



May 30, 2022

№17EN

### Commercial proposal

We hereby offer a heat plant UT90SM for the extraction of humic substances (potassium humate or sodium humate) from humic raw materials (for example, peat, leonardite, sapropel) by means of complex moisture-thermal cavitation hydrodynamic treatment of a mixture of water, raw materials and alkali. The plant allows to master the production of humic substances or to modernize an existing one in order to improve the quality and reduce the cost of the product in a short time and with relatively low costs. This equipment of various capacities is successfully operating in Belarus, Ukraine, Lithuania, Russia, Kazakhstan, Serbia, Montenegro.

The power of the UT90SM unit is 90 kW, the working volume is  $1\text{m}^3$ , the productivity at  $\Delta t = 55\text{ }^{\circ}\text{C}$  (from  $15\text{ }^{\circ}\text{C}$  to  $70\text{ }^{\circ}\text{C}$ ) is  $1\text{m}^3/\text{h}$ , the duration of the working cycle is 1 hour, which includes loading, cavitation treatment, unloading. Applied materials are a working tank, pressure and suction pipes, a cavitator - stainless steel, pump casing and impeller - cast iron. The unit is completed with a power control panel containing microprocessor-based devices for temperature control in the plant and for electric motor protection.

The cost of UT90SM is \$65000, an advance payment is 100%, a production time of 70 working days.

On the basis of the UT90SM, it is possible to manufacture a production line (heat plant UT90-1000, see an application), including units for feeding and weighing peat, mixing peat with water, preliminary cavitation treatment (grinding) of the mixture and separating abrasive particles (sand) from the peat-water mixture, feeding the peat-water mixture into the UT90SM unit, receiving the finished humate from the UT90SM unit and cavitation mixing it with additional components.

The heat plant UT90-1000 is designed for cavitation mixing, preliminary separation, moisture-thermal cavitation hydrodynamic treatment of an aqueous mixture of humic raw materials, receiving of finished humate, cavitation mixing it with microelements. This plant is a technological line for the extraction of humic substances from peat, sapropel, biohumus, brown coal (leonardite) with an average productivity of  $1\text{m}^3/\text{h}$ .

The cost of heat plant UT90-1000 is \$104000, an advance payment is 100%, production time is 90 working days. This commercial proposal is valid until a new commercial proposal is posted on [jurle.com](http://jurle.com).

If you need a different performance or configuration, we can design and manufacture equipment adapted to the requirements of your project.

Application: Scheme and description of the line for the release of humic substances (Heat plant UT90-1000)

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## Technical description of the heat plant UT90-1000

The heat plant UT90-1000 is designed for cavitation mixing, preliminary separation, moisture-thermal cavitation hydrodynamic treatment of an aqueous mixture of humic raw materials, receiving ready-made humate, cavitation mixing it with microelements. This is a technological line for the extraction of humic substances from peat (sapropel, bio-humus, brown coal, leonardite) with an average productivity of 1 m<sup>3</sup>/h. The performance depends on the processing temperature of the mixture, the raw materials properties and the product produced.

