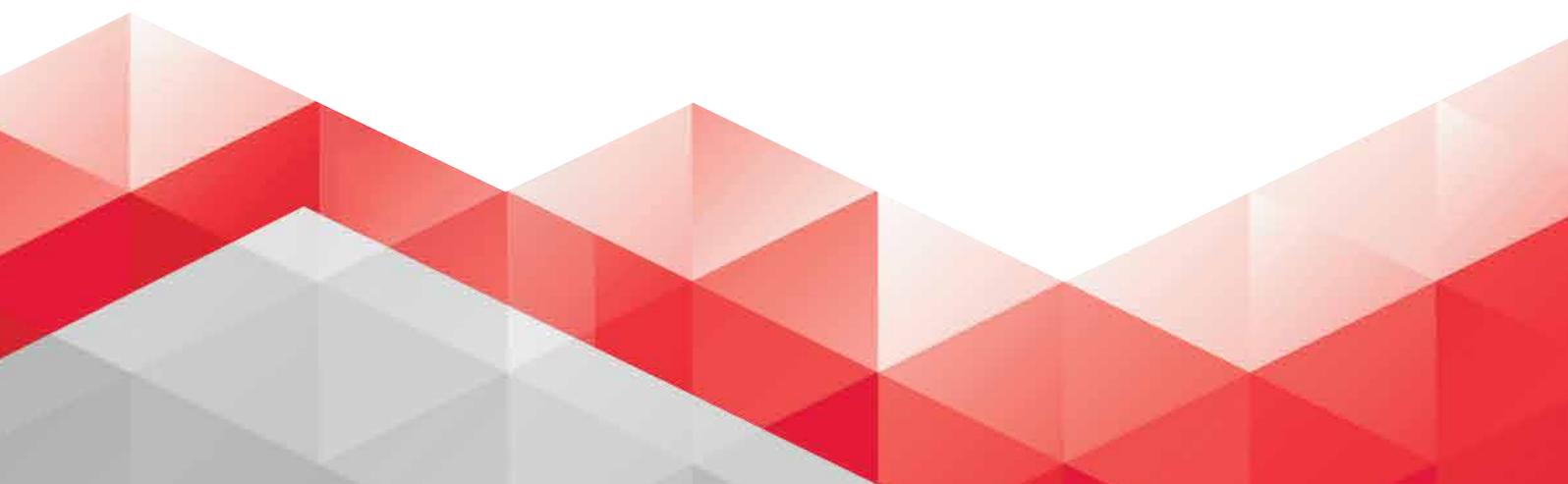




# CATALOG



**PROCESS EQUIPMENT  
FOR OIL AND GAS INDUSTRY**



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\* Specifications has been approved by RMRS. It is possible to manufacture in the marine version for PNK/PBU/SME in accordance with the standards and technical requirements of the customer.

## HMS GROUP AFFILIATE COMPANIES

### PUMPS & SYSTEMS

**Apollo Goessnitz GmbH**, Goessnitz, Germany  
Manufacturing pumps and systems for oil, gas and condensate upstream (including offshore), midstream, and downstream processes as well as thermal power applications

**Nasosenergomash**, Sumy, Ukraine  
Manufacturing pumps for oil & gas, nuclear and thermal energy, water & utilities

**Bobruisk Machine Building Plant**, Bobruisk, Belarus  
Manufacturing pumps for oil & gas processing, petroleum chemistry, mining industry, metallurgy and other industries

**Promburvod**, Minsk, Belarus  
Manufacturing pumps for water & utilities and agriculture

**HMS Livgidromash**, Livny, Russia  
Manufacturing a wide range of pumps for various industries

**Livnynasos**, Livny, Russia  
Manufacturing borehole submersible centrifugal pumps for water & utilities

**Dimitrovgradhimmash**, Dimitrovgrad, Russia  
Manufacturing pumps, storage tanks, pressure vessels, separators and heat exchangers

**Nizhnevertovskremervice**, Nizhnevertovsk, Russia  
Centrifugal pumps manufacturing as well as repair, retrofit and service of pumping and oilfield equipment

**VNIIAEN**, Sumy, Ukraine  
R & D and design engineering works on pumping equipment for nuclear and thermal power plants

### COMPRESSORS & SYSTEMS

**Kazancompressormash**, Kazan, Russia  
Manufacturing compressors, gas compression systems and complete compressor stations for various industry applications

**NIIturbokompressor**, Kazan, Russia  
The leading in Russia and CIS R & D institute of compressor equipment design engineering

### OIL & GAS EQUIPMENT AND PROJECTS

**HMS Neftemash**, Tyumen, Russia  
Manufacturing a wide range of skid-mounted and modular process equipment for oil & gas

**Sibneftemash**, Tyumen, Russia  
Manufacturing stationary and mobile cement storages; well workover equipment, hydraulic fracturing equipment; packers and anchors; tanks and vessels

**Sibnefteavtomatika**, Tyumen, Russia  
Flow rate meters engineering and manufacturing

**Giprotyumenneftegaz**, Tyumen, Russia  
Design engineering of oil, gas and condensate field facilities integrated development projects

**Institute Rostovsky Vodokanalproekt**, Rostov-on-Don, Russia  
Design engineering of water supply & sewage disposal facilities as well as hydraulic engineering structures

### CONSTRUCTION

**Tomskgazstroy**, Tomsk, Russia  
Construction and retrofit of piping, oil and gas treatment and transportation facilities; oil & gas fields development structures



## KEY FACTS AND FIGURES

- HMS Group foundation – 1993
- one of the leading manufacturers of pumps, compressors and oil & gas equipment in Russia and CIS
- extensive experience in the integrated projects for oil & gas and water & utilities
- manufacturing facilities in Russia, Belarus, Ukraine and Germany
- 14 500 employees

## MAIN BUSINESS ACTIVITIES

### PUMPS ENGINEERING, MANUFACTURING AND SERVICE

- pumps (including API compliant) and pumping systems for oil & gas industry
- pumps for thermal & nuclear energy
- pumps for water supply and sewage disposal
- pumps for steel, mining and other industries

### COMPRESSORS ENGINEERING, MANUFACTURING AND SERVICE

- compressors (including API compliant)
- gas compression systems
- refrigerating machines
- complete compressor stations

### OIL & GAS EQUIPMENT ENGINEERING, MANUFACTURING AND SERVICE

- skid-mounted and modular equipment for oil & gas
- oilfield equipment for production stimulation, recovery increase, well works, hydraulic fracturing
- flow meters and systems for oil, gas and water
- tanks & pressure vessels, separators, heat exchangers
- oil & gas equipment repair and maintenance

### EPC & TURNKEY PROJECTS

- integrated project facilities engineering for oil & gas and water & utilities
- procurement of process equipment & systems, installation and commissioning supervision
- complex projects management

## CUSTOMERS OF HMS GROUP – LEADING COMPANIES IN VARIOUS INDUSTRIES

Gazprom, Gazprom Neft, Rosneft, Transneft, LUKOIL, NOVATEK, Surgutneftegas, SIBUR, E4 Group, Globalstroy Engineering, Sroytransgaz, INTER RAO UES, Power Machines, Fortum, Atomstroyexport, and others

## HMS Neftemash JSC

**HMS Neftemash** Joint Stock Company is one of the leading manufacturers in Russia and the CIS countries for the production of process equipment in block-modular design for the oil and gas industry. The enterprise was founded in 1965. Since 2005 the enterprise is a part of HMS Group machine-building holding.

The main business area is the production of equipment for technological processes of upstream production, transport and processing of oil, petroleum products, gas, and gas condensate:

- Pump stations for various purposes
- Equipment for formation pressure maintenance
- Modular units for gas treatment and transport (gaseous media)
- Equipment for oil and water treatment
- Measuring equipment (separating and non-separating)
- Metering systems for various media
- Heat exchanging equipment
- Firefighting station equipment
- Ancillary buildings and facilities

HMS Neftemash JSC has successful experience in the implementation of projects for the complete supply of process equipment to oil and gas facilities.

### Advantages:

**S<sup>2</sup>** own production area of 50 thousand m<sup>2</sup>, including mechanical and assembly workshops, shot-blasting and painting booths, test laboratory, administrative and auxiliary premises, and warehouse center;

 modern park of production equipment represented by CNC machines and machining centers from leading manufacturers in Germany, Italy, Sweden, Turkey, USA, Korea and China;

 1500 employees, of which more than 100 are specialists in design of technological and infrastructure facilities for oil and gas production and more than 20 are specialists involved in the development and implementation of modern technologies in the field of oil and gas equipment;

**ISO** integrated management system certified for compliance with the following standards: ISO 9001, ISO 14001, OHSAS 18001, GOST ISO/IEK 170025, and STO Gazprom 9001;

 certificates of the Russian Maritime Register of Shipping for manufacture of the equipment used in construction of offshore fields;

**!** Unique multi-phase test stand for multi-phase flow testing, intended for testing, calibration various types of flow meters and installations for measuring oil and gas flow rates, as well as for solving a wide range of research and metrological tasks.



# PUMPING STATIONS

## PURPOSE

Pumping stations (hereinafter PMs) are designed for pumping oil and liquids having similar viscosity and chemical activity. Depending on the model of pumping unit, the station can be made in several versions.

The station consists of pumping units that mounted on site in the form of a single building.

Each pump unit has the following equipment installed:

- pumping units;
- receiving and pressure manifolds with stop valves;
- piping for spillage drain;
- instrument racks;
- water or electric Warm up system;
- block lighting and electrical equipment;
- foam fire extinguishing system;
- instrumentation and control devices;
- lifting mechanisms (hoists).



## PRINCIPLE OF OPERATION

Waste water or oil enter the pumps through the inlet manifold valve and the filter. After passing the pumping units, the pressurized fluid enters the pressure pipeline through a discharge manifold, check valves, and gate valves. Leaks from seals of pumping units by gravity flow into a drainage tank. When dismounting, the rollout of pumping units onto the cargo platform is carried out by means of a winch, as well as rigging and lifting devices. The station ventilation is hybrid: forced ventilation is organized by using a fan installed in the pumping unit, free ventilation is organized by using a baffle with valve and via doors. Gas pollution in a room is monitored by gas sensors.

The control and automation system provides the following:

- local manual control of pumps, fan, electric heaters, and lighting;
- local and remote control of pressure in discharge and inlet piping;
- remote control of temperature for bearings and pump seals, condition of filters, leakage of glands and balancing device, gas pollution in the room, and fire hazard.

## SPECIFICATIONS

Parameter	Value					
	NPS1 (V/N)	NPS2 (V/N)	NPS3 (V/N)	NPS4 (V/N)	NPS5 (V/N)	NPS (M)
Station performance, m <sup>3</sup> /hour	1...240	105...420	180...720	300...1200	1200...4800	10...640
Rated discharge head, m	44...330	98...441	85...383	120...540	160...720	200...250
Number of main pumps, pcs	2...5*					
Pump type	CNS (N)					A5 2VV
Motor type	asynchronous					
Explosion class according to PUE	V-1a					
Fire resistance of the building	I ... IV					
Service life, not less, years	30					
Operating mode	Automatic, without permanent presence of staff					
Room Warm up	Water, electric or hybrid					
Room ventilation	Natural exhaust from the upper zone, and supply-extract					

\* Number of pumps is determined by the needs of the customer.

V – process, circulating, river, produced, Cenomanian and waste waters, and foaming agent solution

N – oil and petroleum products, oil condensate and wastewater with oil

M – multiphase

# PUMPING STATIONS

PARAMETERS OF PUMPED MEDIA			
Parameter	Value		
Medium	N, M	V	
Explosive category according to GOST R 30852.11	IIA	fire and explosion proof, non toxic	
Explosive group according to GOST R 30852.5	T2, T3		
Density, kg/m <sup>3</sup>	700...1050		
Kinematic viscosity, m <sup>2</sup> /s, max	1.5x10 <sup>-4</sup>		
Media composition	Gas (volumetric), %, max	<sup>1)3</sup> ( <sup>4)90</sup> )	
	Paraffin, %, max	20	
	Hydrogen sulfide, %, max	<sup>1)none</sup> <sup>5)2</sup>	
	Mechanical impurities in size, mm, max	0,2	0,1
	Water cut, %, max	90	
Temperature of the media, °C	<sup>2)1...45</sup>	<sup>3)1...45</sup>	

1) when using CNSn pumps

2) maximum allowable temperature of pumped medium no more than +60 °C in case of forced cooling of bearings

3) maximum allowable temperature of pumped medium, no more than +105 °C in case of forced cooling of bearings

4) when use of multiphase pumps

5) hydrogen sulfide content in gas for multiphase pumps

## MISCELLANEOUS

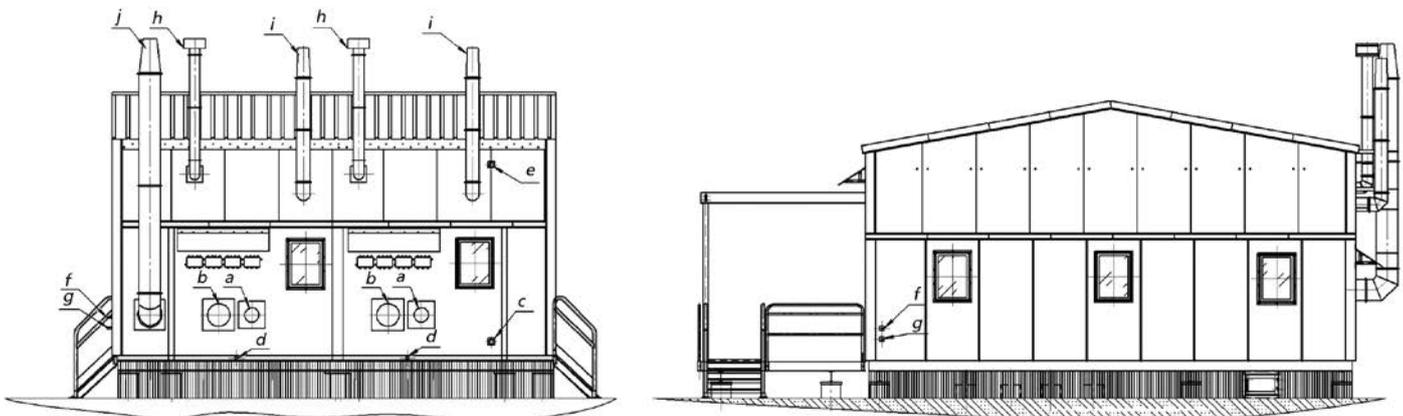
We provide the following at customer request:

- providing with pumps CNS, NM, type of D, K, made by manufacturing companies Flowserve, Sulzer and others, subject to ensuring the required technical characteristics and compliance with safety requirements;
- production task option:
  - modular,
  - frame-panel;
- building Warm up:
  - water,
  - electric,
  - hybrid.

The pumping station won the Diploma of the “100 best products of Russia – 2013” competition.



## PROCESS LAYOUT



a - Product discharge  
b - Product inlet  
c - Drainage  
d - Base drainage  
e - Foaming agent inlet

f - Coolant inlet  
g - Coolant outlet  
h - Deflector (natural ventilation 1 time)  
i - Main fan (removal of heat excess)  
j - Mechanical ventilation (8 times)

## MODULAR MULTIPHASE PUMPING STATIONS

### PURPOSE

The modular pumping multiphase station (hereinafter BMNS) is designed for pumping gas-liquid mixture of production wells to the existing oil treatment units without preliminary gas separation. It consists of a process module and a control module.

### ITEMS SUPPLIED

Inside the process module (PM) there are following items mounted:

- multiphase pumping units;
- process piping with valves and fittings, filters and primary instrument and control devices;
- exhaust fan;
- electric heaters;
- light fixtures;
- lifting mechanisms (hoists).;
- gas control sensor;
- fire alarm sensors;
- foam generators;
- alarm of unauthorized entry in PM.

The process module is a product made of several block-boxes.

Three-layer metal panels with insulation are used as wall and roof barriers of the blocks.

CM room is divided into two sections (for power and weak current equipment).

Inside the power section of CM there are following items mounted:

- motor control cabinet;
- frequency converter;
- low voltage complete set device;
- board with terminal box to power the frequency converter (at the top of the power section);
- board with terminal box to power the pump motors (at the bottom of the power section).

Inside the weak current section of the CM there are following items mounted:

- sensor signal panel;
- control cabinet of pumping units;
- exhaust fan.

The station is equipped with control and automation means designed to control and monitor the process equipment, Warm up, and ventilation. The control and automation system provides the following:

- local and automatic monitoring of the equipment process parameters (pressure in piping, temperature of bearings of pumping units, temperature and gas pollution in rooms);
- automatic trip of pumps upon reaching emergency values of the process parameters, maintaining the temperature in the sections, turning ventilation on, power cut all energy consumers, in case of fire and during high gas pollution;
- automatic activation of the fire extinguishing system from the fire alarm sensors;
- activation of the sound and light alarm when exceeding the permissible level of gas in the PM room and when the fire extinguishing system is triggered;
- protection of all power consumers against short circuits and overloads.



### MISCELLANEOUS

We provide the following at customer request:

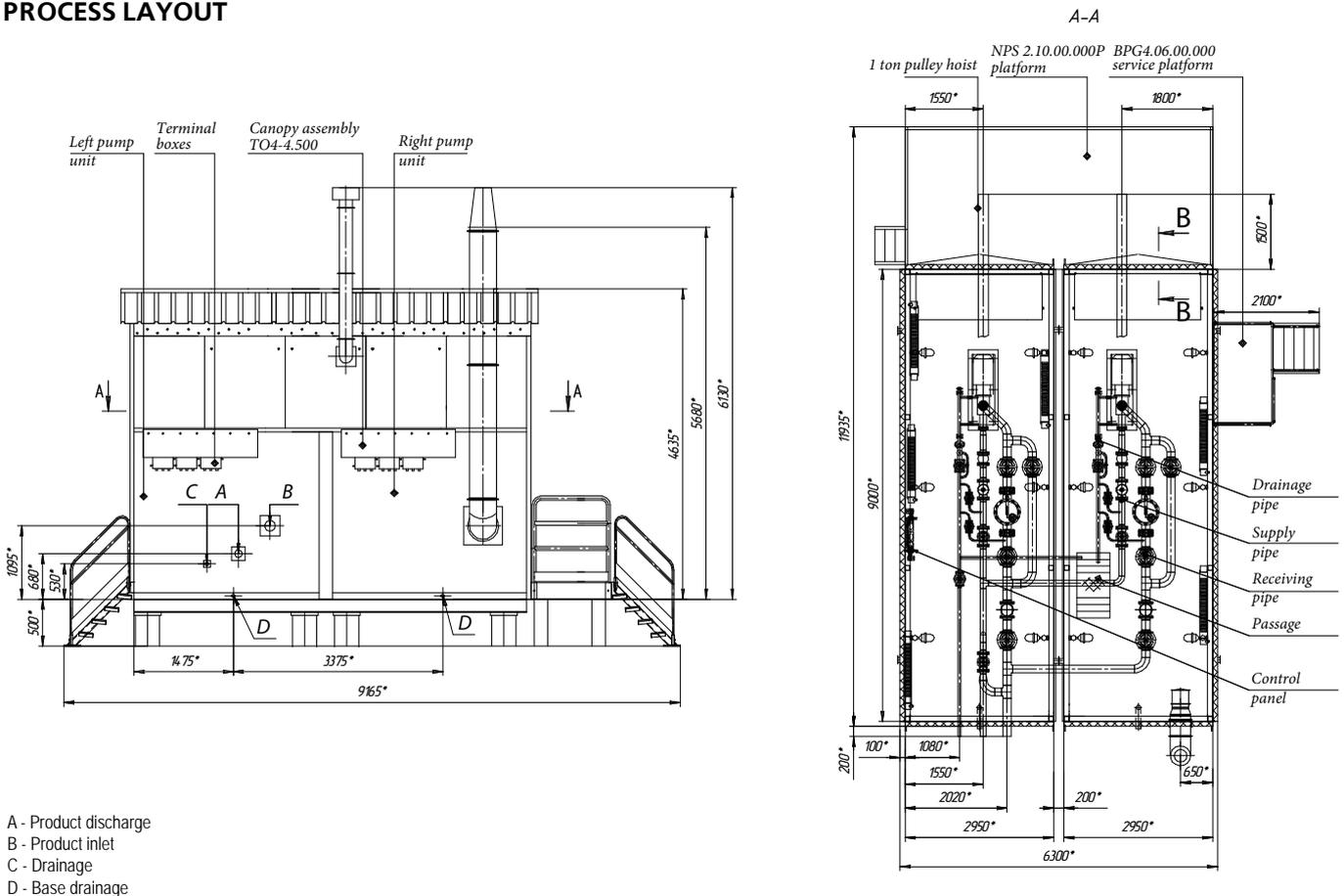
- complete set with multiphase pumps of the following manufacturers: Livgidromash, Netzsch, Borneman, Leistriz.
- building Warm up:
- water;
- electric;
- hybrid.

# MODULAR MULTIPHASE PUMPING STATIONS

SPECIFICATIONS			
Parameter	Value		
Pump type	A52V 160/25-125/20	A52V 160/25-125/20	A52V 160/25-125/20
Motor power	In coordination with a customer, any complete set is possible		
Number of pumps *	2	3	4
- duty	1	2	3
- standby	1		
Station performance with water, m <sup>3</sup> /hour	150	250	375
Station performance with lube oil at viscosity of 0.75x10 <sup>-4</sup> m <sup>3</sup> /s, m <sup>3</sup> /hour	160	320	480
Pressure drop with water, MPa	2.0		
Pressure in case of lube oil at viscosity of 0.75x10 <sup>-4</sup> m <sup>3</sup> /s, MPa	2.5		
Operating medium	Water-gas-oil mixture		
Gas content, %, max	90		
Work media temperature, °C	5 to 80		
Operating mode	24 hour, automatic, without permanent presence of staff		
Room category according to NPB 105-95	A		

\* Number of pumps is set by agreement with a customer.

## PROCESS LAYOUT



# STATIONS FOR HYDRAULIC DRIVE OF SUBMERSIBLE DOWNHOLE PUMPS

## PURPOSE

The pumping station is designed for the hydraulic drive and control of submersible downhole pumps, as well as for the preparation of high-pressure operating fluid from the outlet of production wells in a closed oil and gas collection system.

## ITEMS SUPPLIED

The station consists of two sections:

- process module (PM);
- control module (CM).

PM contains:

- separator;
- power pumps 25 PCR-3-60 (25 PCR-5-60);
- hydrocyclones and sand catchers;
- final purification hydrocyclones for operating fluid;
- circulation pumps of 4CG 50/50-K-11-4-U2 model;
- chemical injection system;
- leak collection and pumping system;
- distribution pipe header;
- process piping;
- instrumentation and automation equipment.



The process module is equipped with an automatic fire extinguishing system using aerosol generators.

CM is a room with installed equipment: switchboard, lighting, Warm up and ventilation.

Lighting is provided with explosion-proof lamps.

PM Warm up is electric type, with use of explosion-proof heaters. Ventilation is provided in a natural way and by fan.

SPECIFICATIONS		
Parameter	Value	
Power pump model	25 PCR-3-60	25 PCR-5-60
Class of explosive zone of the room: process module, control module	V-1 a non-explosive	
Power pump performance, m <sup>3</sup> /hour	5.76	9.58
Pressure of power pumps, MPa	20	
Number of power pumps, pcs		
- duty	2	
- standby	1	
Separator volume, m <sup>3</sup>	12.5	
Performance of the separator for operating fluid, m <sup>3</sup> /hour, max	20	
Pressure in the separator, MPa, max	2.5	
Total rated power, kW, max	146.67	251.67
Parameters of gas-liquid mixture at the inlet of the station:		
- fluid flow, m <sup>3</sup> /day, max	900	
- normalized oil viscosity, cSt, max	40	
- gas factor, Nm <sup>3</sup> /m <sup>3</sup> , max	60	
- temperature, °C	+5 to +50	
- content of solid particles, mg/l, max	1000	
Number of wells connected, pcs	2 to 8	
Station operating mode	permanent, automatic	
Overall dimensions of the process module, mm, max (length x height x width)	12360 x 3980 x 3190	
Overall dimensions of the control module, mm, max (length x height x width)	6360 x 3980 x 3190	

# PUMPING STATIONS ABOVE ARTESIAN WELL (WITH WATER TREATMENT OPTION)



SPECIFICATIONS	
Parameter	Value
Production category	D
Fire resistance	IV
Block box dimensions, mm:	
- length	3580
- width	3110
- height	2640
Base dimensions, mm:	
- length	2990
- width	3140

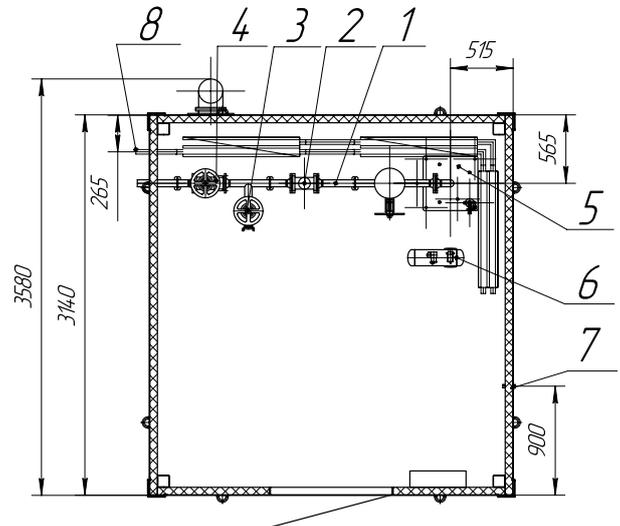
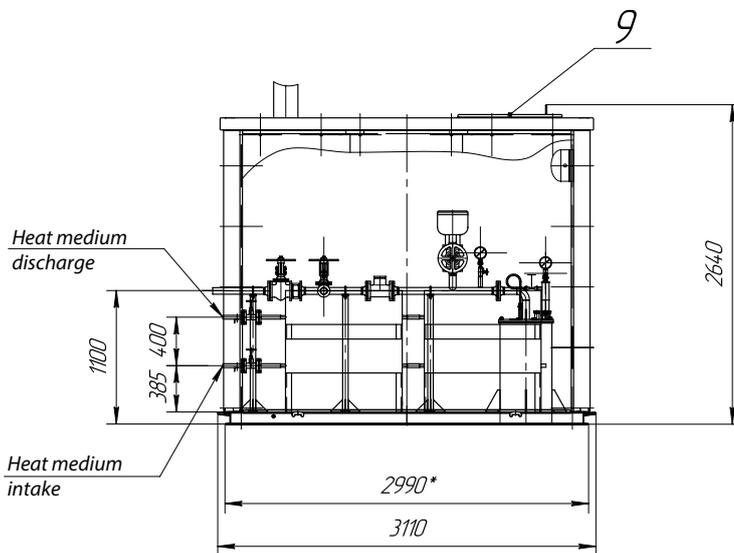
## PURPOSE

The pumping station above an artesian well is designed for pumping water from an artesian well and supplying it to consumers.

## DESIGN

Depending on the model of the pump and pipeline diameter, the station can be made in several versions. The Warm up of the station, by agreement with customer, can be water or electric.

## GENERAL ARRANGEMENT



- 1 - Pipeline
- 2 - Water meter
- 3 - Fire cock
- 4 - Check valve
- 5 - Wellhead
- 6 - Compressor
- 7 - Cable entry
- 8 - Coolant inlet
- 9 - Hatch

## SEWAGE PUMPING STATIONS

### PURPOSE

The sewage pumping station (hereinafter the station) is designed for collection of domestic waste water and pumping the water to domestic waste-water treatment facilities.

### PRINCIPLE OF OPERATION

The principle of operation of the station is periodically filling the tank by draining domestic or industrial effluents (liquids) from process networks (piping) and units during operation and repair of units at oil refineries, petrochemical and gas industries and release the effluent upon reaching a certain level by means of an electric pump unit installed in a block-box, to pump the drainage fluid to regeneration points.



### SPECIFICATIONS

Parameter	Value
Pump	N1V6/5-5/5
Flow, m <sup>3</sup> /hour	5
Discharge head, m	50
Motor	AIM90L4
Power, kW	2.2
Fire resistance of the unit according to SNiP 21-01-97	IV
Room category according to NPB 105-03	D
Reliability category	3
Estimated indoor air temperature, °C	+ 5
Transported medium	Untreated domestic wastewater
Warm up	Water
Station ventilation	Hybrid: 1 – forced, provided by a fan mounted in the box; 2 – natural from the box and tank
Operating mode	Automatic, without permanent presence of staff
Overall dimensions, mm: - box (length x width x height) - receiving tank (length x width x height) - tank (length x width x height)	3500 x 3200 x 3925 2866 x 2172 x 5330 5560 x 1710 x 1815

## SEWAGE PUMPING STATIONS



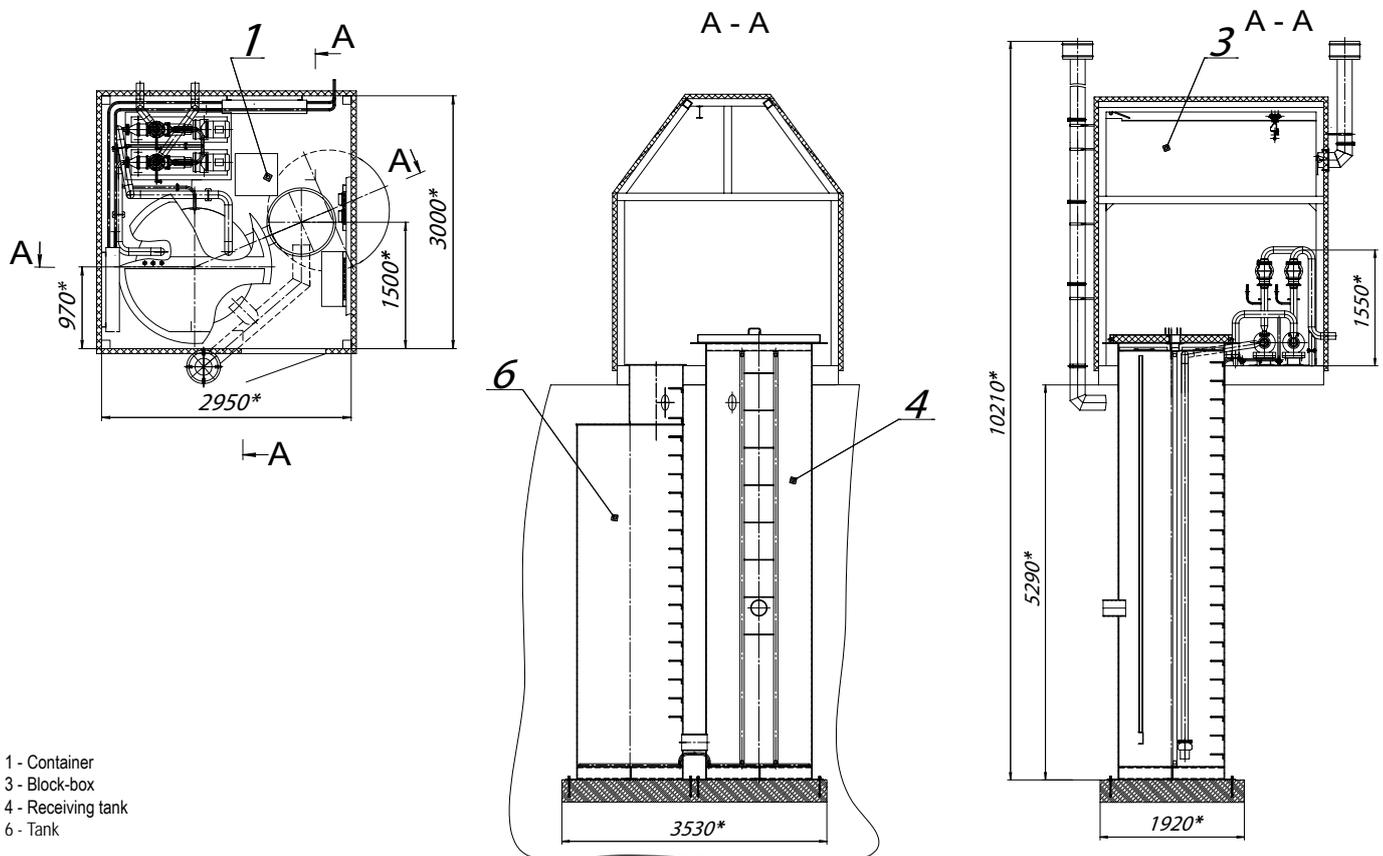
### ITEMS SUPPLIED

The station is a product consisting of a box and two receiving tanks, mounted at the place of operation as a single building according to the installation drawings supplied with the station. The main entrance is a door in the block-box.

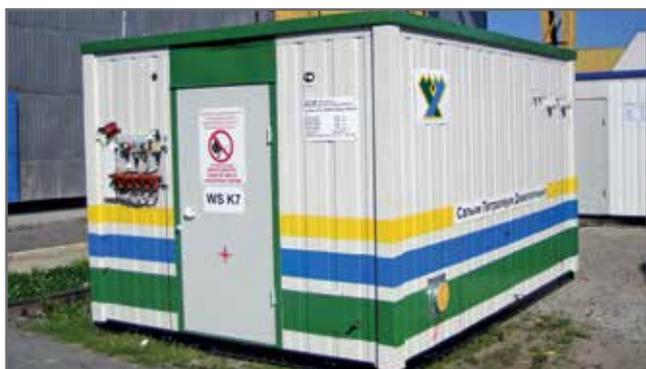
The station is supplied with separate pumping units of transport dimension. Construction of foundations, grounding and lightning protection is carried out in accordance with the specific siting project.

Climatic design of the station: HL1 according to GOST 15150-69.

### PROCESS LAYOUT



## CHEMICAL AND METHANOL DOSING UNITS



### PURPOSE

Chemical dosing unit (hereinafter CDU) is intended for chemical treatment of products of oil and gas wells in the systems for collection, transport and processing of oil and gas. It is used on cluster pads, platforms of booster pumping stations and installations for complex treatment of oil, gas, and water.

### DESIGN

The chemical dosing unit performs the following functions:

- receiving a concentrated chemical agent from a mobile filling tank to the tank using an external pump;
- receiving a concentrated chemical agent from a mobile filling tank to the tank using an own pump;
- mixing a chemical agent in the tank;
- pumping a chemical agent into the tank to adjust the capacity of the dosing pump;
- Warm up a chemical agent in the tank to temperature of +20 to +60 °C;
- dosed feed of a chemical agent in the processed emulsion through a spraying device.

In the control cabinet (with electrical Warm up), there is the starting equipment of all electrical receivers of the unit. The cabinet is located on the outer wall of the unit. If necessary, it is possible to manufacture the control module on a common frame with the technical compartment. Electrical equipment and instrumentation and control devices are used in the explosion-proof design; wires and cables is provided with copper conductors. The level of automation and control ensures the operation of the unit without permanent presence of service personnel.

The control and automation system provides the following:

- a) local manual control of dosing pumps, gear pump, fan, electric heaters, and lighting;
- b) local control of pressure and temperature of a chemical agent;
- c) automatic shutdown of dosing pumps when the chemical agent pressure increases;
- d) automatic control of the temperature of the electric heater installed in the tank;
- e) automatic control of the temperature of the electric Warm up in the control cabinet;
- f) protection of all electrical receivers against short circuits and overloads.

The unit is connected to the raw material product line through a special chemical injection unit (nozzle) supplied as part of the unit.

The units is made in various versions depending on:

- capacity of the dosing pump and its type;
- number of dosing pumps;
- availability and quantity of consumable containers;
- availability of a control cabinet or control module;
- controller availability;
- flow meter availability.

