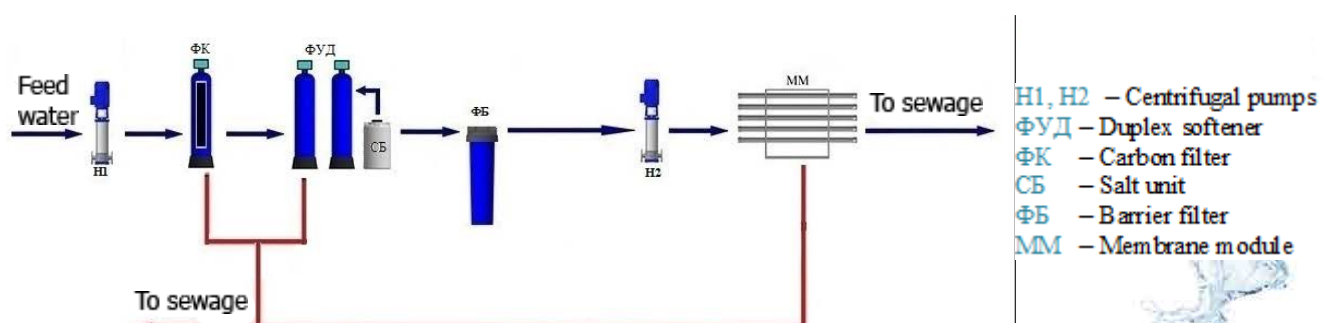
## Water purification systems for production of distilled beverages

The water purification systems of Ecofil LLC for production of distilled beverages meet the requirements developed by the All-Russian Scientific Research Institute of Food Biotechnology for such systems:

- the water quality must meet the requirements of PTR 10-12292-99 "Master formula for production of vodka and distilled beverages"
- the applied materials, assemblies and units must be certified for production
- application of inhibitors, magnetic and microwave field is not allowed
- the rated capacity of membrane units must be ensured not only at the beginning but at the end of the warranty period
- the membrane units must have an option to adjust the microelement composition of treated water
- water purification units must operate and be controlled by common algorithm
- the water purification system must be integrated into recycling water supply loop of the enterprise



Process flow diagram of one of the water purification systems of Ecofil LLC for production of distilled beverages







# Integrated water purification systems

## 2. Systems for treatment of high-quality drinking water

### Consumers:

- settlements
- separate living quarters
- cottage communities
- apartment buildings
- industrial enterprises, organizations
- hotels, recreation centres, holiday centres, inns
- offices, shops
- schools, kindergartens, educational institutions
- polyclinics, hospitals and other health care facilities
- caf, bars, restaurants, canteens

Well water is better for use for production of high-quality drinking water.

The water from underground sources has usually increased indices of hardness and iron. Some sources may have excessive indicators: salt content, fluorides, boron, silicon, ammonium, etc.

Purification of such water provides for deferrization, softening, partial demineralization using reverse osmosis or nanofiltration units. One of main distinctive features of the system for treatment of drinking water by Ecofil LLC is production of treated water with optimum salt composition using them.

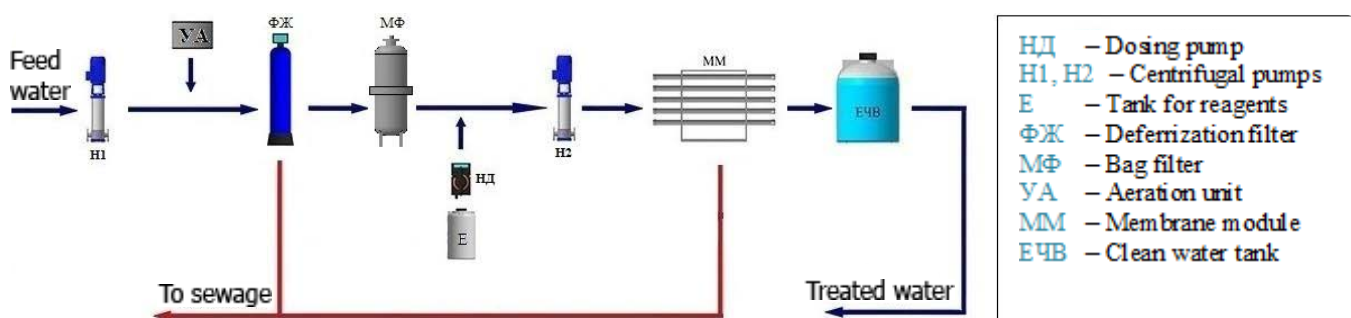
It is achieved not only with application of the elements with required selectiveness but with a possibility of the plants to perform adjustment of microelement composition of purified water by mixing of feed water and permeate.

In case of lack of some salts, mainly of fluorides and iodides, the water purification system is completed with salt dosing unit.

For production of drinking water from the surface sources, polluted with various substances of organic and inorganic origin and having high indicators of odour, chromaticity, turbidity, permanganate demand, the optimum technology is ultrafiltration and ozonic sorption.



Process flow diagram of one of the water purification systems of Ecofil LLC for treatment of drinking water





# Integrated water purification systems

## 3. Water purification systems for production of extra-pure grade process water

The water purification systems for production of extra-pure grade process water by Ecofil LLC are applied in various industries:

- heat and electrical power industry
- chemical industry
- petrochemical industry
- glass industry
- perfume and cosmetic production
- machine building and metallurgy



Water purification systems of Ecofil LLC used for treatment of extra-pure grade process water

## Water purification systems for heat power industry

The efficiency, reliable operation of heat power equipment and condition of heating systems depend on the quality of water purification. The main objective of water purification in heat power industry is softening and/or demineralization of water for prevention of salt settling on the heating surfaces.

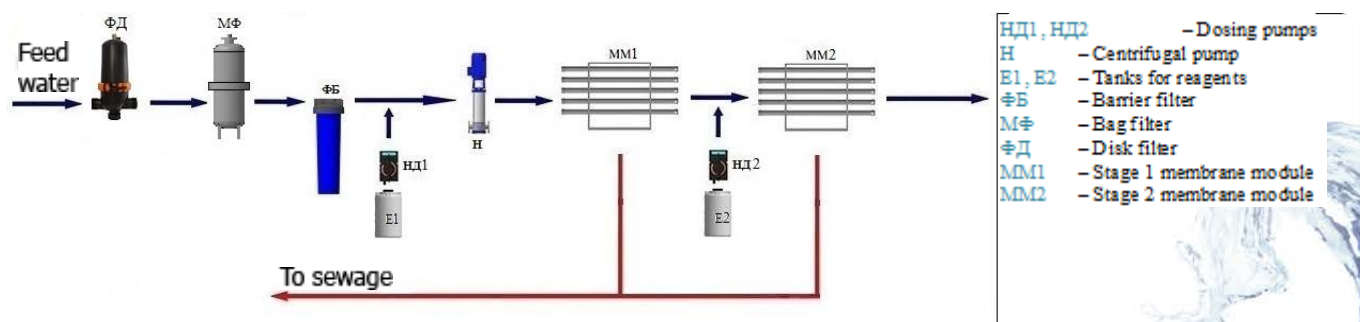
The water softening and demineralization units are usually used for that purpose. The integrated membrane systems, which include ultrafiltration, reverse osmosis as well as, in case of extra high requirements to water, electric deionization, and membrane degassing have widespread application in heat power industry over recent years.

In general, water purification for heat power industry includes the following stages:

- mechanical pre-treatment, deferrization (pressure filters, ultrafiltration)
- softening and /or demineralization (softening, reverse osmosis)
- deionization (electric deionization)
- degassing
- dosing of reagents (if necessary).