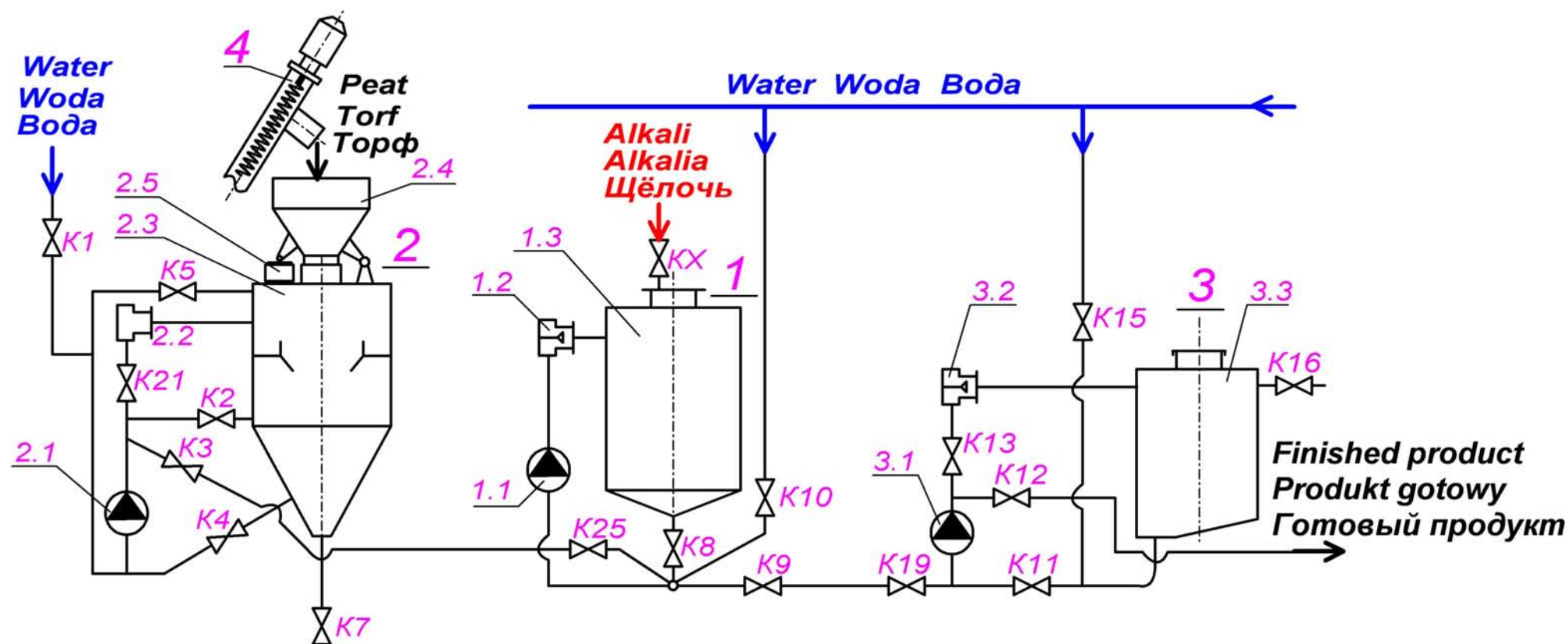
Heat plant UT90-1000 consists of three main units: mixer-separator UT-S1000; heat plant UT90SM; receiving and mixing unit UP-1000. The units are connected to each other by flexible sleeves that are included in the delivery set.

Mixer-separator UT-S1000 is designed for weighing peat, mixing peat with water, preliminary cavitation treatment (grinding) of the mixture and separating abrasive particles (sand) from the peat-water mixture, feeding the peat-water mixture into the UT90SM plant. The power of the mixer-separator is 4 kW, the working volume is 1 m<sup>3</sup>. Applied materials: working tank, pressure and suction pipes, cavitator - stainless steel, impeller and pump volute - cast iron or steel. The mixer-separator is completed with a power control panel PML1230B containing thermal protection of the electric motor.

Heat plant UT90SM is designed to extract humic substances (potassium humate or sodium humate) from humic raw materials by complex moisture-thermal cavitation hydrodynamic treatment of a mixture of water, raw materials and alkali. The power of the installation is 90 kW, the working volume is 1 m<sup>3</sup>. Applied materials: working tank, pressure and suction pipes, cavitator - stainless steel, impeller and pump volute - cast iron. The plant is completed with a power control panel UU-7T-90-K, containing microprocessor-based devices for temperature control in the plant and protection of the electric motor.

The unit for receiving and mixing UP-1000 is designed to receive the finished humate from the UT90SM plant and to mix it cavitation with additional components. The power of the receiving and mixing unit is 2.2 kW, the working volume is 1 m<sup>3</sup>. Applied materials: working tank, pressure and suction pipes, cavitator - stainless steel, impeller and pump volute - cast iron. The receiving and mixing unit is completed with a power control panel PML1230B, which contains thermal protection of the electric motor.