### SPECIFICATIONS

Parameter	Value		
	UDH	UDH (M)	UDH (SUDR)
Dosing pump capacity, l/hour	0.4–6300		0.04–4.0
Dosing pump operating pressure, MPa, max	1 ... 40		1 ... 25
Kinematic viscosity of the dosing medium, cSt, max	800		
Dosing medium temperature, °C	+20 to +60		0 to +70
Supply tank volume, m <sup>3</sup>	1 to 16		0.2 to 1
Electric heaters power of the supply tank, kW	8,0		2.0
Rated power, kW, max	17,0		3,2
Operating mode	Continuous, without permanent presence of staff		
Operating medium	chemicals	methanol	chemicals
Explosive area class (PUE)	V-1a		
Category of the unit room by explosion and fire hazard (NBP 105)	A		
Fire resistance according to SNiP 21.01	III, IV		
Overall dimensions (transport), mm, max (length x width x height)	12360 x 3975 x 3200		3200 x 1400 x 1750

# CHEMICAL AND METHANOL DOSING UNITS

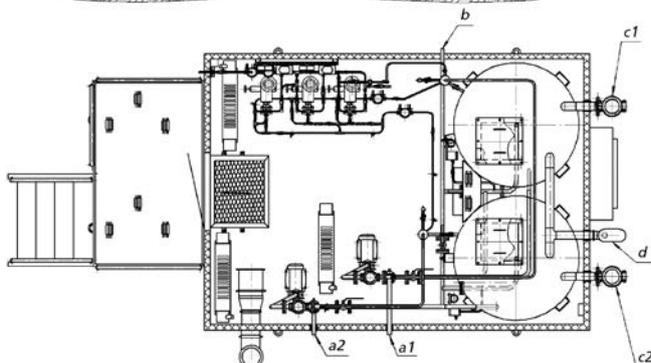
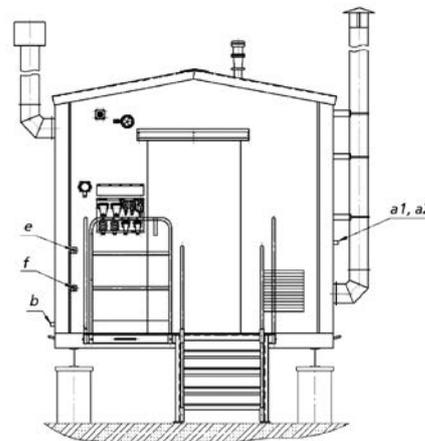
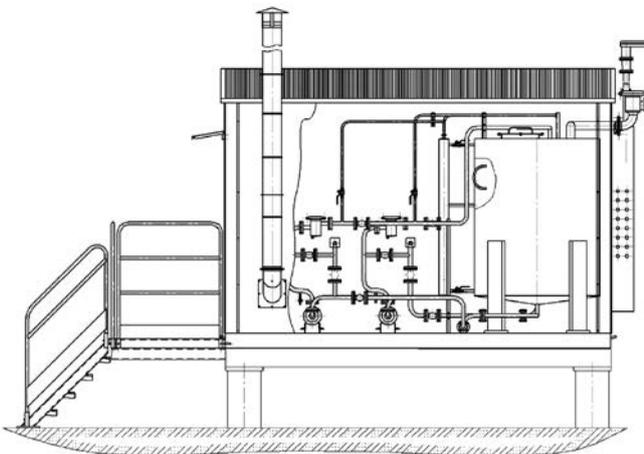
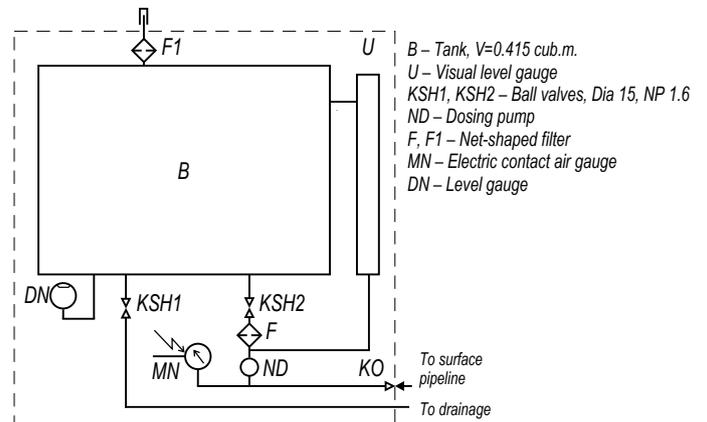


## ADVANTAGES

- filters in the receiving line of each dosing pump;
- filter in the inlet pipeline for pumping into tank ;
- comfortable adjustment of the capacity of the dosing pumps;
- availability of tanks to collect leaks from the dosing pumps;
- in the methanol dosing units there are piping to wash the dosing pumps.

## GENERAL ARRANGEMENT

### Hydraulic circuit



- a1, a2 - Pumping the chemical agent from an external tank and in the external tank
- b - Drainage
- c1, c2 - Filling the chemical agents through the neck
- d - Dispersion of vapor released
- e - Demulsifier outlet
- f - Corrosion inhibitor outlet

# SEWAGE PUMP OUT STATIONS



## PURPOSE

Sewage pumping station (hereinafter the station) provides:

- lifting fluid from an underground tank, well, etc. and its utilization into an oil collection system;
- separation of sand and other solid impurities from liquid;
- emptying of external piping when shutdown of the pump unit.

## PRINCIPLE OF OPERATION

The pumping station principle of operation is based on the transfer of kinetic energy of one stream (operating fluid) to another stream (pumped fluid) by direct mixing. Operating fluid is supplied from the right side of the buffer tank by pumping units to the liquid lifting device (hydraulic elevator) installed in an underground tank. The mixture of operating and pumped liquid from the hydraulic elevator enters the left side of the buffer tank, where partial separation of the liquid from mechanical impurities takes place. The design pressure for lifting liquid from the tank is provided by a pressure regulator due to discharging a portion of liquid into the discharge pipe.

## SPECIFICATIONS

Parameter	Value	
Pump unit type	CNSMA 38-176	CNSAn 60-330
Pump station capacity for pumped out liquid, m <sup>3</sup> /hour, rated	16	40
Fluid pressure at the outlet to the external pipeline, MPa, in range	1.2 to 1.9	2.5 to 3.3
Estimated height of the liquid lift by the hydraulic elevator, m, max:	6	8
Number of pumps, pcs:	2	
- duty	1	
- standby	1	
Pump station operating mode	Periodic, without permanent presence of staff	
Current type	alternating, three phase	
Frequency, Hz	50	
Voltage, V:		
- power circuit	380	
- control circuit	220	
Rated control circuit current, A	6	
Rated power of electrical consumers, kW:	85	230
Room category according to NPB:		
– process module (PM)	A	
– room for control cabinet	D	
Explosive area class for PM according to PUE	V-1a	
Explosive category™ and a group of explosive mixtures for PM according to GOST 12.1.011 -78	IIA-TZ	
Fire resistance degree of the pump station room according to SNiP 2.09.02-85	IV	
Overall dimensions in transport position, mm (length x width x height), max:		
– process module	5320 x 3192 x 3880	6320 x 3220 x 3995
– control cabinet	800 x 800 x 2200	800 x 800 x 2200

## SPECIFICATIONS OF THE MEASURED MEDIUM

Pumped liquid – industrial rainwater runoff, water

- liquid viscosity, cSt, max ..... 15;
- liquid density, rg/m<sup>3</sup>, in range .....950 to 1050;
- liquid temperature, °C, max..... +45.

# SEWAGE PUMP OUT STATIONS

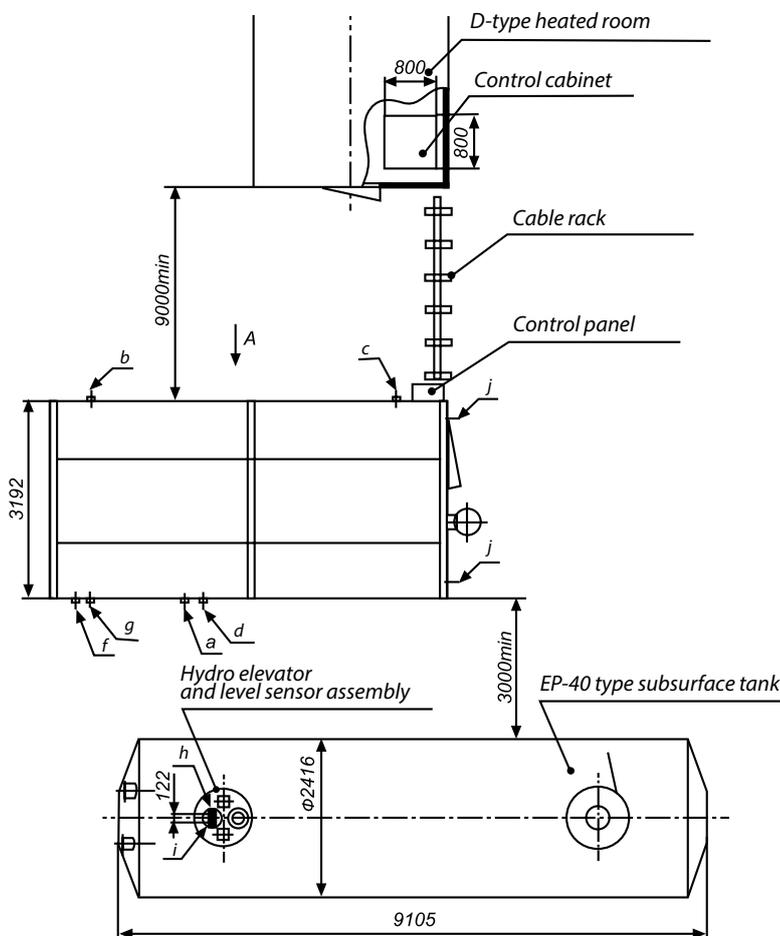
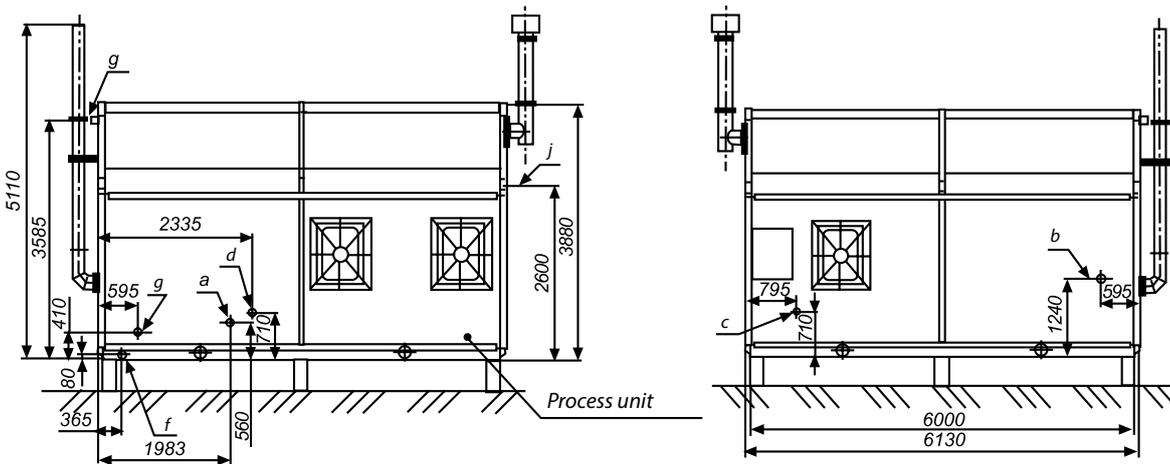
## ITEMS SUPPLIED

Complete set:

- process module;
- hydraulic elevator and level sensors installed in an underground tank;
- control cabinet installed in a separate room.

At the request of the customer, the delivery kit may include a tank of EP type with volume of 40 m<sup>3</sup>. If other sizes are used, it is necessary to clarify the length of the level sensors and the length of the pipe hanger when ordering a pump station.

## GENERAL ARRANGEMENT



- a - liquid inlet from the drainage tank
- b - water inlet to fill the tank and discharge of sludge
- c - liquid outlet for recycling
- d - liquid outlet to hydraulic elevator drive
- e - air vent
- f - leakage outlet to drainage tank
- g - discharge of liquid from the tank into the drainage tank
- h - liquid inlet to hydraulic elevator drive
- i - liquid outlet from the drainage tank
- j - power cable lead-in

# PUMP UNITS FOR CONDENSATE PUMP OUT

## PURPOSE

The condensate pumping unit is designed for pumping condensate from the tank into a pipeline.

## DESIGN

The unit consists of a steel frame, sheathed with three-layer panels with polyurethane foam insulation, and provided with process equipment, Warm up and ventilation systems, electrical equipment and electric lighting, appliances and automation means.

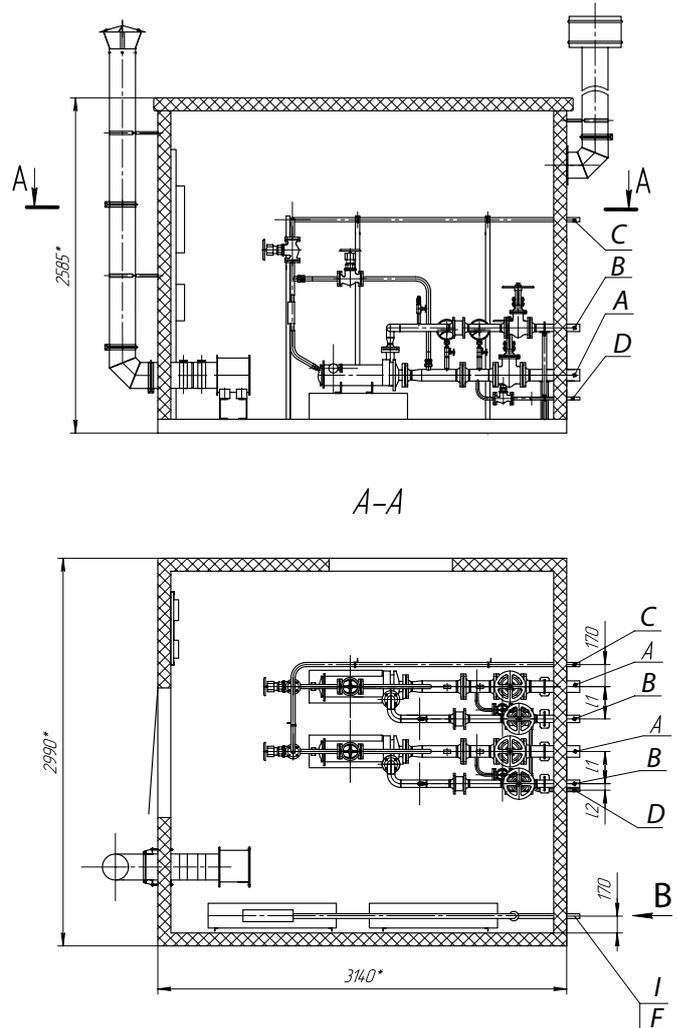
The Warm up is water type.

Ventilation is natural, extraction from the upper zone through the deflector. Mechanical ventilation is provided from the lower zone by an exhaust system.

A detector sensor is installed in the room; the sensor gives a signal of gas pollution in the room above the norm sending it to the control room. Outside the box, an alarm post is installed on the panel, which gives warning sound and light signals about gas pollution above the norm in the room.

Depending on the process equipment placed in it, the module can be manufactured in several versions.

## PROCESS LAYOUT



- A - Condensate inlet
- B - Condensate outlet
- C - Fluid drain
- D - Drainage
- I - Coolant inlet
- F - Coolant outlet

## SPECIFICATIONS

Parameter	Value
Capacity, m <sup>3</sup> /hour	12.5...50
Discharge head, m	50...80
Minimum ambient temperature, °C	- 50
Warm up	Water
Rated power, kW	9.8...20.8
Production category according to SNTP 24-86	A
Explosive area class	V-1a
Fire resistance of the building	IV
Overall dimensions (length x width x height), mm	3240 x 3110 x 2680

## PUMPING STATIONS DREDGER



### PURPOSE

Pumping station dredger (hereinafter the station) with capacity of 140 m<sup>3</sup>/hour designed for use in the systems of pumping and hydraulic fill.

### PRINCIPLE OF OPERATION

The principle of operation of the station is taking water from an opencast through the pipeline installed on a pontoon and delivering water according to its destination. The station can also be used as a pumping station.

### DESIGN

The pumping station is a product consisting of a process module, a control module and a pontoon; all of them is mounted at the place of operation.

### ITEMS SUPPLIED

The process module has the following items installed:

- pumping unit GrUT 1400/40;
- centrifugal cantilever pump K100-65-250-5-U3.1;
- pressure and intake piping with shut-off valves;
- lighting of units and electrical equipment;
- instrumentation and control devices.

The control module has the following items installed:

- RLND releaser (on a mast);
- complete distribution point (KRP-6);
- automated system for commercial accounting of power flow rate (ASCAPC), connected to inlet cell of KRP-6;
- transformer TSZ-100/6/0.4;
- main switchboard (MSB);
- soft start system.

### SPECIFICATIONS

Parameter	Value
- Pumping unit	GrUT 1400/40
- Flow, m <sup>3</sup> /hour	1400
- Discharge head, m H <sub>2</sub> O	40
- Motor	DA304-450H-U1
- Motor power, kW	315
- Motor rotation frequency, rpm	750
Centrifugal cantilever pump	K100-65-250-5-U3.1
- Flow, m <sup>3</sup> /hour	100
- Discharge head, m	80
- Motor	4AM200L2
- Motor power, kW	45
- Motor rotation frequency, rpm	3000
Room category according to NPB 105-03	D
Fire resistance of the building according to SNiP 21-01-03	IV
Transported medium	water
Transport dimensions of the sections, mm (length x width x height):	
- Process Module	7020x3200x3900
- Control Module	6300x3200x3580
- Pontoon	6740x2280x2200
Load capacity, kg, max	300
Ventilation	Supply-extract with natural motion

## MODULAR CLUSTER PAD PUMPING STATIONS

### PURPOSE

Modular cluster pad pumping station (hereinafter MCPPS) is intended for pumping water into productive formations in a system of maintaining reservoir pressure of oil fields.

### ITEMS SUPPLIED

Modular cluster pad pumping stations, taking into account the requirements for accelerated installation times, includes a set of process and electrical block-boxes of maximum prefabrication condition which delivered by rail transport and mounted on a place of field under a single roof.

A version of the unit with optional blocks is possible.

The placement of the MCPPS components at the place of operation, construction of foundations, grounding, and lightning protection are carried out according to the individual requirements of the customer in accordance with the specific siting project developed by the specialized project organization.

### MCPPS consists of the following items:

1. Machinery room: pump units, oil system unit, manifold unit, and drainage (auxiliary) pump unit.
2. Control Module.
3. Power room: thyristor exciter unit, transformer unit, switch-gear unit, and soft start unit.
4. Operator section.
5. Water treatment station.
6. Underground drainage tank.
7. Waste oil tank.
8. Service platforms.
9. Interunit cable connections.

The machinery room of the station may be combined with power units under the same roof or organized as separate units.



### MISCELLANEOUS

The modular cluster pad pumping station won the Diploma of the "100 best products of Russia – 2016" competition.

PARAMETERS OF PUMPED MEDIA	
Parameter	Value
Pumped medium	river, production, or Cenomanian water
Water temperature at the pump inlet, °C	+5 to +60
Density of water, kg/m <sup>3</sup>	1000 to 1180
PH value	5.4 to 7.5
Maximum solid particles concentration, %	0,1
Size of solid particles, mm	0.1 to 0.2
Total mineralization, mg/l	248000

## MODULAR CLUSTER PAD PUMPING STATIONS

MACHINERY ROOM SPECIFICATIONS						
Parameter	Value					
Pump model	CNS-45	CNS-63	CNS-90	CNS-180	CNS-240	CNS-630
Number of pumps	1..8					
Pump capacity, m <sup>3</sup> /hour	45	63	90	180	240	630
Suction pressure, MPa, max	3.1					
Discharge head, m	1900	1100...1900	1100...1900	1050...1900	1050...1900	1700...1900
Motor of the pump unit	STDM, ARM					
Rated power, kW	800	630...800	630...1000	800...1600	1000...1600	4000
Nominal voltage, V	6000					
Current type	alternate					
Rated shaft speed, rpm	3000					

At the request of the customer, the MCPSS can be made in the standard and corrosion-resistant version of CNS pumps, as well as with pumping units of other types.

### CONTROL MODULE (CM)

It serves to control the operation of the station. The module contains cabinets with controllers, a cabinet with secondary devices, power supply sources for analog circuits, an audible alarm device, and an uninterruptible power supply to ensure the efficiency of the MCPSS in case of power failure.

The control module is intended for control and monitoring the process equipment, Warm up, and ventilation. The level of automation and control ensures the operation of the MCPSS without permanent presence of service personnel.

### POWER ROOM

#### Transformer unit (TU)

They are intended to receive, convert voltage and distribute electricity to consumers, control low-voltage motors.

#### Motor soft start unit (SSU)

It serves to ensure smooth, joggles start-up of high-voltage AC motors.

#### Switchgear unit (SGU)

They are intended to receive, convert voltage and distribute electricity to consumers, control high-voltage motors.

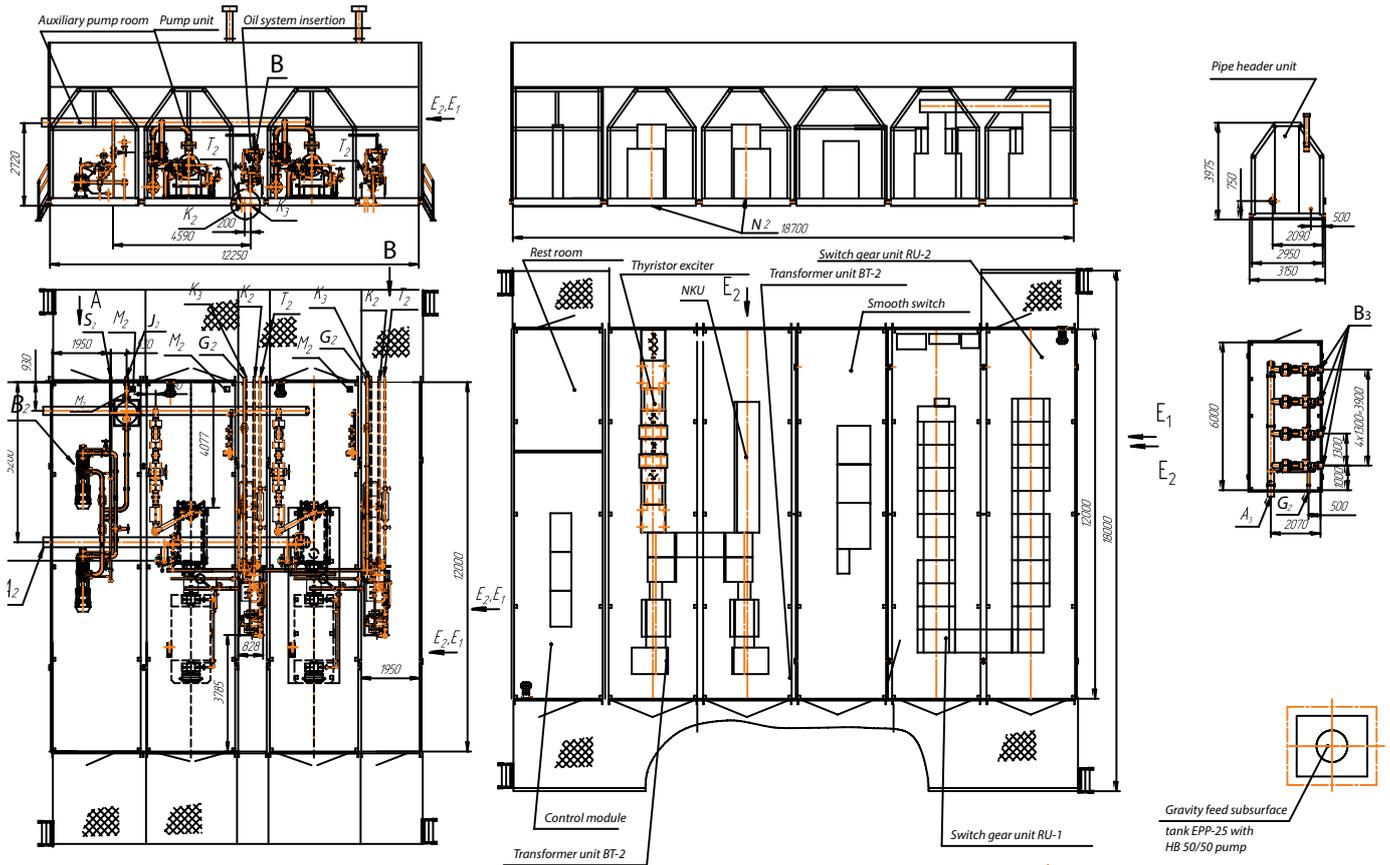
#### Thyristor exciter unit

The unit contains thyristor exciters, matching transformers, and modules of starting resistors.



# MODULAR CLUSTER PAD PUMPING STATIONS

## MCPPS DESIGN WITH 2 PUMPS



MCPPS with 2 pumps CNS – 240-1900-ZTM  
 Comprises an equipment room (12x12.25 meter) and control module,  
 adjacent to power plant (12x18.7 meter)  
 Standalone pipe header unit (3x6 meter)

Equipment room comprises:

- pump units;
- auxiliary pump unit;
- oil station inserts for electric drives.

Power plant comprises:

- KTP units;
- RU units;
- smooth switch.

The pumps are equipped with ball bearing assemblies cooled by the pumped fluid.

Some units are installed on standalone monolith basements.

The control module uses Siemens controllers.

KTP units are produced by Electroshchit factory, Samara

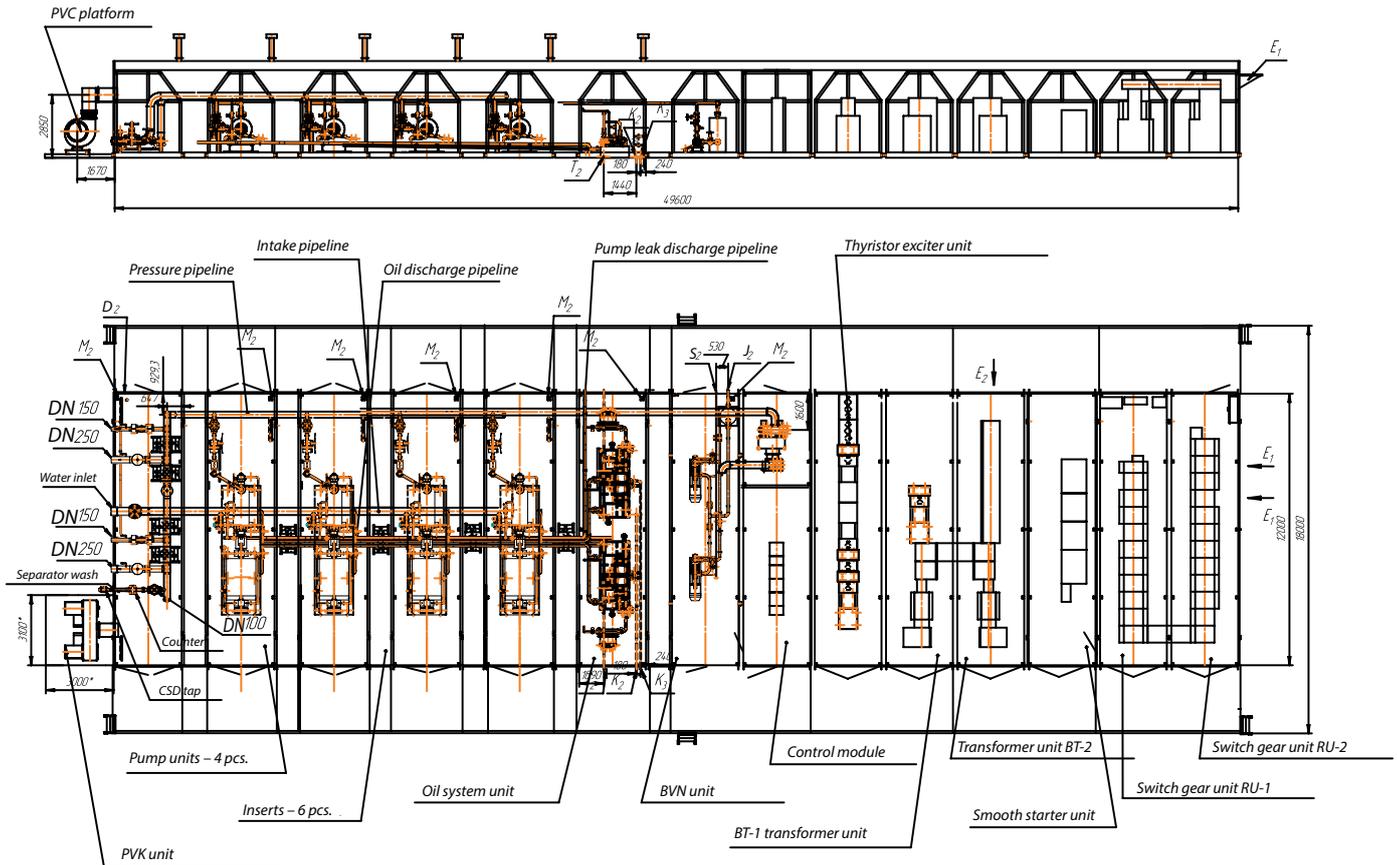
RU units are produced by Eltekhnika, St. Petersburg

Smooth switch units are produced by VNIIR, Cheboksary

Symbols	Items
A2	water intake MCPPS
A3	water intake BG
B2	water outlet MCPPS
B3	water outlet BG
G2	leak discharge to tank
J2	water intake from gravity feed tank
T2	oil addition and replacement
K2	emergency oil discharge
K3	oil discharge from oil tank
M2	discharge of spills from floor
N2	oil discharge from transformers
S2	drainage pump leak discharge
E1	6.0 kW cable inlet
E2	0.4 kW cable inlet

# MODULAR CLUSTER PAD PUMPING STATIONS

## MCPPS DESIGN WITH 4 PUMPS



MCPPS with 4 CNS 180-1900-2TM pumps

Complete MCPPS with adjacent equipment room, control module and power plant in the same building (12x49.6 meter)

Equipment room comprises:

PVK unit;

- pump units with inserts;
- oil system unit;
- auxiliary pump unit.

Power plant comprises:

- transformer units;
- thyristor exciter unit;
- smooth switch unit;
- RU units.

MCPPS is equipped with separate oil systems (different ones for engine and pumps). Each oil system consist of 2 oil units (main and redundant) and a complete set of standby equipment. Inserts secure freed passage between the pump units.

Pump pressure fixtures are completely made of stainless steel.

The control module uses Siemens controllers.

Smooth switch units are produced by VNIIR, Cheboksary

RU 6 kW units use Aurora cells produced by Eltekhnika, St. Petersburg

Upper high-voltage feed of RU units

Symbols	Items
A2	water intake MCPPS
A3	water intake BG
B2	water outlet MCPPS
B3	water outlet BG
B3	water outlet BG
G2	leak discharge to tank
J2	water intake from gravity feed tank
T2	oil addition and replacement
K2	emergency oil discharge
K3	oil discharge from oil tank
M2	discharge of spills from floor
N2	oil discharge from transformers
S2	drainage pump leak discharge
E1	6.0 kW cable inlet
E2	0.4 kW cable inlet

## MODULAR CLUSTER PAD PUMPING STATIONS WITH PLUNGER PUMPS

### PURPOSE

Modular cluster pad pumping station with plunger pumps (hereinafter the station) is intended to pump water into the formation in order to maintain formation pressure. The pumping station is intended for operation in regions with temperate and cold climate, in the UHL1 design according to GOST 15150-69.

### ITEMS SUPPLIED

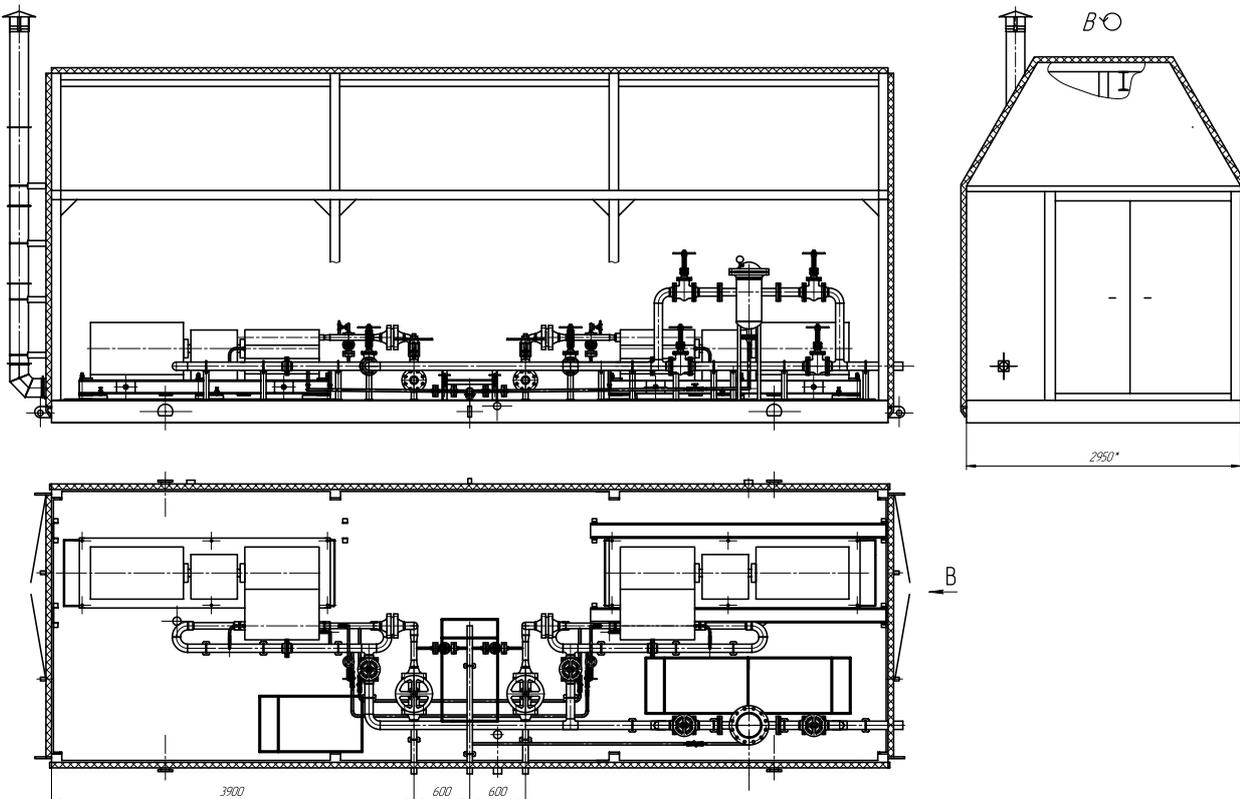
The station can be equipped with plunger pumping units: SIN (Sinergiya), PCR (Sigma) and others.



### SPECIFICATIONS

Parameter	Value
Operating medium pressure, MPa - at the inlet - at the outlet	0.4...4.0 21.0
Capacity, m <sup>3</sup> /day.	551
Operating medium temperature, °C	+5 to +45
Number of pumping units - including duty ones - standby	2 1 1
Overall dimensions, mm, max - length - width - height	9000 2950 4000
Station service life, years, not less	10

### PROCESS LAYOUT



## MODULAR CLUSTER PAD PUMPING STATIONS WITH HORIZONTAL PUMPS

### PURPOSE

Modular cluster pad pumping station with horizontal pumps (hereinafter the station) is intended for:

- controlled pumping water into a pay formation to maintain formation pressure, injecting water into wells to maintain formation pressure;
- control and monitoring operating procedures.

Climatic design: UHL, placement category 1 according to GOST 15150-69.

### PRINCIPLE OF OPERATION

The station operation mode is 24 hour, without permanent presence of staff. Transported medium enters the pumping unit through the receiving pipeline, through the motorized valve, coarse and fine filters. There are gauges, an overpressure sensor and a differential pressure sensor installed on the receiving line, there is also a tap for air release. On the pressure pipeline there are taps for a technical gauge, and overpressure sensor. Also there are flow sensor, check valve, shut-off valve (valve with electric actuator AUMA type). There are taps on the receiving and pressure piping for draining the transported medium from the piping.

### DESIGN

The station is a block-box (vandal-proof) on a rigid frame. The room is equipped with windows, doors, gates, and a compartment to accommodate the control station. Heat insulated three-layer metal panels is used as surrounding structures of the block. There are natural ventilation, supply and exhaust air ventilation with use of a deflector, and forced ventilation with axial fans located in each unit of the station. The Warm up of the room due to heat dissipation from the pump and electric Warm up, with automatic temperature control.

All process equipment and piping are installed and secured with clamps on supports that are welded to the metal base of the room.

### ITEMS SUPPLIED

The station consists of the following items:

- process module with pump unit and equipment;
- apparatus section with a frequency converter, control cabinet, and switchboard for own needs;
- service platforms for process and apparatus sections.



