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Station for Disinfection of Potable Water and Clarified Sewage with Capacity of 12000 m³/day (500 m³/h).

Description of the station for disinfecting sewage.

The station is constructed of “Lazur M-50” units (Fig. 1), each of 50 m³/capacity. The station includes six parallel chains and each chain includes two “Lazur M-50” units connected in series (Figs. 2,3). One of the chains serves as the emergency set.

The inlets and outlets of the chains are connected to the supply and discharge collectors of water under treatment. The valves mounted at the inlet and outlet of each chain serve for leveling the volumes of water flows through the chains and for cutting off the chain from the total scheme for performing the preventive maintenance.

The power supply cabinets are installed near each section on a wall or in a rack. These cabinets are raised over a floor level at a height sufficient for convenient mounting/dismantling of gas discharge lamps incorporated into the units. A distance between the chains should be from 0.8 to 1.0 m. The lower module in the chain is raised over the floor level by ~ 50 cm. The overall area occupied by the units and service zone is ~ 45 m². The total power consumption of the station is 7 kW.

The description of “Lazur M-50” unit.

“Lazur M-50” unit represents the cylindrical design made of stainless steel (Fig. 1, pos. 1), wherein the ultraviolet radiators enclosed in protective quartz casings (Fig. 1, pos. 2) and ultrasonic transmitters are arranged. The volume of the unit is 50l, and the weight including that of the power supply cabinet is 65 kg.

The ultraviolet radiators are essentially the low-pressure mercury vapor lamps provided with the bulb made of synthetic quartz (“Suprasil”). The length of the lamp is 1200 mm. Each lamp consumes a power of 200 W from the net (220 V, 50 – 60 Hz). The lamp radiates UV light (62 – 64 W) in the spectral range of UV – C band (254 nm). The flux density of the bactericidal radiation at a surface of the protective glass (“Suprasil”) is not less than 80 mW/cm². The service life of the lamp is not less than 12,000 h of continuous burning. The lamps of NNI 200 type have longer service life (16,000 h). The lamps are supplied with power by means of the HF (44 kHz) transformer that functions also as a potentiostat.

The ultrasonic (US) transmitters (Fig. 1, pos. 3) are specified as follows:

- each of two transmitters arranged at the flanks of the unit enclosure has the US emitting power of 150 W;
- the US emitting power of US transmitters arranged between the flanks is 100 W;

- the frequency of ultrasonic vibrations is 25 ... 40 kHz;
- the service life of US transmitters is not less than 16,000 h.

The set of M50 module includes five ultraviolet lamps and four ultrasonic cavitators. The total consumed power is 1500 W.

Thus, when a liquid passes through the module, it is subjected to the simultaneous combined action of ultraviolet irradiation (with a flux density of over 40 mWxs/cm²) and ultrasound (with a power density of more than 2 W/cm²).

Under the action of these factors, in the water under treatment strong cavitation and deep oxidative processes take place. They proceed due to the effect of ultraviolet and ozone (O₃) resulting from UV irradiation in vapor-gas bubbles (with a mean diameter of less than 0.1 mm) uniformly spread over the whole operative volume of the module. During this treatment process, the other strong oxidants (H₂O₂, OH, etc.) also form.