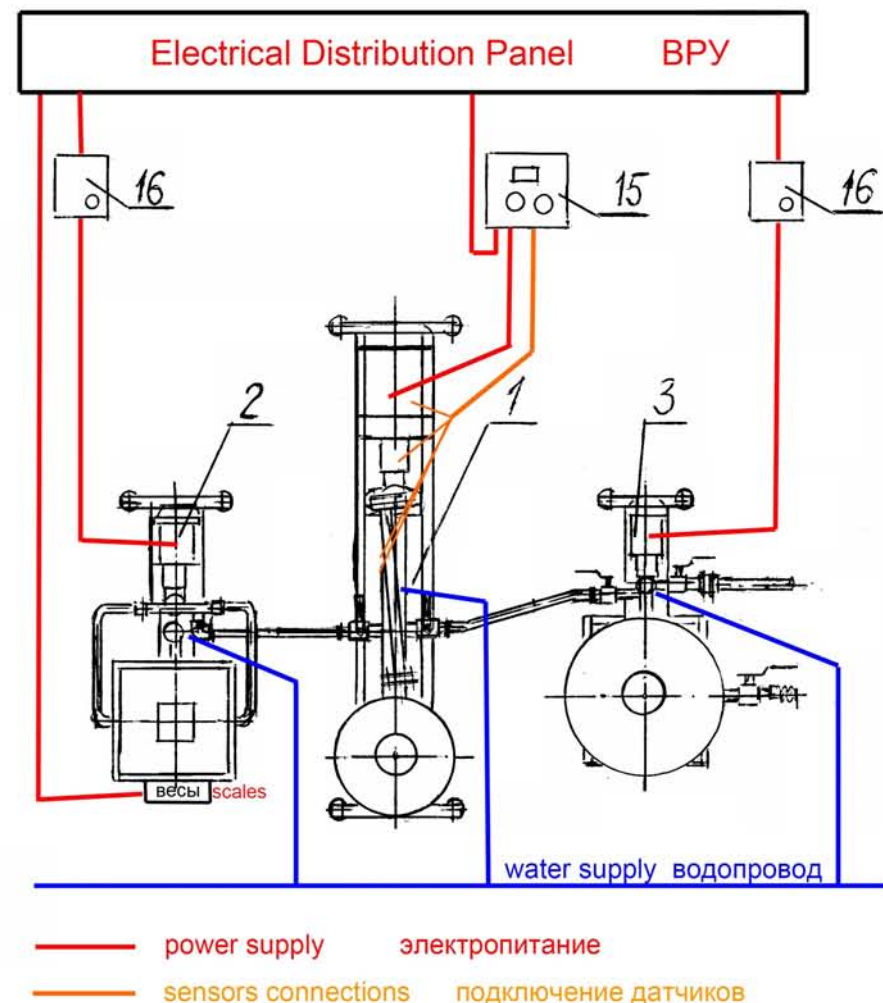
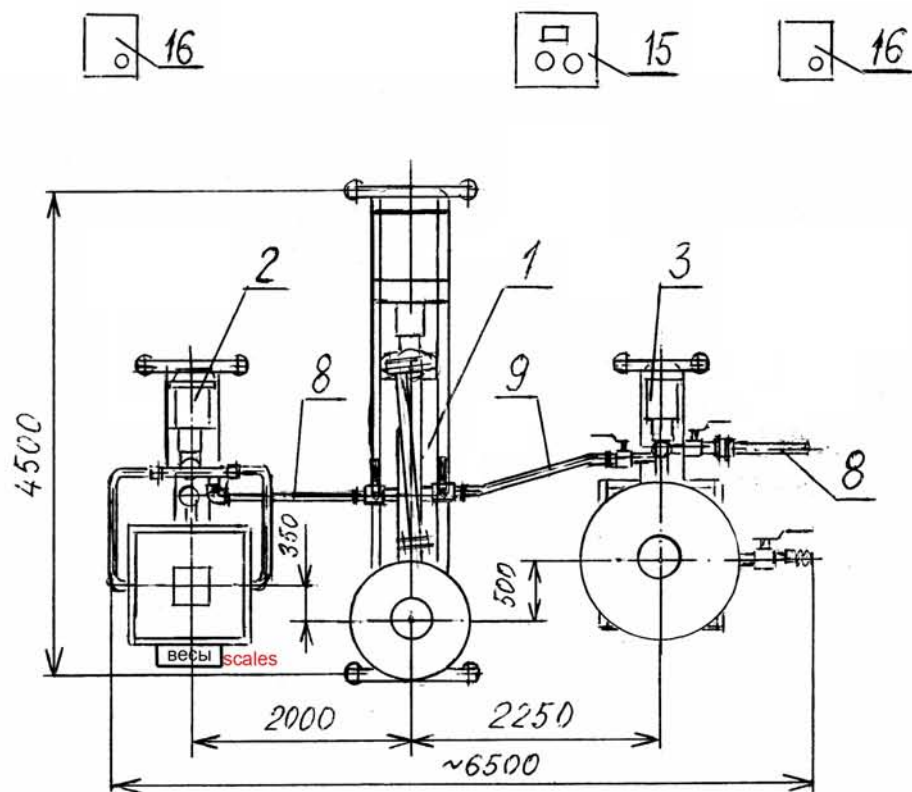
Heat plant UT90-1000  
(technological line for the extraction of humic substances)