### SPECIFICATIONS

Parameter	Value
Capacity, m <sup>3</sup> /day, rated	320
Capacity, m <sup>3</sup> /day, operational	200
Transported medium	river, production, or Cenomanian water
Operating mode	continuous
Nominal pipe size, mm: - water inlet - water outlet	100 100
Discharge pressure, MPa	21
Pressure at the inlet of the station, MPa	0.5... 4
Overall dimensions (in transport position), mm, max: - length - width - height	11200 3150 2600
Category of the room by explosion and fire hazard (NBP 105-2003)	V4
Fire resistance of the building according to SNiP 21-01-97	IV
Constructive fire hazard class according to SNiP 21-01-97	SO
Absolute extreme air temperature, °C	-50 to +40
Air temperature in the unit room, °C, not less	+5

## FLOATING PUMPING STATIONS

### PURPOSE

The floating pumping station (hereinafter the station) is intended to intake river water and transfer it to the formation pressure maintenance system.

### PRINCIPLE OF OPERATION

River water enters the pumps through the filters and vacuum tanks. After passing the pumping units, the pressurized fluid enters the pressure pipe header through pressure pipeline, check valves, and gate valves.

Leaks from seals of the pumping units by gravity flow into a pontoon water intake compartment. Monitoring the number of leaks is carried out using instrumentation and control devices. Pumps are provided for draining pontoon compartments.

For purification of fresh water from algae and large size impurities in the water intake compartment, filters with gravel of 20 to 40 fraction are located.

Contaminated filters can be flushed on the deck, with water supply from the pressure pipeline. To prevent the floating station freezing into ice, a perforated pipeline with a diameter of 57 mm, connected to the pressure pipeline along the station perimeter is provided. Water, passing under pressure through the holes in the pipe, forms an ice-free lane around the pumping station. The station is supplied as an product of completed construction, mounted on a pontoon with the possibility of transportation by river.

### DESIGN

The station is a mounted process equipment on a pontoon in a closed warm room.

### ITEMS SUPPLIED

In the room of the pumping station there are following items installed:

- pumping unit;
- receiving and pressure manifolds with stop valves;
- manual overhead crane with a lifting capacity of 3.2 tons;
- leakage drain piping;
- instrument racks;
- electric Warm up system;
- lighting of units and electrical equipment;
- instrumentation and control devices.

Outside of the room there are following items located:

- fencing;
- two manual hoists with a lifting capacity of 2 tons to replace and move filters to the cargo platform;
- cableway;
- cargo platform;
- replacement filter rack;
- pipe header.

In coordination with a customer, the scope of delivery may include:

power supply unit(s), cable products, block for operator, as well as a pipe header (coastal), a set of pressure hoses, a set of rafts, including a terminal raft and coastal one.



### SPECIFICATIONS

Parameter	Value
Flow, m <sup>3</sup> /hour	1200...1890
Discharge pressure, MPa	1.25...2.1
Pressure at pump intake, MPa, max	0,2
Operating mode	24 hour, automatic, without permanent presence of staff
Motor power	400
Motor rotation frequency, rpm	1500
Indoor temperature, °C, not less	+5
Pumped medium	River water
Temperature of the pumped medium, °C	+3 to +45
Category of production room by NBP	D
Fire resistance of the building	IV
Warm up	electric
Ventilation: - forced - natural	by fan through vents, windows, doors, gates
Dimensions, mm - length - width - height	29720 9232 11800

## PIPE HEADER UNITS (WATER DISTRIBUTION UNITS)



### PURPOSE

The pipe header unit is intended for distribution, measurement of flow rate and pressure of water pumped into the injection wells of the formation pressure maintenance system (FPM).

### ITEMS SUPPLIED

The unit room contains:

- process equipment;
- Warm up system;
- lighting system;

Water meters are installed at each water discharge port. Pipe header units have different modifications depending on:

- pressure;
- capacity;
- number of connected wells.

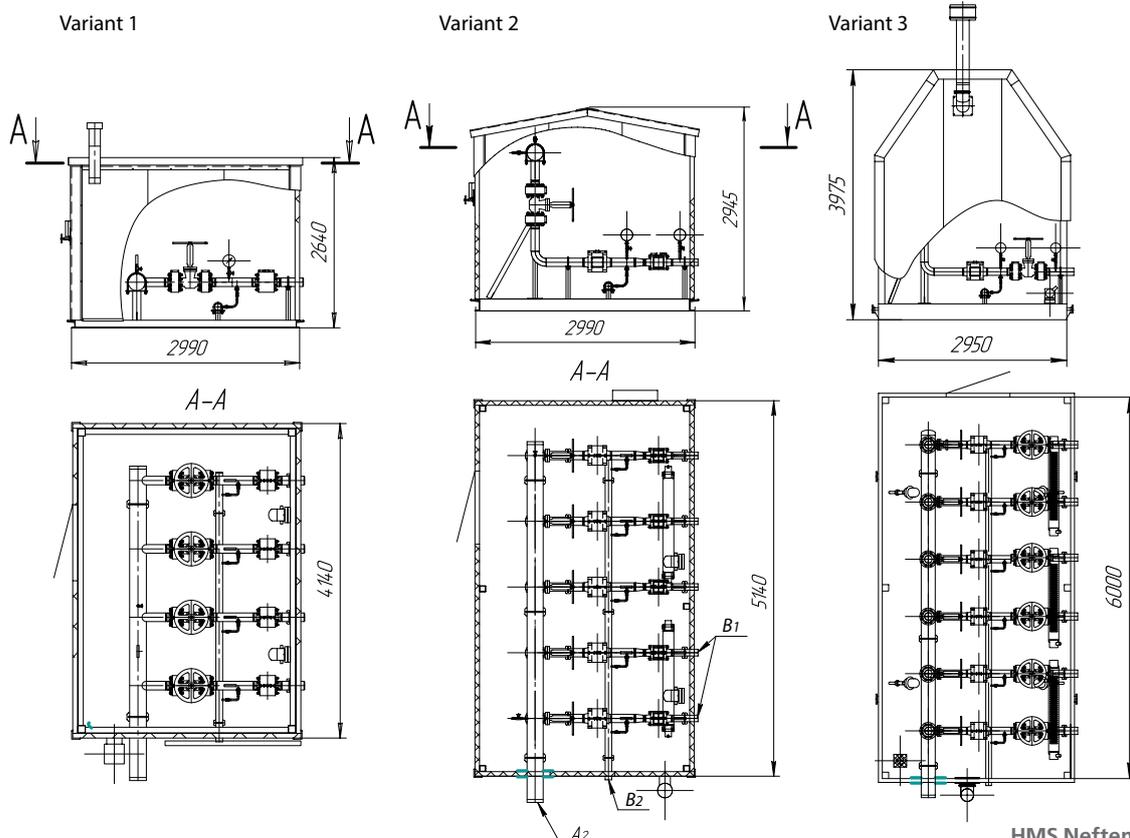
### SPECIFICATIONS

Parameter	Value
Pressure, MPa	16, 20, 25
Nominal pipe size, mm	100, 80, 50
Number of wells connected, pcs	2 to 8
Climatic design	HL1
Room category according to NPB 105-95	A, D*
Room fire resistance category	IV
Unit room class according to PUE	V-1a

\* Depending on the composition of the transported liquid

The water distribution unit won the Diploma of the "100 best products of Russia - 2014" competition.

### PROCESS LAYOUT



## ASSOCIATED GAS TREATMENT UNITS



### PURPOSE

The associated gas treatment unit (hereinafter AGTU) is intended for automated extraction, preparation, measurement and control of the volumetric flow rate of associated gas separated from gas-liquid mixture (multiphase medium) of an individual well (or group of wells). Gas extraction is performed for microturbines or other consumers.

### PRINCIPLE OF OPERATION

The multiphase medium enters the separator, where a part of the gas necessary for the operation of the unit is separated. Regulation of the amount of gas in the separator is performed

by flow of multiphase medium. Extracted gas is moved to the receiver. The receiver accumulates the gas required for quick increase of gas flow during start-up. The gas goes from the receiver and enters the gas treatment and reduction unit. The gas is cleaned from drip moisture, heated and reduced to the parameters needed for consumers. Compressor station and gas treatment and reduction unit are equipped with systems for purging production lines with nitrogen. It is possible to install the compressor station after the separator at low pressure of gas-liquid mixture or to change composition of the associated petroleum gas.

### SPECIFICATIONS

Parameter	Value
Operating medium	associated petroleum gas
Operating medium pressure (inlet and outlet), MPa	upon customer request
Number of outlet piping	according to process layout
Maximum capacity, Nm <sup>3</sup> /hour	upon customer request
Temperature, °C - operating medium at the inlet - operating medium at the outlet, not less - environment - in the box, not less	upon customer request upon customer request -55 ... +40 +5
Class of hazardous area according to the "Electrical installation code" (PUE)	V-1a
Category and group of explosive medium in accordance with GOST 12.1.011-78	Ila-T1
Production category according to NBP 105-95	A
Air change rate per 1 hour, not less: - natural ventilation - mechanical ventilation	3 8
Warm up	electric heaters
Fire resistance according to SNiP 21-01-97	IV
Lighting of the unit is carried out by incandescent lamps, V	220

## ASSOCIATED GAS TREATMENT UNITS

### DESIGN

The unit is a block-complete facility of full factory readiness and is located in a box with a sealed compartment for installation of electrotechnical equipment.

The unit is equipped with electric lighting, electric Warm up and ventilation, control and monitoring system; cabinet of low-voltage switching devices; fire alarm cabinet, fire detectors and fire alarms; gas extinguishing system; gas monitoring and analysis system.

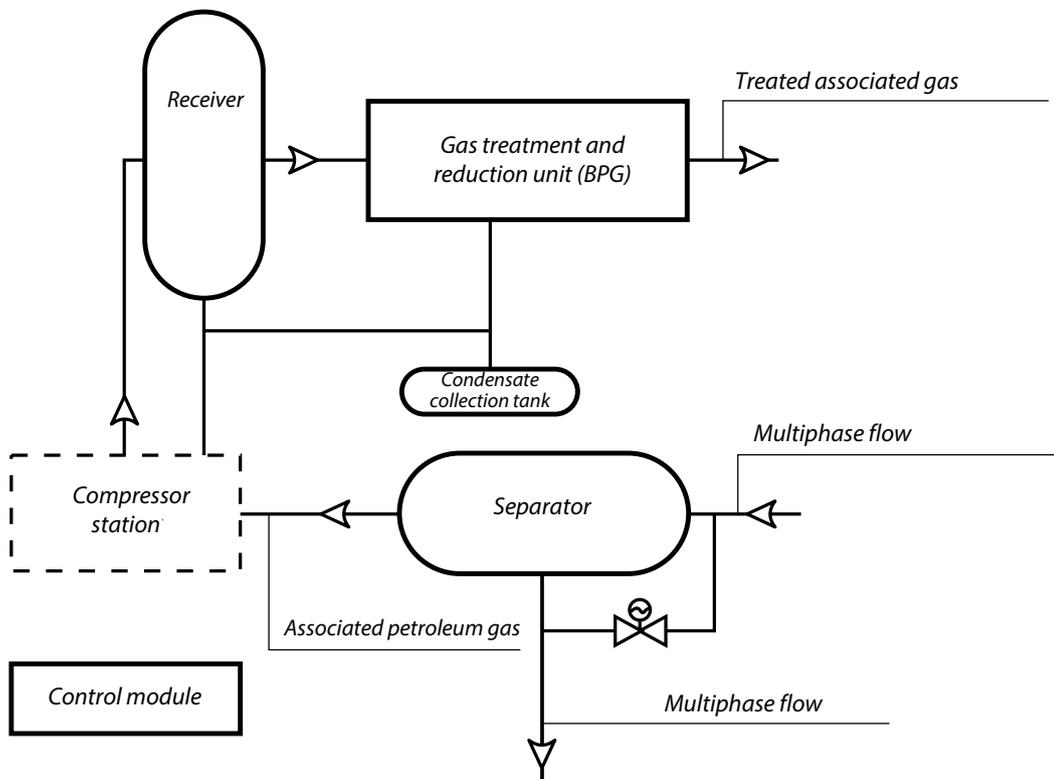
### ADVANTAGES

AGTU is equipped with all necessary engineering systems (lighting, Warm up, ventilation, and alarm) and emergency shutdown in accordance with the applicable rules and rules of design and operation. It has 100% redundancy of the main process equipment. It can be delivered in any climatic design. Operation mode: 24 hour, automatic, without permanent presence of staff.

### MISCELLANEOUS

The associated gas treatment unit won the Diploma of the "100 best products of Russia – 2015" competition.

### PROCESS LAYOUT



## NATURAL GAS COMPLEX TREATMENT UNITS



### PURPOSE

The natural gas complex treatment unit (hereinafter GTU) is intended to treat gas, reduce and maintain gas pressure at the unit outlet at a given level, as well as to separate and treat gas condensate from well products for further transportation to a storage or processing site.

Gas treatment is provided by the method of low-temperature separation. Unstable condensate in the gas-saturated state is fed to the condensate pipeline.

The process solutions provide:

- continuity of the gas and condensate treatment process;
- possibility of changing (reducing) the amount of formation gas and condensate coming for treatment;
- production safety;
- process automation.

### DESIGN

The unit is mounted on the open area. Maximum raw gas line capacity is 15 000 000 Sm<sup>3</sup> per day at the mass concentration of the liquid inlet up to 340 g/Sm<sup>3</sup> of gas.

The delivery set of each particular unit is determined by the customer according to the design of the siting, depending on the specific conditions.

### SPECIFICATIONS

Parameter	Value
Operating medium	Natural gas with gas condensate, oil and water impurities, and inhibitors
Operating medium pressure, MPa - at the inlet, max - at the outlet and in the treatment process	25 in accordance with the technical regulations
Capacity, Sm <sup>3</sup> per day. - by gas, max - by liquid, max	15 000 000 25 000
Operating medium temperature, °C	in accordance with the technical regulations
Class of hazardous area of premises with production category A according to the "Electrical installation code" (PUE, 2000)	V-1a, V-1g
Category and group of explosive medium in accordance with GOST 12.1.011	IIA-T1 (T2, T3)
Production category of the unit according to NBP 105-95	A
Fire resistance level of enclosing structures of all unit buildings according to SNiP 21-01-97, not lower	III
Temperature, °C - environment during operation - in rooms, not less	-60 ... +45 +5
The dimensions of the main components of the unit in the transport position correspond to the loading dimensions of the train and do not exceed the following dimensions (length x width x height), mm	12450x3150x4000
Service life, not less, years	20

## GAS SEPARATING MEMBRANE UNITS

### PURPOSE

Gas separating membrane unit is intended to treat fuel gas for consumers with different quality requirements. The filter-coalescer, which is a part of the unit, provides preliminary purification of the incoming gas to the blocks of the gas separating membrane unit to separate solid impurities, and dropping and aerosol liquids.

The unit is provided with two groups of membrane gas separating blocks:

MB-1/1...5 – towards the drives of compressors of gas compressor station and fuel gas treatment unit;

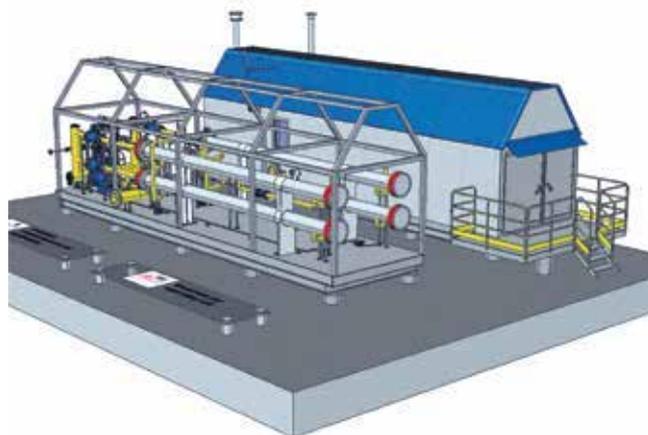
MB-2/1...3 – towards the own power supply complex and other consumers.

### SCOPE OF DELIVERY

The gas separating membrane unit is a membrane module located in a container that has the necessary life support components: lighting, Warm up, ventilation, gas pollution monitoring system, fire protection system, lifting and transport mechanisms (manual hoist). The equipment is delivered to the place of operation in the full factory readiness condition, with all the necessary utilities.

The scope of delivery of the gas separating membrane unit includes:

- filter-coalescers (1 operating and 1 reserve);
- system for measuring the quantity and parameters of free petroleum gas to the membrane gas separating unit MB-1 (SIKG-1);
- system for measuring the quantity and parameters of free petroleum gas to the membrane gas separating unit MB-2 (SIKG-2);
- gas separating membrane module MB-1/1...5;
- gas separating membrane module MB-2/1...3.



### SPECIFICATIONS

Parameter	MB-1/1...5	MB-2/1...5
Capacity for treated gas per 1 module (at the temperature 20 °C and pressure 101325 MPa), m <sup>3</sup> /hour	3850	10940
Pressure (g) of gas at the unit inlet, MPa	4.4	
Pressure (g) of the treated gas at the unit outlet, MPa	4.1	
Pressure (g) of permeate at the unit outlet, MPa	0.05-0.1	
Gas temperature at the unit inlet, °C	40-45	
Temperature of the treated gas at the unit outlet, °C	15-23	19-32
Temperature of permeate at the unit outlet, °C	32-41	
Overall block-container dimensions, m	12.0 x 3.15 x 3.0	

## GAS DISTRIBUTION STATIONS



### PURPOSE

Gas distribution station (hereinafter GDS), with a capacity up to 100 000 Nm<sup>3</sup> /hour, is intended to treat gas, reduce and maintain the gas pressure at the outlet at a predetermined level during gas supply to consumers.

### ITEMS SUPPLIED

As a part of the GDS, at the request of customers, there may be supplied: reduction units with an integrated boiler, stand-alone gas Warm up units (with large GDS capacity), auxiliary rooms unit (including rooms for operator, switchboard, canteen, mechanic workshop, and bathroom), a unit of containers with an odorant, a unit for switching to the manual gas supply mode, condensate collection tanks, and drainage tanks.

### DESIGN

GDS is a block complete device of full factory production, tested and tuned for operating parameters. The dimensions of the GDS and the number of transport units depend on the operating parameters. GDS can consist of one block, which includes all the necessary equipment and premises, and of several blocks that correspond to the transport dimensions and mounted at the place of operation in a single building or complex of buildings.

A GDS with a capacity up to 30 000 Nm<sup>3</sup> / hour consists of one block comprising a process room, an autonomous boiler room combined with an switchboard room, and an odorization compartment separated from each other by sealed partitions.

Each room has a separate external entrance. The equipment of the process room provides gas treatment according to the required parameters. The boiler room equipment provides room Warm up and gas Warm up. Electrical equipment provides uninterruptible power supply and automatic control of the operation of all GDS systems. Odorization equipment provides automatic gas odorization with manual backing-up.

The boiler room uses gas; the boilers for the period of commissioning and in emergency situations during the winter time can also work using solid fuels.

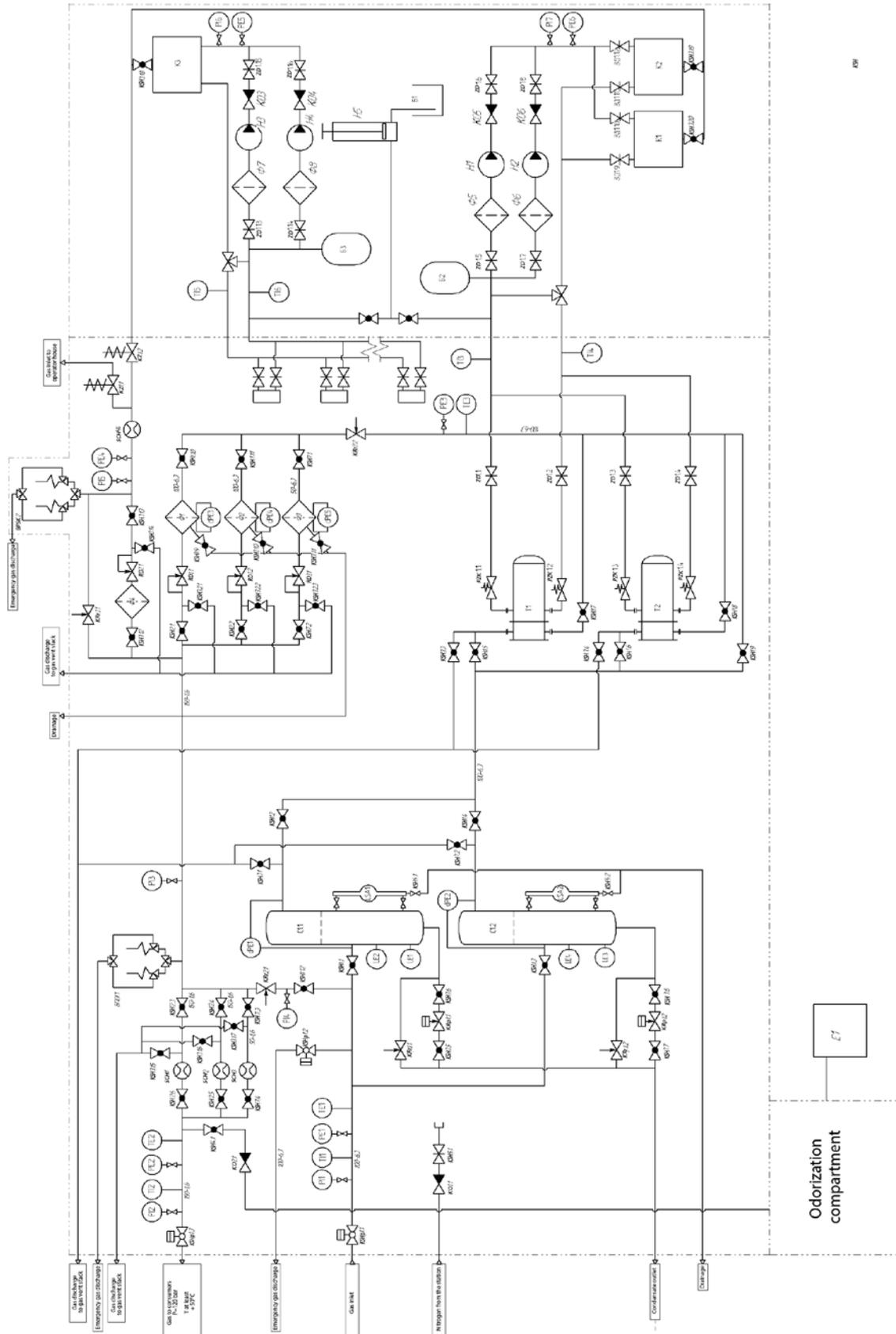
GDS is equipped with all necessary engineering systems (lighting, Warm up, ventilation, and alarm) and emergency shut-down in accordance with the applicable rules and rules of design and operation. It also has 100% redundancy of the main process equipment.

GDS can be delivered in any climatic design.

GDS operation mode: 24 hour, automatic, without permanent presence of staff.

# GAS DISTRIBUTION STATIONS

## PROCESS LAYOUT



Odorization compartment

## NITROGEN COMPRESSOR UNITS



### PURPOSE

The nitrogen compressor unit (hereinafter the nitrogen unit) is intended to produce nitrogen from atmospheric air with a concentration of 90 to 99.9999% directly at the place of flow rate, to blow devices, as well as for firefighting systems in the consumer buildings.

Nitrogen unit can be operated at ambient temperatures from -60 to +45 °C, in open areas; it does not require the creation of additional infrastructure. The station operation mode is 24 hour, without permanent presence of staff.

### DESIGN

The nitrogen unit is a block complete device of full factory production, tested and tuned to operating parameters. The overall dimensions of the station and the number of transport units depend on the operating parameters.

The unit is equipped with all necessary engineering systems (lighting, Warm up, ventilation, and alarm) and emergency shutdown in accordance with the applicable rules and rules of design and operation. If necessary, it can have a 100% redundancy of the main process equipment.

The process is automated and mechanized. Process control is carried out using a touch panel. The automation system uses emergency shutdown and interlock signals. The system provides data transfer to a remote control or PC for monitoring.

### SCOPE OF DELIVERY

The nitrogen compressor unit consists of the following systems and modules:

- The module of the compressor unit, consisting of:
  - main operating compressor;
  - standby compressor;
  - drive electric motor (with gas or diesel drive);
  - air cooler;
  - filter system;
  - condensate drain system.
- The module for air preparation, gas separation and control and automation systems, consisting of:
  - adsorption (refrigerated) drier;
  - carbon filter;
  - station control and monitoring system;
  - gas separation membranes or gas distribution blocks of the adsorption type.
- Pressure boosters (if necessary).

The unit modules are mounted as separate containers on a frame and fasten between themselves. The equipment in the modules is interconnected by piping and electrical cables.

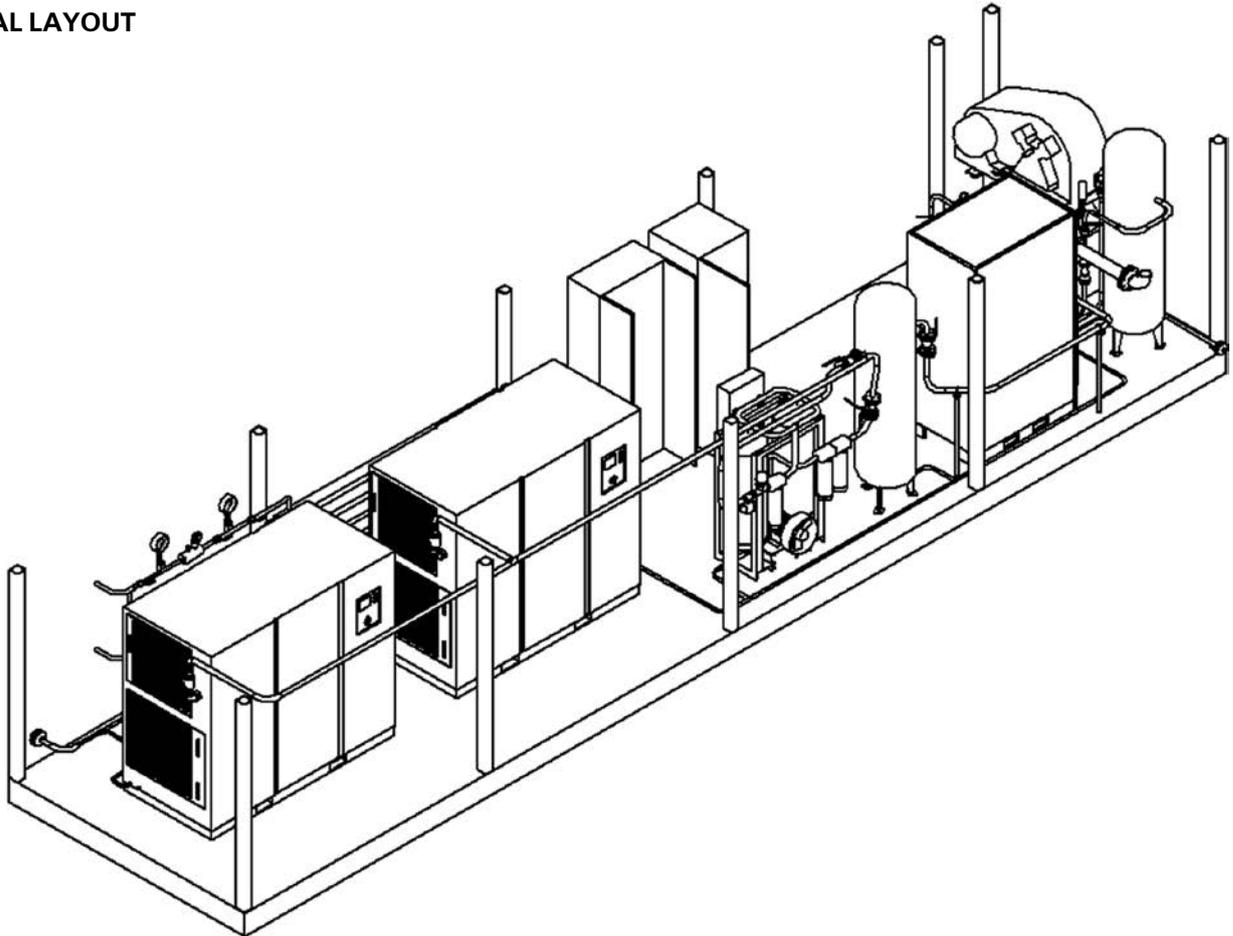
The manufacture of each unit, the selection of the process equipment, the selection of the technological scheme is made taking into account the operating conditions and in accordance with the requirements specified in the questionnaire or the requirement specification.

### MISCELLANEOUS

The nitrogen compressor unit won the Diploma of the “100 best products of Russia – 2018” competition.

## NITROGEN COMPRESSOR UNITS

### GENERAL LAYOUT



### SPECIFICATIONS

Membrane type of air separation (without the use of a pressure booster)	
Parameter	Value
Operating pressure, bar/atm, max	10
Capacity for nitrogen, Nm <sup>3</sup> / hour, max	500
Nitrogen concentration, %, max	99.5

Adsorption type of air separation (without the use of a pressure booster)	
Parameter	Value
Operating pressure, bar/atm, max	8
Capacity for nitrogen, Nm <sup>3</sup> / hour, max	1500
Nitrogen concentration, %, max	90 ... 99.9999

Membrane type of air separation (with the use of a pressure booster)	
Parameter	Value
Operating pressure, bar/atm, max	50
Capacity for nitrogen, Nm <sup>3</sup> / hour, max	500
Nitrogen concentration, %, max	99.5

Adsorption type of air separation (with the use of a pressure booster)	
Parameter	Value
Operating pressure, bar/atm, max	50
Capacity for nitrogen, Nm <sup>3</sup> / hour, max	1500
Nitrogen concentration, %, max	90 ... 99.9999

## AIR COMPRESSOR UNITS



### PURPOSE

The air compressor unit (hereinafter ACU) is intended for cleaning, compressing and drying atmospheric air, maintaining the flow rate and air pressure at the outlet at a predetermined level for the consumer.

The unit is operated in open areas at ambient temperatures from  $-60$  to  $+40$  °C, at remote construction sites, mining projects and in other industries, because does not require the creation of infrastructure.

The unit is operated in automatic mode; permanent presence of staff is not required.

### PRINCIPLE OF OPERATION

Atmospheric air through the inlet valve with integrated discharge valve provides air supply with specified parameters for each of the operating modes of the compressor, is fed into the air filter, where the microparticles are removed from the incoming air, then compressed in a screw compressor.

Then the compressed air enters the oil separator, intended to remove oil from the compressed air, and goes to adsorption type dryer to remove moisture.

An oil filter is provided for cleaning the oil.

The microprocessor automation system allows automatic monitoring of compressor operating parameters, ensuring protection of all important functions. Depending on the model, the controller allows synchronization of work of several compressors, which ensures optimal control and maximization of the use of installed equipment.

### DESIGN

ACU is a block complete device of full factory production, tested and tuned for operating parameters. The overall dimensions of the ACU and the number of transport units depend on the operating parameters.

The ACU equipment provides cleaning, compression and air drying according to the required parameters.

### ITEMS SUPPLIED

ACU room has the following equipment:

- two screw oil-filled compressors;
- screw oil filled (oil-free) compressors;
- air dryer of the adsorption (refrigeration) type (with a maximum dew point of  $-70$  °C);
- water and oil separator;
- compressed air receivers (upon customer request);
- filters;
- power electrical cabinet;
- control cabinet;
- piping with safety and shut-off and control valves;
- instrumentation and automation equipment;
- systems of power supply, Warm up, ventilation, lighting and fire extinguishing.

The process is automated and mechanized. Process control is carried out using a touch panel. The automation system uses emergency shutdown and interlock signals. The system provides data transfer to a remote control or PC for monitoring.

The controller is connected to an external computer network.

# AIR COMPRESSOR UNITS

## SPECIFICATIONS

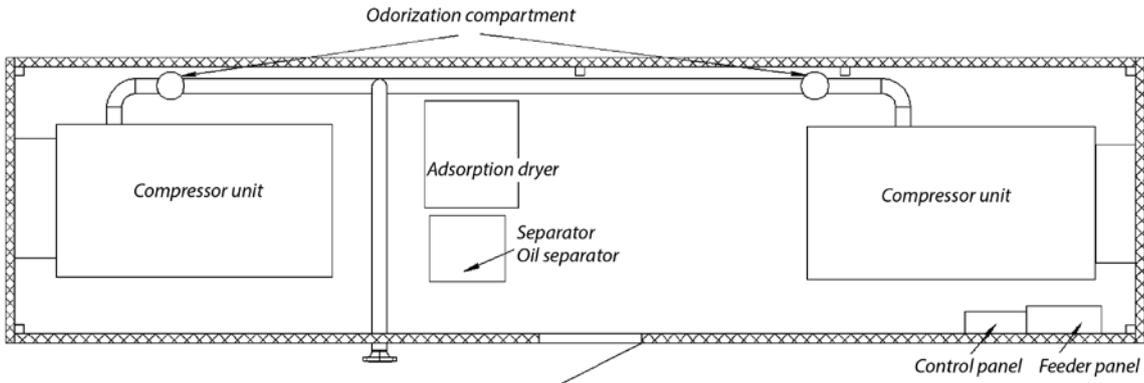
ACU is equipped with all necessary engineering systems (lighting, Warm up, ventilation, and alarm) and emergency shut-down in accordance with the applicable rules and rules of design and operation. It also has 100% redundancy of the main process equipment (upon customer request).

The unit can be supplied in any climatic design and operates in automatic mode, without permanent presence of staff.

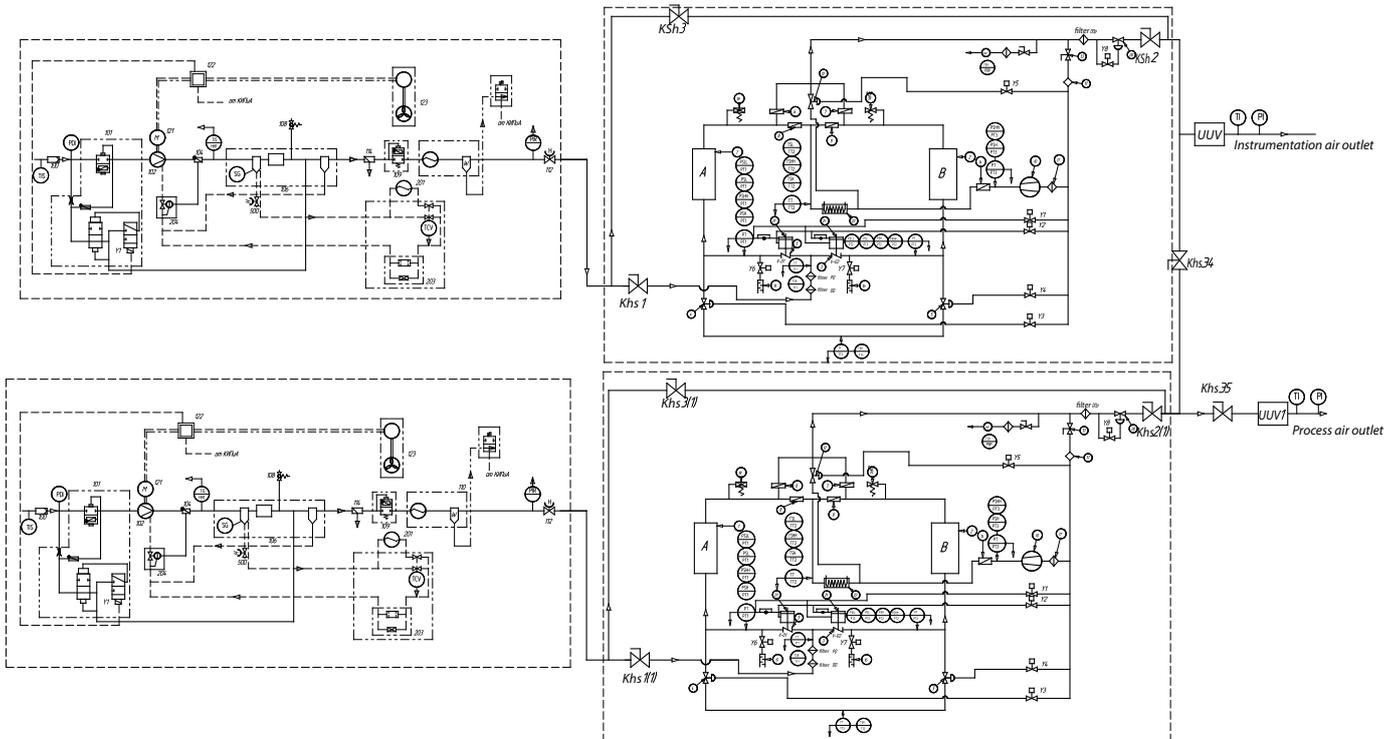
ACU can be ordered according to a questionnaire; schematic diagrams and main technical solutions are agreed with the customer.