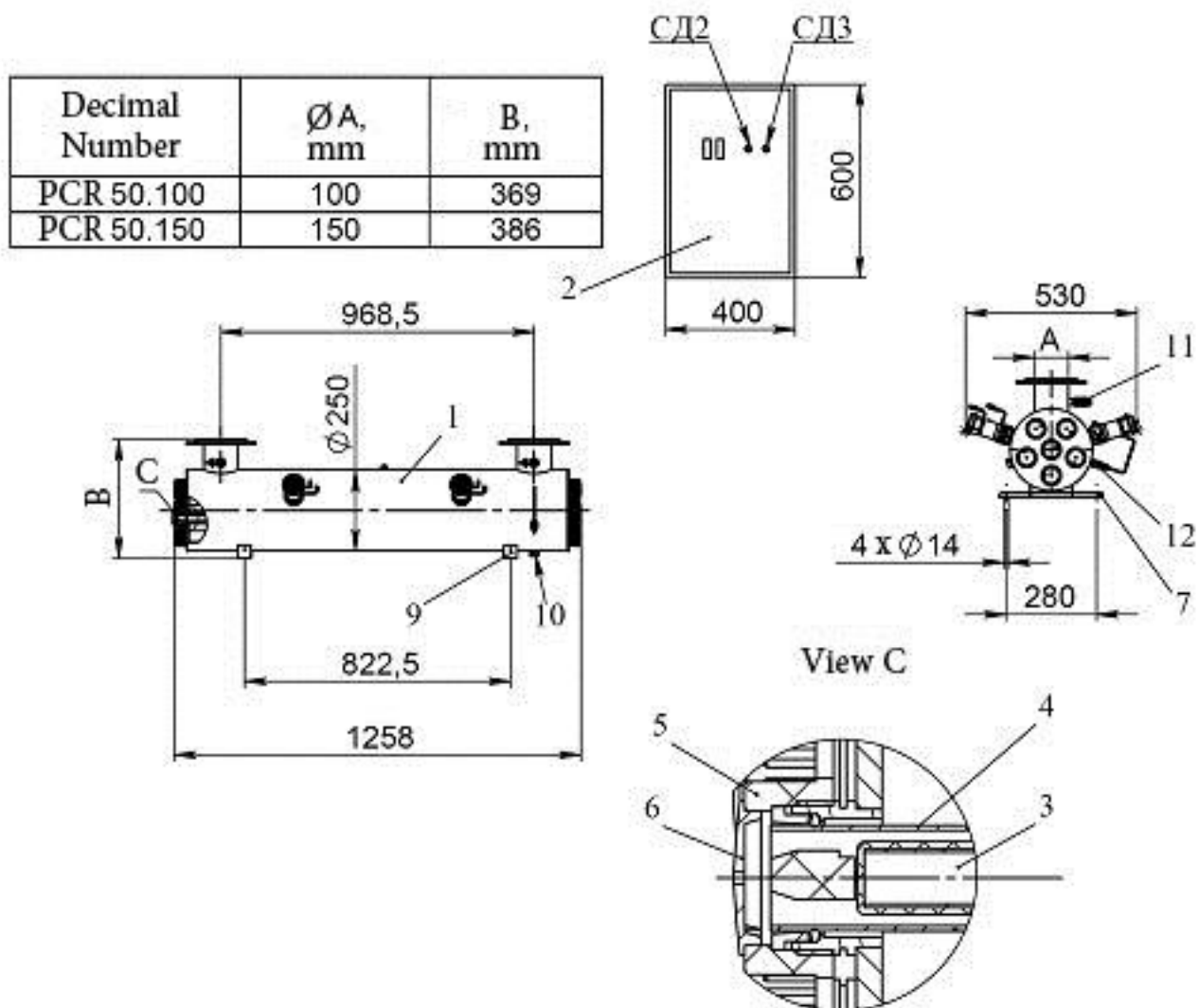
This technology allows the treatment of turbid liquids (with a level of transparency to 50%) as well as of the liquids containing appreciable amounts of suspended particles (with a content of up to 10 mg/l) and the concentrations of Fecal Coliforms up to 1,000,000 units/l. Moreover, the application of ultrasound does not allow particles, which are present in the liquid to form a sediment on the protective glass and walls of the working chamber thus increasing the operation effectiveness. This makes unnecessary the cleaning of the surfaces in contrast to the conventional ultraviolet water treatment technology.

The described above unit is significantly more affective (by a factor from 100 to 1000) as compared with the conventional ultraviolet disinfecting systems with analogous power consumption and capacity of the UV-3000 type produced by the Trojan Company.

The series coupling of two "Lazur M-50" units (Fig. 2,3) appreciably increases the reliability and still more enhances its disinfecting characteristics with respect to destruction of spore-forming (with a content of up to 1,000,000 units/l), virus forms (with a content of up to 100,000 units/l), fungous microorganisms (with a content of up to 10,000 units/l), molds (with a content of up to 1000 units/l), and protozoa (with a content of up to 1000 units/l).

To provide the necessary capacity of the station in the mode of the gravity flow, the total drop in the height from the outlet of biological (or any other) purification system to the outlet of the system in point must be from 4 to 6 m. All the modules are provided with necessary devices controlling their operation. The levels of ultraviolet radiation and the power of ultrasonic transmitters are permanently monitored. The power supply blocks are equipped with connectors for linking-up to the total control system. The indicator lamps of monitoring the operation of subsystems are arranged on the front panels of the control cabinet. The weight of the control and power supply cabinet of the chain is 50 kg.