**Fig.1.** Basic hydraulic diagram of the plant for mixing, preliminary separation, moisture-thermal cavitation hydrodynamic treatment of an aqueous mixture of humic raw materials, receiving ready-made humate and cavitation mixing it with microelements

- 1- Heat plant UT90SM: 1.1 – electric pump unit SM200-150-400 (N=90 kW);  
1.2 – vortex cavitator; 1.3 – heat-insulated tank, V=1000 L.
- 2- Mixer-separator UT-S1000: 2.1- electric pump 1K65-50-160-S or AH65-50-125-A-S-U2 (N=4 kW); 2.2 – vortex cavitator;  
2.3 – tank-hydrocyclone, V=1000 L; 2.4 – peat dispenser hopper; 2.5 - scales.
- 3- Unit for receiving and mixing the finished humate with microelements:  
3.1 - electric pump K50-32-125 (N=2,2 kW); 3.2 – vortex cavitator; 3.3 – cylindrical tank, V=1000 L.
- 4- Loader (supplied by the Buyer).

Fig.2. Heat plant UT90-1000. Placement and connection of equipment.



1. Heat plant UT90SM
  2. Mixer-separator UT-S1000
  3. Unit for receiving and mixing the finished humate with microelements
  8. Flexible hose PAR or VG; 9. Flexible hose KShh
  15. Control unit UU-7T-90-K for UT90SM heat plant; 16. Control devices PML1230B mixer-separator and receiving and mixing unit
- Electrical Distribution Panel - lead-in distributor of the humic substances production shop

# **HEAT PLANT UT90-1000**

## **Technological line for the extraction of humic substances from peat, sapropel, vermicompost, brown coal (leonardite)**

### **1. . TECHNICAL CHARACTERISTICS OF THE LINE**

- 1.1. Installed electric power of equipment, kW – 96,2, included:
  - electric pump unit SM200-150-400/4 of heat plant UT90SM – 90;
  - electric pump unit 1K65-50-160-S\* or AH65-50-125-A-S-U2\* of the UT-C1000 mixer-separator – 4;
  - electric pump unit K50-32-125 of the receiving and mixing unit UT-P1000– 2,2.
- 1.2. The working volume of the cavitation unit (heat plant UT90SM), m<sup>3</sup> – 1,0.
- 1.3. The total volume of the cavitation unit (heat plant UT90SM), m<sup>3</sup> – 1,147\*
- 1.4. The working volume of the UT-S1000 mixer-separator, m<sup>3</sup> – 1,0.
- 1.5. The total volume of the UT-S1000 mixer-separator, m<sup>3</sup> – 1,017\*.
- 1.6. The working volume of the receiving and mixing unit UT-P1000, m<sup>3</sup> – 1,0
- 1.7. The total volume of the receiving and mixing unit UT-P1000, m<sup>3</sup> – 1,263\*
- 1.8. Average productivity for the processed mixture (at  $t_{\text{init}} = 15\text{ }^{\circ}\text{C}$ ,  $t_{\text{final}} = 70\text{ }^{\circ}\text{C}$ )\*\* , m<sup>3</sup>/h – 1,0\*\*\*.
- 1.9. Electricity consumption for one working cycle (at  $t_{\text{init}} = 15\text{ }^{\circ}\text{C}$ ,  $t_{\text{final}} = 70\text{ }^{\circ}\text{C}$ )\*\* , no more, kW\*h – 90\*\*\*.
- 1.10. Operating air temperature in the workshop room,  $^{\circ}\text{C}$  – 10 - 30.
- 1.11. Estimated schedule of the main technological processes, min:
  - supply and dosing of peat – 5\*\*\*;
  - mixing peat with water and separating impurities in the mixer-separator – 10\*\*\*;
  - reloading of the peat-water mixture from the mixer-separator into the working tank of the cavitation unit – 5\*\*\*;
  - cavitation treatment of peat mixture (at  $t_{\text{init}} = 15\text{ }^{\circ}\text{C}$ ,  $t_{\text{final}} = 70\text{ }^{\circ}\text{C}$ )\*\* - 50\*\*\*;
  - reloading of humate from the working tank of the cavitation unit into the tank of the receiving and mixing unit – 5\*\*\*.
- 1.12. Allowable processing temperature of the mixture,  $^{\circ}\text{C}$ , no more – 90
- 1.13. Permissible moisture content of the mixture, %, not less – 80\*\*\*
- 1.14. Recommended moisture content of the mixture, % - 85...90\*\*\*