SPECIFICATIONS	
Parameter	Value
Operating pressure, MPa, max	1.8
Capacity, Nm <sup>3</sup> /minute, max	50
Dew point, °C, max	-70

## GENERAL ARRANGEMENT



## PROCESS LAYOUT



## COMPRESSOR UNITS



### PURPOSE

Compressor unit of modular design (hereinafter the unit) is intended for cleaning, compressing and further supply of gas to the customer.

### PRINCIPLE OF OPERATION

Gas entering the inlet pipe is fed to the inlet separator (if necessary). After cleaning of droplet liquid the gas enters the filter to be cleaned of mechanical impurities. Next, the gas flow enters the compressor inlet, where it is compressed. After the compressor, the gas flow is directed to the gas cleaning system (oil separator, separator, etc.). Next, the gas through the pipeline is fed to the air cooler of gas, where it is cooled to the desired temperature. After cooling, the gas flow enters the filter-separator, where the final gas cleaning of droplet liquid occurs. The process line may vary depending on the type of compressor used. Further utilization of gas is possible.

To control the operation of the station, an automation and control system is provided.

To release the internal volumes of gas piping, vessels and apparatus from the air during start-up and after opening the gas containing volumes, a system of purging with inert gases is provided.

### ITEMS SUPPLIED

The compressor module includes:

- container\* with explosion proof equipment. The container is divided by a sealed partition into 2 compartments: a compressor room (explosive class V-1a) and a power room (non-explosive room).
- compressor unit with an explosion-proof drive and a capacity adjustment system mounted on a frame;
- oil cooling system;
- gas air cooling unit;
- suction piping with shut-off and control valves;
- discharge piping with shut-off and control valves;
- oil system, including a pump, and coarse and fine filters;
- gas cleaning system;
- set of special tools;
- spare parts kit;
- set of operational documentation.

\* depends on the original customer data.

Compressor units for compressing or booster compressing explosive and harmful gases should, as a rule, be located in separate units or in a frame building.

### OTHER CHARACTERISTICS

The unit can be designed for single operation or for operation in parallel with one or several compressor units, have various methods of communication with the operator (cable, or radio), as well as have other features specified in the design assignment.

SPECIFICATIONS	
Parameter	Value
Compressed medium	Associated petroleum gas
Placement category	**
Gas pressure at the inlet of the module, MPa, min, abs.	0,1
Gas temperature at the unit inlet, °C	+5...+30
Capacity of the compressor module under normal conditions at the inlet and the position of the productivity regulator 100%, not less, Nm <sup>3</sup> /hour	100 - 25 000
Final gas temperature, °C, max	90
Type of drive**	Motor Gas engine
Type of compressor	**
Sound level on the measuring circuit at a distance of 1m from the container equipment, max, dB(a)	80
Power supply of the compressor motor** - voltage, kV - frequency, Hz	3x0.4 50
Power supply of the auxiliary equipment** - voltage, kV - frequency, Hz	3x0.4 50
Power supply of the control system - voltage, V - frequency, Hz	220 50
Oil temperature after the compressor, °C, max	90
Time of pre-launch preparation of the compressor module, hours, max	8
Start-up time of the compressor module in the prepared state, minutes, max	1

\*\*In accordance with the requirements of the customer.

## UNITS FOR SURVEYING GAS CONDENSATE WELLS



### PURPOSE

The unit for study of gas condensate wells (hereinafter the unit) is intended for analysis gas condensate wells in order to treat baseline data for calculation of gas and condensate reserves, as well as operational characteristics of wells.

### ITEMS SUPPLIED

The unit includes:

- inlet node for reduction, with throttle and instrumentation;
- line of reduction with methanol tank, intended for methanol admission, throttle and instrumentation;
- research separator;
- outlet gas line with a sampler, instrumentation and diaphragm critical-section meter DIKT;
- condensate tank;
- heat exchanger (optional).

### PRINCIPLE OF OPERATION

Gas from the well enters the inlet pipe to the throttle. Required mode of operation (pressure) is set by installation of interchangeable lens into the throttle. Next, the gas is fed to the inlet pipeline of the research separator. The gas entering the separator first passes through a coagulator, which serves to partially clean of vapor, and enters the separator, where the

final cleaning of moisture occurs by a swirler and separating elements. The purified gas passes from separator through the outlet pipeline, on which a gas meter is installed; after measuring the gas can be directed to a flare system or gas collector.

The liquid phase (condensate) from the separator flows into a condensate tank, in which the condensate volume is measured. The factory calibrates the condensate tank, which ensures precise monitoring of the amount of the liquid phase. The liquid phase is removed from the tank into the pipeline by displacement, or to a flare system, or to a special condensate tank (optional). Condensate is drained from the tank periodically, as it accumulates.

The small size and weight of the unit allows its transportation by road.

Additionally, the unit can be equipped with a heat exchanger for Warm up the gas, and with inlet manifolds.

The scope of delivery and structure of the unit can be changed at the request of the customer.

### SPECIFICATIONS

Parameter	Value
Operating medium pressure, MPa:	
- at the inlet, max	20
- operating, in the separator	10
Capacity, Sm <sup>3</sup> per day:	
- by gas, max	400 000 ... 600 000
- by liquid, max	120 ... 400
Operating medium temperature, °C:	
- operating	+10 ... +60
- design, max	+70
Ambient temperature, °C	-60 ... +45
Category and group of explosive medium	IIA-T1
Overall dimensions of the largest part (length x width x height), mm, max:	4610 x 1180 x 2500

# OIL TREATMENT UNITS

## PURPOSE

The oil treatment unit (hereinafter OTU) is intended for the dehydration and desalting of oil emulsions and preparation of commercial oil. It is a block-integrated automated units.

The manufacture of each oil treatment unit, the selection of process equipment, the choice of the technological scheme is carried out taking into account the quality of the initial medium, the required performance, operating conditions and individual customer's requirements.

## ITEMS SUPPLIED

OTU complex may include:

1. Oil and gas separator.
2. Chemical dosing units.
3. Line heater.
4. Three phase separator.
5. Oil sump.
6. Electrical dehydrator.
7. Gas separator (horizontal or vertical).
8. Pump unit.
9. Gas treatment unit.
10. Operator and household premises.
11. Other process equipment.
12. APCS equipment for OTU.

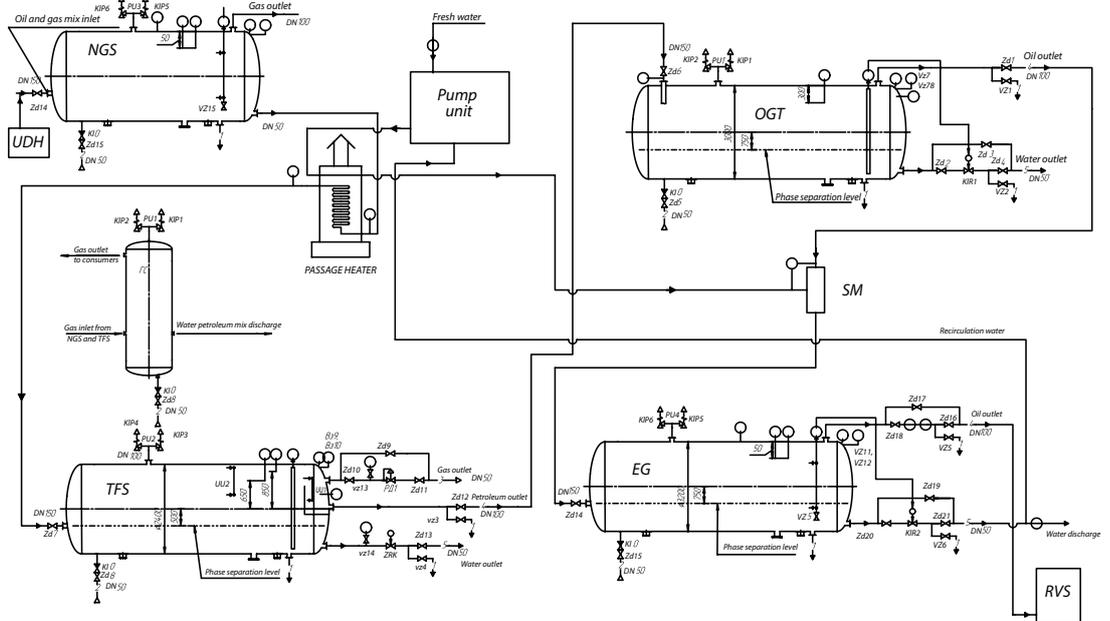
## MISCELLANEOUS

The oil treatment unit won the Diploma of the "100 best products of Russia – 2010" competition.



## PROCESS LAYOUT

- 1 – drainage
  - 2 – water vapor
  - 3 – associated gas
  - 4 - oil
  - 5 – gas
- Zd – slide valve
  - ZRK – shut-off and control valve
  - vz – shut-off valve
  - f – filter
  - KIR – control valve
  - KIO – check valve
  - KIP – safety valve
  - PU – switching device
  - TT – temperature transmitter
  - Ti – temperature indicator
  - PI – pressure indicator
  - PT – pressure transmitter
  - dP – differential pressure gauge
  - FE – fluid meter
  - LS – level signal
  - LC – level control
  - W – water cut meter



## SALINE SOLUTION REGENERATION UNITS



### PURPOSE

The unit of saline solution reconditioning (hereinafter regeneration unit) is intended for the following technological operations:

- saline purification, i.e. separation of petroleum products, organics, colloidal clay and other suspended solid substances;
- pumping of the purified solution to the standard solution unit for its weighting and reuse.

### PRINCIPLE OF OPERATION

Initially, the saline solution enters the settler flotation unit. When pumping into the settler tank, a chemical agent (coagulant) is fed into the solution, which contributes to a more rapid separation of the solution of petroleum products and mechanical impurities. Then, in order to intensify the separation process, the solution is floated. A compressor is used for flotation. Next, the separated petroleum products are discharged into the drainage tank, and the settled solids are discharged into the waste pit. The purified solution is passed through a floating-load filter, which allows to separate the remaining petroleum products and mechanical impurities. The applied technology allows restoring the saline solution without losing its density. Next, the saline solution is transferred to the existing saline solution unit for final preparation for reuse.

### DESIGN

The regeneration unit is a single heated room assembled at the place of operation of four transportable blocks which are separated by heat insulated boxes with three-layer sandwich panels. The process equipment is made in corrosion-resistant version.

The process is automated and mechanized. The process control is carried out using a touch panel, which shows a mnemonic scheme with the images of the main components and elements. The automation system uses emergency shutdown and interlock signals.

A unique technology based on the use of chemical coagulation methods, air flotation and filtration through a porous medium is used for the saline solution regeneration; filtration is performed with use of floating-load filters (the filters have been designed and manufactured by HMS Neftemash JSC).

### ITEMS SUPPLIED

The room has the following equipment:

- two single-screw pumping units;
- two settler-flotator tanks;
- two floating-load filters;
- mobile compressor;
- one power electrical cabinet;
- two control cabinets;
- piping with safety and shut-off and control valves;
- instrumentation and automation equipment – systems of power supply, Warm up, ventilation, lighting and fire extinguishing.

### ADVANTAGES

- reducing the flow rate of dry salt to treat a new solution for killing oil wells;
- release of transport and lifting mechanisms for the transportation of dry salt;
- reducing the cost of unloading and storage of dry salt in bags;
- reducing the load on the existing saline solution unit, which prepares the saline solutions;
- reducing the cost of disposal of waste salt solution, reducing fresh water intake.

At the request of the customer, it is possible to manufacture a regeneration unit for the required capacity, taking into account the wishes and process features, climate, etc.

### SPECIFICATIONS

Parameter	Value
Operating medium is brine after killing wells	
Solution temperature, °C, in range	-7...+20
Content of suspended solid substances at the inlet, mg/l, max	300
Gas content in the initial solution, m <sup>3</sup> /m <sup>3</sup> , max	0,1
Oil content at the unit inlet, mg/l, max	200
Content of suspended substances at the outlet, mg/l, max	20
Oil content at the outlet, mg/l, max	20
Solution pressure at the unit outlet, MPa, max	0.5
Capacity for initial solution, m <sup>3</sup> /day, max	150
Initial solution density, g/cm <sup>3</sup> , max	1.35

## COMPLEXES FOR OIL SEPARATION AND PUMPING



### SPECIFICATIONS

Parameter	Value
Measured fluid flow rate of oil wells under operating conditions, tons/day, max	1000
Measured gas flow, Sm <sup>3</sup> /day, max	64000
Climatic design of the complex according to GOST 15150-69	HL.1
Current type - frequency, Hz - voltage, V	Alternate (50±2) (380± 57)
Overall dimensions of the units length x width x height, mm, max: - separation and measurement unit - storage tanks each - pump unit - control module - flare unit - condensate collection tank - underground tank unit with pump	12360 x 3200 x 3950 13420 x 2680 x 3700 8360 x 3200 x 3950 6540 x 3200 x 3700 12360 x 3200 x 2700 2250 x 1572 x 3115 4295 x 2250 x 3580
Service life, not less, years	10

### PURPOSE

The complex of oil separation and pumping (hereinafter the COSP) is designed for automated measurement of the flow rate of oil and gas production wells at various pressures with the possibility of utilization of associated gas to a flare system.

### ITEMS SUPPLIED

Mobile complex of oil separation and pumping, taking into account the requirements for accelerated installation times, includes a set of process and electrical blocks of maximum prefabrication condition which delivered by rail transport and mounted on the site.

When placing the components of the MCOSP on site, it is necessary to connect the grounding wires of the mobile units to the movable ground loop of the unit lightning protection system.

The complex consists of the following main blocks:

1. Separation and measurement unit (SMU).
2. Storage tanks units (STU).
3. Pump unit (PU).
4. Control unit (CU).
5. Flare unit (FU).
6. Condensate collection tank (CCT).
7. Underground tank unit with pump (UTU).

### PARAMETERS OF PUMPED MEDIA

Parameter	Value
Operating pressure, MPa: - separation and measurement unit - storage tanks unit - flare unit	0 to 1.0 0 to 1.0 0 to 1.0
Well product temperature, °C	+ 5 to + 70
Kinematic viscosity of liquid, m <sup>2</sup> /s	1x10 <sup>-6</sup> to 1.5x10 <sup>-4</sup>
Fluid density, kg/m <sup>3</sup>	550 to 1100
Hydrogen sulfide content, %, max	2



# MOBILE COMPLEXES FOR SURVEYING AND DEVELOPMENT OF WELLS



## PURPOSE

The mobile complex of research and development of wells (hereinafter the complex) is intended for the study of oil and gas wells in order to treat baseline data for calculating the oil, gas and condensate reserves, as well as the operational characteristics of facilities.

## ITEMS SUPPLIED

The unit includes:

- inlet node for reduction, with throttle and instrumentation;
- heat exchanger;
- line of reduction with methanol tank, intended for methanol admission, throttle and instrumentation;
- research separator;
- outlet gas line with a sampler, instrumentation and diaphragm critical-section meter DIKT;
- condensate tank.

## PRINCIPLE OF OPERATION

The plant works as follows: gas from the well enters the inlet pipeline to the heat exchanger. In the heat exchanger, the gas is heated, passing through the tube bundle which is surrounded with the coolant flow.

Next, the gas is fed to the inlet pipeline of the research separator. The required mode of operation (pressure) of the heat exchanger and the separator is set by throttles.

Then the gas passes through a coagulator, which serves to partially clean of vapor, and enters the separator, where the final cleaning of moisture occurs by a swirler and separating elements. After the separator, the gas is supplied through the outlet pipeline to the DIKT and then to the horizontal flare system.

The liquid phase from the separator flows into the condensate tank, from which it is removed either to the flare system or to a special condensate tank.

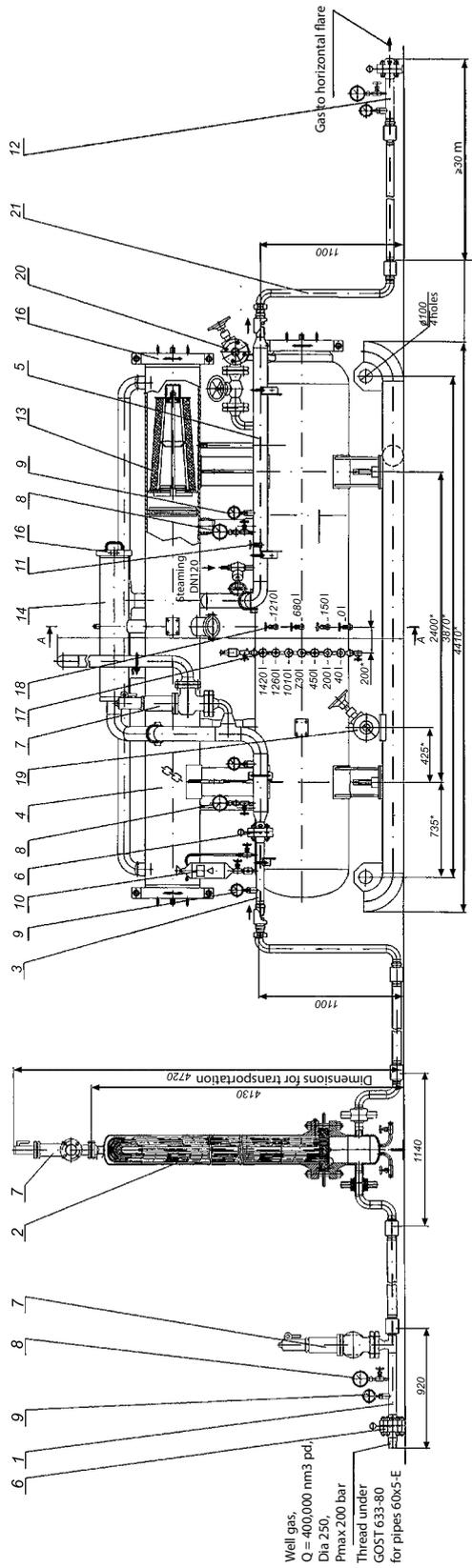
## SPECIFICATIONS

Parameter	Value
Operating medium	gas with gas condensate, oil and water impurities
Operating medium pressure, MPa:	
- at the inlet, max	20
- after D1 throttle	16
- operating pressure in the separator (after throttle 2)	10
Capacity:	
- for gas, Sm <sup>3</sup> /day, max	400 000 ... 600 000*
- for liquid, m <sup>3</sup> /day, max	120 ... 400
Operating medium temperature, °C:	
- maximum, not more	+70
- operating	+10 ... +60
Ambient temperature, °C	-60 to +45
Category and group of explosive medium	IIA-T1
Overall dimensions of the largest part, mm, max:	
- length	4 610
- width	1180
- height	2 370

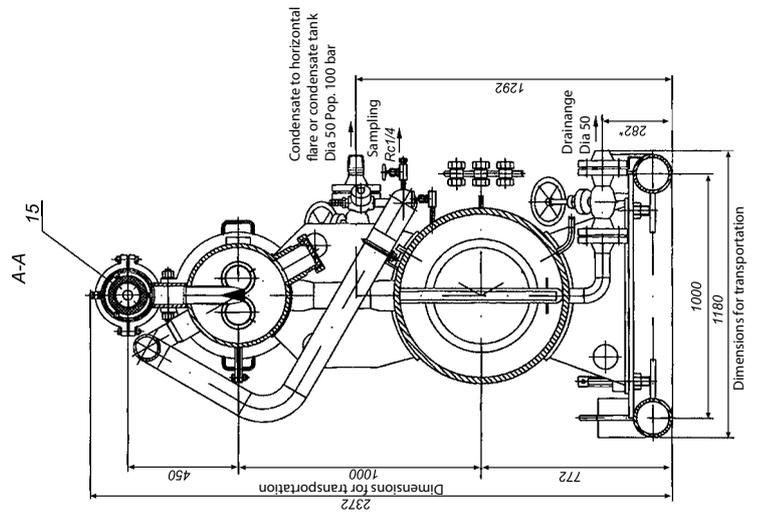
\* It is possible to manufacture a plant with gas capacity up to 1 500 000 Sm<sup>3</sup>/day.

# MOBILE COMPLEXES FOR SURVEYING AND DEVELOPMENT OF WELLS

## PROCESS LAYOUT



- 1 - Inlet joint
- 2 - Heat exchanger
- 3 - Reduction line
- 4 - Research separator
- 5 - Gas outlet line
- 6 - Throttle
- 7 - Safety valve
- 8 - Pressure gauge
- 9 - Thermometer
- 10 - Methanol tank
- 11 - Sampler
- 12 - Diaphragm critical-section meter DIKT
- 13 - Separating component
- 14 - Coagulator
- 15 - Filter
- 16 - Quick-detachable cover
- 17 - Level indicator
- 18 - Measuring valves
- 19 - Drain valve
- 20 - Condensate pipeline
- 21 - Elbow



## SALINE SOLUTION UNITS

### PURPOSE

The saline solution unit (hereinafter SSU) is intended to produce salt solutions with various specific gravity, free from all undissolved impurities of suspended solids harmful to the oil formation (which are particles having a diameter greater than 5 microns).

### PRINCIPLE OF OPERATION

For the preparation of the saline solutions, six identical blocks are used, consisting of a frame base, a preparation tank, a circulation pump, a fine filter, piping with valves, instrumentation and control devices. The saline solutions are prepared in vertical tanks equipped with a dry salt receiving bin, mud mixer, alarm indicator of high and low levels, temperature sensor and densitometer. Through ultrasonic flow meter, the technical water is poured into each tank by the pump; the water is passed through the fine filters and settled in the storage tanks. Dry and packed by weight, the salt from the storage compartment with the help of a crane is delivered to the process room and fed into the receiving bin of the solution preparation tanks; the package is opened and the salt is poured into the container. Before pouring into a tank truck, the solution is mixed with chemicals and delivered to the tank truck through a mass flow meter. To treat the solution, two of four solution preparation blocks are used that have access to a loading rack. The solution is shipped in concentrated condition.

### DESIGN

According to its functional purpose, production and warehouse equipment is divided into four separate standing facilities:

1. The room for preparation of saline solutions with a warehouse for storage of dry, packaged salt, which includes:
  - frame-panel building with a compartment for receiving, storing and unpacking of salt; with a compartment for preparation of saline solutions, with an electrical switchboard room and an operator room on an upper floor;
  - tank, pumping and lifting equipment, process piping with shut-off and control valves, instrumentation and automation equipment, systems of Warm up, ventilation, lighting, as well as fire extinguishing and alarm systems.
2. The block of flow rate tanks for chemicals (on the open site) consists of six horizontal cylindrical tanks equipped with thermal insulation and a water heater.
3. The chemical dosing block is a block-box with pumping equipment and control and regulation devices placed in it.
4. The emulsion preparation block (under a canopy) is an open-space spatial construction on a rigid frame base with an emulsion preparation tank, a circulation pump, a fine filter, piping with shut-off valves and control devices.



### ITEMS SUPPLIED

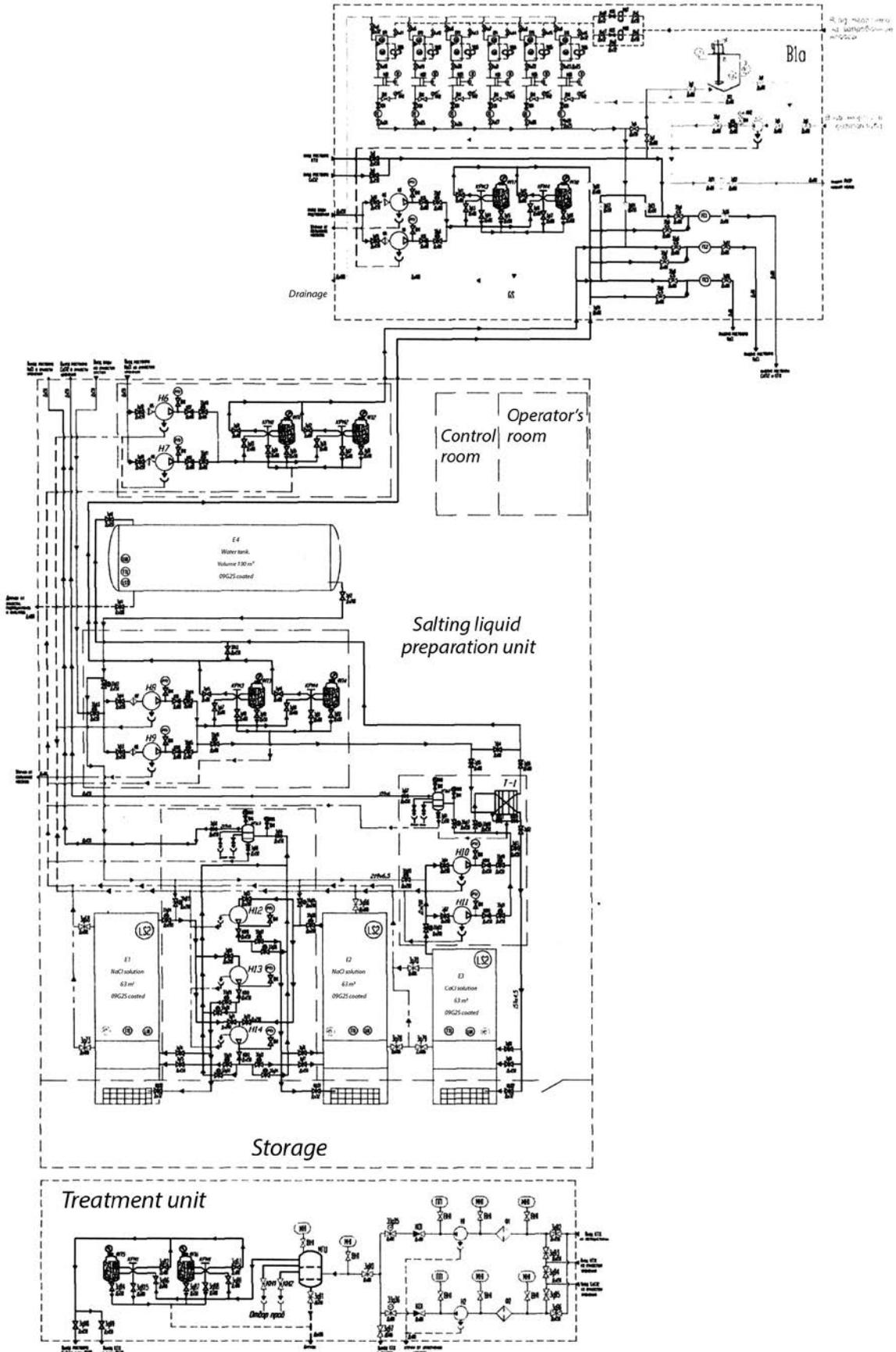
The manufacture of each unit, the selection of process equipment, the choice of the technological scheme is carried out taking into account the quality of the initial medium, the required performance, operating conditions and individual customer's requirements, according to the questionnaire.

### ADVANTAGES

SSU operates in semi-automatic mode, with the presence of staff. Equipping the process equipment with instrumentation and flow rate meters allows you to control the process of preparing the solution both visually and remotely, with all data documentation in the APCS.

# SALINE SOLUTION UNITS

## PROCESS LAYOUT



## UNITS FOR PREPARING MUDS AND EMULSIONS

### PURPOSE

The unit for preparation of muds and emulsions (hereinafter MPU) is intended for preparation of drilling and cementing muds, both with water base and hydrocarbon-based solutions of chemical reagents and various process fluids, including fluids for development and workover of wells.

MPU is used as part of the circulation system or autonomously in the construction and workover of oil and gas wells.

### PRINCIPLE OF OPERATION

After filling the tank with 80% of water and mud, the valve opens in the receiving line of one of the sand pumps. The sand pump that takes the mud out of the tank starts, and the resulting mixture returns to the tank of the preparation unit through the pipeline, forming a closed circulation cycle. In the process of injection and further preparing of the mud, the mud in the tank is stirred by mechanical agitators.

With the help of the same pump, the mud is recirculated into the pumping unit of the modular pumping station (MPS) and into the receiving tanks of the circulation system and is pumped into the well by the mud pumps.

### DESIGN

The process module is a room in which there are sand pumps, process piping, small-sized mobile steam generating unit, instrumentation and automation equipment, as well as the systems of Warm up, ventilation, lighting, and electrical equipment.

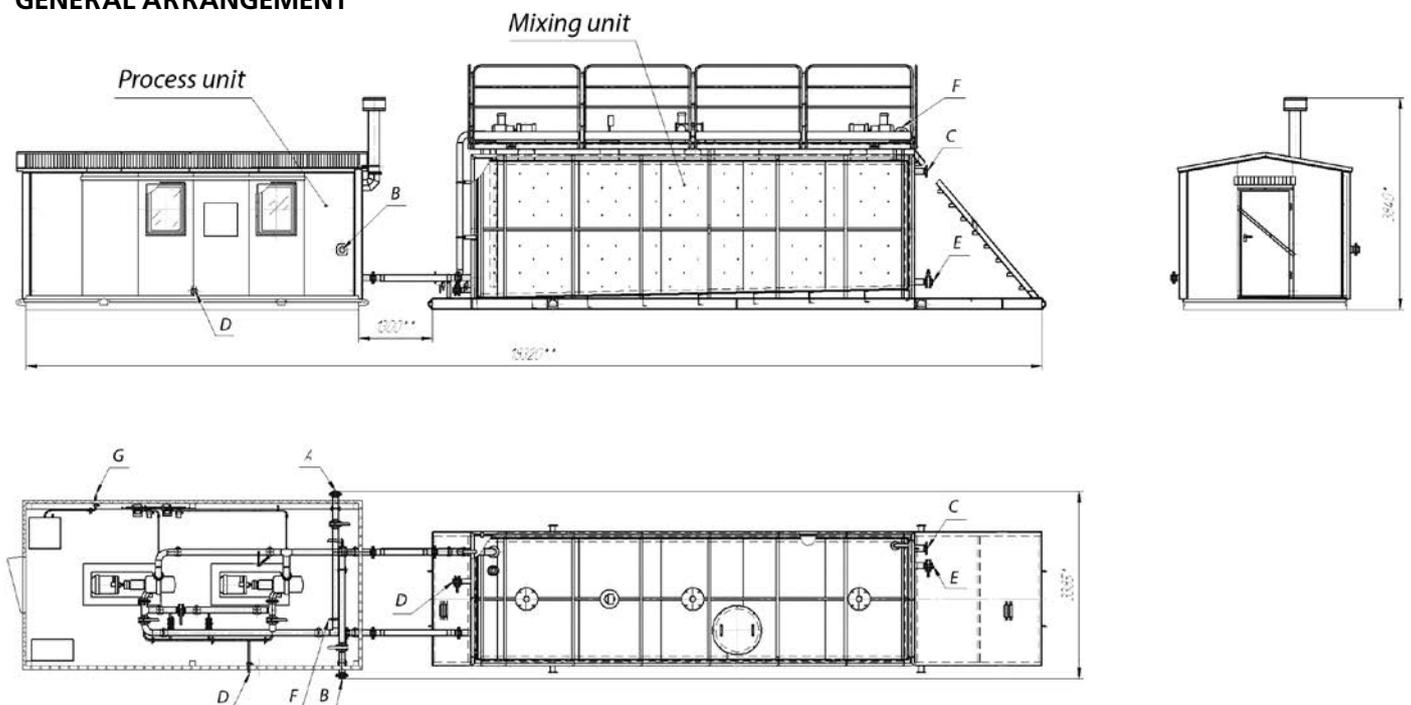
The tank for storing and mixing the solution is equipped with removable railing for the time of transportation, and a ladder. For internal inspection and cleaning inside the tank there is a hatch with a ladder. To determine the liquid volume in the tank, a measuring scale and a radar level gauge (without contact with the solution) are mounted. Three modernized paddle-type mechanical agitators are mounted in the tank.

### ITEMS SUPPLIED

MRU consists of two units:

- tank for storage and mixing of the solution;
- process module.

### GENERAL ARRANGEMENT



- A – solution inlet
- B – outlet of the solution for recirculation into MPS
- C – inlet solution from MPS
- D – drain into the drainage tank
- E – outlet of the mud to an external pump
- F – sampling
- G – stand
- H – steam outlet

## UNITS FOR PREPARING MUDS AND EMULSIONS

SPECIFICATIONS	
Parameter	Value
Operating volume of the tank, m <sup>3</sup>	40
Sand pump unit PB-63/22,5, pcs	2
- Duty	1
- Standby	1
Flow, m <sup>3</sup> /hour	63
Discharge pressure of the pump, m	22.5
Motor power, kW	15
Mechanical mixer PLM, pcs	3
Motor power, kW	7.5
Nominal diameter of the suction pipeline, mm	100
Nominal diameter of the discharge pipeline, mm	100
Warm up of the tank by Warm up cable with installed power, kW	6
Overall dimensions of the process module (length x width x height), mm:	6560 x 3200 x 2850
Overall dimensions of the mixing unit (length x width x height), mm	11160 x 2670 x 4420
Indoor air temperature in the process module, °C	+5
Room category according to SP12.13130.2009	D
Fire resistance of the building according to SNiP 21-01-97	IV
Constructive fire hazard class according to SNiP 21-01-97	S0
Estimated temperature of the coldest five days, °C	-43
Wind load for construction area II, kPa	0.30
Snow load for the V area according to SNiP 2.01.07-85, kPa	3,2
Warm up	Electric
Ventilation	natural, through the deflector and the door
Service life, not less, years	10

## UNITS FOR HYDROCYCLONE PURIFICATION OF CENOMANIAN WATER FOR PPD SYSTEM

### PURPOSE

The unit for hydrocyclone purification of Cenomanian water (hereinafter the unit) intended for purification of formation water of the Aptian-Albian-Cenomanian horizon, which does not contain oil and colloidal suspended solids, with cleaning of mechanical impurities and feeding it under excessive pressure to the pumps of the cluster pad pumping stations (CPPS) of the formation pressure maintenance system (FPMS). The unit is mounted at the CPPS site in accordance with the siting project made by the competent organization.

Climatic design: UHL1 according to GOST 15150-69. Category of the room of the of the process module (PM) for fire and explosion hazard according to NBP105-95: D. Explosive area class for PM according to PUE: not regulated. The degree of fire resistance of the blocks of the unit IV according to SNiP 31-03-2001.

### PRINCIPLE OF OPERATION

Cenomanian water runs from the separator through the valve to the inlet of the operating pump. The water is supplied from the discharge pipe of the operating pump through the check valve of the gate valve to the inlet compartment of multi-hydrocyclones, in which, under the action of centrifugal forces, the water is cleaned of the most of mechanical impurities. To provide high-quality cleaning, the pressure drop on multi-hydrocyclones should be at least 0.3 MPa. Pressure drop is controlled by the difference in the readings of the pressure gauges. Water contaminated by captured solids is run through valves to a drainage tank for settling and further disposal. Partially purified water is fed through the valves into the inlet compartment of filters, where the water is filtered through the Krapukhin filtering elements into the outlet compartment and through the valves is fed under excessive pressure to inlets of the CPPS pumps. Mechanical impurities accumulated in the inlet compartments of filters are removed to the drainage tank by alternate backwash during operating of the standby pump.

### ITEMS SUPPLIED

The process module (PM) is a mobile heated room with surrounding structures organized as a box with three-layer panels. PM has the following equipment:

- two booster pumping units;
- two multicyclones;
- two filters with Krapukhin filtering elements (KFE);
- two power electrical cabinets;
- one control cabinet;
- piping with safety and shut-off and control valves;
- instrumentation and automation equipment.

Warm up of the PM is carried out by electric heaters and is provided for a start-up period or for a period of repair when the heat generation from the process equipment is missing or insufficient to ensure the operation of the process equipment. Heater control is manual and automatic. The PM ventilation is natural, from the upper zone through the deflector.

The PM lighting is provided with explosion-proof lamps. The switching on of the lamps is carried out by local switches.



Fire extinguishing in the PM is provided by means of automatic powder fire extinguishing systems of the "Buran" type. The scope of automation and control means can ensure the operation of the unit with the periodic presence of staff. The control and automation system provides the following:

- manual local start and stop of the pump unit electric motor;
- remote stop of the electric motor from the control module;
- automatic shutdown of the electric motor at the minimum level of the liquid in the separator, the minimum (with time lag) and maximum pressure in the injection manifold, in case of fire in the PM. Starting the electric motor in automatic mode is not provided, because before it is necessary to find out and eliminate the cause for its automatic shutdown;
- automatic shutdown in case of fire in the PM;
- manual activation and deactivation of electric heaters of the PM and CM;
- automatic shutdown of electric heaters PM in case of fire;
- automatic activation and deactivation of the PM electric heaters at set temperature;
- manual turning on and off the PM lighting.