Process flow diagram of one of the water purification systems of Ecofil LLC for treatment of boiler water





# Integrated water purification systems

## Water purification systems for chemical, petrochemical, glass and perfume and cosmetic industries

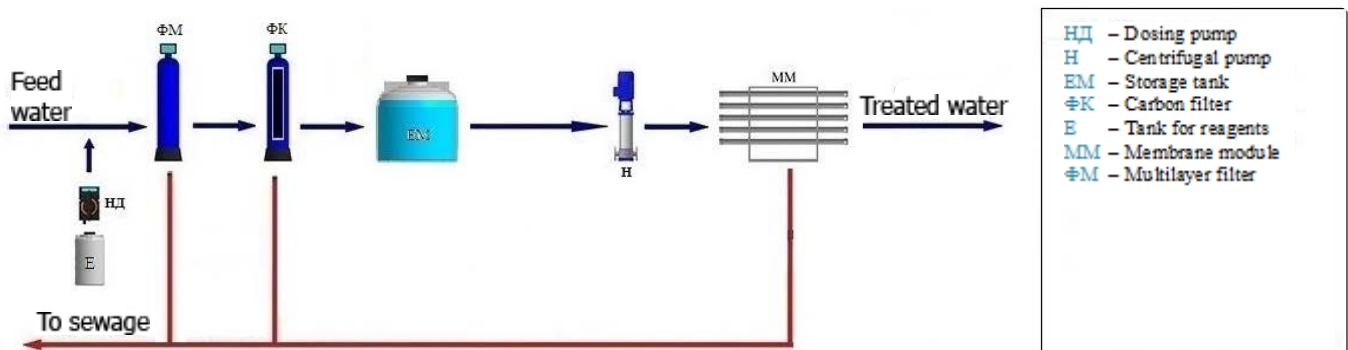
Supply of water purification systems for chemical, petrochemical, glass and perfume and cosmetic enterprises includes designing, manufacture, designer supervision, start-up and commissioning of equipment. The base for designing consists in the initial data, which includes composition of feed water, requirements to treated water, capacity of water purification system, operation mode of the facility and degree of automation of the process.



Water consumption at the enterprises may achieve hundreds of cubic metres per hour. The quality of water, which is used for process needs as well as feed water, varies significantly making the batch production of water purification systems difficult and results in practical terms into individual designing and manufacture of such systems. The requirement to enhanced reliability of the systems urges to include backup units into the scope of supply.

The integrated water purification systems for production of extra-pure grade process water can be distinguished with high level of process and design study, quality completion, decent manufacture and high reliability. Supply of turnkey systems, training of maintenance personnel, warranty and post-warranty maintenance comprise the standard package of services. All supplied equipment is certified.

Process flow diagram of one of the water purification systems of Ecofil LLC for glass production





# Integrated water purification systems

## 4. Systems for treatment of deionized water for electronic industry

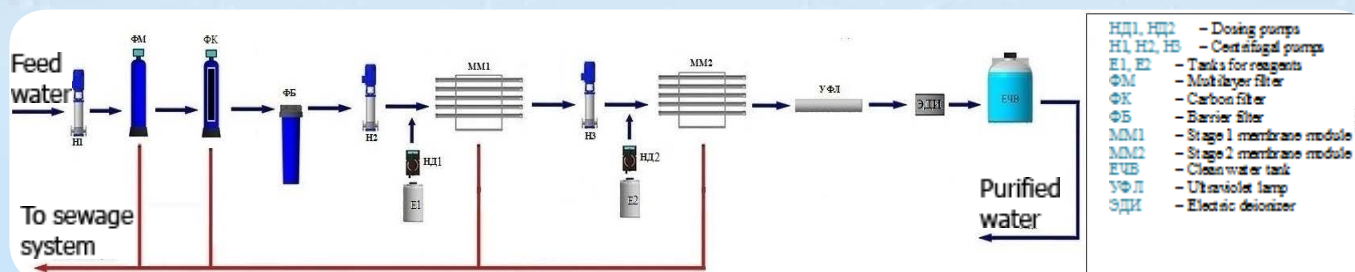
The deionized water is the essential agent used in production of printed circuit cards, integrated circuits, electronic components, semiconductors.

As compared to other sectors, the water for microelectronics requires extra careful treatment and is regulated with industry standard OST 11 029.003 - 80.

Depending on application, the water of different grades A, B, C may be required. The water purification systems we propose for production of deionized water include pre-treatment unit, two-stage osmosis, electric deionization, loops for distribution of deionized water.



Process flow diagram of one of the water purification systems of Ecofil LLC for treatment of deionized water



## 5. Systems for production of purified water for pharmaceutical industry

The requirements to the water used in pharmaceuticals are regulated with pharmacopoeial items FS 42-2619-97 "Purified water", FS 42-2620-97 "Water for injections" as well as "Good Manufacturing Practice standards for medicinal products" (GMP).

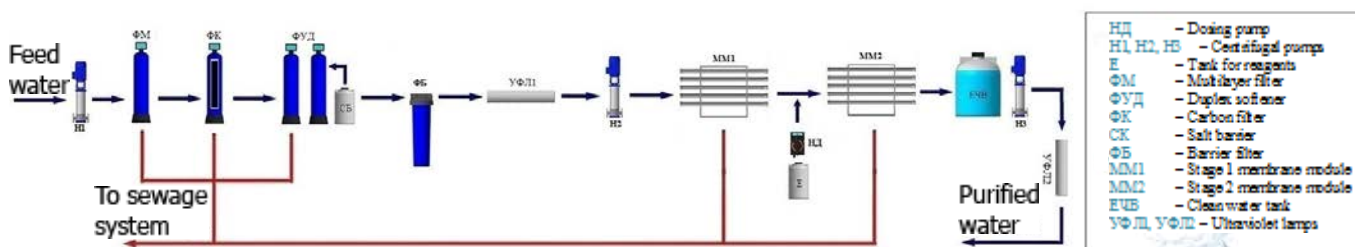
The purified water is produced from drinking water by the technology, which includes distillation, ion exchange, reverse osmosis, filtration, etc.

The purified water is used for rinsing of dishware and equipment during production of the medicinal products for external use.

The water for injections is produced from the water treated by distillation. The water for injections is used for final rinsing of dishware and equipment before sterilization, during production of dosage forms.



Process flow diagram of one of the water purification systems of Ecofil LLC for pharmaceutical production





# OVOD water purification membrane units

## Consumers:

- food industry
- chemical and petrochemical industry
- housing and public utilities, drinking water supply
- electronic industry
- pharmaceutical industry
- glass industry
- perfume and cosmetic production
- heat and electrical power industry
- machine building and metallurgical industry



Types of OVOD water purification membrane units manufactured by Ecofil LLC:

- reverse osmosis units based on spiral-wound elements
- nanofiltration units based on spiral-wound elements
- ultrafiltration units based on hollow fibres
- microfiltration units

OVOD water purification membrane units can be operated both independently and as part of various water purification systems. They are completed with reverse osmosis, nano- or ultrafiltration membrane elements.

OVOD units are designed and manufactured individually with regard to the composition of feed water, requirements to permeate, specifics of production and customer's requests. Therefore, OVOD units of similar capacity may differ considerably from each other.

OVOD membrane units are designed according to the customer's Terms of Reference and are manufactured with various capacity from 0.2 to 100 m<sup>3</sup>/h and over.





# OVOD water purification membrane units

## 1. OVOD reverse osmosis and nanofiltration water purification units based on spiral-wound elements

OVOD reverse osmosis and nanofiltration units allow producing demineralized water with various degree of its mineralization up to the level of distilled water. The units are applied in various industries: food, heat power industry, electronic, machine building, pharmaceuticals, chemical, housing and public utilities as well as for production of drinking water.