Notes:

\* to be specified upon production of equipment,

\*\*  $t_{\text{init}}$  is the temperature of the mixture at the beginning of the treatment,  $t_{\text{final}}$  is the temperature of the mixture at the end of the treatment. If, according to the technological process, other temperatures for processing the mixture are required to achieve the quality parameters of the product, then the average productivity, energy consumption per working cycle, the schedule of technological processes may be different.

\*\*\* Depends on the properties of raw materials, the initial and final temperatures of processing the mixture, the product produced.

- 1.15. Overall dimensions of the platform for placing the line, mm, not less\*:
- length – 6500
  - width – 4500
  - height – 4000
- 1.16. Weight, kg, no more\* – 2800.
- 1.17. Overall dimensions and weight of line components\*
- 1.17.1. Heat plant UT90SM:
- length, mm, no more – 4515
  - width, mm, no more – 1200
  - height, mm, no more – 2570
  - weight, kg, no more - 1500
- 1.17.2. Mixer-separator UT-S1000
- length, mm, no more – 2300
  - width, mm, no more – 1350
  - height, mm, no more – 2950
  - weight, kg, no more - 700
- 1.17.3. Receiving and mixing unit UT-P1000
- length, mm, no more – 2510
  - width, mm, no more – 1355
  - height, mm, no more – 1500
  - weight, kg, no more – 600

Notes:

\* to be specified upon production of equipment

## **2. DESCRIPTION OF THE LINE (HEAT PLANT UT90-1000)**

The main technological solution in the line is a complex moisture-thermal cavitation hydrodynamic treatment of a mixture of water, initial humic raw materials (for example, peat, sapropel, leonardite) and alkali when the temperature rises to 50-90 ° C. The use of hydrodynamic cavitation in the production of humates can significantly reduce the energy consumption of the process in comparison with traditional methods of obtaining plant growth regulators and increase the yield of humic acids.

The line consists of (see Fig. 1, Fig. 2) heat plant UT90SM 1, in which the main moisture-thermal cavitation hydrodynamic treatment of the peat mixture in an aqueous-alkaline medium is carried out, a mixer-separator UT-S1000 2, in which peat is weighed, mixing peat with water, preliminary cavitation treatment (grinding) of the mixture and separation of abrasive particles (sand) from the peat-water mixture, supply of the peat-water mixture to the UT90SM unit, the unit for receiving and mixing UT-P1000 3 receiving the finished humate from the UT90SM unit and its cavitation mixing with additional components, peat loader 4 (loader supplied by the Buyer).

Cold water is supplied to the working tanks of the technological line and the hydrodynamic cavitation unit from the local water supply, which must provide the required water flow with a pressure of at least 0.2 MPa (2.0 Bar).