Operation alarm provides signals about the following:

- switched on and off the electric motors of the pumps;
- the average level of the liquid in the separator;
- switched on and off the PM heaters.

Sound and light emergency alarm system (with the possibility of its forced testing):

- at low liquid level in the separator;
- in case of fire in the PM;
- when the minimum and maximum pressure in the discharge piping of the power pumps.



## MEASURING UNITS "MERA®-MASSOMER"

### PURPOSE

Measuring unit (hereinafter the unit) "Mera®-Massomer" is intended for automated measurement of mass flow rate of separated liquid (crude oil) and volumetric associated free gas flow (hereinafter the gas), produced from oil wells, with the subsequent determination of the monthly production of wells with metering of each component.

### PERFORMED FUNCTIONS

The unit provides for each connected oil well connected for the measurement:

- direct measurements of average mass flow rate and mass of crude separated oil (hereinafter the liquid);
- direct measurements of the standard volumetric flow rate reduced to the standard conditions and the volume of free petroleum gas (hereinafter the gas) released after the separation;
- direct and indirect measurements of the volume or mass fraction of water in crude oil;
- indirect measurements of average mass flow rate and mass of crude oil excluding water (hereinafter the oil).

### ITEMS SUPPLIED

The unit consists of a process module (PM), and a control module (CM).

The PM is intended for placing, covering and ensuring the normal operating conditions of the process equipment and measuring devices of the unit.

The CM is intended for placing, covering and ensuring the normal operating conditions for equipment that provides power, control, indication of parameters and modes, control of the unit operation, transfer of measurement data to the central control room of the oil field.



Possible options for manufacturing of the units:

- stationary
- mobile

### SPECIFICATIONS

Parameter	Value
Measurement range of crude oil mass flow, tons/day	5 to 2000
Gas/oil ratio (GOR)*, Sm <sup>3</sup> /ton, max	1000
Operating pressure, MPa	0.2 to 6.3
Number of inlets for connecting wells, pcs	1 to 14
Limits of permissible relative measurement error:	
– liquid, %	±2.5
– gas, %	±5.0
Mass and mass flow rate of oil under operating conditions with water content:	
– 0 to 70%	±6.0
– over 70 to 95%	±15.0
– over 95%	In accordance with the measurement procedure
Climatic design of the unit according to GOST 15150-69	UHL.1
Category of explosion and fire hazard as per VNTP 01/87/04 and NBP 105-95	A
Class of hazardous area in the PM room according to the classification of the "Electrical installation code" (PUE)	V-1a
Category and group of explosive mixture in accordance with GOST R 51330.0-99	IIA-TZ
Station service life, years, not less	10

\* GOR factor is the amount of petroleum gas, reduced to the standard conditions and extracted with one ton of oil.

# MEASURING UNITS "MERA<sup>®</sup>-MASSOMER"

## SPECIFICATIONS OF MEASURED MEDIUM

Metered (operating) medium is oil well production

- temperature, °C ..... + 5 to + 90;
- kinematic viscosity, m<sup>2</sup>/s ..... 1 x 10<sup>-6</sup> to 150 x 10<sup>-6</sup>;
- density, kg/m<sup>3</sup> ..... 750 to 1100;
- volume content of water, %, max ..... 99.



## MISCELLANEOUS

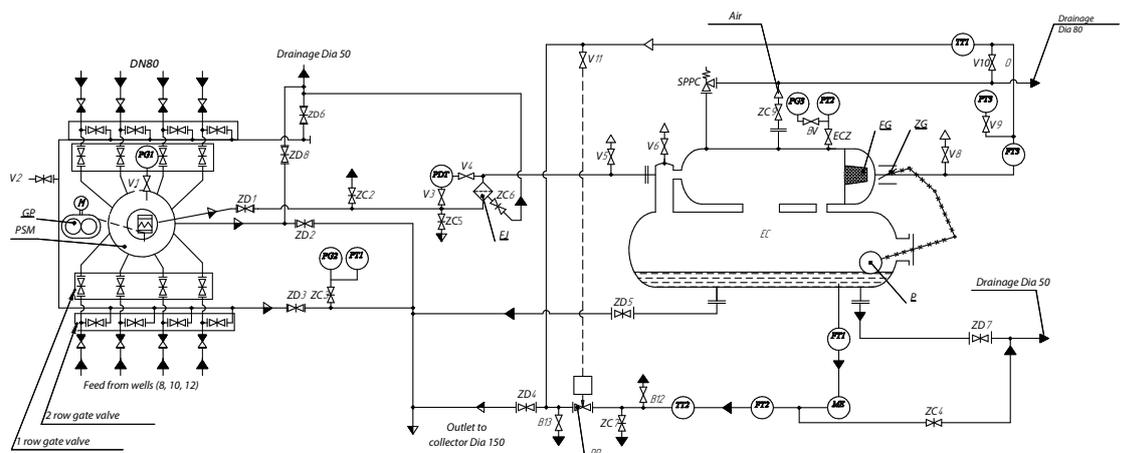
The following is possible on request:

- equip the unit with a bypass gauge to visualize the process of filling the measuring tank;
- internal anticorrosion and wear-resistant coating of the separation tank, piping and the MSM, the operating part of the MSM and the carriage can be made of stainless steel.

The measuring unit "Mera Massomer" won the Diploma of the "100 best products of Russia - 2015" competition.

## GENERAL LAYOUT

- KOP - reverse valve
  - PSM - multipath well switch
  - GP - hydrodrive
  - DI1, DI2 - excess pressure sensor
  - V1 - V10 - globe valves
  - ES - separator
  - ZC1 - ZC9 - wedge gate valves
  - VL - humidity gauge
  - GC - hydrocyclone
  - Mn1-Mn3 - pressure gauge
  - RJ - fluid flow meter
  - RG - gas flow meter
  - SPPC - safety valve
  - ZG - gate
  - RR - volume regulator
  - P - float
  - TC1, TC2 - thermotransducers
  - T - TOP counter
  - PU - manual sampler, produced by HMS Neftemash OJSC
- Oil and gas flow lines  
 - - - Electrical communication lines  
 - - - Mechanical communication lines



## ADVANTAGES OF MEASURING UNITS "MERA<sup>®</sup>-MM"

1. The measuring unit "Mera<sup>®</sup>-MM" it can be equipped with a separation tank having a volume of 2.5 times more than the old units. "Mera<sup>®</sup> MM 40-n-400" V<sub>cen</sub> > 2 m<sup>3</sup>, "Mera<sup>®</sup> MM 40-n-1500" V<sub>cen</sub> > 5 m<sup>3</sup> equipped with original hydrocyclone of the HMS Neftemash production (with a separate outlets of liquid and gas), multistage baffle and mesh drip trap on the gas line.
2. The use of flow regulators and valves manufactured by Kurzan-Media and New Technologies firms are the most reliable in operation.
3. Coriolis flow meter is installed in a spatial frame, which prevents the impact on it of compressive tension, torsion, which may occur during manufacture and during operation of the measuring unit.
4. The unit can be equipped with a coarse filter between the multi-stream switching manifold (MSM) and the separation tank; a pressure drop sensor is installed, which determines the filter contamination degree.
5. A pressure gauge is installed on the MSM housing to monitor the pressure, and a drain line from the MSM into a drain outlet of a bypass line is provided for pressure relief and drainage of residual liquid.
6. Direct measurement of mass and volumetric flow rate of the medium.
7. Easy installation and maintenance of measuring instruments (flow meters).
8. Higher measurement accuracy due to improved separation (lower content of free gas in the liquid pipeline and dropping liquid in the gas pipeline compared to similar measuring units).
9. The control system can be made on the basis of the Direkt Logic, Siemens, SCADAPack, and other controllers.
10. In the adjustment mode, the control is carried out by the operator through a touchscreen (LCD).

## MEASURING UNITS "MERA®-MR"



### PURPOSE

Measuring unit "Mera-MR" (hereinafter the unit) is intended for continuous or discrete measurements of flow rate and the amounts of components of an oil well production, as well as indication, archiving and transmission of measurement results and alarms to the central control room of the oil field in conditions of moderately cold climate. The main distinctive feature of the proposed unit is the use of NetOil&Gas multiphase flow meter (hereinafter the MPFM), the use of which allows measuring the amount of oil, gas and water coming from the well, without prior separation in the separator\*.

*\*When the presence of gas fraction in the stream is no more than 50% under operating conditions. A pre-separator is provided in the presence of gas fraction of more than 50%.*

Possible versions of the units:

- stationary;
- mobile.

### PRINCIPLE OF OPERATION

The principle of operation is based on measuring the mass and density of fluid with a Coriolis flow meter, which, together with data from water cut, pressure, and temperature sensors, allows calculating the mass and volume of the three fluid components (oil, water, associated petroleum gas) in two aggregate states (liquid and gas). Thus, the unit provides real time measurements of flow rates and masses (volumes) determining the cumulative total of the following components: liquid (crude oil), oil (crude oil without water), water, free gas and dissolved gas.

### ITEMS SUPPLIED

The units include the following sections:

- process module (hereinafter the PM);
- control module (hereinafter the CM);
- well switch section (hereinafter the WSS) the delivery of BPS is determined by the order.

Each module is a modular building of standard design with equipment placed inside. The module are connected to each other with interface and power cables.

The PM is intended for placing, covering and ensuring the normal operating conditions of the process equipment and measuring instruments (hereinafter the MI) of the units. PM contains:

- a distribution header for alternately connecting one of the oil wells to the NetOil&Gas and others to the outlet header by the multi-stream switching manifold.
- NetOil&Gas multiphase flow meter (State Register No. 51424-12).
- I/A Series mass flow meter with CFS10, CFS20 flow converter and CFT51 measuring transducer (State Register No. 53133-13).
- Auxiliary sensors and transducers.
- Piping.
- a separation tank (if available), which serves to pre-separate free petroleum gas from crude oil and is equipped with a system for control the level of crude oil accumulated in the separation tank.

The CM is intended for placing, covering and ensuring the normal operating conditions for equipment that provides power, control, indication of parameters and modes, control of the unit operation, transfer of measurement data to the central control room of the oil field. The CM consists of the following items:

- Control cabinet with microprocessor controller (hereinafter the MCC) intended for collecting and processing information of the metering system and for controlling the system of regulating the level of the distribution unit of the PM or WSS, as well as for archiving, displaying and transmitting information to the upper level.
- Power cabinet for power supply of the PM and CM systems.
- Secondary devices applied in the PM metering system (if available).
- Terminal blocks.

The WSS is intended for placing, covering and ensuring the normal operating conditions for the installed distribution header (hereinafter the DH) for alternately connecting one of the oil wells to the separation tank (hereinafter the ST) placed in the PM and other wells to the manifold.

The units are connected to the measured wells by means of flexible high-pressure hoses that included as the assembly parts.

## MEASURING UNITS "MERA®-MR"

### SPECIFICATIONS OF MEASURED MEDIUM

Metered (operating) medium is oil well production with parameters:

- operating pressure, MPa ..... 0.3 to 10.0;
- temperature, °C ..... -29\* to +121;
- liquid kinematic viscosity, mm<sup>2</sup>/s ..... 1 to 50;
- crude oil density, kg/m<sup>3</sup> ..... 700 to 1100;
- oil density, kg/m<sup>3</sup> ..... up to 870;
- volume fraction of water in crude oil, % ..... 0 to 100;
- maximum gas content, % ..... 100;
- hydrogen sulfide content, %, max ..... 6\*\*.



\* Provided that the medium is in a liquid state.

\*\* When the content of hydrogen sulfide is more than 2%, the unit is made using special materials.

### SPECIFICATIONS

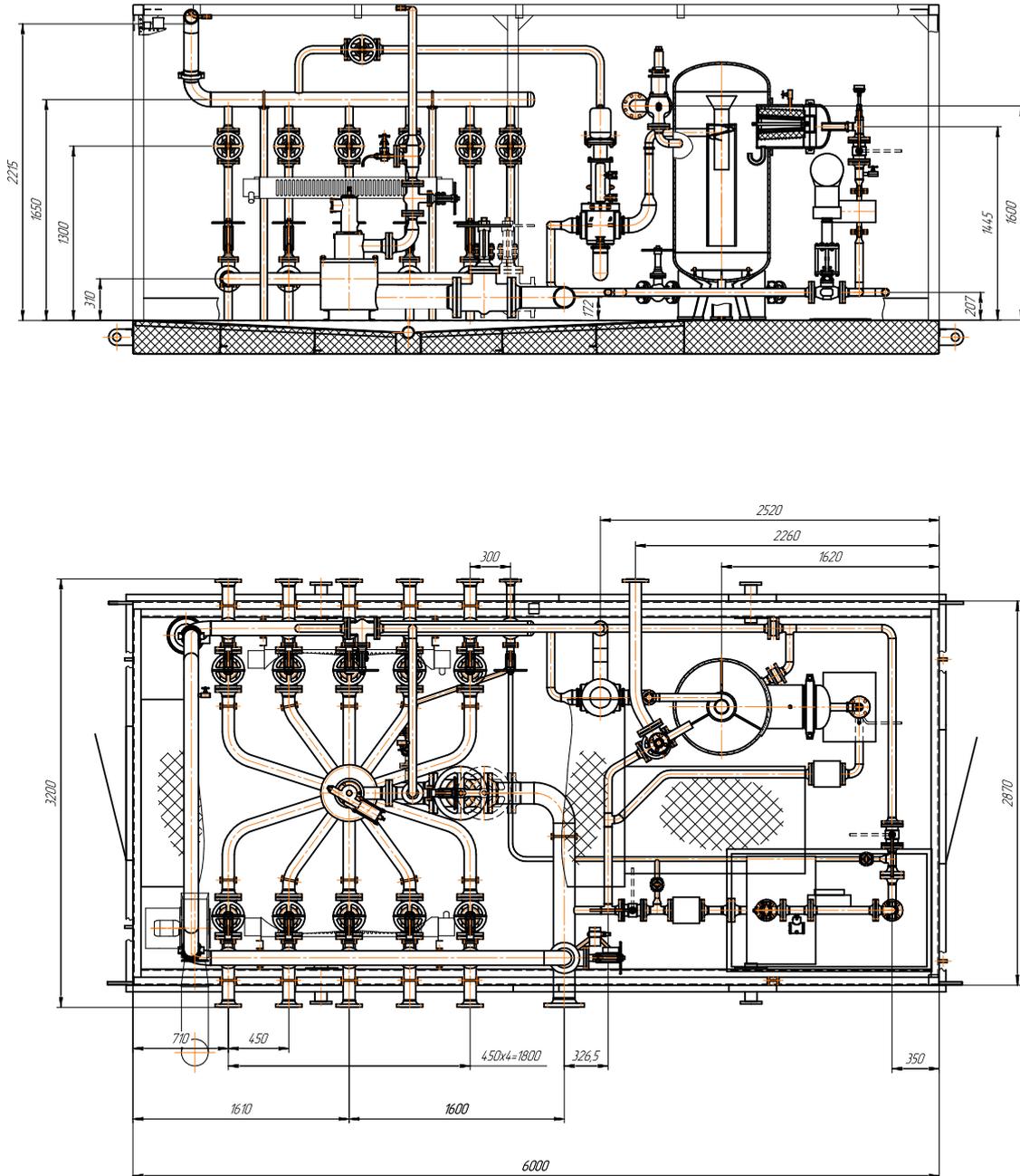
Parameter	Value
Measurement range of crude oil mass flow without gas, tons/day	1 to 2700
Measurement range of crude oil mass flow with gas volume fraction up to 50%, tons/day.	10 to 1368
Measurement range of volumetric flow rate of free petroleum gas, reduced to standard conditions, m <sup>3</sup> /day	100 to 1500000
The unit is powered from a three-phase AC network: <ul style="list-style-type: none"> <li>– frequency, Hz</li> <li>– voltage, V</li> </ul>	50 220/380
Power flow rate, kW, max	30
Limits of permissible relative measurement error for mass and liquid mass flow rate, %	±2.5
Limits of permissible relative measurement error for volume and volumetric flow rate of gas reduced to the standard conditions,%	±5.0
Limits of permissible relative measurement error of the unit for mass and the mass flow rate of oil under the operating conditions when the water content in the liquid, %: <ul style="list-style-type: none"> <li>– 0 to 70%</li> <li>– over 70 to 95%</li> <li>– over 95%</li> </ul>	±6 ±15 not rated
Number of inlet lines, pcs	1 to 14
Service life, not less, years	10

### APPROVAL DOCUMENTATION

- Certificate of conformity.
- Pattern approval certificate.
- Vehicle type approval (when mobile unit version).

# MEASURING UNITS "MERA®-MR"

## GENERAL ARRANGEMENT



# SYSTEMS FOR METROLOGICAL SERVICE



## PURPOSE

System for metrological service is designed for technical support of the calibration process of measuring volumes of tanks for the measuring units "Mera®" in moderately cold climate conditions.

## ITEMS SUPPLIED

The unit includes:

- Tractor trailer chassis;
- Process Module;
- Storage tank;
- Flexible pipe with quick-release joints;
- Earthing electrode;
- Set of adapters for connecting to the measuring unit;
- Connecting cables.

## PRINCIPLE OF OPERATION

Liquid is pumped through the flexible pipe from the storage tank through the flow meter into the calibrated tank of the measuring unit.

The number of calibration cycles is performed in accordance with the requirements of the Verification Methodology.

The monitoring of the current liquid level in the tank is carried out using the controller panel or visually according to the indications of the visual indicators of the level gauge.

When the temperature of the liquid in the tank drops below the minimum value, the blocks of electric heaters are turned on at the command of the operator or in automatic mode. When the operating temperature of the liquid in the tank is reached, the electric heater blocks are switched off at the operator command or in automatic mode.

In the case when with the included blocks of electric heaters the liquid level in the tank reaches low value, at the command of the level sensor, the electric heater blocks are automatically switched off.

For the forced warming up of the operating fluid, the possibility of connecting units of steam truck type is provided.

## DESIGN

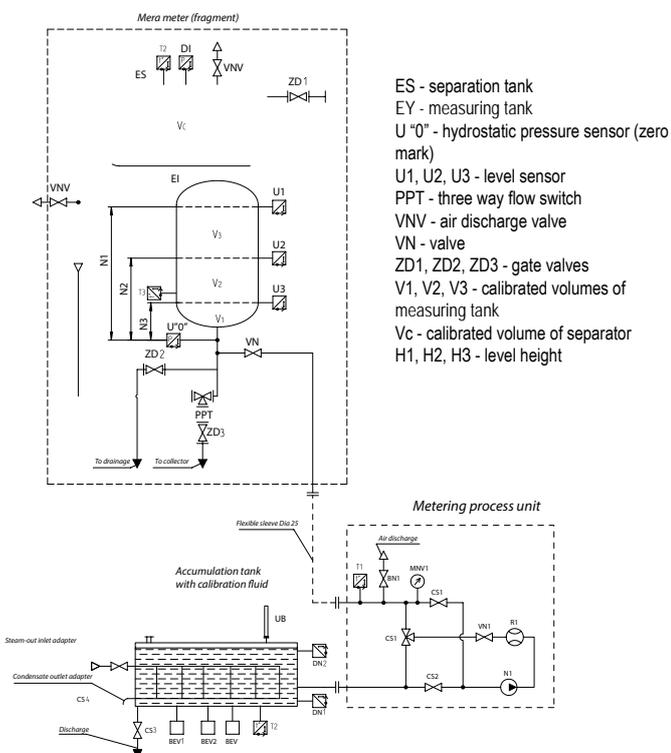
The unit consists of two sections: the process module and the storage tank, which are located on a tractor trailer chassis.

The PM is a container type building.

The storage tank is made of corrosion-resistant material with thermal insulation.

Convenient design, easy to operate and maintain.

## HYDRAULIC CIRCUIT



## SPECIFICATIONS

Parameter	Value
Operating fluid (hereinafter the fluid)	technical water
Allowed to use other neutral non-toxic non-freezing liquids of constant density	NaCl water solution or similar
Ambient air temperature during unit operation, °C	-10 to +50
Protection degree of the unit room according to GOST 14254	IP04
Operating pressure, MPa, max	0,25
The unit is powered from a three-phase AC network with the following parameters: - frequency, Hz - voltage, V - allowable voltage variation of electric power from nominal value	50±1 380 10%
Power flow rate, kW, max	15
Overall dimensions of the unit, mm, max	10000x2500x3970

## MEASURING UNITS "MERA®-MIG"



### PURPOSE

Measuring unit "Mera®-MIG" (hereinafter the unit) is intended for continuous or discrete measurements of flow rate and the amounts of components, resulting from the separation of products, respectively, one or more oil wells, as well as indication, archiving and transmission of measurement results and alarms to the central control room of the oil field.

The scope of application: systems of sealed collection of oil and gas at oil fields, including those in the final production conditions (high water content in product of wells).

### PERFORMED FUNCTIONS

The unit provides for each connected oil well for the measurement:

- direct measurements of average mass flow rate and mass of crude separated oil (hereinafter the liquid);
- direct measurements of the standard volumetric flow rate reduced to the standard conditions and the volume of free petroleum gas (hereinafter the gas) released after the separation;
- direct or indirect measurements of the volume or mass fraction of water in crude oil;
- calculations of average mass flow rate and mass of crude oil excluding water.

### ITEMS SUPPLIED

The unit consists of a process module and a control module.

The process module is intended for placing, covering and ensuring the normal operating conditions of the process equipment and measuring devices of the unit. The process module has the following items installed:

- separation-measuring tank, used for separation the associated gas from the oil-water mixture;
- switching manifold (in the case of connecting several wells), which serves to connect one of the oil wells to the separating-measuring tank, and the other wells to the outlet manifold;
- piping, which serves to connect the outlets of the separating-measuring tank of gas and liquid with the outlet manifold, and the inlet of the tank with the switching manifold;
- measuring instruments used to measure the flow rate and mass of liquid, volume content of water in crude oil, flow rate and mass (volume) of gas, pressure, and temperature;
- control and gate valves;
- Warm up, lighting and ventilation systems.

The control module is intended for placing, covering and en-



suring the normal operating conditions of the equipment installed in the unit. The control module includes (depending on the unit version):

- controller for collecting and processing information from the measuring equipment installed in the process module to control the switching manifold of the process module, and to transmit information to the upper level;
- power cabinet for powering the controller, Warm up systems, lighting, measuring instruments, ventilation, as well as actuators located in the process module;
- secondary devices of measuring instruments used in the process module;
- Warm up, lighting and alarm systems.

### DESIGN AND PRINCIPLE OF OPERATION

In the mode of discrete measurement of liquid and gas, the production of wells runs through piping connected into the well multi-stream switching manifold (MSM). The production of one of the wells is directed through a hydrocyclone into the separation-measuring tank (SMT), while the production of the other wells is run into the outlet manifold. The tank separates the gas from the liquid. The released gas flows through the gas filter (GF) and the gas flow meter (GFM) into the outlet manifold, and the liquid is accumulated in the lower part of the SMT.

According to indication of the level sensor (LS) (upon reaching a predetermined level of liquid in the tank), the shut-off and control valve (ZRK) in the liquid line opens.

This mode provides a periodic discharge of accumulated liquid through the liquid flow meter (LFM). The measured liquid is run into the outlet manifold.

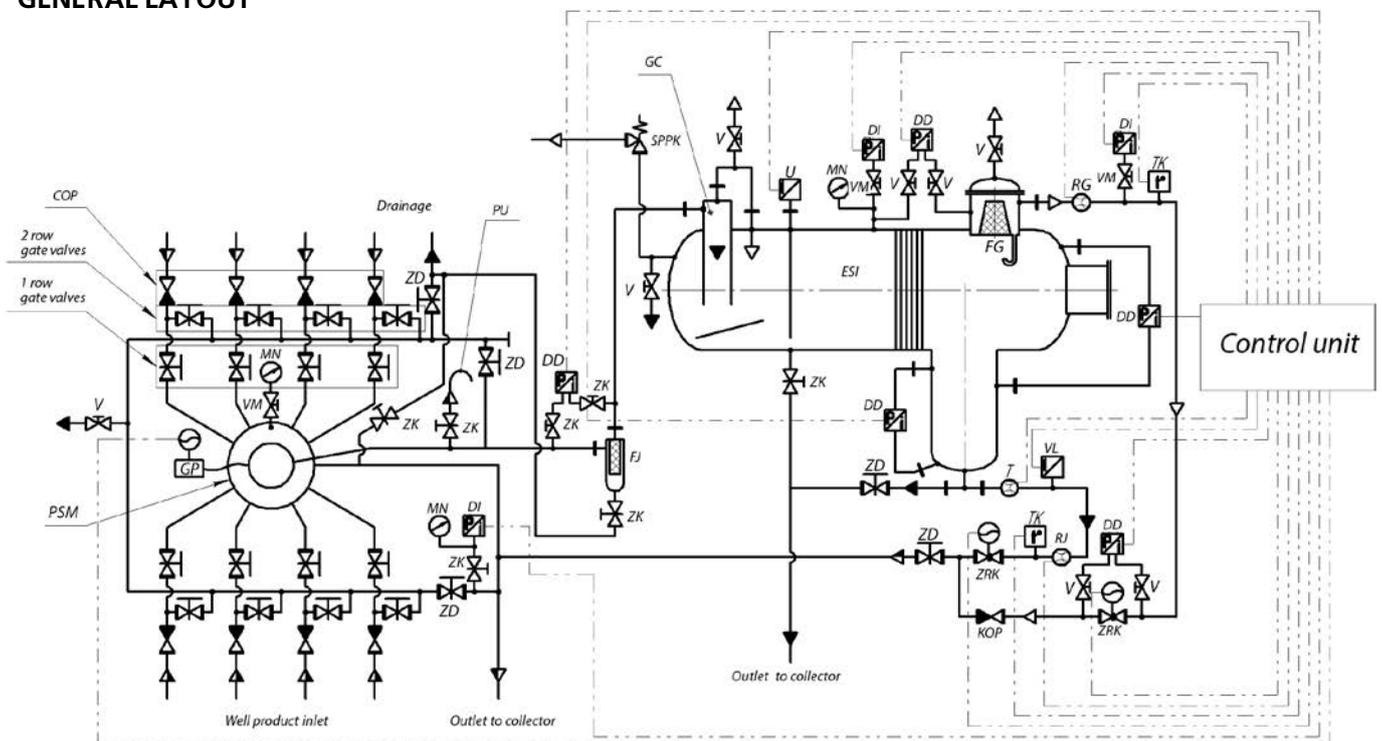
Also, the unit can operate in continuous measurement mode for liquid and gas.

During operation in this mode, the DI sensor is set with the value of specified level which is need to be kept. With a decrease in the level in the tank, the DI3 sensor sends a command to the ZRK valve of the liquid line to reduce the flow area, and vice versa, when the liquid level rises above the specified level.

# MEASURING UNITS "MERA®-MIG"

SPECIFICATIONS	
Parameter	Value
Number of wells connected, pcs	not limited
Operating pressure, MPa, max	10
Parameters of the measured medium:	
- temperature, °C	-5 ... +90
- density, kg/m <sup>3</sup>	680 - 1250
- water volume content, %	0 - 99.9
- viscosity, cSt, max	500
- mass fraction of mechanical impurities, %	0.3
- GOR Sm <sup>3</sup> /day, max	1000
Measuring range	
- crude oil, ton/day, max	2000
- gas, m <sup>3</sup> /day, max	2 000 000
Limits of permissible relative measurement error	
- crude oil mass, %	2.5
- mass of crude oil, excluding water, when the water content in crude oil:	
- up to 70%	5
- 70% to 95%	10
- over 95%	28
- petroleum gas volume, %	5

## GENERAL LAYOUT



V – steel straight-through valve VPZ  
 VM – steel straight-through valve for  
 VPZM gauge  
 VL – water cut meter  
 GP – hydraulic drive  
 PSM – multipath well switch  
 DD – differential pressure sensor  
 DI – excess pressure sensor  
 ESI – separation and metering tank  
 ZD – wedge lock  
 ZC – coupling wedge lock  
 ZRC – shut-off and control valve

COP – reverse shut-off  
 MN – pressure gauge  
 PU – manual sampler  
 RG – gas flow meter  
 SPPK – safety valve  
 T – turbine fluid flow meter  
 TC – thermal transducer  
 U1 – level gauge  
 FG – gas filter  
 FJ – fluid filter

## PROCESS UNITS AGZU SPUTNIK AM, B



### PURPOSE

The process units AGZU Sputnik AM, Sputnik B is intended for automatic measurement the flow rate of oil wells for liquid and gas.

### PRINCIPLE OF OPERATION

In the mode of discrete measurement of liquid and gas, the production of wells runs through piping connected into the well multi-stream switching manifold (MSM). By means of MSM, the production of one of the wells is run to the separator, and the products of the remaining wells are run into the common pipeline. The tank separates the gas from the liquid. The released gas flows into the common pipeline, and the liquid is accumulated in the bottom of the separator tank.

By means of a flow regulator and a gate valve connected to the float level gauge, the cyclical passage of accumulated fluid through the meter at constant speeds is ensured, which provides the measurement the flow rate of wells in a wide range. The switching of wells is controlled by the control module according to the established program or by an operator. The use of a bypass line (bypass) and a meter with a display device allows you to measure the flow rate of wells in manual mode in case of a faulty of the MSM. The MSM is fixed to the piping with quick-detachable connections (with the use of two half-clamps), which allows it to be replaced during repair.

### DESIGN

It is a unit mounted on a metal base. The walls are three-layer sandwich panels attached to a metal frame. The roof is double slope. The unit has a switching manifold, piping and separation tank, as well as Warm up, lighting, and ventilation systems.

### ITEMS SUPPLIED

It consists of a process module and a control module. The process module can be made in several versions depending on the number of connected wells, nominal inside diameter, and capacity. The maximum possible number of connected wells: 14.

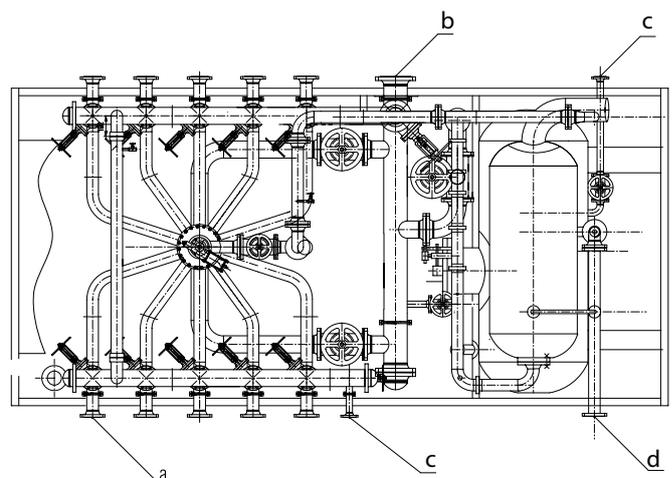
Unit designation	Nominal inside diameter of the gate valves or piping	
	to the MSM	to the bypass
Sputnik AM 40-8(10,14)-400	DN50	
Sputnik AM40-1(2,8,10,14)400*	DN80	
Sputnik AM 40-8(10,14)-400	DN80	DN50
Sputnik AM25(40)-8(10)-1500	DN80 (with one side inlet)	
Sputnik AM25(40)-8-1500	DN100 (with one side inlet)	
Sputnik AM25-8(10)-1500**	DN80 (double side inlet)	
Sputnik AM25-8-1500**	DN100 (double side inlet)	
Sputnik B40-8(10,14)-400* (with chemical dosing unit)	DN80	DN50

Notes:

\* - in the standard version and with anticorrosive coating of the internal surfaces of the piping;

\*\* - with anticorrosive coating of the internal surfaces of the piping.

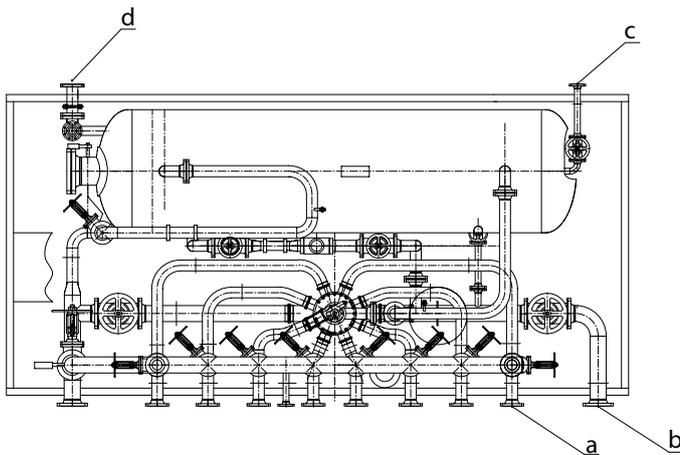
### SCHEME WITH DOUBLE SIDE INLET OF WELL PRODUCTS



- a - inlet of product of wells
- b - outlet to manifold
- c - drainage
- d - discharge from safety valve

## PROCESS UNITS AGZU SPUTNIK AM, B

### SCHEME WITH ONE SIDE INLET OF WELL PRODUCTS



### MISCELLANEOUS

The process module can be manufactured with an anticorrosive coating of the internal surfaces of the process piping, MSM, and separation tank.

A chemical dosing unit can be applied in the process module of the unit.

A gas meter can be installed at the request of the customer.

For years, well-known design, familiar "from alpha to omega" to the operating organizations.

- a - inlet of product of wells
- b - outlet to manifold
- c - drainage
- d - discharge from safety valve

### SPECIFICATIONS

Parameter	AM40-400	AM25(40)-8-1500	AM25(40)-10-1500	B40-400
Well flow rate range, m <sup>3</sup> /day, within	5 – 400	10 – 1500	10 – 1500	5 – 400
Operating pressure of the measured medium, MPa, max	4.0	2.5; 4	2.5; 4.0	4.0
Number of wells connected to the unit, pcs	8,10,14	8	10	8,10,14
Measurement error, %, max: <ul style="list-style-type: none"> <li>- to measure the amount of liquid</li> <li>- to measure the amount of gas</li> <li>- to measure the pressure</li> </ul>			±2.5 ±4.0 ±1.5	
Power supply parameters: <ul style="list-style-type: none"> <li>- current</li> <li>- voltage, V</li> <li>- allowable voltage deviation, %</li> <li>- alternating current frequency, Hz</li> <li>- power flow rate, kW, max</li> </ul>			alternate 380/220 -15 to +10 50±1 10	
Power supply of pneumatic circuits: gas pressure, MPa, max	4.0	2.5; 4.0	2.5; 4.0	4.0
Pressure drop between the separator and the common pipeline, necessary for the operation of the fluid flow regulator, MPa, max			0.12	
Indoor temperature, °C, not less			+ 5	
Relative humidity at the temperature of 20 °C, %, max			80	
Characteristics of the operating medium: <ul style="list-style-type: none"> <li>- kinematic viscosity at the temperature of 20 °C, m<sup>3</sup>/s</li> <li>- water content in liquid (volume fraction), %, max</li> <li>- gas content in oil reduced to the normal conditions, Nm<sup>3</sup>/m<sup>3</sup>, max: <ul style="list-style-type: none"> <li>• at the pressure of 0.8 MPa</li> <li>• at the pressure more than 0.8 MPa</li> </ul> </li> </ul>			1/106 to 120/106 98 25 16	
Room class			V-1a	
Instrument version			Explosion proof	
Overall dimensions of the process module, mm, max: <ul style="list-style-type: none"> <li>- length</li> <li>- width</li> <li>- height</li> </ul>	5760 3200 2600	6400 3200 2650	7200 3200 2650	6760 3200 2650

# GAS QUANTITY AND QUALITY MEASUREMENT SYSTEMS



The limits of the permissible relative error of measurements of the amount of free (associated) gas, natural gas, and other gases are provided in accordance with the requirements of the customer.

Depending on the standards of accuracy and the customer requirements, flow transducers of various types are used as part of SIKG: vortex, rotational, ultrasonic, jet, thermo-anemometric, etc.

## ITEMS SUPPLIED AND DESIGN

The SIKG is designed according to the block principle and consists of structurally complete sections:

- process module (PM);
- control module (CM) (it is delivered according to the requirements of the customer);
- data collection and processing systems (DPS).

The PM consists of the following items:

- inlet and outlet manifold;
- filter unit (FU);
- instrumentation line unit (ILU);
- process and drainage piping.