The membrane modules include the apparatus with membrane elements, pipelines with stop valves, frame, integrated circuit of chemical washing of membrane elements with a tank for washing solution. The bearing frame and high-pressure pipelines of the module are manufactured from stainless steel, the permeate line is made of high-quality food grade PVC.

The units operate both in manual and automated mode. They are equipped with visual control block with digital indication of consumption, temperature and salt content in the feed water and permeate.

The degree of takeoff of permeate of reverse osmosis and nanofiltration units is 65-90% and depends on the composition of feed water. Minimum pressure of feed water is 1.5 kgf/cm<sup>2</sup>.

OVOD reverse osmosis and nanofiltration units are designed according to the customer's Terms of Reference and are manufactured with various capacity from 0.2 to 100 m<sup>3</sup>/h and over.



### Weight dimension characteristics of OVOD reverse osmosis and nanofiltration units

Unit type	Capacity by permeate*, m <sup>3</sup> /hour	Overall dimensions (length x width x height), mm	Weight (not more than), kg
OVOD - 01	0,1	500 x 500 x 1250	35
OVOD - 02	0,2	500 x 600 x 1250	42
OVOD - 03	0,3	500 x 600 x 1500	50
OVOD - 04	0,4	500 x 600 x 1500	60
OVOD - 05	0,5	1500 x 800 x 1100	75
OVOD - 08	0,8	1500 x 800 x 1300	90
OVOD - 1	1	2300 x 900 x 1300	150
OVOD - 2	2	2300 x 900 x 1500	200
OVOD - 3	3	2300 x 900 x 1700	270
OVOD - 4	4	2300 x 1200 x 1500	350
OVOD - 5	5	3550 x 1500 x 1500	550
OVOD - 10	10	4900 x 1700 x 1650	750
OVOD - 15	15	4900 x 1700 x 2000	1100
OVOD - 25	25	7000 x 2000 x 2400	1600
OVOD - 50	50	7000 x 2500 x 2400	2800
OVOD - 100	100	7000 x 4000 x 2400	5000

\*- the unit capacity is indicated as of the end of warranty period at the feed water temperature of 10 °C and pressure in membrane circuit of 1.0 MPa.



# OVOD water purification membrane units

## 2. OVOD ultrafiltration membrane water purification units based on hollow fibres

The ultrafiltration units based on hollow fibres differ from the units based on spiral-wound ultrafiltration element in that they allow performing flushing of hollow fibres with purified water for recovery of their capacity. During operation of the unit, approximately once per 30 minutes, a part of modules is switched to back flushing mode for 30-60 seconds while other modules keep on working. Thus, the unit capacity is recovered.



The typical ultrafiltration unit based on hollow fibres includes self-cleaning strainer, block of ultrafilters on the bearing frame, chemical washing assembly, assembly for accumulation of purified water, assembly for back flushing of ultrafilters, control cabinet, I&C.

The ultrafiltration units are designed according to the customer's Terms of Reference and are manufactured with various capacity from 0.2 to 100 m<sup>3</sup>/h and over.

### Weight dimension characteristics of OVOD ultrafiltration units

Unit type	Capacity by permeate, m <sup>3</sup> /hour	Overall dimensions (length x width x height), mm	Weight (not more than), kg
OVOD - V 1	1	2300 x 900 x 1300	50
OVOD - V3	3	2300 x 900 x 1700	120
OVOD - V5	5	3550 x 1500 x 1500	230
OVOD - V10	10	4900 x 1700 x 1650	450
OVOD - V50	50	7000 x 2500 x 2400	1200
OVOD - V100	100	7000 x 4000 x 2400	2500



# Automatic pressure filters for water purification

## Consumers:

- food industry
- heat and electrical power industry
- chemical and petrochemical industry
- housing and public utilities, drinking water supply
- electronic industry
- pharmaceutical industry
- glass industry
- perfume and cosmetic production
- machine building and metallurgical industry

Types of automatic pressure filters manufactured by Ecofil LLC:

- softening (Single, Duplex, Triplex)
- carbon
- multilayer
- deferrization
- deionization

The automatic pressure filters are intended for water purification and applied in various sectors, housing and public utilities, as well as advanced treatment or production of drinking water.

The automatic filters manufactured by Ecofil LLC consist of glass-reinforced plastic tank, automatic control valve, top and bottom distributor, collector array, lift pipe, filtration medium and gravel pad. The scope of delivery includes power adaptor, and reagent tank in case of softening and deionization filters. For performance of continuous softening and deionization, Duplex and Triplex filters are intended having two or three filtration tanks with ion exchange resin.

We offer the following for automatic pressure filters:

- piping manifold
- water meters, pressure gauges, rotameters, various sensors, stop valves
- pump stations

The specialists of Ecofil LLC perform calculation of filters in strict compliance with the requirements of the producers of filtration charge, carry out delivery, installation supervision, start-up and maintenance.

The capacity of automatic pressure filters is calculated on the basis of customer's initial data and may vary from 0.2 to 200 m<sup>3</sup>/h and over.





# Automatic pressure filters for water purification

## 1. Automatic softening filters

Single softening filter represents a glass-reinforced plastic tank with cation exchange resin, usually in Na<sup>+</sup>- form, collector array, automatic control valve and salt tank. The filter is intended for water softening. Calcium and magnesium of feed water is substituted with sodium cations while contacting with cationite. After depletion of resin-exchange capacity, its regeneration is carried out by common salt. Regeneration is carried out in automatic mode, which is ensured with the pilot valve equipped with electronic controller.

Tank type	Tank volume, l	Performance			Diameter, mm	Height, mm
		nominal, m <sup>3</sup> /h	maximum, m <sup>3</sup> /h	back washing, m <sup>3</sup> /h		
835	26.9	0.7	1.4	0.4	214	898
844	34.4	0.7	1.4	0.4	214	1132
1035	39.4	1.1	2.1	0.5	264	897
1044	51.2	1.1	2.1	0.5	264	1126
1054	63	1.1	2.1	0.5	264	1368
1252	97	1.7	3.3	0.8	311	1338
1354	105	1.7	3.5	0.9	338	1398
1465	150	2.0	4.0	1.0	365	1664
1665	185	2.8	5.6	1.4	416	1678
1865	236	3.8	7.6	1.9	487	1772
2162	312	4.8	9.6	2.4	550	1728
2472	450	6.0	12	3.0	618	1915
3072	708	9.4	18.8	4.7	775	1836
3672	999	13.6	27.2	6.8	932	1856
4272	1308	17.0	34.0	8.5	1038	2224
4872	1675	21.6	40.3	10.8	1172	2225

Duplex and Triplex softening filters include two and three columns with cationites correspondingly, which allows performing continuous softening process. During regeneration of one column, softening is carried out using one and two columns that remained. Switching of columns to regeneration and operation mode is carried out automatically. The softening filters are used the most frequently in heat power industry for boiler water purification.





# Automatic pressure filters for water purification

## 2. Automatic carbon filters

The carbon filters represent a glass-reinforced plastic tank with activated carbon, collector array, automatic control valve. Regeneration of carbon is carried out by reverse flow of water in automatic mode. The carbon filters are used the most frequently for dechlorination of water, improvement of organoleptic characteristics of drinking water, reduction of content of dissolved organic matters. The activated carbon from coconut shell is used in the filters. It is distinguished with high abrasion resistance and sorption capacity.