### 3. DESCRIPTION

#### TECHNOLOGICAL PROCESS OF MAKING HUMATE

**from humic raw materials (for example, peat, leonardite, sapropel)..**

Peat \* with a moisture content of 50 - 60% to remove large inclusions and, if necessary, sift on a sieve with a mesh size of 5 - 7 mm to remove pieces of wood and other debris.

Load the prepared peat with a loader 4 into the hopper of the peat dispenser 2.4 of the mixer-separator 2, measuring the required amount of peat by scales 2.5. Pour the required amount of water into the hydrocyclone tank 2.3 and transfer the peat from the peat metering hopper 2.4 to the hydrocyclone tank 2.3.

Mix peat with water and separate solid inclusions (sand) from the peat. To do this, turn on the electric pump 2.1 of the mixer-separator 2 and drive the peat-water mixture through the mixing circle for 5 minutes *"Tank-hydrocyclone 2.3 - valve K4 - electric pump 2.1 - valve K21 - cavitator 2.2 - tank-hydrocyclone 2.3"*, and then another 5 minutes along the centrifugation circle *"tank-hydrocyclone 2.3 - valve K5 - electric pump 2.1 - valves K2 - tank-hydrocyclone 2.3"*. During the first 5 minutes, the peat mixture will undergo primary cavitation treatment, mix until homogeneous, during the second 5 minutes, it will be divided into solid and liquid phases. The solid phase in the form of insoluble ash inclusions and sand will settle in the lower part of the cone of the tank-hydrocyclone 2.3, and the liquid phase will be at the top.

Transfer the peat-water mixture from the mixer-separator 2 to the cavitation unit 1. To do this, open the valve K3 of the pipeline connecting the mixer-separator 2 with the working heat-insulated tank 1.3 of the cavitation unit 1. Switch on the electric pump 2.1 of the mixer-separator 2 and transfer the prepared mixture from the mixer-separator to cavitation unit UT90SM along the line *"tank-hydrocyclone 2.3 - valve K4 - electric pump 2.1 - valve K3 - valve K25 - valve K8 - working tank 1.3 of the cavitation unit 1"*.

After reloading the peat-water mixture from the mixer into the cavitation unit, fill (pour) through the upper valve of the working tank 1.3 or supply with a dosing pump to the working tank the alkali in the specified amount (the method of loading and dosing, the equipment required for this is selected and supplied by the Buyer), turn on the electric pump 1.1 of the unit 1 and proceed with the moisture-thermal cavitation hydrodynamic treatment of the mixture. During processing, there are several hundred cycles of the mixture passing in a circle *"working tank 1.3 - valve K8 - electric pump 1.1 - cavitator 1.2 - working tank 1.3"*. When the mixture temperature set according to the technical process (50-90 ° C) is reached, the electric pump of the plant will stop. The product is processed in a cavitation unit and is ready for further technical processes.



Unload humate from the cavitation unit 1 into the unit 3 for receiving and finishing the mixture of humate with microelements along the line *"working tank 1.3 - valve K8 - valve K9 - valve K19 - electric pump 3.1 of the intake and mixing unit - valve K13 - cavitator 3.2 - tank 3.3 of the intake and mixing unit"*. After unloading the humate, microelements are loaded into the tank of the receiving and mixing unit (the method of loading and dosing, the equipment necessary for this is selected and supplied by the Buyer) and cavitation mixing of humate with microelements is performed along the line *"tank 3.3 - valve K11 - electric pump 3.1 of the receiving and mixing unit - valve K13 - cavitator 3.2 - capacity 3.3 of the intake and mixing unit"*. After processing in unit 3 for receiving and mixing, the finished humate is fed to the following technological processes (filtration, centrifugation, filling, storage).