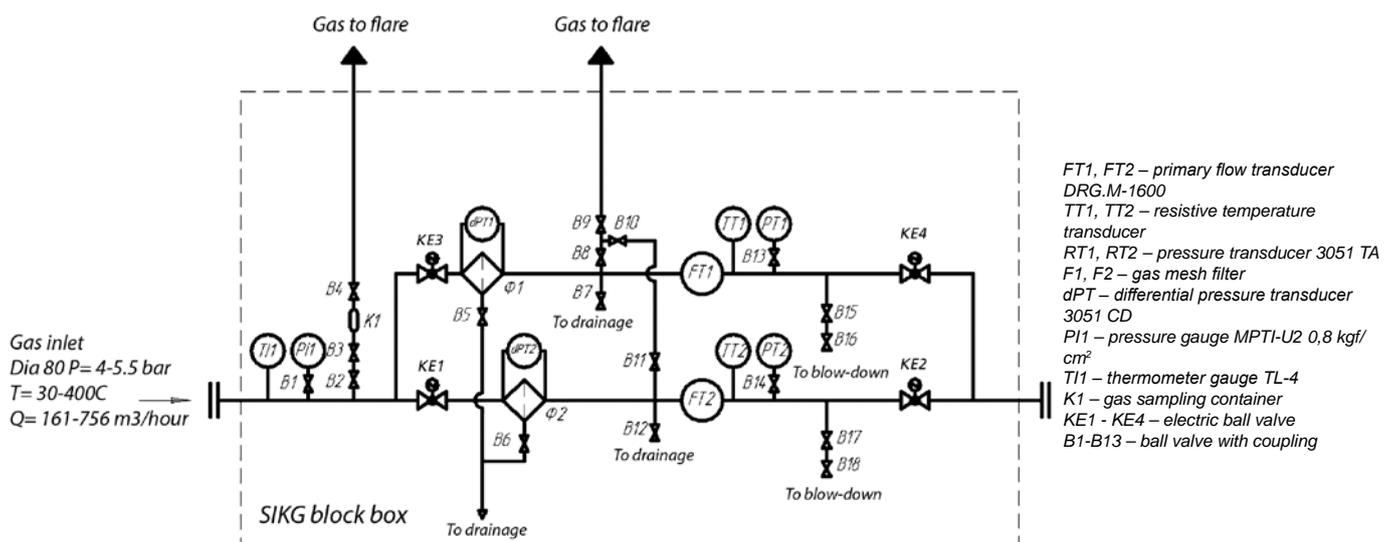
Depending on the customer requirements, the PM equipment can be partially or fully placed on an open frame base or in a block-box, and quality measuring equipment in a block-box, which is common with a PM or a separate one. DPS cabinets may be placed in a separate block-box or in the customer room. The block-boxes are equipped with lighting, Warm up, ventilation, and gas alarm systems and fire alarms, and air conditioning, on the customer request.

Design and manufacture of the SIKG is carried out taking into account the requirements of the customer, the technical characteristics of the pumped gas, environmental climatic conditions and in accordance with the requirements of the legislation of the Russian Federation, and the normative and technical documentation for this type of equipment.

## PURPOSE

The system for measuring the quantity and parameters of gas quality (hereinafter the SIKG) is intended for automated measurements of flow rates and volumes of natural, free petroleum and other gases that should be reduced to the standard conditions.

## PROCESS LAYOUT



## OIL (PETROLEUM PRODUCTS) QUANTITY AND QUALITY MEASUREMENT SYSTEMS



### PURPOSE

Gas quantity and quality measurement system is intended for automated measurements with normalized measurement errors and includes:

- subsystem for gross weight and net weight of crude oil (hereinafter the SQICO);
- subsystem for gross weight and net weight of stock oil (hereinafter the SQISO);
- subsystem for liquid petroleum gas, weight of gas condensate and NGL;
- subsystem for mass of petroleum products and process fluids: according to the customer requirements.

Depending on the standards of accuracy and customer requirements, the measurement systems of quantity and quality indicators of liquid hydrocarbons (hereinafter the SQQILH) includes transducers of physical and chemical properties of the product and flow parameters with use of various types and manufacturers.

### SPECIFICATIONS

The average lifetime of the SQISO (SQICO): at least 10 years. The average service life of the SQQILH is at least 10 years. The service life values of products that are part of the SQQILH are taken in accordance with their operational documentation.

The dimensions of the blocks and their weights do not exceed the allowable values adopted in the Russian Federation for the transportation of products by rail, water and road transport.

### ADDITIONAL INFORMATION

Design and manufacture of the SQQILH is carried out taking into account the requirements of the customer, the technical characteristics of the pumped liquid hydrocarbons, environmental climatic conditions and in accordance with the requirements of the legislation of the Russian Federation, and the normative and technical documentation for this type of equipment.

### ITEMS SUPPLIED AND DESIGN

The SQQILH is designed according to the block principle and consists of structurally complete parts:

- process module (PM);
- quality module;
- data collection and processing system (DPS).

The PM consists of the following items:

- inlet and outlet header;
- filter unit (fine or coarse);
- instrumentation line unit (ILU);
- stationary calibration unit or mobile calibration unit connection device;
- flow control module via calibration unit;
- pressure control module;
- sampling device;
- process and drainage piping.

Depending on the customer requirements, the PM equipment can be partially or fully placed on an open frame base or in a block-box, and quality measuring equipment in a block-box, which is common with a PM or a separate one. DPS cabinets may be placed in a separate block-box or in the customer room. The block-boxes are equipped with lighting, Warm up, ventilation, and gas alarm systems and fire alarms, and air conditioning, on the customer request.

Bearing and enclosing structures ensure the safety of equipment during their transportation, installation and operation.



# WATER AMOUNT MEASUREMENT SYSTEMS



## PURPOSE

The system of measuring amount of water (hereinafter the SMAW) is designed for automated measurement of flow rate, and volume of water.

The SMAW may use various types of flow-metering complexes: vortex, turbine, ultrasonic, or electromagnetic.

## SPECIFICATIONS

The service life of the SMAW is at least 10 years.

The resources and the service life of the components included in the equipment for the SMAW are determined in accordance with the individual forms (data sheets, labels) for them.

## DESIGN

The unit is designed to accommodate process equipment and is a stationary facility. Bearing and enclosing structures are designed depending on the environmental conditions.

The unit is equipped with Warm up, lighting, ventilation, gas pollution alarm and fire alarm systems.

The dimensions of the SMAW sections do not exceed the transport dimensions adopted in the Russian Federation for the transportation of products by rail and dirt roads.

## ITEMS SUPPLIED

The SMAW is designed according to the block principle and consists of structurally complete sections and lines:

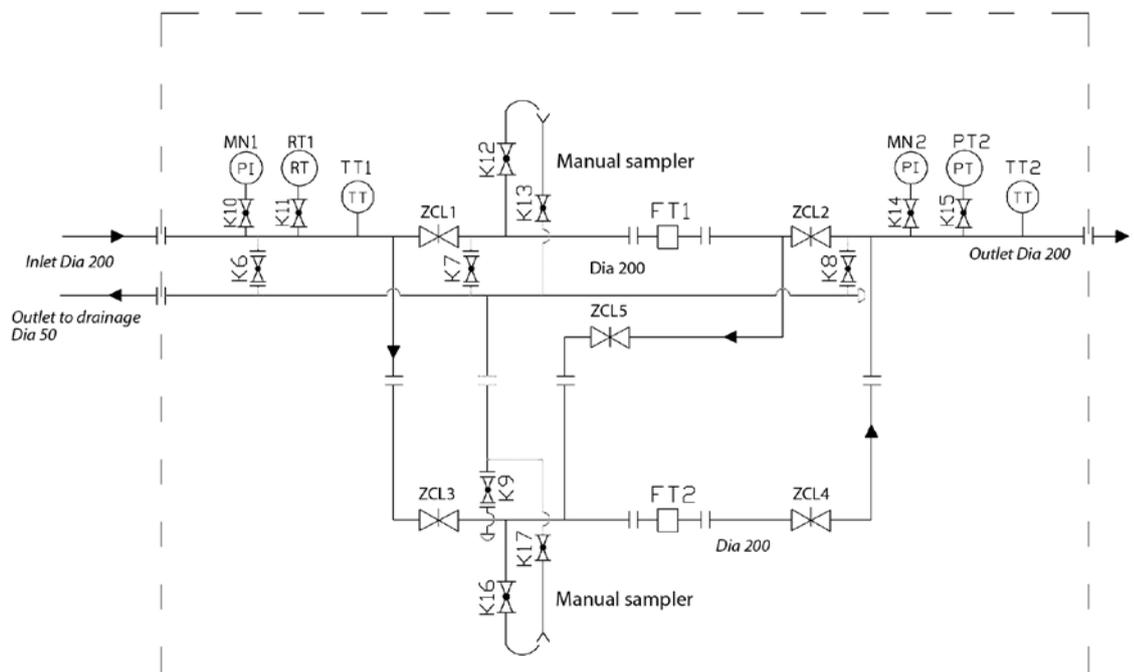
- 1) – instrumentation line unit (ILU);
- 2) Data collection and processing system (DPS).
- 3) Process and drainage piping.

All measuring instruments included in the SMAW have valid certificates of conformity, certificates of entry into the State Register of measuring instruments of the Russian Federation that are approved for use in the Russian Federation in the prescribed manner, certified calibration methods and certificates of verification.

## OTHER

SMAWs are manufactured based on customer needs, technical characteristics of the measured medium and climatic environmental conditions.

## PROCESS LAYOUT



## SEPARATION AND MEASURING UNITS



### PURPOSE

Separation and measurement unit (hereinafter the SMU) is intended for treatment and accounting of gas flow rate at a given level for gas supply to consumers in areas with moderate and cold climate, with the unit climatic design U according to GOST 15150-69.

### ITEMS SUPPLIED

The unit is equipped with Warm up, ventilation, lighting, process and instrument equipment, devices to monitor gas pollution and temperature in the room.

### DESIGN

SMU consists of a module with the tight and thermal insulated frame base. The roof of the building is sheet assembly of steel profiled sheets and thermal insulation made of mineral wool. The external walls are three-layer panels made of steel profiled sheets and mineral wool thermal insulation.

### SPECIFICATIONS

Parameter	Value
Operating medium	oil, water, or natural gas
Operating medium pressure, MPa	1,6
Maximum capacity, Nm <sup>3</sup> /hour (at 1.6 MPa)	10 400
Operating medium temperature at the inlet, °C	-40
Operating medium temperature at the outlet, °C	-5
Ambient temperature, °C	-40... + 60
Temperature in box, not less, °C	+5
Class of hazardous area according to the "Electrical installation code" PUE/SO of process room	153-34.20.120-2003 V-1a
Category and group of explosive medium in accordance with GOST R 51330.5-99, GOST R 51330.11-99	Ila-T1
Production category according to NBP 105-03/SP 12.13130-2009	A
Fire resistance of the structures as per SNiP 21.01-97	IIIa
Air change rate of the natural ventilation per 1 hour, not less	3
Supply voltage, V	380
Rated power, kW, max	12

## GASKETED PLATE HEAT EXCHANGERS

### PURPOSE

Gasketed plate heat exchangers are used for heat recovery between the flows of operating media: Warm up, cooling, and condensation. In these apparatuses the heat exchange between operating media is provided: liquid – liquid, vapor – liquid. Gasketed plate heat exchangers are characterized by a high intensity of heat irradiation and heat transfer processes with moderate hydraulic resistances.

### APPLICATION AREA

- oil and gas production;
- oil refining and petrochemistry;
- metallurgy;
- refrigeration;
- energy and housing and utility infrastructure;
- food industry;
- other industries.

### DESIGN

The design of the plate heat exchanger is a package of heat transfer plates located between the holding plates. The tightness of the device is achieved with clamping screws. The mesh-flow system of internal channels is formed by plates and rubber seals.

### MISCELLANEOUS

The heat exchange equipment won the Diploma of the “100 best products of Russia – 2017” competition.



### ADVANTAGES

- relatively small dimensions and reliability of the structure;
- possibility of mechanical cleaning of the surface of the heat exchanger plates by completely disassembling the apparatus at the place of operation;
- heat exchanger design allows easy plate pack replacement;
- it is possible to install additional plates, which allows you to adjust the power of the heat exchanger.

### SPECIFICATIONS

Parameter	Value
Maximum temperature, °C	190
Maximum operating pressure, bar	25
Plate area, m <sup>2</sup>	0.016 - 4.17
Plate pack surface area, m <sup>2</sup>	Up to 1200
Diameter of fittings, mm	DN25 – DN500
Maximum coolant flow rate, m <sup>3</sup> /hour	2500
Material of the plates	AISI316, SMO254, Titanium, Hastelloy C-276
Material of the gaskets	NBR, HNBR, EPDM, VITON
The heat exchanger housing is made of special corrosion resistant materials	09G2S, 20JuCh, 10H18N10T
Manufacturing of the heat exchanger in the offshore version is possible	
Selection of materials is carried out taking into account the climatic features of the north of Russia UHL1 (up to -60°C)	

## THE BLOCK TYPE WELDED AND GASKETED HEAT EXCHANGERS

### PURPOSE

The BLOCK welded heat exchangers are used for heat recovery between the flows of operating media for Warm up, cooling, condensation and evaporation of liquids, vapors and their mixtures of high pressure and temperature. In these apparatuses the heat exchange between operating media is provided: liquid – liquid, vapor – liquid, vapor + gas – liquid, gas – liquid, and gas – gas. The BLOCK heat exchangers are characterized by a high intensity of heat irradiation and heat transfer processes with moderate hydraulic resistances.

### APPLICATION AREA

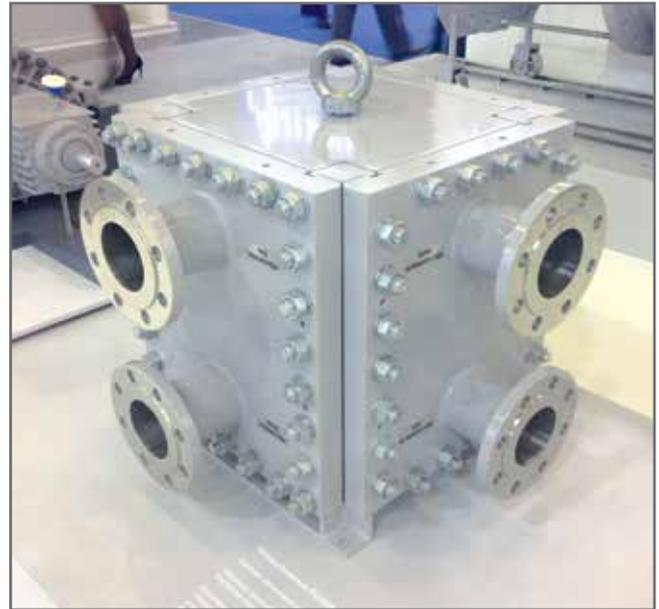
- oil and gas production;
- oil refining and petrochemistry;
- metallurgy;
- refrigeration;
- energy and housing and utility infrastructure;
- food industry;
- other industries.

### DESIGN

The design of the heat exchanger is a pack of heat transfer plates, which is placed in a gasketed housing providing mechanical cleaning for both operating media.

### MISCELLANEOUS

The heat exchange equipment won the Diploma of the “100 best products of Russia – 2017” competition.



### ADVANTAGES

- possibility of complete dismantling of the housing, which allows mechanical cleaning of the heat exchanger channels;
- heat exchanger design allows replacement of plate pack;
- form of the heat exchanger provides a compact technological piping.

### SPECIFICATIONS

Parameter	Value
Maximum temperature, °C	315
Maximum operating pressure, bar	32
Plate area, m <sup>2</sup>	0.09 - 0.24
Plate pack surface area, m <sup>2</sup>	Up to 100
Diameter of fittings, mm	DN25 – DN400
Maximum coolant flow rate, m <sup>3</sup> /hour	1400
Material of the plates	AISI316, SMO254, Hastelloy C-276
The heat exchanger housing is made of special corrosion resistant materials	09G2S, 20JuCh, 10H18N10T
Manufacturing of the heat exchanger in the offshore version is possible	
Selection of materials is carried out taking into account the climatic features of the north of Russia UHL1 (up to -60°C)	

## WELDED HEAT EXCHANGERS OF THE "HIBRID" TYPE

### PURPOSE

The "HIBRID" welded heat exchanger is used for heat recovery between the flows of operating media for Warm up, cooling, condensation and evaporation of liquids, vapors and their mixtures of high pressure and temperature. In these apparatuses the heat exchange between operating media is provided: liquid – liquid, vapor – liquid, vapor + gas – liquid, gas – liquid, and gas – gas. The "Hybrid" heat exchangers are characterized by the ability to provide a large area of heat transfer in a limited volume.

### APPLICATION AREA

- oil and gas production;
- oil refining and petrochemistry;
- metallurgy;
- refrigeration;
- energy and housing and utility infrastructure;
- food industry;
- other industries.

### DESIGN

The design of the "Hybrid" heat exchanger is a plate with channels that have a tubular shape, thus combining the advantages of plate and tube heat exchangers.

### MISCELLANEOUS

The heat exchange equipment won the Diploma of the "100 best products of Russia – 2017" competition.



### ADVANTAGES

- one apparatus may provide three or more stream at once;
- possibility of using the apparatus as a heat recovery boiler with steam generation;
- design of heat exchangers having area up to 4000 m<sup>2</sup> in a single housing.

### SPECIFICATIONS

Parameter	Value
Maximum temperature, °C	500
Maximum operating pressure, bar	60
Plate area, m <sup>2</sup>	0.09 – 3.3
Plate pack surface area, m <sup>2</sup>	Up to 4000
Diameter of fittings, mm	DN25 – DN2000
Maximum coolant flow rate, m <sup>3</sup> /hour	2500
Material of the plates	AISI316, SMO254, Hastelloy C-276
The heat exchanger housing is made of special corrosion resistant materials	09G2S, 20JuCh, 10H18N10T
Manufacturing of the heat exchanger in the offshore version is possible	
Selection of materials is carried out taking into account the climatic features of the north of Russia UHL1 (up to -60°C)	

## WELDED AND WELDED AND GASKETED SHELL AND PLATE HEAT EXCHANGERS

### PURPOSE

The welded and welded and gasketed shell and plate heat exchangers of housing and plate type are used for heat recovery between the flows of operating media for Warm up, cooling, condensation and evaporation of liquids, vapors, and their mixtures of high pressure and temperature. In these apparatuses the heat exchange between operating media is provided: liquid – liquid, vapor – liquid, vapor + gas – liquid, gas – liquid, and gas – gas.

### APPLICATION AREA

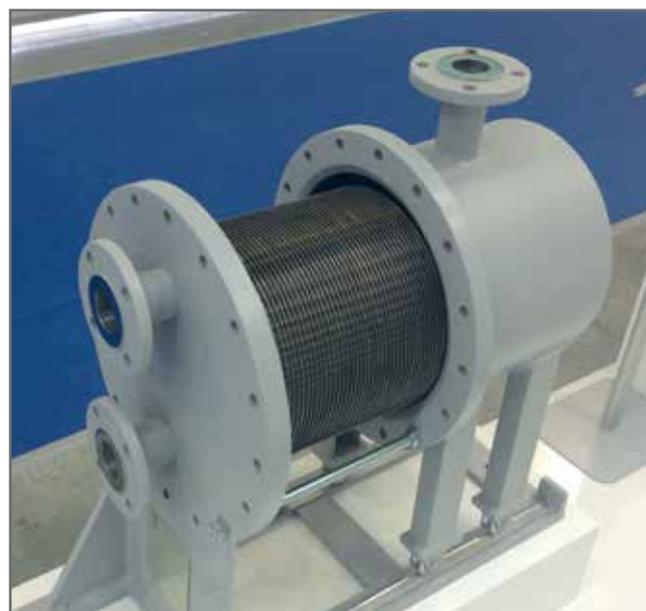
- oil and gas production;
- oil refining and petrochemistry;
- metallurgy;
- refrigeration;
- energy and housing and utility infrastructure;
- food industry;
- other industries.

### DESIGN

The design of the heat exchanger is a pack of round welded to each other plates, placed in a cylindrical housing (shell). The housing of the heat exchanger can be manufactured in both welded and gasketed version.

### MISCELLANEOUS

The heat exchange equipment won the Diploma of the “100 best products of Russia – 2017” competition.



### ADVANTAGES

- high stability of the apparatus under cyclic loads;
- combines the advantages of gasketed plate and non-gasketed tube heat exchangers;
- the cylindrical configuration of the heat exchanger housing provides the ability to withstand high operating pressures of the media, as well as large pressure difference between the media;
- heat exchanger design allows replacement of plate pack.

### SPECIFICATIONS

Parameter	Value
Maximum temperature, °C	500
Maximum operating pressure, bar	110
Plate area, m <sup>2</sup>	0.01 – 0.717
Plate pack surface area, m <sup>2</sup>	Up to 673
Diameter of fittings, mm	DN25 – DN700
Maximum coolant flow rate, m <sup>3</sup> /hour	4000
Material of the plates	AISI316, SMO254, Hastelloy C-276
The heat exchanger housing is made of special corrosion resistant materials	09G2S, 20JuCh, 10H18N10T
Manufacturing of the heat exchanger in the offshore version is possible	
Selection of materials is carried out taking into account the climatic features of the north of Russia UHL1 (up to -60°C)	

# REBOILER

## PURPOSE

The reboiler evaporator is intended to cool down the gas before it is fed to the low-temperature separator in gas treatment processes, or petrochemical synthesis. It can also be used for cooling (condensation) of other media or evaporation (full or partial) of liquids in various manufacturing processes, including food industry.

## PRINCIPLE OF OPERATION

The cold medium in the liquid phase runs into the space of the shell from below and evaporates passing between the plates thereby cooling the medium supplied into the closed space between the plates. The evaporated cold coolant is discharged from the apparatus through a fitting located on top of the housing. The supply of the cooled medium into the closed space between the plates is carried out through fittings located in the removable end cap.

## DESIGN

The design of the plate-type reboiler evaporator is very similar to the design of the classic housing and tube evaporator with vapor space. The difference is that a plate pack is used instead of a tubular bundle. Therefore, the compactness of the plate evaporator reboiler is achieved.

The pack of plates is arranged so that a closed space is formed, into which the medium for cooling is supplied. Outside the pack is surrounded by cold evaporating medium. The plates are assembled into a stack with use of argon arc welding. In the same way, the plate pack is welded to the end plates of the pack. The branch pipes supplying and discharging the cooling medium are welded to the end plate on one side. They also join the pack and the flange cover, which is mounted on the heat exchanger housing by means of a bolt flange. To facilitate the removal of the plate pack, roller supports are provided, which can be moved along guides inside the apparatus.

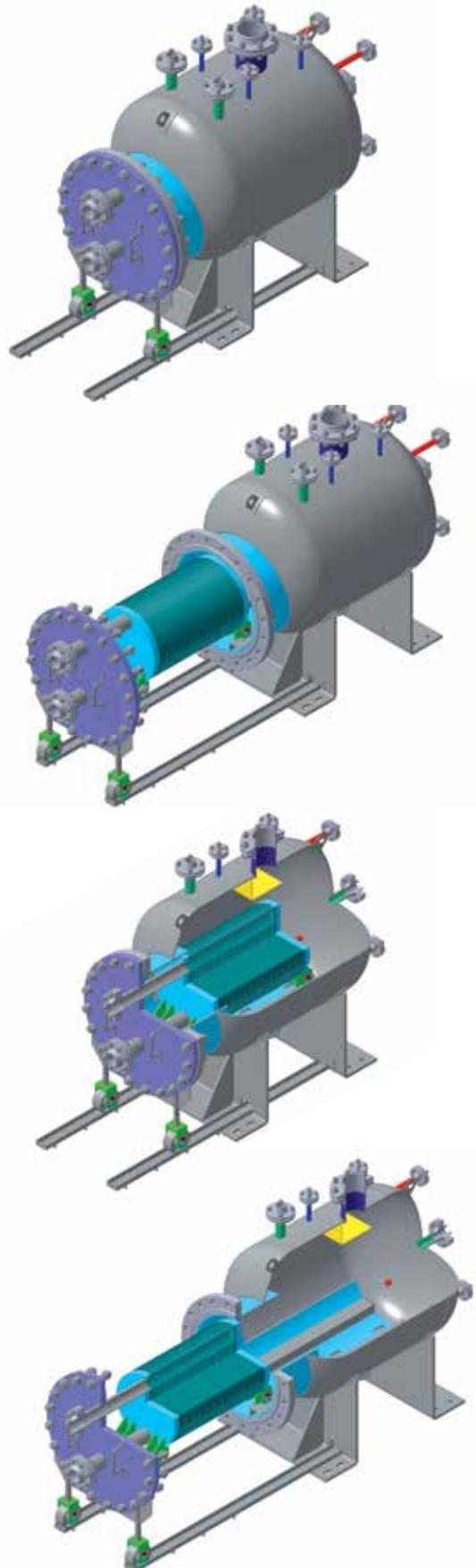
The housing is horizontal, as is customary in case of the classic housing and tube evaporators with vapor space, and has all the necessary fittings for the supply/removal of cooling medium, process control and operation. A guide device is provided to prevent the drift of droplets of the evaporating phase.

## ITEMS SUPPLIED

The reboiler can be equipped with instrumentation, as well as a unit for washing the pack of plates and with a set of gaskets.

## MISCELLANEOUS

The heat exchange equipment won the Diploma of the "100 best products of Russia – 2017" competition.

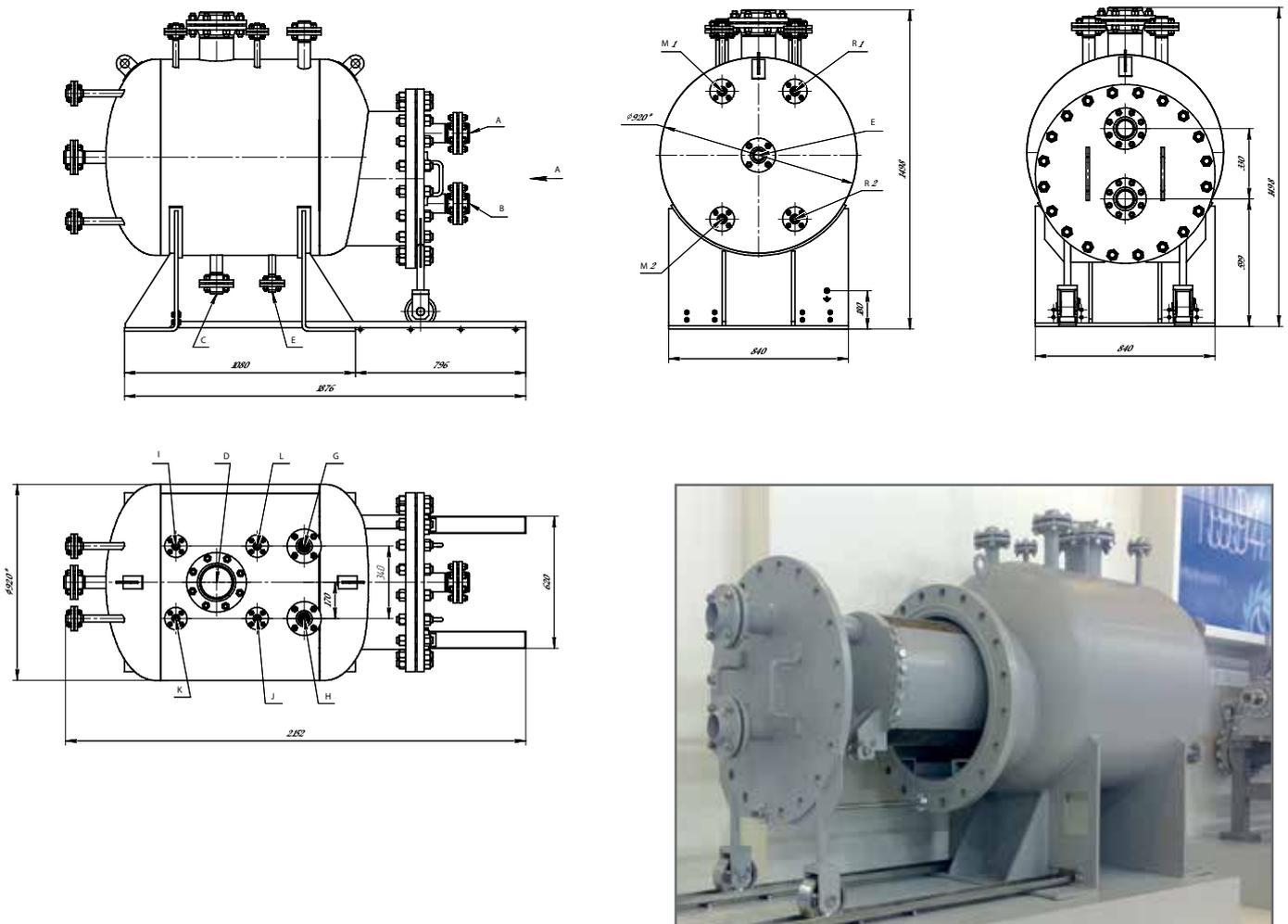


# REBOILER

## SPECIFICATIONS

Parameter	Value
Pressure in the housing, MPa	vacuum...2.2
Pressure inside the plate pack, MPa	up to 10
Temperature of the media, °C	-200...500
Media flow rate, m <sup>3</sup> /hour	up to 700 (inside the plate pack)
Heat exchange surface area, m <sup>2</sup>	up to 511
Shell diameter, mm	400...2000
Material of the plates	AISI 316, SMO254
Material of the housing	Carbon steel, stainless steel

## GENERAL ARRANGEMENT



## SHELL AND TUBE HEAT EXCHANGERS



### PURPOSE

The housing and tube heat exchanger is used for heat recovery between the flows of operating media, cooling, condensation and evaporation of liquids or vapors having a high operating pressure, temperature; it is used for heat exchange of especially dangerous media. In these heat exchangers the heat exchange between operating media is provided: liquid – liquid, vapor – liquid, vapor + gas – liquid, gas – liquid, and gas – gas.

### APPLICATION AREA

- oil and gas production;
- oil refining and petrochemistry;
- metallurgy;
- refrigeration;
- energy and housing and utility infrastructure;
- food industry;
- other industries.

### DESIGN

The design of housing and tube heat exchangers is a bundle of tubes placed in a cylindrical housing such that the inside of the housing there is intertube space.

### ADVANTAGES

- high resistance to hydroshocks;
- high efficiency, close to the plate type apparatus;
- housing and tube heat exchangers do not require a pure coolant – it may be contaminated, which does not prevent the operation of the apparatus;
- design typification.

### MISCELLANEOUS

The heat exchange equipment won the Diploma of the “100 best products of Russia – 2017” competition.

### SPECIFICATIONS

Parameter	Value
Maximum temperature, °C	550
Maximum operating pressure, bar	250
Surface area, m <sup>2</sup>	Up to 1060
Material	Carbon steel, stainless steel
Maximum coolant flow rate, m <sup>3</sup> /hour	4000
Apparatus type	TN, HN, IP, KN, TK HK, IK, INT, IKT, IPT, KVN, KVK, TP, HP, KP, TU, TPK, IP, IU, TT.
Maximum length of the tube bundle, m	9
Maximum diameter, mm	2000

## SWIRL SEPARATORS

### PURPOSE

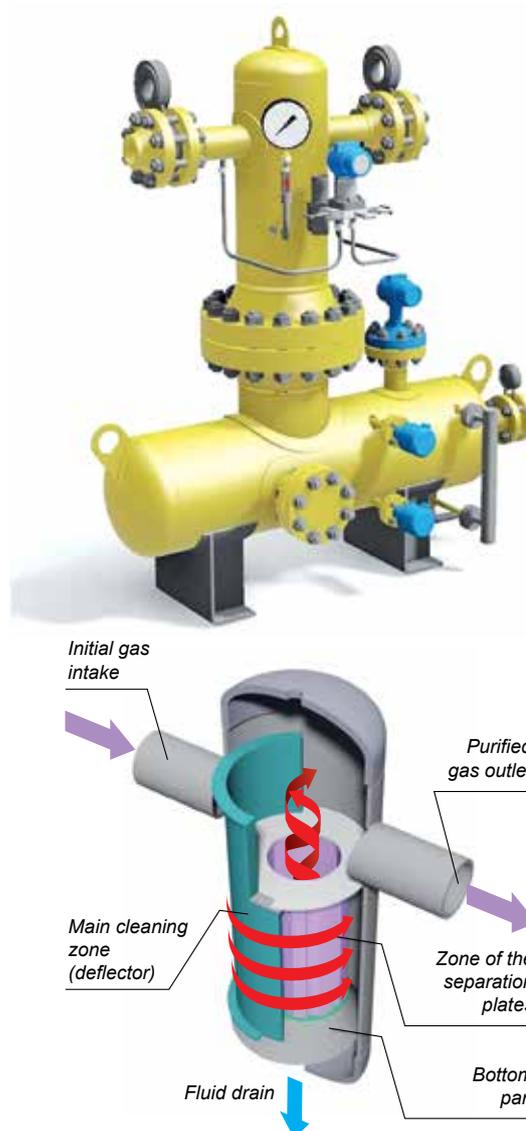
The swirl gas separator (hereinafter the separator) is intended for cleaning the gas flow from mechanical impurities and droplet liquid.

### PRINCIPLE OF OPERATION

The separator principle of operation is based on the separation of multiphase medium under the action of high centrifugal forces. A gas stream containing solid and liquid particles in suspended state is fed to the separator baffle. As a result, the flow is twisted and significant centrifugal forces arise in it. Under the influence of this force, the largest solid and liquid particles move to the inner surface of the wall of the vessel, and fine particles that are not settled on the vessel move towards the center and settle on the outer surface of flat curved plates (zone of separation plates). The captured particles are moved downward, fall on a false bottom (bottom part) and are discharged through the outlet fitting of the lower stream into a storage tank.

### FEATURES OF THE DESIGN

- Separation efficiency: remove 99.9% of particles of 5  $\mu\text{m}$  or more.
- Wide range of loads: 30 to 130% of rated capacity.
- Low pressure loss.
- Stable work in piston flow.
- Easy maintenance.
- Small dimensions and weight.
- The possibility of replacing the internal structural elements, which significantly increases the service life of the apparatus.
- The service life is up to 20 years.



### SPECIFICATIONS

Parameter	Value
Operating medium	Natural or associated petroleum gas with condensate, water and mechanical impurities
Operating pressure, MPa	0.1 to 16
Nominal diameter of the vessel, mm	100 to 1500
Maximum capacity, Nm <sup>3</sup> /min	5 to 85325
Vessel volume, m <sup>3</sup>	0.001 to 1.6
Material of the separation pack	12H18N10T
Material of the separator casing	09G2S, 20JuCh, 12H18N10T
Operating medium temperature, °C	In accordance with the requirements of the customer
Design wall temperature, °C	In accordance with the requirements of the customer
Degree of purification for particles of 5 $\mu\text{m}$ , %	99.9
Maximum hydraulic resistance, MPa	0.006
Service life, not less, years	20
Climatic design according to GOST 15150-69	U, UHL, HL, M

# CENTRIFUGAL SEPARATORS

## PURPOSE

The separator with centrifugal elements (hereinafter the separator) is intended for the purification of natural gas from liquid and solid impurities at inlet, intermediate and terminal stages of separation of drying units, pumping/Warm up stations, complex gas treatment units, and gas treatment facilities. It is possible to equip it with a section with coalescing filter elements.

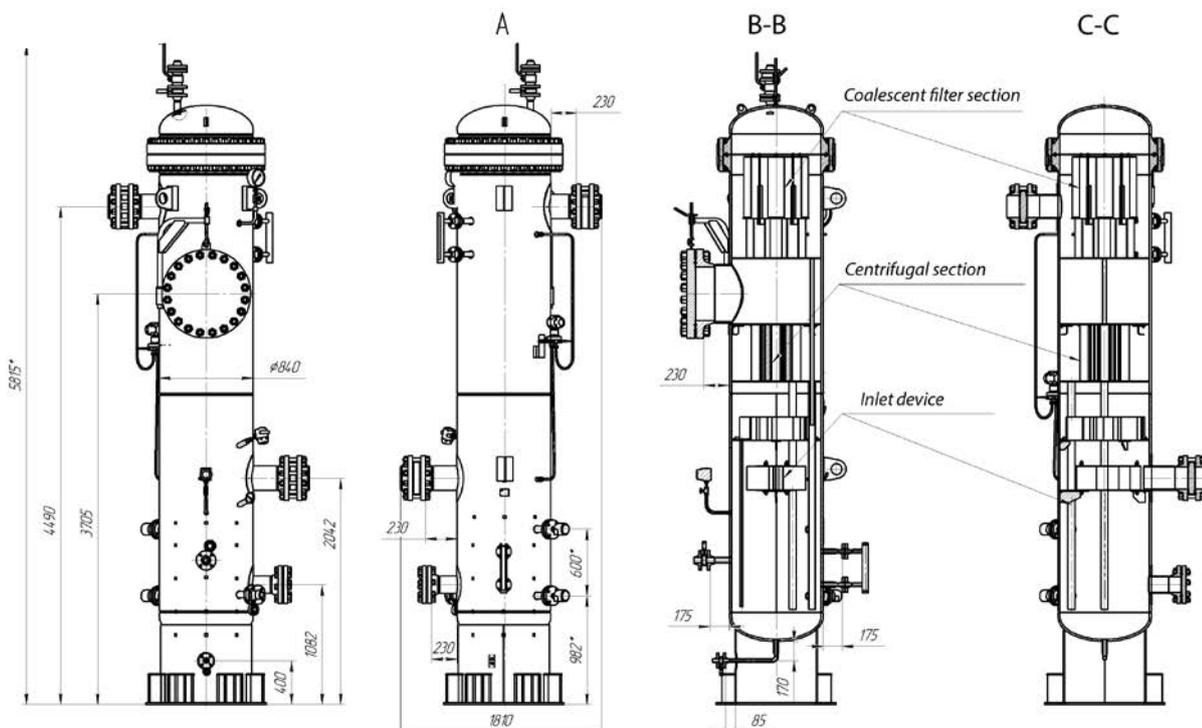
## ADVANTAGES

- performance in conditions of high concentrations of droplet carryover.
- high cleaning efficiency from droplet carryover in a large range of changes in performance and pressure;
- simple design and operation;
- unified inlet devices and centrifugal elements;
- low hydraulic resistance of the apparatus;
- removable, easily replaceable centrifugal components.