Tank type	Tank volume, l	Performance			Diameter, mm	Height, mm
		nominal, m <sup>3</sup> /h	maximum, m <sup>3</sup> /h	back washing, m <sup>3</sup> /h		
835	26.9	0.4	0.6	0.96	214	898
844	34.4	0.4	0.6	0.96	214	1132
1035	39.4	0.5	0.8	1.2	264	897
1044	51.2	0.5	0.8	1.2	264	1126
1054	63	0.5	0.8	1.2	264	1368
1252	97	0.8	1.2	1.92	311	1338
1354	105	0.9	1.4	2.16	338	1398
1465	150	1.0	1.5	2.4	365	1664
1665	185	1.4	2.1	3.4	416	1678
1865	236	1.9	2.9	4.6	487	1772
2162	312	2.4	3.6	5.8	550	1728
2472	450	3.0	4.5	7.2	618	1915
3072	708	4.7	7.1	11.3	775	1836
3672	999	6.8	10.2	16.3	932	1856
4272	1308	8.5	12.8	20.4	1038	2224
4872	1675	10.8	16.2	25.9	1172	2225



# Automatic pressure filters for water purification

## 3. Automatic multilayer filters

The multilayer filters represent a glass-reinforced plastic tank with several layers of filtration materials intended for retention of mechanical particles of various nature (gravel, garnet, quartz sand of various fractions, hydro antracite, Filter-Ag, zeolite). Regeneration of filter is carried out by reverse flow of water in automatic mode. The multilayer filters are used usually as part of water purification systems and serve for clarification of water. They are used at the enterprises of various industries, for production of drinking water, housing and public utilities.



Tank type	Tank volume, l	Performance			Diameter, mm	Height, mm
		nominal, m <sup>3</sup> /h	maximum, m <sup>3</sup> /h	back washing, m <sup>3</sup> /h		
835	26.9	0.4	0.8	1.44	214	898
844	34.4	0.4	1.0	1.44	214	1132
1035	39.4	0.5	1.0	1.8	264	897
1044	51.2	0.5	1.0	1.8	264	1126
1054	63	0.5	1.0	1.8	264	1368
1252	97	0.8	1.6	2.88	311	1338
1354	105	0.9	1.8	3.24	338	1398
1465	150	1.0	2.0	3.6	365	1664
1665	185	1.4	2.8	5.04	416	1678
1865	236	1.9	3.8	6.84	487	1772
2162	312	2.4	4.8	8.64	550	1728
2472	450	3.0	6.0	10.8	618	1915
3072	708	4.7	9.4	16.92	775	1836
3672	999	6.8	13.2	24.48	932	1856
4272	1308	8.5	17	30.6	1038	2224
4872	1675	10.8	21.6	38.88	1172	2225



# Automatic pressure filters for water purification

## 4. Automatic deferrization filters

Deferrization filter is intended for removal of dissolved ferrous iron from water composition by its transfer to ferric insoluble form. The ferric iron is settled onto filter charge (catalyst) and is flushed away to the sewage system by reverse flow during regeneration. Various materials can be used as catalysts (birm, greensand, MZnF, pyrolox, DMI, etc.). These catalysts allow usually reducing the content of not only iron but manganese and hydrogen sulphide in water. Air, ozone, sodium hypochlorite, potassium permanganate can be used as iron oxidizer. Therefore, equipment for deferrization must include compressors, air blowers, dosing units (for hypochlorite, potassium permanganate), reagent tanks for oxidizers in addition to deferrization filters. The filters are used widely for production of drinking water, in heat power industry, in water purification systems for various industries.



Tank type	Tank volume, l	Performance			Diameter, mm	Height, mm
		nominal, m <sup>3</sup> /h	maximum, m <sup>3</sup> /h	back washing, m <sup>3</sup> /h		
835	26.9	0.3	0.48	1.0	214	898
844	34.4	0.3	0.48	1.0	214	1132
1035	39.4	0.4	0.6	1.3	264	897
1044	51.2	0.4	0.6	1.3	264	1126
1054	63	0.4	0.6	1.3	264	1368
1252	97	0.7	0.9	2.0	311	1338
1354	105	0.8	1.1	2.0	338	1398
1465	150	0.9	1.2	2.5	365	1664
1665	185	1.2	1.7	3.5	416	1678
1865	236	1.6	2.3	4.8	487	1772
2162	312	2.1	2.9	6.0	550	1728
2472	450	2.6	3.6	7.5	618	1915
3072	708	4.1	5.6	11.8	775	1836
3672	999	5.9	7.0	17	932	1856
4272	1308	7.3	10.3	21.3	1038	2224
4872	1675	9.3	13	27	1172	2225



# Automatic pressure filters for water purification

## 5. Automatic deionization filters

The deionization filter represents a glass-reinforced plastic tank with ion exchange resin, collector array, automatic control valve and reagent tank. Two series-connected ion exchange filters are used for water deionization. One filter contains cation exchange resin in H<sup>+</sup>- form and serves for replacement of cations of feed water for H<sup>+</sup> cation. Regeneration is carried out with acid (sulphuric, hydrochloric). Another filter contains anion exchange resin in OH<sup>-</sup>-form and serves for replacement of anions of feed water for anionite in OH<sup>-</sup>-form. Regeneration is carried out with alkali. The filters are used in electronic industry, pharmaceuticals.



Tank type	Tank volume, l	Performance			Diameter, mm	Height, mm
		nominal, m <sup>3</sup> /h	maximum, m <sup>3</sup> /h	back washing, m <sup>3</sup> /h		
835	26.9	0.6	1.2	0.3	400 x 400	898
844	34.4	0.6	1.2	0.3	400 x 400	1132
1035	39.4	1	2	0.5	500 x 500	897
1044	51.2	1	2	0.5	500 x 500	1126
1054	63	1	2	0.5	500 x 500	1368
1252	97	1.4	2.8	0.7	600 x 600	1338
1354	105	1.8	3.6	0.9	650 x 650	1398
1465	150	2	4	1	700 x 700	1664
1665	185	2.6	5.2	1.3	800 x 800	1678
1865	236	3.2	6.4	1.6	1000 x 1000	1772
2162	312	4.4	8.8	2.2	1000 x 1000	1728
2472	450	5.8	11.6	2.9	1200 x 1200	1915
3072	708	9.2	18.4	4.6	1500 x 1500	1836
3672	999	13.2	26.4	6.6	1800 x 1800	1856
4272	1308	17.8	35.6	8.9	2000 x 2000	2224
4872	1675	23.4	46.8	11.7	2300 x 2300	2225



# Container type water purification systems



## Consumers:

- rotational camps
- housing and public utilities
- standalone enterprises
- military bases
- utilization as backup source of water supply

For provision of remote facilities (settlements, enterprises, shift teams, etc.) with pure drinking, technical or special purpose process water, Ecofil LLC developed and manufactures the water purification systems placed in a portcabin.

The feed water can be well water or water from the surface spring.

The capacity of water purification systems mounted in portcabins is up to 50 m<sup>3</sup>/h. This is a quick-to-mount version of water purification system having high level of reliability. The unit can be applied in the areas with the design air temperature to - 50 °C.

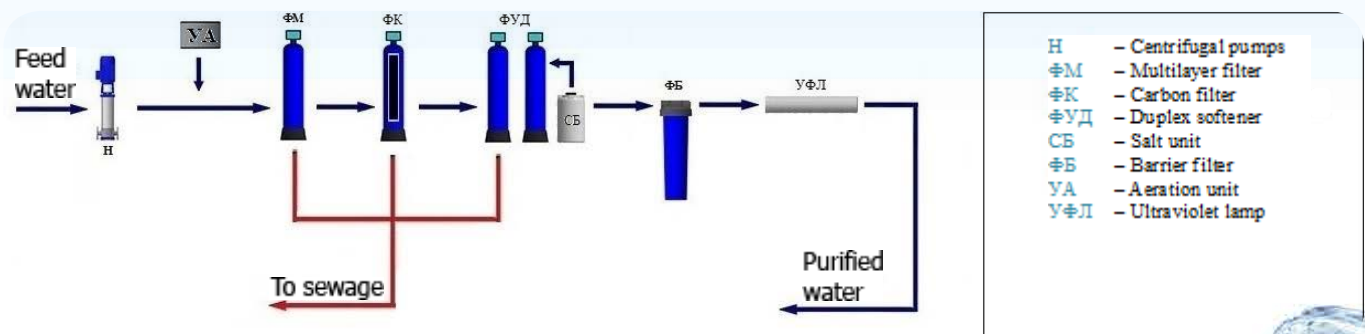
After delivery of a portcabin, only connection to electrical supply, sewage, water supply networks is required. If necessary, completion with additional equipment is possible. Based on the climatic conditions and customer's requirements, the portcabins can be proposed both in common and arctic heat-insulated design.