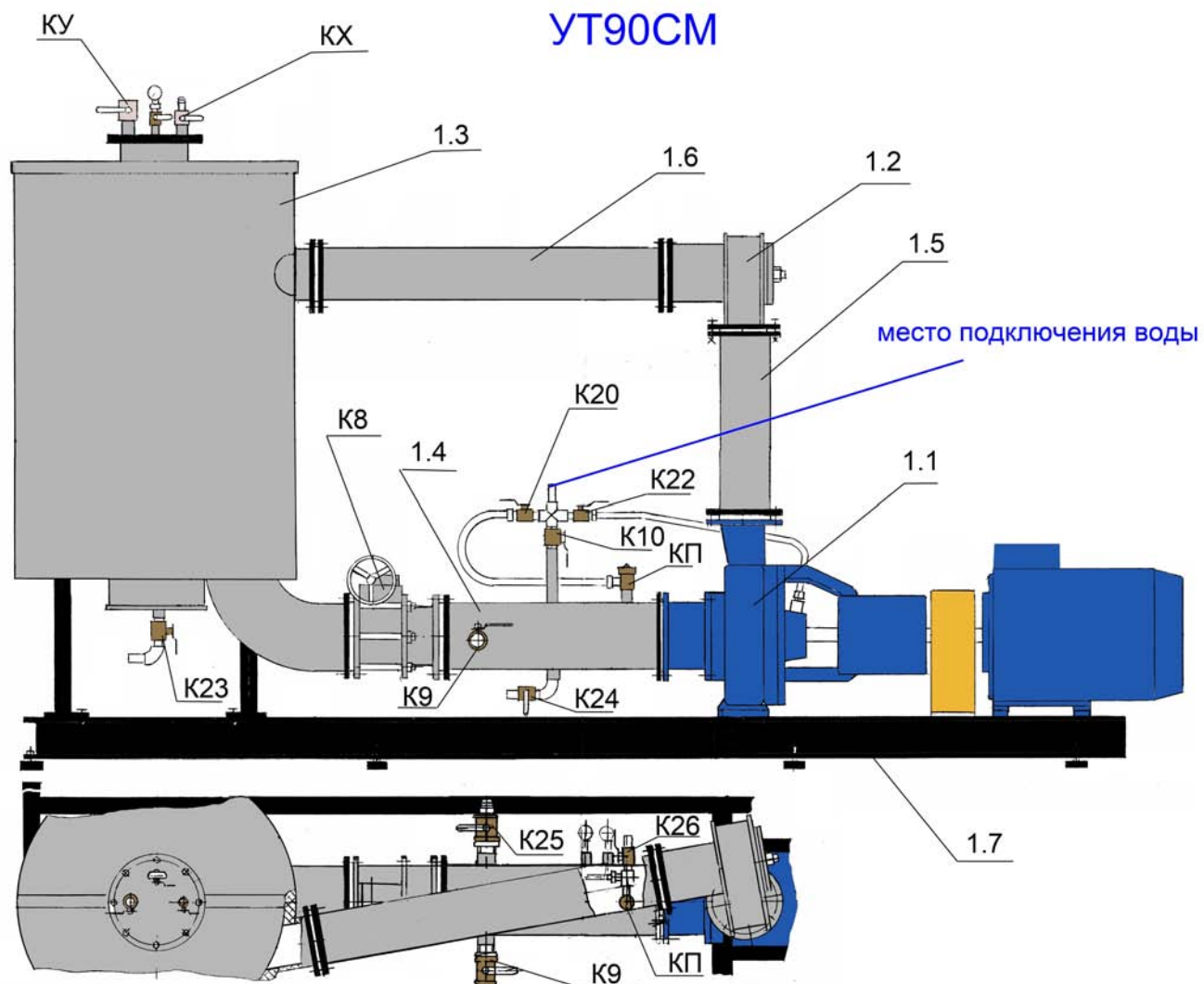
In the process of operation of the cavitation unit 1, the next portion of peat is prepared and loaded into the mixer-separator 2, the peat is mixed with water and separated.

Further, the process of preparing humates is repeated.

An internal sewerage system (ladders, pipelines, etc.) should be organized in the room, which allows efficiently (in accordance with sanitary standards) to drain wastewater and sedimentary material into the treatment zone and then into the external sewerage system. The room must be equipped with ventilation in accordance with sanitary standards. Appropriate safety precautions must be observed when working with chemicals. For normal operation of the technological line in the off-season and winter time in the production area, a positive air temperature must be maintained at least +5 ° C.

\* the operating procedure is the same for vermicompost, brown coal, leonardite and sapropel





# УТ-C1000