## SPECIFICATIONS

Parameter	Value
Nominal diameter of the vessel, mm	400 to 2000
Operating pressure, MPa	1.6 to 16
Capacity, m <sup>3</sup> /hour	up to 190000
Hydraulic resistance, MPa	0.015 (without section of filter elements)
Service life, not less, years	20
Climatic design according to GOST 15150-69	U, UHL, HL
Applicable centrifugal components	Sulzer, CKBN, NovomoskovskGazDetal, etc.
Applicable coalescing filter elements	LARTA Technology, Uraltehfiltir-Inzhiniring, Pall, etc.

## GENERAL ARRANGEMENT



# GAS SEPARATORS (GRAVITATIONAL, MESH TYPE)

## PURPOSE

The gas separator (gravity, mesh type) (hereinafter the separator) is intended to clean natural and petroleum associated gas from liquid (condensate, hydrate formation inhibitor, or water) in field gas facilities intended for gas treatment for transport, complex gas treatment units, underground storage facilities, as well as gas plants and refineries. The separators can be manufactured with a coil in the separator vessel.

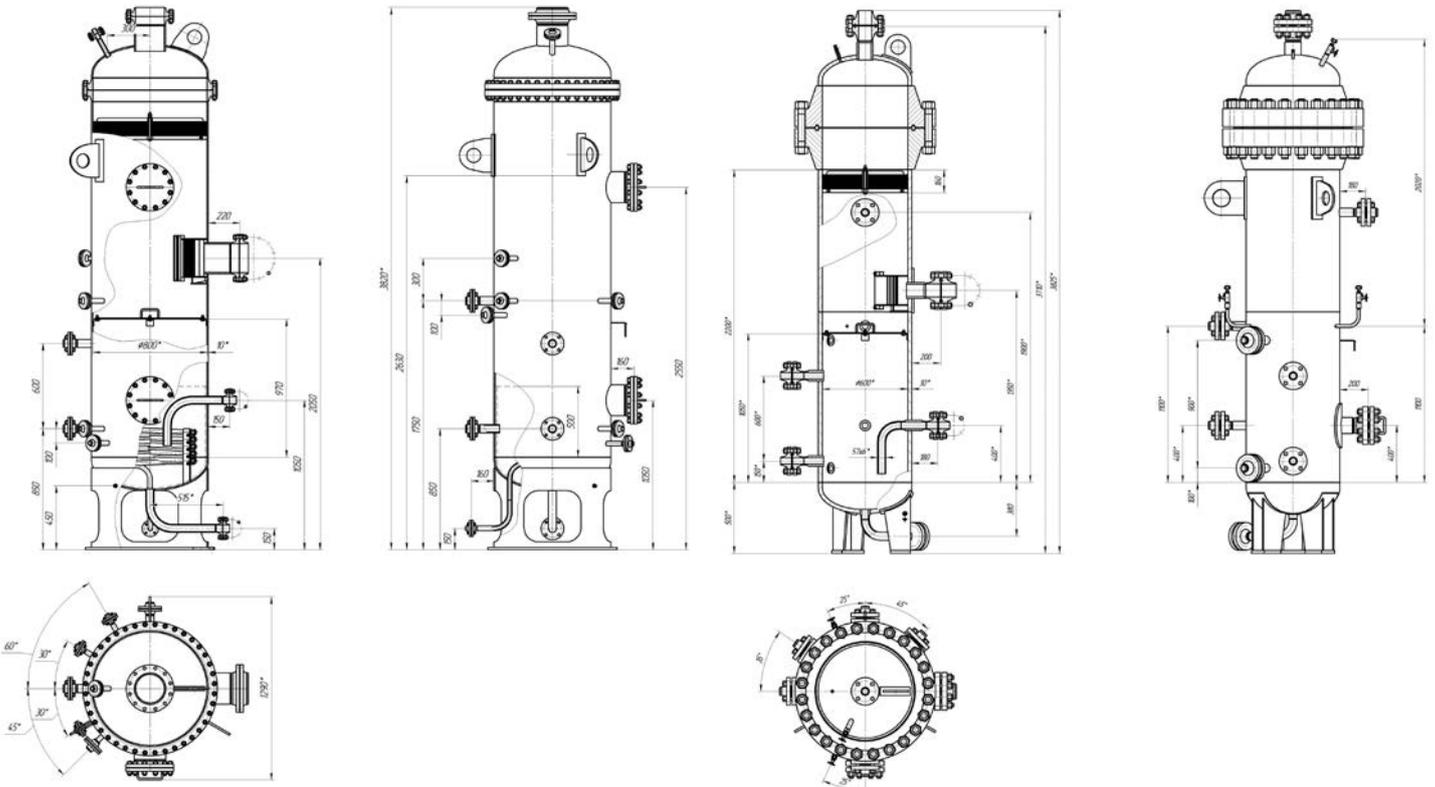
## ADVANTAGES

- high cleaning efficiency from droplet carryover in a large range of changes in performance and pressure;
- large volume of the vessel allows effective operation in the conditions of peak liquid intakes;
- unified inlet devices and mesh centrifuge components;
- simple design and operation.

## SPECIFICATIONS

Parameter	Value
Nominal diameter of the vessel, mm	600 to 2000
Operating pressure, MPa	1.6 to 16
Capacity, m <sup>3</sup> /hour	up to 150500
Hydraulic resistance, MPa, max	0.020
Service life, not less, years	20
Climatic design according to GOST 15150-69	U, UHL, HL

## GENERAL ARRANGEMENT



## FILTERS FOR GAS AND LIQUID MEDIA



### PURPOSE

Filter for gas and liquid media (hereinafter the filter) is intended for protection of the equipment in the process and field units of the oil and gas industry, and oil refineries.

Climatic design and placement category of the filters: U1, HL1 according to GOST 15150-69.

The manufacturing of the filters is provided without heat treatment and with heat treatment for use with media that cause corrosion cracking, and if indicated in an order.

Permissible seismicity of the area for the filter installation is not more than 6 magnitude on the Richter scale. It is allowed to use filters in areas with seismicity over 6 magnitude when confirmed by a special calculation for seismic resistance in accordance with the requirements of GOST 30546.1, SP 14.13330, taking into account the specific size. Justification of the seismic resistance of the filter should be applied to the strength calculation.

### SPECIFICATIONS

Parameter		Value
Nominal pipe size, DN, mm		15 ... 1220
Pressure, MPa	operating, max	0.1 ... 16
	rated	1.0 ... 16
	trial at hydrotest	1.25... 20
Temperature, °C	operating medium	In accordance with the requirements of the customer
	estimated, of the wall	In accordance with the requirements of the customer
	minimum, of the wall, under pressure	minus 45; minus 60
Operating medium name		natural gas with gas condensate, oil and water admixtures, inhibitors, oil; condensate; process, recycling, river, production, Cenomanian and waste water; foaming solutions; multiphase emulsions; chemicals; methanol; light and dark oil products; and lube oils
Vessel group as per PB 03-584, GOST R 52630		In accordance with the requirements of the customer
Capacity, m <sup>3</sup> /hour, with filtration fineness of 200 μm		Determined by nomogram depending on viscosity and pressure drop
Capacity, m <sup>3</sup> /hour, with filtration fineness of 4 μm		For DN 400 – 2000 For DN 500 – 2500
Nominal filtration fineness, μm		200
Filtration fineness for oil, mm, max		4
Maximum pressure drop with a clean filter element, MPa		0.03
Maximum pressure drop with a contaminated filter element, MPa, with filtration fineness of 200 μm		0,1
Maximum pressure drop with a contaminated filter element, MPa, with filtration fineness of 4 μm		0.05
Addition to compensate for corrosion, mm		2
Holding capacity, m <sup>3</sup>		0.01 1.65
Outer diameter, mm		273 ... 1028
Filtration surface, m <sup>2</sup> , not less		0.18 ... 3.75

## FILTERS FOR GAS AND LIQUID MEDIA

Hazard classes of the transported fluid 1, 2, 3, and 4 as per GOST 12.1.007.

Several filter designs are manufactured according to the type of connection to the pipeline:

- version 1 – flanged;
- version 2 – welded;
- version 3 – coupled.

### ITEMS SUPPLIED

The product includes:

- filter assembly with all internal devices and mating flanges to fittings;
- set of instrumentation and automation equipment (at the

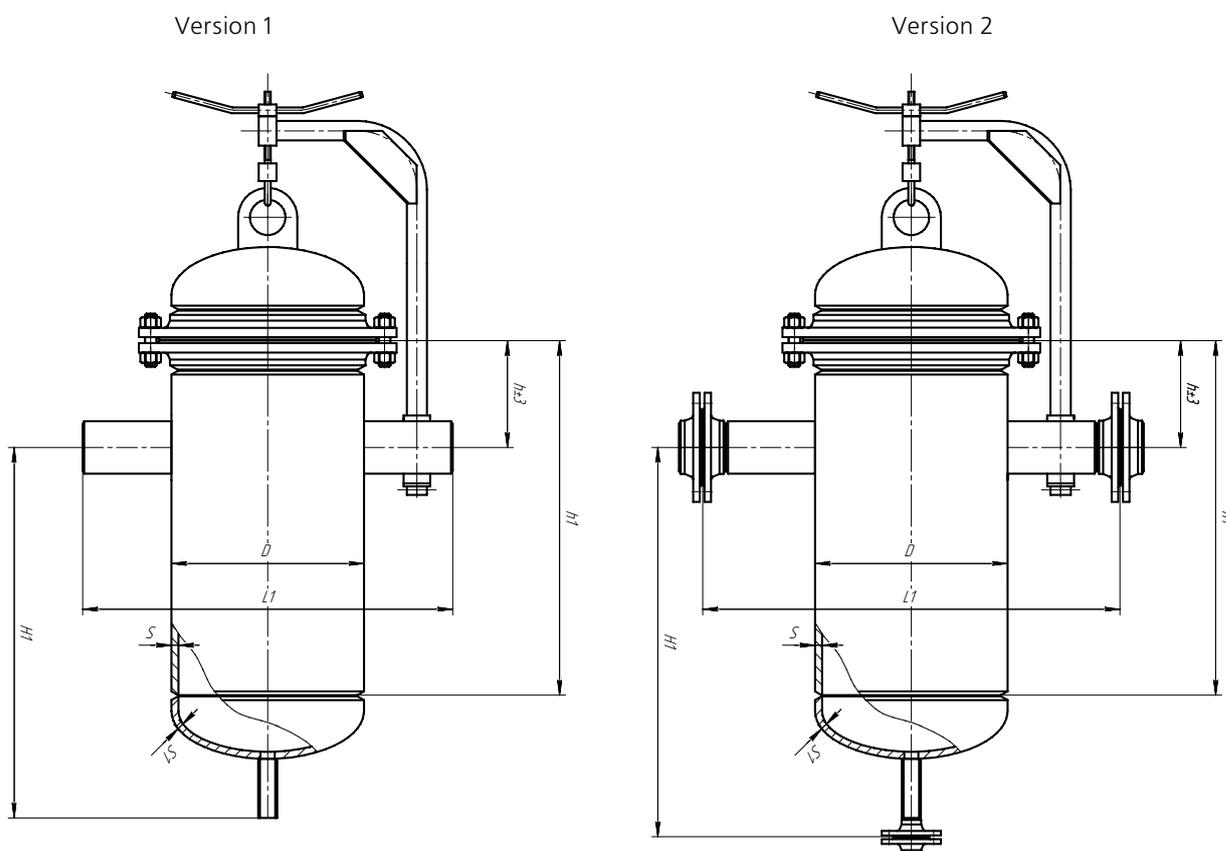
request of the customer);

- process module (at the request of the customer);
- interface for transferring data from the control module to the APCS (upon customer request);
- set of spare gaskets.

In coordination with a customer, the scope of delivery may include:

- metal structures (service platforms, stairs, frame, etc.);
- piping with shut-off and control valves (process module);
- instrumentation, including: temperature sensors, pressure sensors, liquid level alarms, level controls (including primary devices and a converter unit), moisture meter, etc.

### GENERAL ARRANGEMENT



## COALESCER SEPARATORS (COALESCER FILTERS)

### PURPOSE

Coalescer separators (filter coalescer) (hereinafter the separator) are intended for fine cleaning of gas from solid impurities and droplet carryover in field gas treatment facilities.

### DESIGN

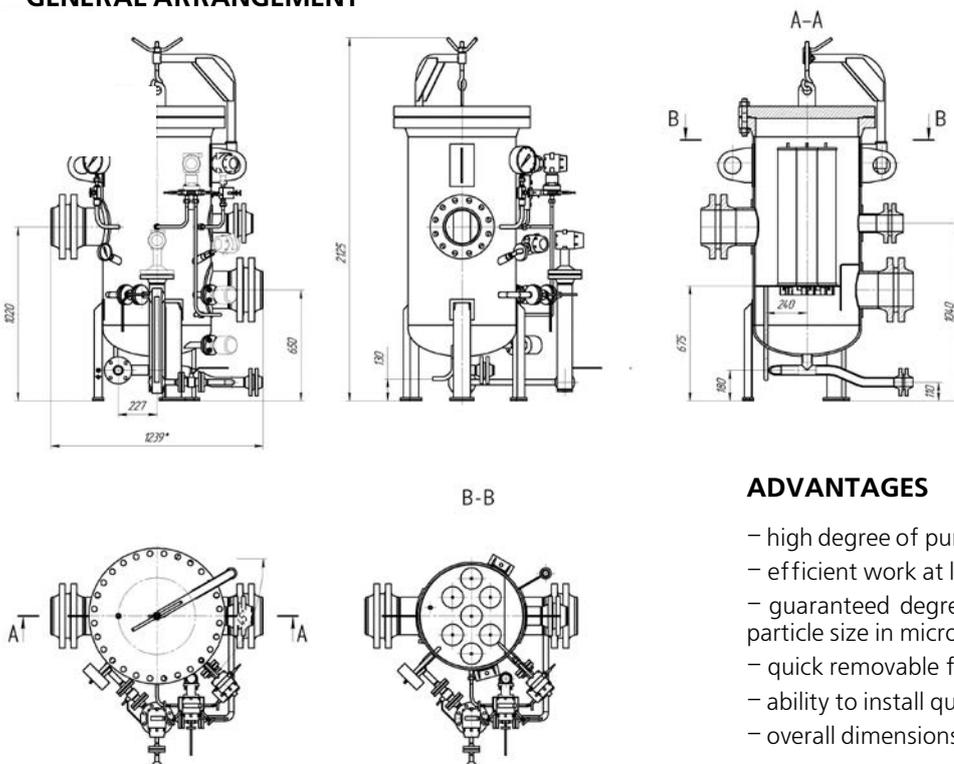
As a rule, they are installed after coarse gas separators (inlet separators or slug catchers). The overall dimensions allow mounting the separators directly into the process compartments of gas treatment units.



### SPECIFICATIONS

Parameter	Value
Nominal diameter of the vessel, mm	200 to 2000
- Operating pressure, MPa	0.6 to 16
- Capacity, m <sup>3</sup> /hour	depending on the specific performance of the applied filtering elements
- Hydraulic resistance, MPa	depending on type of filtering elements
- Service life, years, not less	20
- Climatic design according to GOST 15150-69	U, UHL, HL
- Used coalescing filter elements	LARTA Technology, Uraltehfiltir-Inzhiniring, Pall, etc.

### GENERAL ARRANGEMENT



### ADVANTAGES

- high degree of purification from solid impurities and liquids;
- efficient work at low flow rates;
- guaranteed degree of purification of particles with given particle size in microns;
- quick removable filter elements;
- ability to install quick removable covers;
- overall dimensions.

# FOAM FIREFIGHTING VALVE CHAMBERS



Inside the station there are items mounted:

- process equipment;
- Warm up system;
- ventilation;
- lighting and electrical equipment;
- instrumentation and automation equipment.

The foam firefighting valve chamber is manufactured with the exit of the piping through the base; upon the request of the customer, it can be made with the exit of the piping through the wall.

## PURPOSE

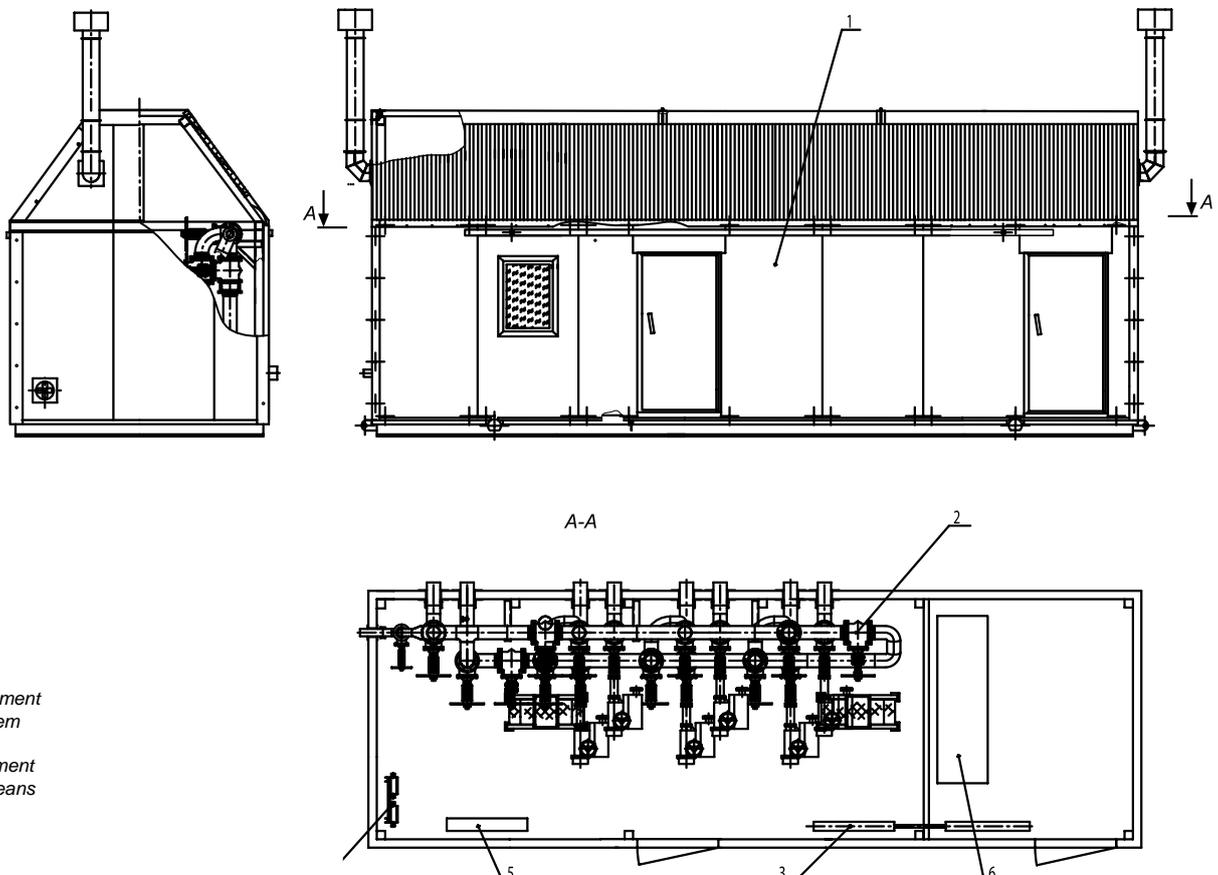
The foam firefighting valve chamber (hereinafter the station) is intended to supply the foam generator solution of the pumping unit to the foam generators.

## ITEMS SUPPLIED

The foam firefighting valve chamber is located in a block-box consisting of a base and a frame covered with three-layer panels with thermal insulation.

## GENERAL ARRANGEMENT

SPECIFICATIONS	
Parameter	Value
Foam firefighting valve chamber	for 6 and 11 lines
Room category of explosion and fire hazard as per NPB	D
Room class as per PUE	not explosive
Fire resistance	II
Indoor temperature, °C, not less	10
Overall dimensions, mm (length x width x height), max	12360 x 3150 x 3975



- 1 - Box
- 2 - Process equipment
- 3 - Warm up system
- 4 - Impulse lines
- 5 - Electric equipment
- 6 - Automation means

## VALVE CHAMBERS WITH DOSING TANKS AND FOAMING AGENT MIXING SYSTEMS



### PRINCIPLE OF OPERATION

In case of fire, a signal is sent from the control button to open the solenoid valve. There will be pressure drop in the actuating system, which kept the concentrate control valve diaphragm in closed position. The concentrate control valve opens, and the concentrate from the flexible chamber of the container is fed through a pipe with a diaphragm into the foam mixer, where the formation of solution takes place. The solution runs through the manifold into the distribution pipe header with solenoid valves, which are duplicated by manual valves. The electrically operated valves are opened remotely and the solution is supplied to the foam generators.

Upon completion of the fire extinguishing, the solenoid valves are closed and the water supply to the receiving pipeline and the solution to the foam generators is stopped. After that, it is necessary to drain the water and the solution from the system by means of the drain valves.

### PURPOSE

The valve chamber with dosing tanks and foaming agent mixing systems (hereinafter the station) is intended for extinguishing a possible fire at sites and tanks with high-expansion air filled foam.

### SPECIFICATIONS

Parameter	Value
Pressure in piping: - at the inlet of the fire-fighting water supply system, MPa - at the outlet of the foaming agent solution generator, MPa, not less	0.8 0.7
Dosing tank MHS-1 (2 work tanks): - holding capacity, l - version - foaming agent solution - design pressure (MHS-1), MPa - test pressure (MHS-1), MPa	6000 vertical on the inside of the membrane 1.2 1.8
Operating medium	fresh water
Indoor air temperature, °C - in the control room - in the switchboard and controller rooms	+5 +10
Medium density, kg/m <sup>3</sup>	1000
Room category according to SP12.13130.2009	D
Fire resistance of the building according to SP12.13130.2009	IV
Constructive fire hazard class according to SP12.13130.2009	S0
Functional fire hazard class according to SP12.13130.2009	F5.1
Estimated temperature of the coldest five days, °C	-49
Wind load for construction area III, kPa	0,38
Snow load for the VI area according to SNiP 2.01.07-85, kPa	4.0
Overall dimensions of the station, mm (length x width x height)	18300x3200x5100
Warm up	electric
Ventilation	natural, through the deflectors and doors
Service life, not less, years	30

# VALVE CHAMBERS WITH DOSING TANKS AND FOAMING AGENT MIXING SYSTEMS

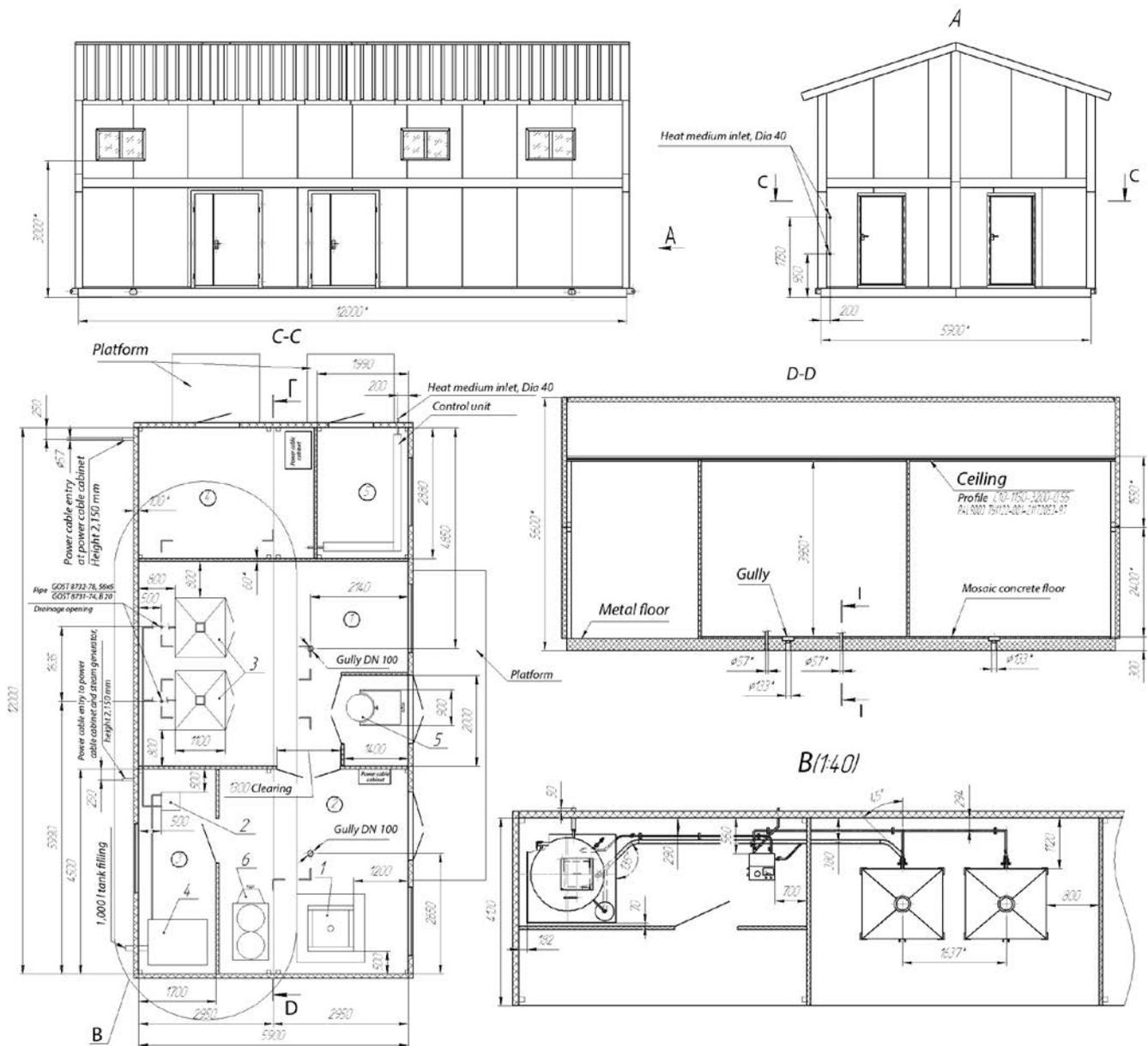
## DESIGN

The station is a product consisting of a block of tanks, process module, additional block, and service platforms, mounted at the place of operation as a single building according to the installation drawings supplied with the station. The main entrance is the doors to the process room, to the switchboard room and the controller room.

## ITEMS SUPPLIED

- The unit contains:
- foam fire extinguishing system with dosing tank;
  - receiving and pressure manifolds with stop valves;
  - pressure gauge rack;
  - electric Warm up system;
  - unit lighting system;
  - instrumentation and automation equipment;
  - board of the low-voltage switch unit.

## GENERAL ARRANGEMENT



- A - water inlet
- B - for connection of mobile equipment
- C - outlet to foam generators
- D - drainage

## FIREFIGHTING WATER PUMPING STATIONS

### PURPOSE

The pumping station of water fire extinguishing (hereinafter the station) is designed to supply water to the fire extinguishing systems.

The station is a product consisting of lower sections and additional sections, mounted at the place of operation as a single building according to the installation drawings supplied with the unit. The main entrance is the gate to the pump room and the doors to the storage room for diesel fuel. The station is supplied as the separate pumping units of transport dimension.

Construction of foundations, grounding and lightning protection is carried out in accordance with the specific siting project.



SPECIFICATIONS	
Parameter	Value
Station performance, m <sup>3</sup> /hour	up to 684
Operating medium	fresh water
Operating temperature, °C	+5
Medium density, kg/m <sup>3</sup>	1000
Indoor temperature, °C, not less	+10
Fire resistance of the unit according to SNiP 21-01-03	II
Room category of the pump room according to NPB 105-03	D
Design outdoor temperature, °C, max	above -50
Electric pump fire extinguishing unit (2 work units): - Pump type - Number of pumps - Pump capacity, m <sup>3</sup> /hour - Electric motor model - Electric motor power, kW	1D630-125-t-E 2 450 DA30-500Yk1-4 U1 400
Diesel engine pump unit (2 standby units): - Pump type - Number of pumps - Pump capacity, m <sup>3</sup> /hour - Engine pump model - Power, kW	1D630-125-t-E 2 450 Deutz-BF8M1015CP 385
Circulating electric pump (1 duty, 1 standby): - Pump type - Number of pumps - Pump capacity, m <sup>3</sup> /hour - Electric motor model - Electric motor power, kW	1K100-65-250-t-E 2 100 4AMU200L2 45
Warm up	electric
Ventilation in the room of the pumping station	Hybrid: - supply-extract - air Warm up by electric air heater - natural, through the deflectors and gates
Ventilation in the diesel fuel storage room	- natural, through the deflector and the door
Service life, not less, years	30

# FIREFIGHTING WATER PUMPING STATIONS

## PRINCIPLE OF OPERATION

Water from the fire reservoirs runs through the valves and the receiving manifold to the pumps. After passing the pumping units, the pressurized water enters the firefighting water supply network through a pressure manifold and gate valves. Leaks from seals of pumping units by gravity flow into an industrial sewage system. Leaks are monitored with use of instruments and automation equipment.

A circulation pump is used to circulate water in the fire water supply system.

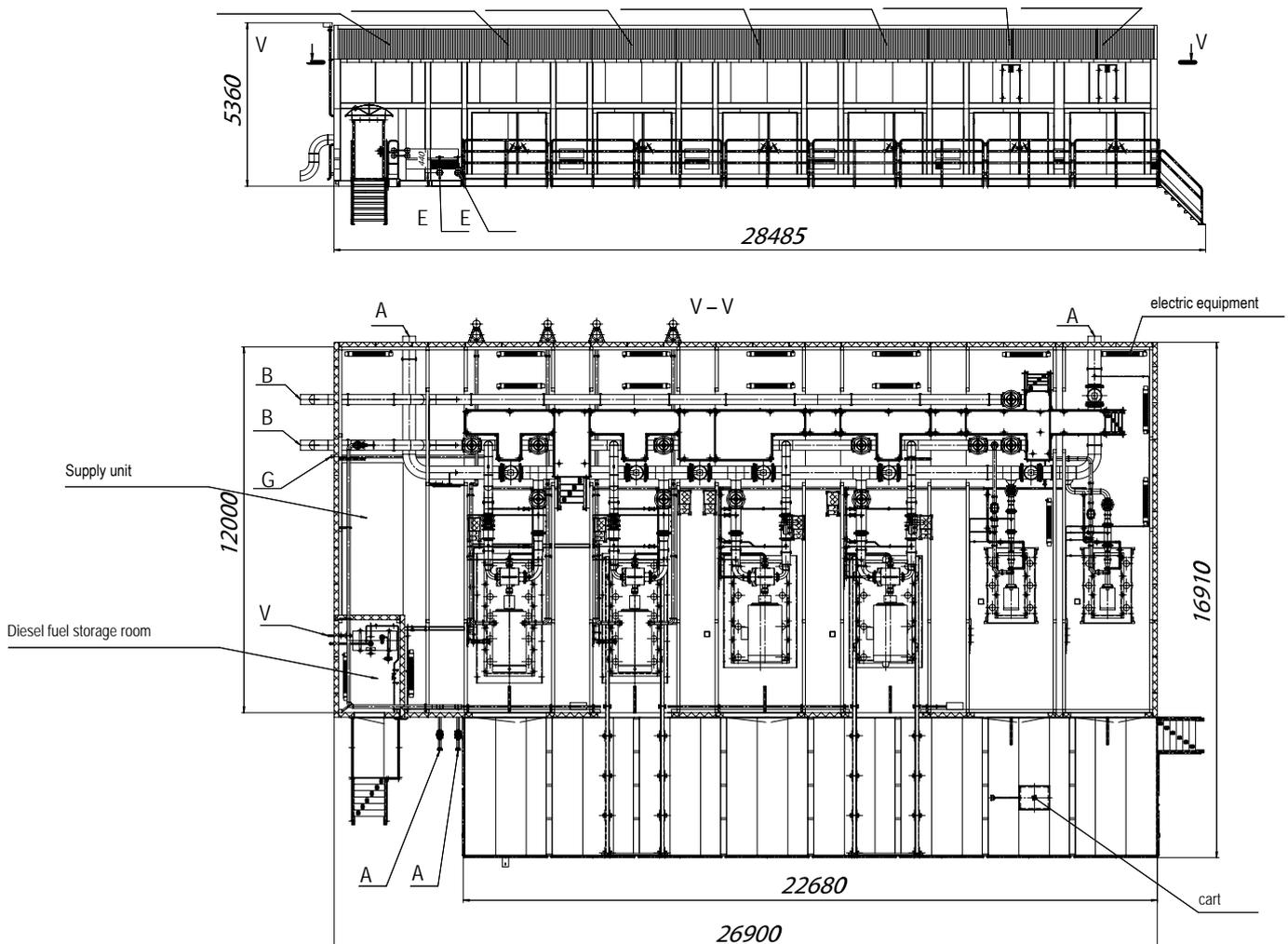
In case of a fire, the fire-extinguishing electric pump units are started and solenoid gate valves are opened, and water is supplied to the fire-fighting network.

In the pumping station, diesel engine pumps are provided for operation for a period of lack of electricity. A fuel tank is installed in a separate room to supply the diesel engine.

From the pressure manifold, water is also supplied to the fire couplings to connect portable fire extinguishing means and to fire hydrants.

## GENERAL ARRANGEMENT

Additional section No. 7 Additional section No. 6 Additional section No. 5 Additional section No. 4 Additional section No. 3 Additional section No. 2 Additional section No. 1



- A - water from firefighting tanks
- B - water into firefighting circuit
- V - diesel fuel
- G - drainage pipeline
- E - for connection of mobile fire extinguishing equipment

# MODULAR BOXES OF THE GAS (CARBON-DIOXIDE) FIREFIGHTING STATIONS

## PURPOSE

Modular box of the gas (carbon-dioxide) firefighting station (hereinafter the module) is intended for storing carbon dioxide in liquid state and its supply during extinguishing fires and burning electrical equipment that is under voltage.

## PRINCIPLE OF OPERATION

The module is used for fire protection of premises and process equipment as part of gas fire extinguishing units when extinguishing by volumetric or local volumetric method.

## DESIGN

A module is a building mounted on site with use of some individual blocks. The module consists of a base, roof, frame, and surrounding panels.

The module walls are covered with three-layer wall panels; the partitions of the rooms are three-layer wall panels; the ceiling is made of profiled sheets.

The module is equipped with:

- electric Warm up;
- lighting;
- mechanical ventilation;
- isothermic module for liquid carbon dioxide (MIJU);
- automatic switchboard;
- distribution point;
- box with stepdown safe distribution transformer;
- protective potential equalization line;
- instrumentation and automation equipment;
- system of fire alarm, speakerphone and alert;
- set of spare parts.