The portcabins can be completed with:

- ventilation
- heating
- emergency lighting
- flood and fire alarm sensors
- security alarm
- lightning rods and grounding
- fire extinguishing system
- diesel generators



Process flow diagram of one of the container type water purification systems by Ecofil LLC



The integrated container type water purification systems offered by Ecofil LLC can be distinguished with high level of process and design study, quality completion, decent manufacture and high reliability. Supply of turnkey systems, training of maintenance personnel, warranty and post-warranty maintenance comprise the standard package of services. All supplied equipment is certified.



# Electric deionization units

## Consumers:

- electronic industry
- pharmaceutical industry
- glass industry
- chemical industry
- heat and electrical power industry

The electric deionization units are intended for production of ultra-pure water to 18 MOhm\*cm without using reagents. The feed water for electric deionization units is the water with specific resistance of about 0.1 MOhm\*cm and over. Reverse osmosis permeate is used usually for that purpose.

The electric deionization units are applied the most frequently in water purification systems for production of water grade A, B, C for electronic industry. They are used more and more frequently in heat power industry for production of deionized water for high pressure boilers. The electric deionization units are applied in pharmaceuticals and chemical industry. The typical set of electric deionization unit includes electric deionization cells, power sources, chemical washing unit, control cabinet, I&C, pipelines. The electric deionization units are completed often with ultraviolet unit, recycling line, storage tank with piping.



The key advantages of electric deionization unit as compared to conventional line of equipment for water deionization (cation exchange filter – anion exchange filter – mixed bed filter) is absence of the need in application of reagents (acid, alkali) for regeneration of ion-exchange resins.

The electric deionization units are designed according to the customer's Terms of Reference and are manufactured with various capacity from 0.2 to 100 m<sup>3</sup>/h and over.

Unit type	Performance, m <sup>3</sup> /h	Overall dimensions	Power consumption, kW
OVOD – E02	0,2	0,5 x 0,5 x 1,5	1
OVOD – E05	0,5	0,5 x 0,5 x 1,5	1
OVOD – E1	1	0,5 x 0,7 x 1,7	2
OVOD – E3	3	0,7 x 1,0 x 1,7	4
OVOD – E5	5	1,0 x 1,5 x 1,8	5
OVOD – E10	10	1,0 x 2,0 x 1,8	10



# Ozonisers



The ozone generators of OVOD-OZ-A series are designed for operation on non-treated (wet) air. The ozonisers of this series are used for oxidation processes in industrial water purification systems. The key distinctive feature of OVOD-OZ-A ozone generators is absence of performance loss of ozonisers during operation. All ozone generators of this series have an option for control of analogue signal (e.g. beeper) or control computer.

Upon a Client's request, the ozonisers are completed with programmable control units or beepers.

OVOD-OZ-A ozone generators have a wide performance range from 0.3 to 20 gO<sub>3</sub>/hour, are completed with water damage protection system for ozoniser, as may be necessary.



Unit type	Maximum performance by ozone, g/h	Gas flow through discharge chamber (nominal) m <sup>3</sup> /h	Power consumption, W	Overall dimensions (length x width x height), mm	Weight (not more than), kg
OVOD-OZ-A-1	1	0,2	25	320 x 200 x 120	1,5
OVOD-OZ-A-2	2	0,4	40	320 x 200 x 120	2
OVOD-OZ-A-3	3	0,6	60	320 x 200 x 120	3
OVOD-OZ-A-5	5	1	100	400 x 200 x 120	5
OVOD-OZ-A-10	10	2	200	400 x 200 x 120	7
OVOD-OZ-A-20	20	4	400	500 x 600 x 200	14

The ozone generators of OVOD-OZ-O series are designed for operation on concentrated oxygen. The ozonisers of this series are developed for operation as part of industrial water purification systems, in the water filling production lines, waste treatment lines and other industries. The oxygen ozonisers in high and medium capacity water purification units have a number of obvious advantages over ozonisers using air as the working gas: ozone concentration in oxygen ozonisers is several times higher than in air ones. OVOD-OZ-O ozone generators have higher energy efficiency as compared to OVOD-OZ-A ozone generators.

All ozone generators of this series have an option for control of analogue signal (e.g. beeper) or control computer. Upon a Client's request, the ozonisers are completed with programmable control units or beepers. The model range of OVOD-OZ-O ozonisers includes the ozonisers with the performance ranging from 5 gO<sub>3</sub>/hour to 10 kgO<sub>3</sub>/hour.

Unit type	Maximum performance by ozone, g/h	Gas flow through discharge chamber (nominal) m <sup>3</sup> /h	Power consumption, W	Overall dimensions (length x width x height), mm	Weight (not more than), kg
OVOD-OZ-A-5	5	0,05	0,1	300 x 300 x 800	35
OVOD-OZ-A-10	10	0,1	0,2	400 x 400 x 1100	55
OVOD-OZ-A-20	20	0,2	0,38	600 x 600 x 1300	80
OVOD-OZ-A-50	50	0,5	0,8	600 x 600 x 1300	85
OVOD-OZ-A-100	100	1	1,7	900 x 700 x 1550	95
OVOD-OZ-A-200	200	2	3,2	900 x 700 x 1550	110
OVOD-OZ-A-300	300	3	5	800 x 800 x 1600	150
OVOD-OZ-A-500	500	5	8	600 x 1200 x 1400	200



# Germicidal ultraviolet units

## Consumers:

- food industry
- heat and electrical power industry
- chemical and petrochemical industry
- housing and public utilities, drinking water supply
- electronic industry
- pharmaceutical industry
- glass industry
- perfume and cosmetic production

The ultraviolet lamps use the energy of ultraviolet radiation for elimination of microbiological pollutions. As distinguished from conventional methods of water disinfection, such as chlorination, UV-lamp sterilizes water with ultraviolet radiation introducing no admixtures.

UV unit for decontamination of drinking water includes several basic elements:

- body made of food grade stainless steel;
- quartz tubes fixed with sealing sleeves on the body;
- germicidal lamps located in the middle of quartz tubes;
- the unit is also equipped with the sensors ensuring stable, safe and efficient operation;
- starting from 2012, all main models of UV units are equipped with high-tech BSK system for control of operation.

Upon a client's request, decontaminating UV units for treatment of drinking water can be supplied with additional set of spare parts, special tools or mounting brackets.