Fig. 1



Maintenance Area

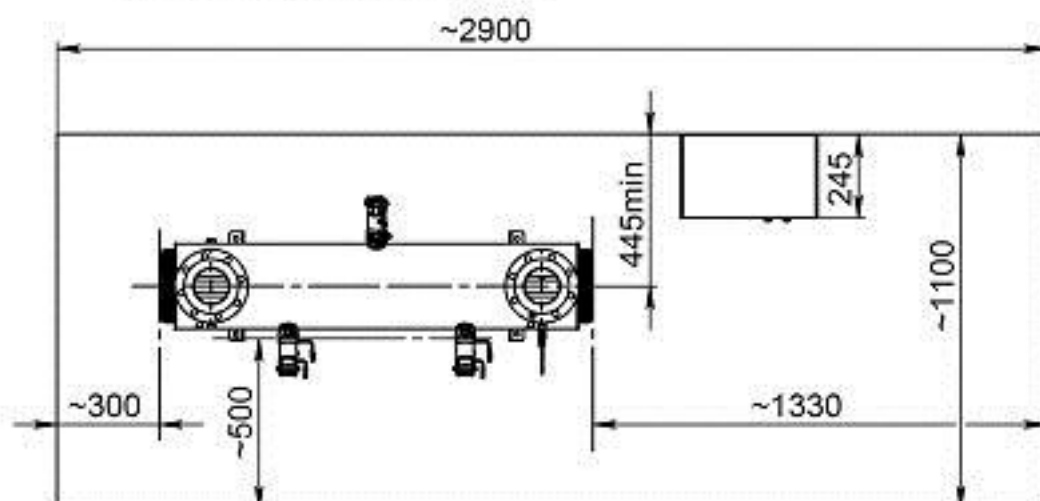
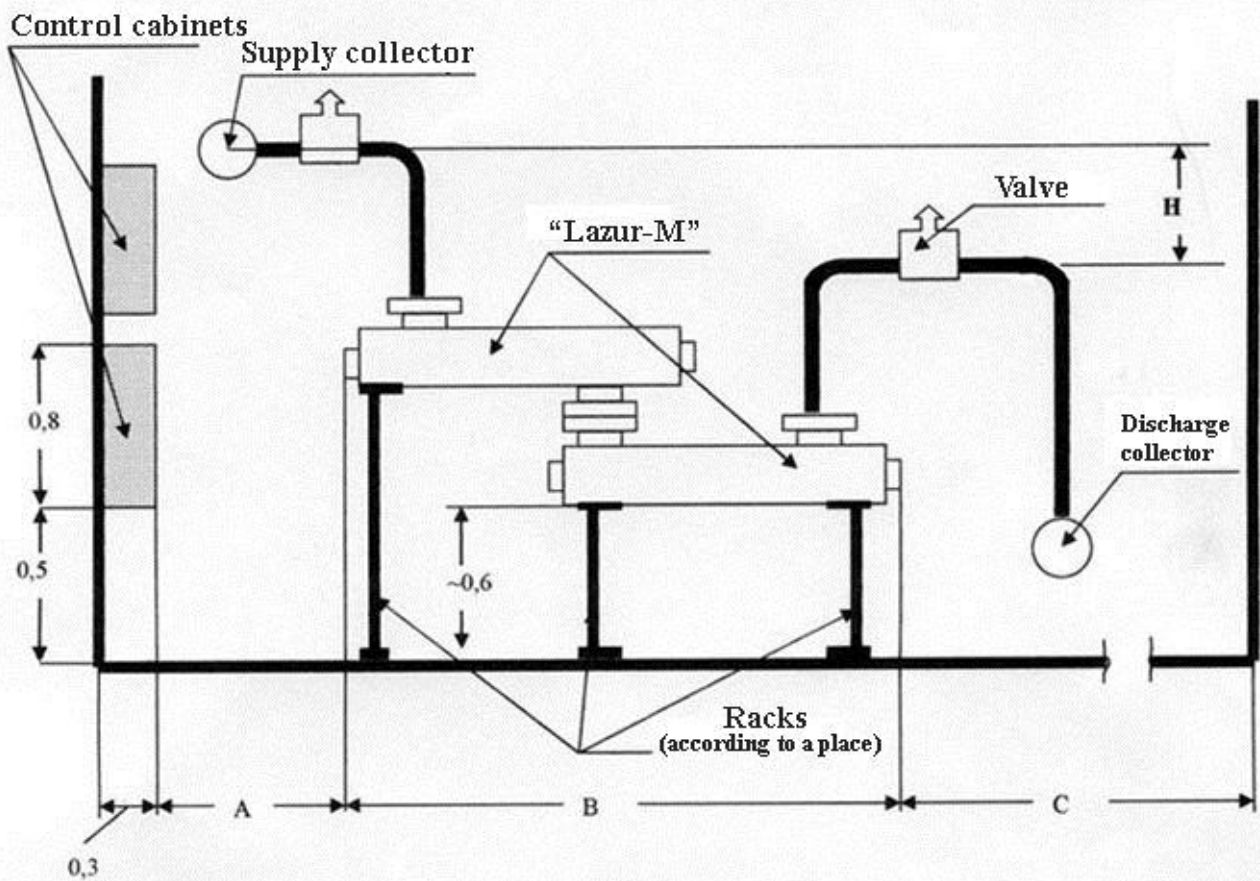


Fig. 2

Parallel-series connection of "Lazur-M" units.



Lazur	A	B	C	t	L ₁	L ₂
M50	1,0	2,0	2,0	0,8-1,0	1,0	1,0
M100	1,0	3,0	2,0	1,2	1,2	1,2
M250	1,0	3,0	2,0	1,4	1,5	1,5

All dimensions are given in meters.

Fig. 3

Scheme of water disinfecting station based on modules of "Lazur-M" series (parallel-series connection).