Description	Rating, m <sup>3</sup> /h (water from underground sources of class I)	Power sumption, W	Lamp peration time meter	BSK control system	UV-monitor	Cleaning unit
Units with low-pressure mercury lamps						
OVOD-UFT-P-2	2	40	-	-	-	-
OVOD-UFT-P-3	3	65	-	-	-	-
OVOD-UFT-P-5	5	90	+	-	+	-
OVOD-UFT-P-10	10	195	+	-	+	-
OVOD-UFT-P-15	15	270	+	-	+	-
OVOD-UFT-P-20	20	360	+	+	+	-
OVOD-UFT-P-30	30	450	+	+	+	+
OVOD-UFT-P-50	50	600	+	+	+	+
OVOD-UFT-P-75	75	810	+	+	+	+
OVOD-UFT-P-100	100	1260	+	+	+	+
Units with low-pressure amalgam lamps						
OVOD-UFT-A-1-101	15	290	+	+	+	+
OVOD-UFT-A-1-114	20	290	+	+	+	+
OVOD-UFT-AM-1-101	25	350	+	+	+	+
OVOD-UFT-AM-1-114	30	350	+	+	+	+
OVOD-UFT-A-2	40	580	+	+	+	+
OVOD-UFT-A-3	60	870	+	+	+	+
OVOD-UFT-A-4	90	1160	+	+	+	+
OVOD-UFT-A-5	110	1450	+	+	+	+



# Microfiltration equipment



## Bag filters

The bag filters are intended for retention of mechanical particles of various nature and used both for preliminary and for finishing filtration.

The bag filters can be distinguished with high performance and contaminant capacity, low resistance.

There are quite many various designs of bag filters.

The classical industrial bag filter consists of a body, usually of stainless steel, and filtering bag. The filtering bags are manufactured from various filtration materials: polypropylene, polyether, viscose, nylon. The size of retained particles is 1, 3, 5, 10, 25, 50, 75, 100, 200  $\mu\text{m}$ .

The performance of industrial bag filters is up to  $160 \text{ m}^3/\text{h}$ , the operating pressure is up to 0.8 MPa.

## Barrier filters

The barrier filters are intended for cleaning of liquid media from mechanical particles. The industrial barrier filters for filtration of water can be single- and multiple-cartridge ones. The number of cartridge filters in one body can be up to 32. The bodies of barrier filters are manufactured from stainless steel.

The standard filtration cartridge has the diameter of 70 mm and height of 250 mm. The height of cartridge filters can be multiple of the height of standard filter and equal to 500, 750, 1,000 mm. The cartridge elements of cartridge type (cartridges) can be depth (retention of mechanical particles in the volume of filtration material) and membrane ones (surface retention of particles). The size of retained particles of depth cartridges is 0.5, 1, 3, 5, 10, 20, 50, 100  $\mu\text{m}$ , the size of retained particles of membrane cartridges is 0.1, 0.2, 0.45, 0.65, 1  $\mu\text{m}$ .

The performance of industrial filters is up to  $80 \text{ m}^3/\text{h}$  (with the size of retained particles of 50  $\mu\text{m}$ ), the operating pressure is up to 0.8 MPa.



## Strainers and disk filters

The disk filter is made in the form of a set of disks from performance resin. Each disk has the grooves of certain depth. During compression of disks, the channels are formed, through which the water is filtered. The cross section of the channels can be various and ensures retention of the particles from 5 to 200  $\mu\text{m}$ . The contaminants settle on the surface of disks. The disk filters can be easily flushed in automatic mode with almost completely recovered filtration capacity.



Strainers. The principle of their operation is based on the water flow through the fine screen (the size of cells ranges from 10 to 300  $\mu\text{m}$ ) located in the body. The filter screen in the filter is flushed periodically in automatic mode. Flushing is carried out due to special tube with nozzles for suction. The treated water is filtered through internal surface of the screen. The contaminants settle on its surface (the size of their particles exceed the size of cells). After accumulation of contaminants (it is estimated by pressure drop), the screen is flushed using rotation of special tube and sucks in the contaminants from the screen surface as a vacuum cleaner. The flushing mode is started with the controller. Moreover, the drain channel is opened and the tube starts rotating, while sucking in the contaminants. Rotation of the tube is carried out with a motor or hydraulic drive.





# Rain and melt water purification units

## Consumers:

- fuelling stations
- garages
- parking areas
- territories of haulage companies
- service stations
- oil stores

UODV-2.5 units manufactured by Ecofil LLC are intended for purification of storm and melt waters from petrochemicals and suspended substances in accordance with the instructions of the "Rules for protection of surface waters" during discharge of effluents into the water bodies of drinking and household water use, and water use for fishery.

The units for purification of storm and melt waters employ a comprehensive approach, which includes the stages of settling of particulate pollutants (sand, clay), thin-layer separation of suspended substances and petrochemicals, sorption of emulsified and dissolved petrochemicals on highly efficient polymer sorbent and activated carbon.

The key advantages of UODV units:

- high degree of treatment
- small size
- possibility to increase performance
- simple and reliable operation
- high resistance to load variations
- no need in constant attendance
- minimum costs for construction



**UODV-2.5 unit manufactured by Ecofil LLC and its transportation using a truck**

## Main technical data on UODV units manufactured by Ecofil LLC

Description of the unit	Performance		Intake area, ha	Overall dimensions* (l*w*h), m
	l/s	m <sup>3</sup> /h		
UODV-1	1	3,6	0,10	3,0*1,5*2,0
UODV-1.5	1,5	5,4	0,15	3,0*2,0*2,0
UODV-2.5	2,5	9,0	0,25	3,5*2,0*2,2
UODV-5	5	18,0	0,50	2*(3,5*2,0*2,2)
UODV-7.5	7,5	27,0	0,75	3*(3,5*2,0*2,2)
UODV-10	10	36,0	1,00	4*(3,5*2,0*2,2)

\* including adsorber with a charge from activated carbon.

The water is supplied for treatment by gravity. If the relief pattern does not ensure gravitation to the unit, the technology provides in addition to the basic version for installation of the pump station ensuring continuous supply of waste waters.

The quality of purification of the basic version by the content of petrochemicals is up to 2 mg/l, suspended substances up to 15 mg/l. For achievement of the content of petrochemicals in purified water > 0.05 mg/l and suspended substances > 5 mg/l (for discharge of waste waters into the water bodies used for fishery), an additional assembly is installed - an adsorber with a charge from activated carbon.

With the rain water flow of over 10 l/s (36 m<sup>3</sup>/h), the scope of delivery of UODV units may additionally include the storage tanks of various capacity, in which accumulation of rain water occurs for not less than 2 hours.

Upon a Customer's request, Ecofil LLC is ready to sign a contract for development of design documentation and manufacture of equipment for return of treated purified storm sewers for production needs.



# Membrane elements



The radical changes in the design of membrane elements, technology of their production, process equipment as well as use of quality import material (turbolators, drainage materials) allowed Ecofil LLC to set-up production of new series of the elements:

- reverse osmosis (EMO)
- nanofiltration (EMN)
- ultrafiltration (EMU)



## Reverse osmosis membrane element of EMO series

Not only import turbolators and drainage materials are used in reverse osmosis membrane elements manufactured by Ecofil LLC but thin-film composite membranes of the leading foreign companies. Along with modification of the design and manufacturing technology, it ensures production of quality, reliable elements with persistently high characteristics. According to its specifications (performance, selectiveness, service life), EMO membrane elements do not differ from similar elements of foreign manufacturer, world leaders in this field. The warranty for reverse osmosis elements manufactured by Ecofil LLC is up to 3 years.

## Energy-saving EMO-N membrane elements

Ideal for the majority of water demineralization processes combining high performance and selectiveness at low operating pressure.

Standard size, diameter-length, mm	200-1016	100-1016	96-950	61-1016	45-350
Pressure, operating/maximum, MPa	1,0/4,1	1,0/4,1	1,0/4,1	1,0/4,1	0,3/1,0
Performance*, l/h	1700	400	330	120	3
Selectiveness*, %					
minimum	98,0	98,0	98,0	98,0	93,0
typical	99,0	99,0	99,0	99,0	95,0

\* - on standard solution NaCl 1.5 g/l, temperature 25°C, conversion 15%. Deviation in performance of separate elements is allowed within the range of ±15%.

## EMO-S membrane elements

Indispensable for heat power industry, electronics, brackish water with high content of salts (5—15 g/l), distinguished with high selectiveness and stability of characteristics.

Standard size, diameter-length, mm	200-1016	100-1016	96-950	61-1016	45-350
Pressure, operating/maximum, MPa	1,6/4,1	1,6/4,1	1,6/4,1	1,6/4,1	0,3/1,0
Performance*, l/h	1500	350	280	105	2
Selectiveness*, %					
minimum	99,0	99,0	99,0	99,0	95,0
typical	99,5	99,5	99,5	99,5	97,0

\* - on standard solution NaCl 1.5 g/l, temperature 25°C, conversion 15%. Deviation in performance of separate elements is allowed within the range of ±15%.

## EMO-M membrane elements

Optimum for desalination of sea water.

Standard size, diameter-length, mm	200-1016	100-1016	96-950	61-1016	61-350
Pressure, operating/maximum, MPa	5,5/7,0	5,5/7,0	5,5/7,0	5,5/7,0	5,5/7,0
Performance*, l/h	800	150	120	45	16
Selectiveness*, %					
minimum	99,2	99,2	99,2	99,2	99,2
typical	99,5	99,5	99,5	99,5	99,5

\* - on standard solution NaCl 1.5 g/l, temperature 25°C, conversion 8%. Deviation in performance of separate elements is allowed within the range of ±15%.

## Nanofiltration membrane elements of EMN series

Applied in OVOD membrane units for water purification as well as for separation of organic compounds from salts in water solutions in food, chemical, electronic industries, in biotechnology.



# Membrane elements

Standard size, diameter-length, mm	200-1016	100-1016	96-950	61-1016	45-350
Pressure, operating/maximum, MPa	1,6/2,5	1,6/2,5	1,6/2,5	1,6/2,5	0,3/1,0
Performance*, l/h	<1	<1	<1	<1	<1
Selectiveness*, %	1700	400	330	120	3
minimum					
typical	95	95	95	95	90
NaCl	50-70	50-70	50-70	50-70	30-50

\* - on standard solution NaCl 1.5 g/l, temperature 25°C, conversion 15%.

\*\* - on standard solution MgSO<sub>4</sub> 2 g/l, NaCl 1.5 g/l, temperature 25°C, conversion 15%. Deviation in performance of separate elements is allowed within the range of ±15%.

## Ultrafiltration membrane elements of EMU series

With isolation by molecular mass from 10000 to 200000 Dalton. Applied in OVOD membrane units for water purification as well as cleaning and concentrating of the solutions of enzymes, biologically active preparations, dairy products.

Standard size, diameter-length, mm	200-1016	100-1016	96-950	61-1016	45-350
Pressure, operating/maximum, MPa	0,2/1,0	0,2/1,0	0,2/1,0	0,2/1,0	0,2/1,0
Content of free residual chlorine in feed water, ml/l	<1	<1	<1	<1	<1
Performance* of the element on the membrane with isolation					
**20000 Dalton, not less, l/h	2500	580	470	140	25
***50000 Dalton, not less, l/h	3000	700	570	170	30

\*- on distilled water, temperature 25°C, conversion 10%.

\*\* - by myoglobin.

\*\*\* - by haemoglobin.

Deviation in performance of separate elements is allowed within the range of ±15%.

	EMO-N	EMO-S	EMO-M	EMN	EMU
Operating pressure, MPa	1,0	1,6	5,5	1,6	0,2
Maximum operating pressure, MPa	2,1	4,1	7,0	2,5	1,0
Maximum operating temperature, °C	45	45	45	45	55
pH operating range	3-10	3-10	3-10	2-11	2-11
Maximum SDI index of feed water	5	5	5	5	5
Conversion, %	15	15	8	15	10
Maximum flow of feed water (m <sup>3</sup> /hour) for the elements with the diameter:					
200 mm	12	12	12	12	12
100 mm	4,1	4,1	4,1	4,1	4,1
61 mm	1,3	1,3	1,3	1,3	1,3
Minimum flow of concentrate (m <sup>3</sup> /hour) for the elements with the diameter:					
200 mm	2,7-3,6	2,7-3,6	2,7-3,6	2,7-3,6	3,6
100 mm	0,9-1,1	0,9-1,1	0,9-1,1	0,9-1,1	1,2
61 mm	0,22	0,22	0,22	0,22	0,22
Maximum content of substances in the feed water (mg/l):					
- free residual chlorine	0,1	0,1	0,1	1	1
- petrochemicals	0,1	0,1	0,1	0,1	0,1
- dissolved iron	0,1	0,1	0,1	0,1	0,1



# Accessories and components for water purification

## Apparatus for membrane elements

One- and two-place apparatus with maximum operating pressure of 2, 4 and 8 MPa for membrane elements with the diameter of 61 and 100 mm are manufactured from stainless steel. For membrane elements with the diameter of 200, the glass-reinforced plastic apparatus by Wave Cyber can be supplied with maximum operating pressure of 2.1, 4.1, 6.9, 8.2 MPa. Wave Cyber apparatus are manufactured in various design with placement from 1 to 6 elements in 1 body. All apparatus can be made with side inlet/outlet or with inlet/outlet in the body cover.



Number of placed membrane elements with the diameter of 200 mm	Length of apparatus, mm	Distance between attachment points, mm		Weight of apparatus, kg not more
		maximum	minimum	
1	1473	875	500	21
2	2489	1890	500	29
3	3505	2910	960	37
4	4521	3190	1970	45
5	5537	3560	2990	55
6	6553	4020	4020	64
7	7569	6170	5090	73

## Glass-reinforced plastic tanks for pressure filters

The pressure filter body can be manufactured from glass-reinforced plastic and in some cases from stainless steel. The filter body is usually in the form of hollow cylinder, which has a special base in the bottom, which is required for its maintenance in vertical position.

There is an opening, which the filtration medium or other charges required for production of water with certain properties are filled through, in the upper zone of the body. This form ensures the required operation mode of filtration materials, which improves reliability of the system operation.



## Automatic valves for control of pressure filters

The pilot valve represents a device with electromechanical drive for sequential switching of water flow inside the filter according to the set programme. The main task of the pilot valve is timely regeneration of filtration medium with back flushing. The back flushing starts at the time set by the beeper or upon achievement of the set volume of water that passed through the filter.





# Accessories and components for water purification

## Clack control valves

Valve model	Maximum operating flow, m <sup>3</sup> /h	Maximum flow at back flushing, m <sup>3</sup> /h	Diameter of inlet/outlet nozzle, inch	Drainage, inch	Tank size, inch
V1RRBTZ	6	6	1	3/4	8-14
V125RRBTZ	7,7	7,7	1,25	1	24
V15RRBTZ	13,6	11,3	1,5	1	30
V2RRBTZ	26,1	18,2	2	2	36
V3RRBTZ	56,7	50,0	3	3	42-48

## Stop valves, pressure gauges, rotameters, water meters



## Reagents for water purification

- preparations for ensuring relevant quality of water in the cooling system and cooling fluid
- preparations for ensuring corresponding quality of water in the systems of hot water and steam boilers
- corrosion inhibitors
- detergents
- preparations for chemical cleaning of membrane elements
- sludge inhibitors for membrane units

## Filter charges

The filtration materials represent the main component of multilayer filters, deferrization filters, carbon filters. They perform the functions of water clarification, oxidation and retention of iron, sorption of organic compounds and free chlorine.

Quite a wide range of filtration media is currently manufactured on the basis of natural materials. They are characterized with the following indicators: granule size, density of granules, bulk (volume) weight, grain uniformity factor, shape factor, mechanical strength, chemical resistance.

Brief information below refers to filtration materials offered by Ecofil LLC and having a widespread application in water purification systems.

**Activated carbon.** It allows reducing the content of organic substances and chlorine, removing odour, colour, improving organoleptic properties of water. Regeneration is confined to periodic back wash. The activated carbon manufactured from coconut shells has high sorption capacity and abrasion resistance. Applied in carbon filters.



# Accessories and components for water purification



**Garnet.** Garnet sand referred to almandites. It serves for removal of suspended particles. It is used as lower supporting layer. It ensures high flow rates in maintenance mode. It is close to quartz sand by filtration properties but excels it by mechanical strength, layer porosity and chemical resistance. It is applied in multilayer filters with high filtration rate and contaminant capacity.

**Hydro antracite.** Stone coal prepared specifically for filtration of water. It has lower density than that of quartz sand thus being placed above the sand layer in multilayer filter. The uniformity of granules by size (low uniformity factor) and their irregular shape allow suspended particles to penetrate into the layer of filtration material to deep depth. This results into increase in contaminant capacity of filtration layer, duration of filtration cycle, reduction of layer resistance. It is usually used in multilayer filters.

**Ion exchange resins.** The ion exchange resins are used to solve a wide range of tasks in water purification including:

- softening
- deionization
- dealkalization
- denitration
- removal of organic compounds.

The conventional line is supplemented with resins for production of high-ohmic water, nuclear grade and special purpose resins.

**Birm.** It is an efficient and economic filtration material serving for removal of iron and manganese of low and medium concentrations from water. It acts as catalyst for oxidation of ferrous iron into ferric one with oxygen dissolved in water. The material does not require application of chemicals, regeneration is carried out with back flushing. It is used in pressure and gravity deferrization filters.

**MZHF.** A filtration material comprising the derivative products of rocks containing dolomite. This is a porous material consisting of the mixture of oxides and carbonates of calcium and magnesium as well as oxides of aluminium and silicon. A catalytic component - manganese dioxide is fixed in the pores of the filling agent. MZHF accelerates the processes of oxidation of iron, manganese, hydrogen sulphide with air oxygen acting as catalyst.

**AS sorbent.** Aluminosilicate polyfunctional adsorbent. It is used mainly in deferrization filters. It is applied both in pressure and in gravity filters. This is the most optimum and economically efficient solution for removal of various contaminants (iron, strontium, aluminium, petrochemicals, etc.).

**MSK sorbent.** It is recommended for application both in pressure and in gravity systems, as basic or multilayer element of charge layer. It is especially efficient at combined application with the charges AS sorbent and MS sorbent.

**Greensand.** A filtration material from glauconite mineral. It serves for removal of iron, manganese and hydrogen sulphide. Periodic or continuous regeneration pattern is applied for recovery of oxidation capacity of the catalyst. Potassium permanent solution is used as a chemical recovering the oxidation capacity of the catalyst.

**Pyrolox.** A mineral based on manganese dioxide  $MnO_2$ , oxidises and catalyses the reactions of oxidation of dissolved iron, manganese and hydrogen sulphide. It is suitable for treatment of wellbore water. Regeneration is carried out with back flushing.

**MS sorbent.** A sorbent of the second generation containing catalytic active elements. The contaminants subjected to oxidations and contained in the water are converted to coarse particles, which are retained on the last layers of the charge. They are removed with reverse flow of water. The sorbent does not require additional chemical reagents. The sorbent is not spent during operation, which is also an important advantage. It has long period of operation, resistant to chlorine, removes hydrogen sulphide, MS sorbent has high contaminant capacity.



# Accessories and components for water purification

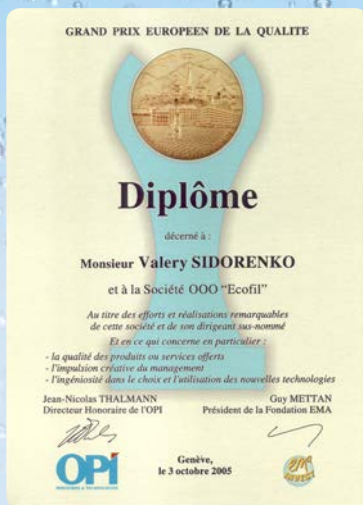
**Gravel, quartz sand.** Quartz sand is used for removal of suspended particles as one of the layers of multilayer filters. Gravel of regular spherical shape is applied as supporting layer and serves concurrently for uniform distribution of water flow in multilayer, carbon filters, deferrization, softening filters. They have high strength and chemical resistance. They are chemically inert, do not release soluble compounds. They are used in household, industrial and municipal filters.

**Pelleted salt.** It is applied for regeneration of ion exchange resins in pressure softening filters. The pelleted salt for water purification systems represents edible salt (NaCl) of Extra grade without iodine and potassium ferrocyanide supplements (flow enhancers), which is pressed into tablets or pellets. It is filled into brine tanks (feeders).

Description	Birm	Greensand	Hydro antracite	Sand, gravel	Garnet	Activated carbon
<b>Physical properties</b>						
1	Colour	black	black	black	from milk-white to red-brown	from light brown to reddish
2	Bulk weight (g/cm <sup>3</sup> )	0,6 - 0,7	1,4	0,7 - 0,8	1,4 - 1,47	1,9 - 2,2
3	Density of granules (g/cm <sup>3</sup> )	2	2,4-2,9	1,65	2,65 - 2,75	3,8 - 4,2
4	Uniformity factor	1,72	1,4 - 1,6	1,25 - 1,4	1,6	<1,5
5	Size of granules (mm)	0,42 - 2	0,25 - 1,2	0,6 - 1,41	0,3-5	0,42-2,43
<b>Application conditions</b>						
1	Water pH	6,8 - 9	6,2 - 8,8	-	-	-
2	Maximum content of Fe and Mg in feed water (mg/l)	4	15	-	-	-
3	Presence of H <sub>2</sub> S in water	no	allowable	-	-	-
4	Layer height (cm)	75 - 90	75	60 - 90	45 - 76	7,5 - 25
5	Water flow rate (m/h)					
	- maintenance mode	8,6 - 12	5 - 12	12	3,5 - 12	12
	- back flushing mode	24 - 29	20 - 29	32 - 44	36 - 48	32 - 44
6	Layer expansion (%)	20 - 40	35 - 50	20 - 40	20	35 - 50
7	Need in reagents	no	potassium	no	no	no
8	Reagent dose (g/l)	-	2 - 4	-	-	-
<b>Package</b>						
1	Package (l)	28,32	28,32	28,32	28	20
2	Package weight (kg)	19,2	38,6	21,8	40	45



# Awards



European prize for quality  
GRAND PRIX EUROPEEN DE LA QUALITE



The company was rated in TOP-100 enterprises of  
Russia at All-Russian Contests - "1000 Best Enterprises  
and Organizations of Russia for 2005 - 2008



Awarded with a rank of the "Leader of Russia 2013" amongst the leading enterprises  
in the Russian economy at the National Business Rating for 2011-2012



The Best Organization of Vladimir Region  
in 2002 and 2006



International prize GRAND PRIX EFFIE for reliability,  
sustainability and success





# Clients



## Ecofil LLC provides a full range of services for water purification:

- development and optimization of advanced technologies in water purification using computer modelling
- designing and manufacture of water purification systems for all industries, medicine, housing settlements, cottages, hotels, recreation centres, holiday centres, offices
- supply of equipment of leading foreign companies
- manufacture of control cabinets for water purification systems and other processes
- analysis of operation and modernization of existing water purification sites
- maintenance of domestic and imported water purification systems
- supply of components for various purpose water purification systems
- installation and commissioning
- warranty and post-warranty service
- training of maintenance personnel



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