## ITEMS SUPPLIED

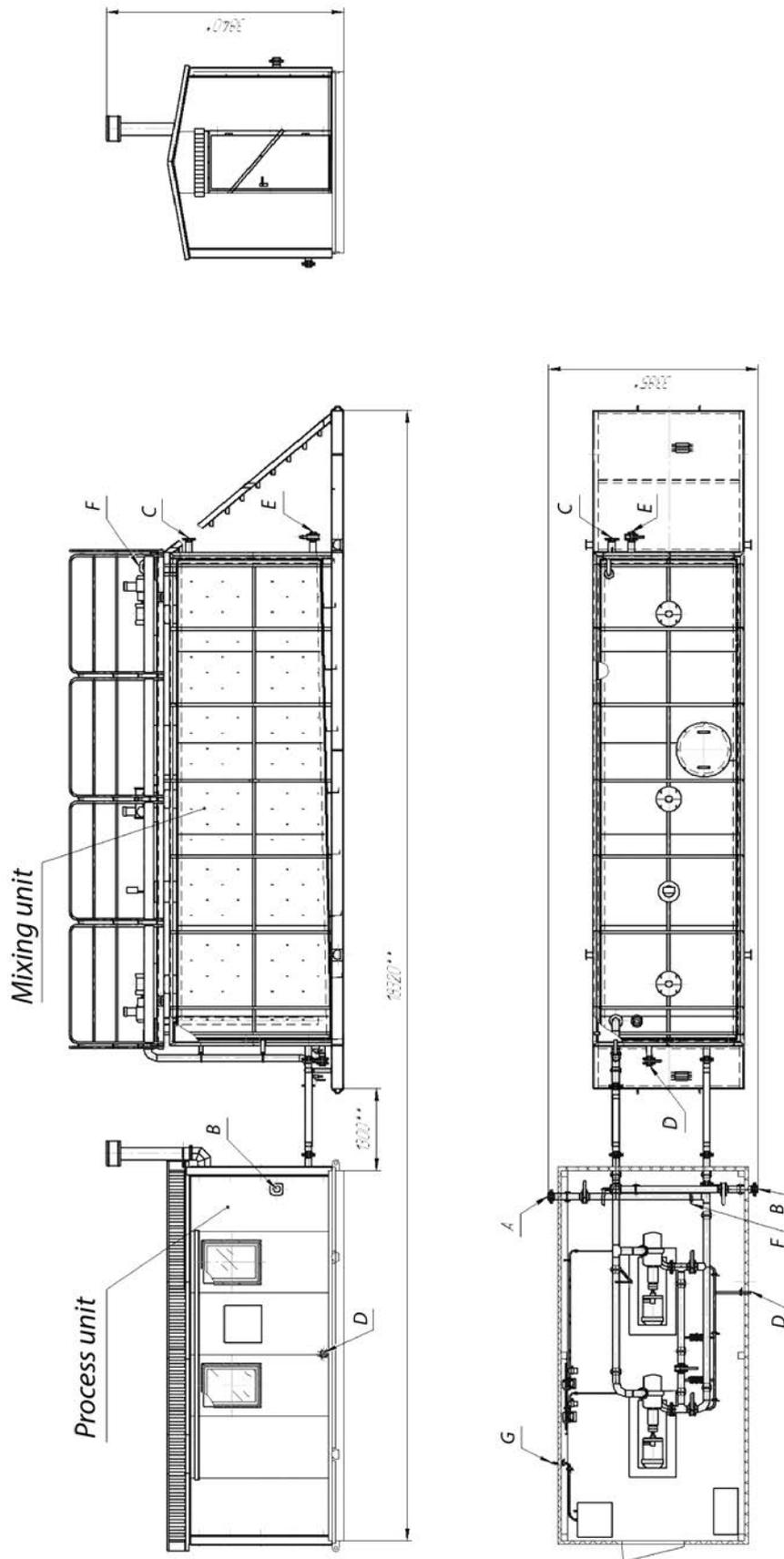
The module is a complex unit consisting of an isothermal reservoir for liquid carbon dioxide with shut-off and control valves, stop/start device, weighing device, refrigeration unit with a set of refrigeration circuit equipment, control module for electric heaters, and control cabinet with an external signal unit.



SPECIFICATIONS	
Parameter	Value
Climatic design according to GOST 15150-69	HL1
Constructive fire hazard class of the building according to SNiP 21-01-97	S0
Air temperature in the room, not less, °C	15
Air temperature of the coldest five-day period with reliability of 0.92, °C	-49
Air temperature of the coldest 24 hour period with reliability of 0.92, °C	-52
Wind load, kPa, max	0.23
Snow load, kPa, max	3,2
Area seismicity, Richter scale magnitude	5
Functional fire hazard class according to SNiP 21-01-97	F.5.1
Fire resistance according to SNiP 21-01-97	II
Room category of explosion and fire hazard according to NPB 105-03	D
Storage and transportation temperature, max, °C	-60
Building overall dimensions, max, mm (length x width x height)	7360x4800x5250
Dimensions of the building at the base, max, mm (length x width)	7000x4500

# MODULAR BOXES OF THE GAS (CARBON-DIOXIDE) FIREFIGHTING STATIONS

## GENERAL ARRANGEMENT



## FIRE HYDRANTS UNITS



### PURPOSE

The fire hydrant unit (hereinafter the unit) is intended to take water from the fire water network and provide external fire extinguishing by supplying water through special nozzles equipped with fire connecting couplings; and with water supply to the place of fire using fire pressure hoses and fire hose nozzles.

### ITEMS SUPPLIED

The unit is equipped with:

- water Warm up;
- lighting;
- natural ventilation;
- natural exhaust through the baffle;
- service platforms (only for the unit with 8 connections).

### DESIGN

The unit comprises ground assembly of fire hydrants. Water is supplied to the unit via two inlets (for 4 connections) or via four inlets (for 8 connections) with subsequent distribution of extinguishing water in four pipe branches (for 4 connections) or eight pipe branches (for 8 connections). Shut-off valves are installed on each pipe branch inside and outside the unit.  
Climatic design: HL, placement category 1 according to GOST 15150-69.

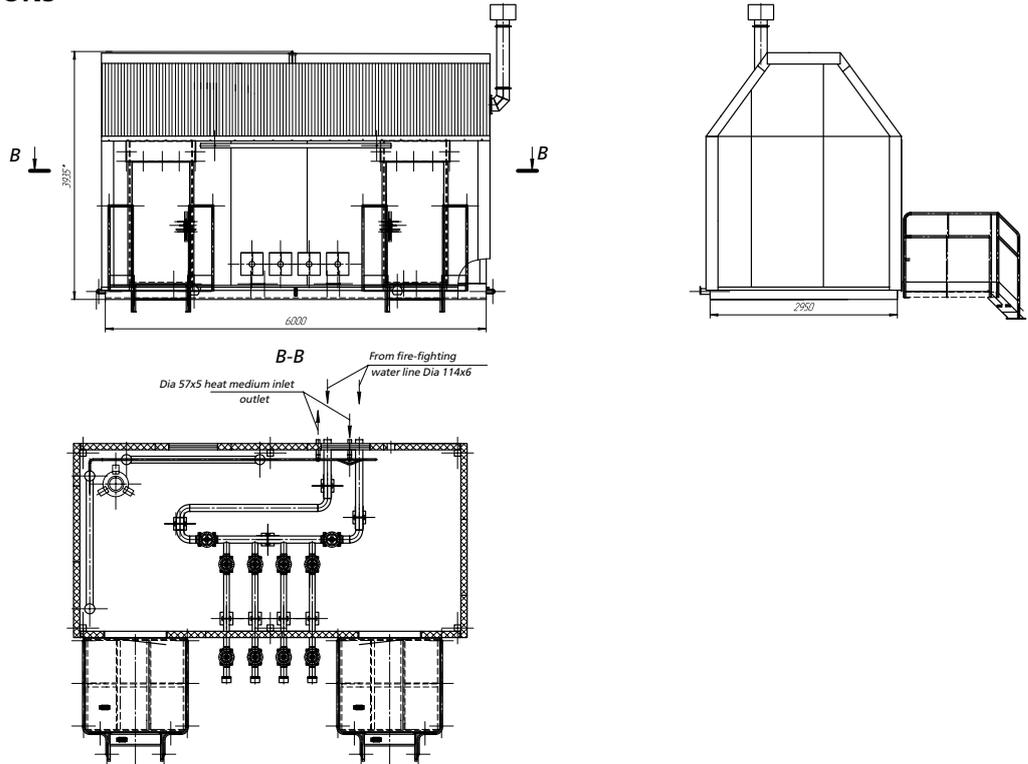
### SPECIFICATIONS

Parameter	Value
Room category of explosion and fire hazard according to NPB 105-95	D
Responsibility class of the building according to SNiP 2.01.01-85	II
Fire resistance according to SNiP 21-01-97	III
Absolute extreme ambient air temperature, °C	- 70 to + 45
Wind load, kPa, max	0,38
Snow load, kPa, max	3,2
Nominal voltage, V	220
Frequency, Hz	50
Power consumed by lighting, kW, max	0,16
Overall dimensions, mm, max:	
- length	9700
- width	3200
- height	3935

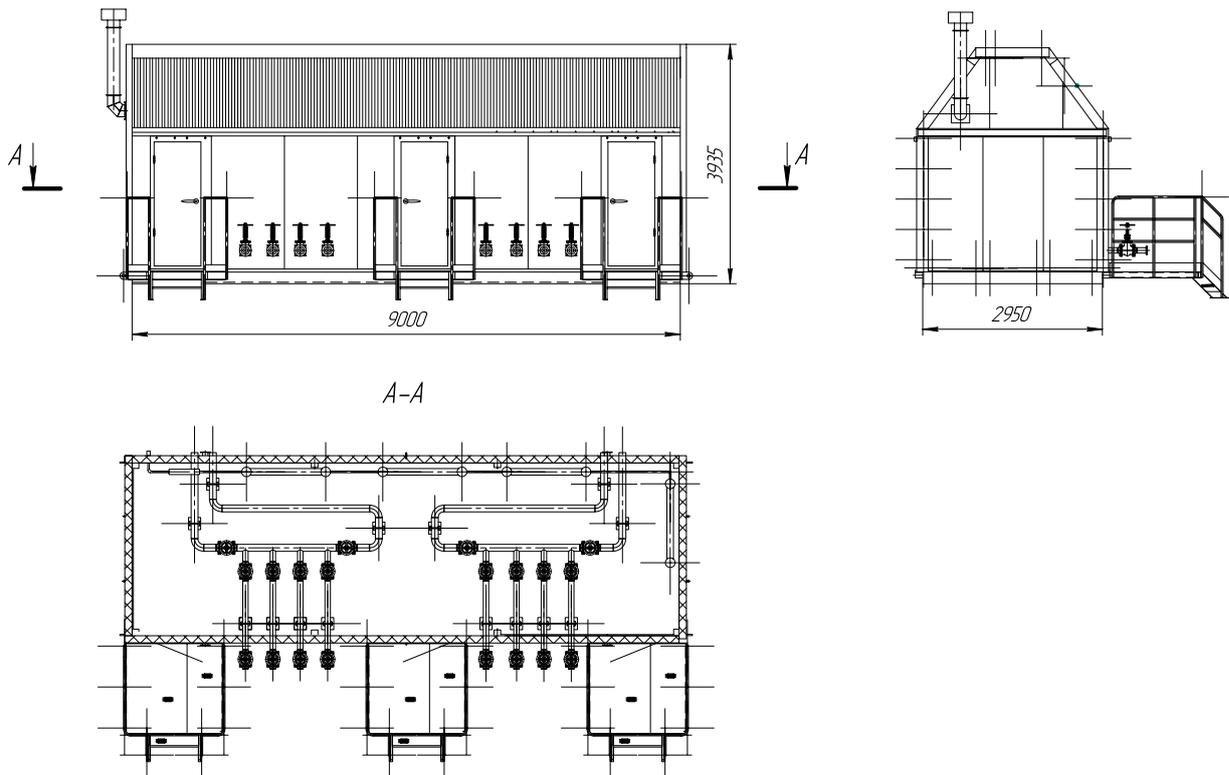
# FIRE HYDRANTS UNITS

## GENERAL ARRANGEMENT

### BLOCK FOR 4 CONNECTIONS



### BLOCK FOR 8 CONNECTIONS



## FOAM FIREFIGHTING STATIONS



### PURPOSE

Foam firefighting station (hereinafter the station) is intended for extinguishing a possible fire at sites and tanks with high-expansion air filled foam on the basis of foaming agent. The water supply is provided by means of a firefighting ring main.

### ITEMS SUPPLIED

The station building consists of two sections of frame-panel design. The sections have a metal base, thermal insulated with insulating plates; frame of the buildings is made of square sectional profiles with fireproof coating; the shelter of the buildings is metal, three-layer, wall panels with mineral wool thermal insulation.

The station is located in a building divided into two rooms: the room of the process fittings and the switchboard room, which includes the fire control automation panel and control panel.

The station is equipped with the process equipment, Warm up, ventilation, electrical equipment, electrical lighting, automation and instrumentation means.

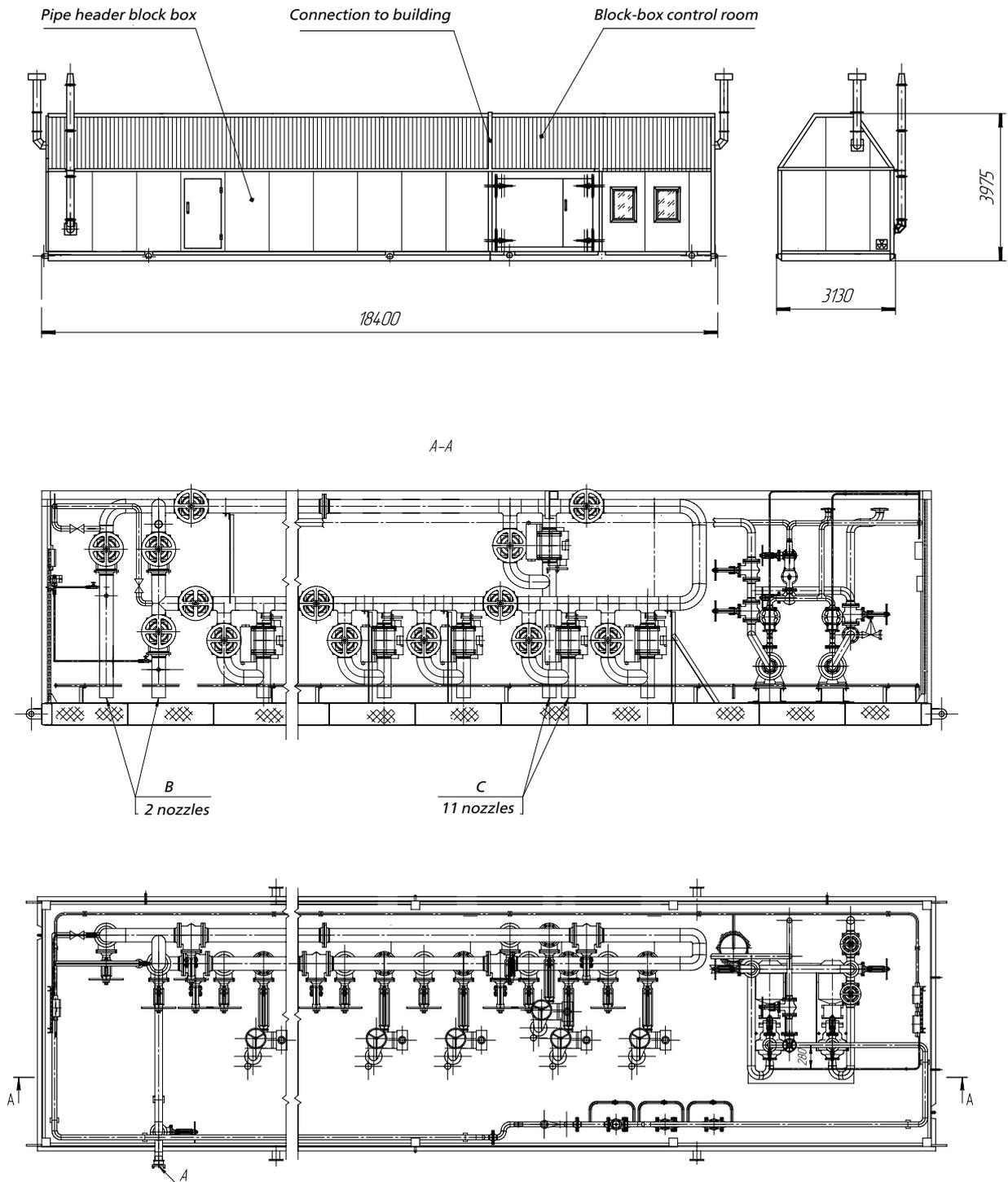
The station is an automated facility with temporary stay of the staff during start-up, shutdown, inspection and adjusting of instruments, valves, and equipment. Climatic design: HL1.

### SPECIFICATIONS

Parameter	Value
Room category of explosion and fire hazard according to NPB 105-95 Fire Safety Standards	D
Fire resistance according to SNiP 21-01-97	II
Design fire mixture pressure, to feed into the protected sections, m H <sub>2</sub> O	70,6... 84
Ventilation	supply with mechanical motion
Pump unit type	CVK 5/125
Pump unit capacity, m <sup>3</sup> /hour	18
Discharge head, m	125
Number of pumping units:	2
- duty	1
- standby	1
Electric motor model	4AM180M2
Motor power, kW	30
Motor speed, rpm	3000
Warm up	water
Design outdoor temperature, °C, not less	- 43
Indoor temperature, °C, not less	+ 5
Overall dimensions, mm:	
- block-box of pipe headers (length x width x height)	12400 x 3200 x 3925
- block-box of switchboard (length x width x height)	6400 x 3200 x 3925

# FOAM FIREFIGHTING STATIONS

## GENERAL ARRANGEMENT



A – connection of portable fire fighting equipment

B – inlet from firefighting water circuit

C – outlet to consumers

# WAREHOUSES OF FOAMING AGENT AND FIREFIGHTING EQUIPMENT



## PURPOSE

Warehouse of foaming agent and firefighting equipment (hereinafter the warehouse) is intended for storing the stock of foaming agent in the containers and firefighting equipment (fire hoses, motor pumps, spare fire extinguishers, etc.).

## PRINCIPLE OF OPERATION

To fill a fire truck or other container with a foaming agent solution, there is the connection on the pipeline leaving the unit, which allows connection of fire hoses. The foaming agent stored in the unit in a special container is fed out with a pump. Two fire trucks can be filled at the same time.

## DESIGN

The module is a building mounted with use of some individual blocks. The module consists of a base, roof, frame, and surrounding panels.

The walls and partitions of the module are covered with three-layer wall panels; the ceiling is made of profiled sheets. The module is equipped with electric Warm up, lighting, mechanical and natural ventilation.

## ITEMS SUPPLIED

The warehouse of foaming agent and firefighting equipment includes two sections:

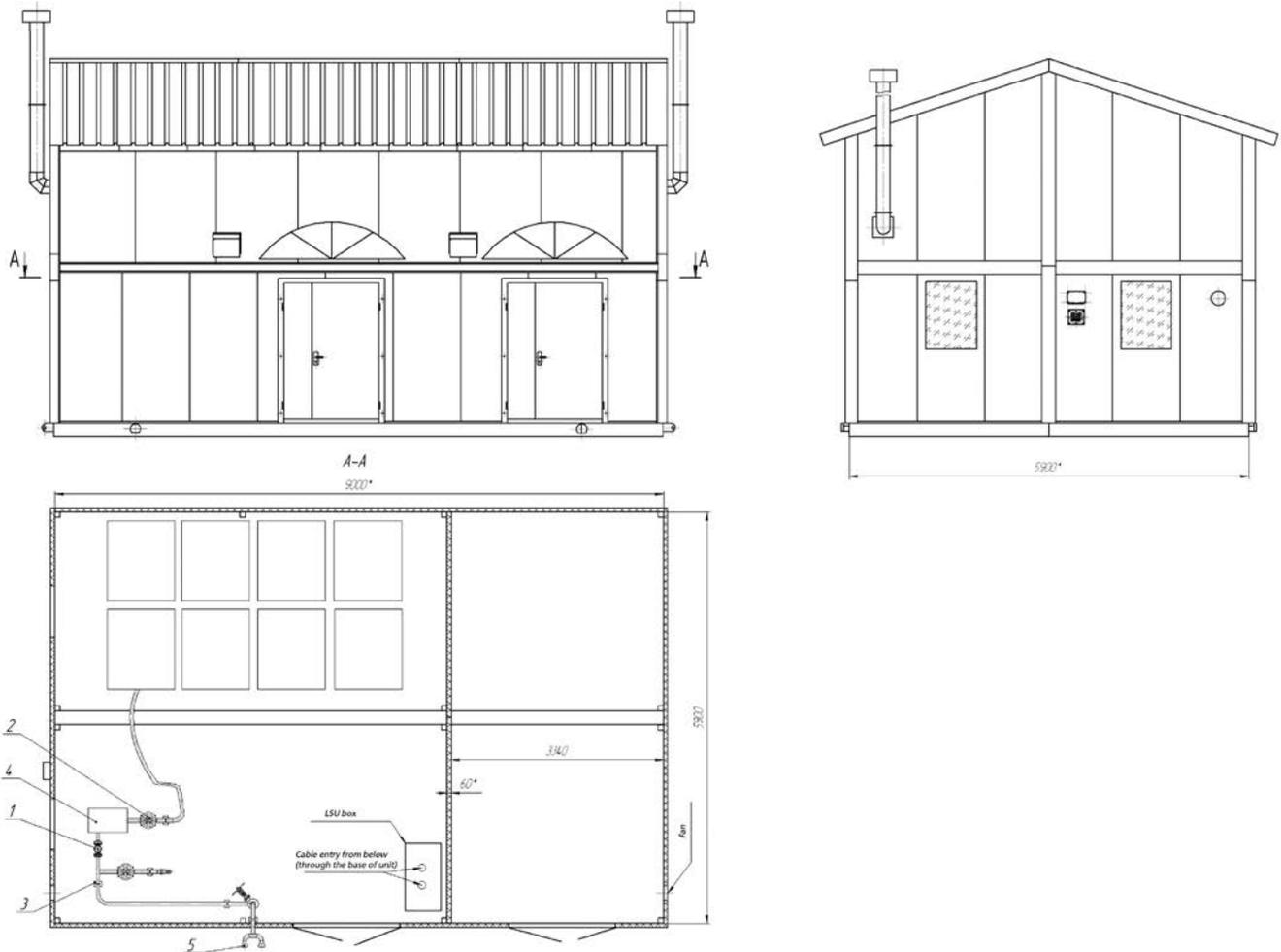
- warehouse for storage of foaming agent;
- warehouse for storage of fire fighting equipment and fire fighting tools and materials.

## SPECIFICATIONS

Parameter	Value
Climatic design of the unit according to GOST 16350-80	HL
Constructive fire hazard class of the building according to SNiP 21-01-97	S0
Absolute minimum temperature, °C	-55
Air temperature of the coldest five-day period with reliability of 0.92, °C	-46
Humidity zone (normal)	2
Estimated weight of snow cover, kPa	2,4
Wind load, kPa	0,73
Fire resistance according to SNiP 21-01-97	II
Functional fire hazard class	F5.1
Internal air temperature, not less, °C	+5
Humid room conditions	normal
The degree of aggressive impact of the environment on metal structures	non-aggressive
Overall dimensions of the building, mm, max:	
- length	10100
- width	6850
- height	6120

# WAREHOUSES OF FOAMING AGENT AND FIREFIGHTING EQUIPMENT

## GENERAL ARRANGEMENT



- 1 - swing check valve
- 2 - wedge gate valve made of 20 GL steel with manual operation
- 3 - support
- 4 - Grundfos Pomona PO 23 R pump
- 5 - GM-50 HL1 fire hose coupling

# FOAMING AGENT DOSING MIXERS COMPLETE WITH TANKS



## PURPOSE

Foaming agent dosing unit and mixer complete with foaming agent storage tanks (hereinafter the dosing tank) is intended for storage of fluorine-containing foaming agent, automatic dosing and proportional mixing of foaming agent concentrate with water.

The dosing tanks are used in automatic fire extinguishing systems with use of low-expansion foam, for extinguishing tanks with oil, or with use of high-expansion foam in process and field facilities of the oil and gas industry, and at oil refineries.

## ITEMS SUPPLIED

The product includes:

- foaming agent dosing and mixing unit
- foaming agent storage tank;
- piping with shut-off and control valves;
- instrumentation and automation equipment (at the request of the customer).

## DESIGN

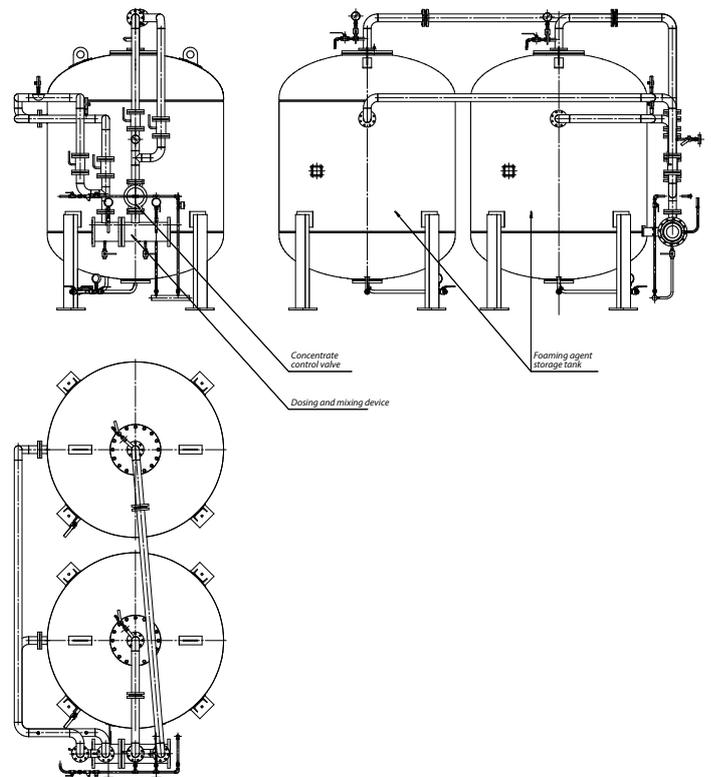
The dosing tanks should include the following main blocks:

- horizontal or vertical foaming agent storage tank;
- internal elastic vessel;
- foaming agent dosing and mixing device;
- pressure pipeline for supplying water to the inner chamber of the tank;
- supply pipeline of the foaming agent, displaced from the elastic vessel into the dosing and mixing device;
- pipeline to fill the elastic vessel with the foaming agent;
- pipeline to drain the water from the inner chamber of the tank.

A perforated central tube for more efficient discharge of the foaming agent should be installed in the foaming agent storage tank.

SPECIFICATIONS	
Parameter	Value
Hazard class according to GOST 12.1.007, not higher	4
Category of explosive mixture	not explosive
The medium must have a density, not more than, kg/m <sup>3</sup>	1100
Climatic design of the category 1 according to GOST 15150, °C, not less:	
- U	-40
- HL	-60
- T	-10
Operating pressure, MPa	0.8 - 1.2
Design pressure, MPa	up to 1.6
Operating medium	water, foam generating agents
Volume, l	
- vertical	2500 – 8000
- horizontal	600 – 12000
Operating water pressure before the dosing unit, MPa	0.8 – 1.2
Pressure drop at the dosing unit outlet, MPa, max	0,08
Service life, not less, years	10

## GENERAL ARRANGEMENT



## MODULAR BOXES FOR ELECTRICAL EQUIPMENT



### PURPOSE

The modular box for electrical equipment (hereinafter the modular box) is intended for installation of packaged transformer substation (PTS), low-voltage switch unit (LSU), PTS with LSU, distribution unit, and other electrotechnical equipment. The boxes is manufactured with the dimensions of 3x3 m, 3x6 m, 3x9 m, 3x12 m, 6x9 m, 6x12 m, and 6x15 m.

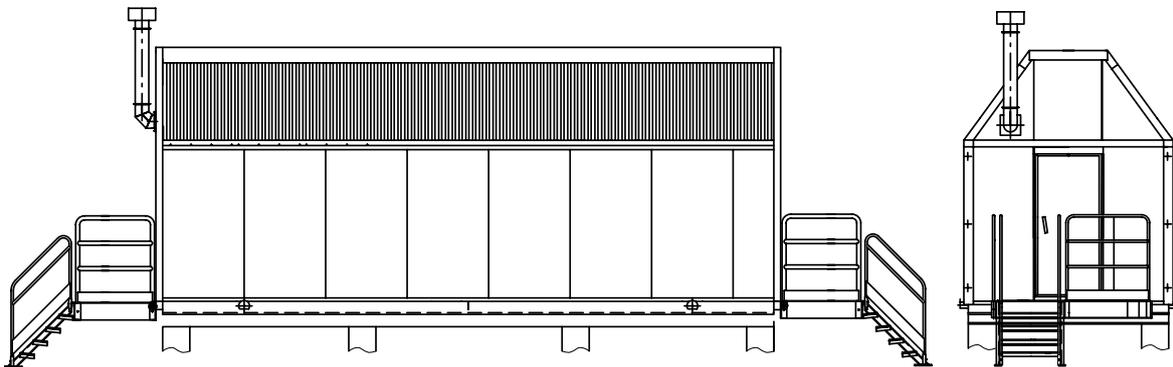
### DESIGN

The modular boxes have a number of features:

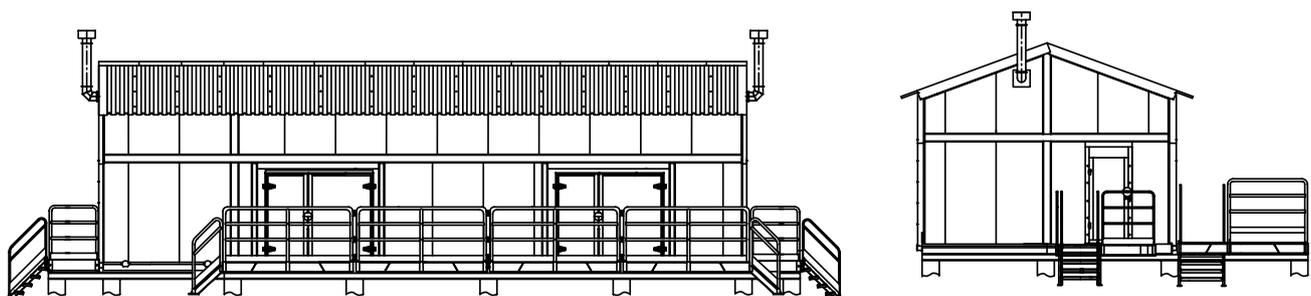
- accelerated terms of installation due to the use of the structure with additional blocks;
- lack of internal supports;
- partitions at the request of the customer;
- plastic windows;
- metal doors of the improved design;
- branded coloring, etc.

### GENERAL ARRANGEMENT

#### BOX FOR PLACING PTS WITH LSU (3H9M)



#### BOX FOR PLACING PTS WITH LSU (6H15M)



## OPERATOR ROOMS



### PURPOSE

The operator room is intended to create comfortable conditions for the efficient work of personnel and reliable operation of technical means of automated system of the production.

### DESIGN

The building has a block structure. The blocks consist of a base, a frame, covered on the outside with three-layer panels with mineral wool insulation, inside with a layer of min-

eral wool insulation and plastic panels. Doors and windows are plastic, with triple glazing. There are heated floor, covered with linoleum, and suspended ceiling. The operator room is well lit, soundproof, with a ventilation system, optimal for area to place and safe maintain the automation equipment. the scope of delivery includes an air conditioning unit.

We provide the following at customer request:

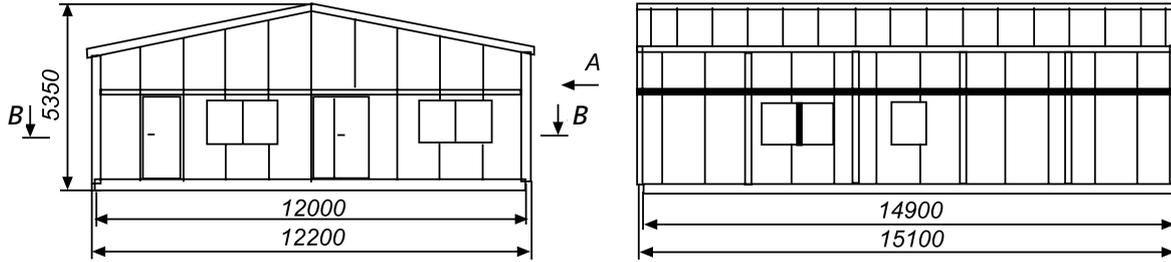
- change of overall dimensions;
- change of layout and interior decoration;
- providing with furniture.

### SPECIFICATIONS

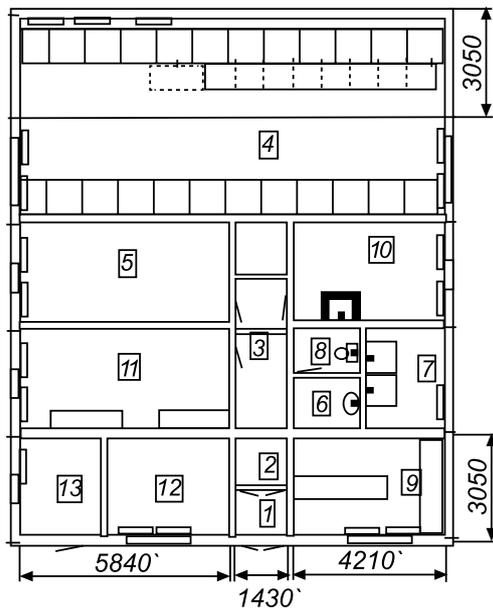
Parameter	Value
Climatic conditions:	
- ambient temperature, °C	-70 ... +45
- average annual relative humidity, %	80
- wind load, kPa, max	0.35
- snow load, kPa, max	3.8
Air temperature in the room, °C, not less	21
Constructive fire hazard class according to SNiP 21-01-97	SO
Fire hazard class of building structures according to GOST 30403-96	KO
Explosive area class as per PUE	D
Fire resistance of the building according to SNiP 21-01-97	II
Overall dimensions, mm	
- length	9000 ... 14900
- width	6000 ... 9000
- height	4600 ... 5050

# OPERATOR ROOMS

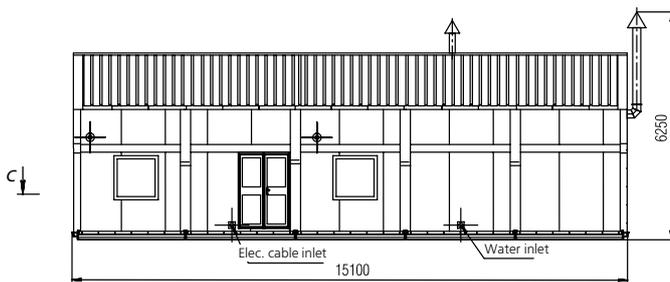
## GENERAL ARRANGEMENT



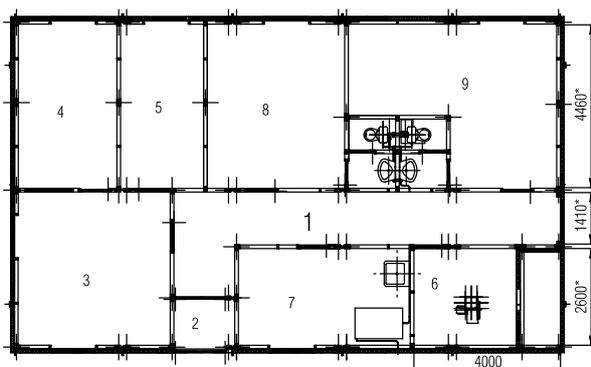
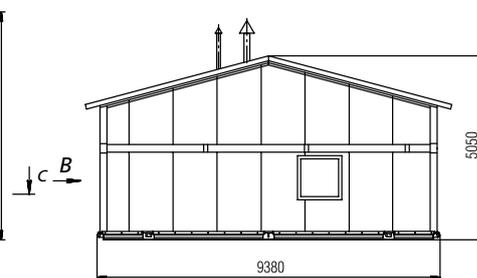
B-B



- 1 - Air lock
- 2 - Air lock
- 3 - Corridor
- 4 - Operator room
- 5 - Instrumentation workshop
- 6 - Air lock
- 7 - Shower room
- 8 - WC
- 9 - Drying and dressing room
- 10 - Dining room
- 11 - Metal workshop
- 12 - Electrician room
- 13 - Heat generating section



B-B



- 1 - Corridor
- 2 - Air lock
- 3 - Operator room
- 4 - foreman's office
- 5 - communications unit
- 6 - ventilation cell
- 7 - Dining room
- 8 - men's locker room for 6 persons
- 9 - ladies' locker room for 18 persons

## WARM UP UNITS FOR THE FIELD PERSONNEL

### PURPOSE

The Warm up unit for the field personnel is intended for Warm up personnel and placement various household and office equipment in the premises.

### ITEMS SUPPLIED

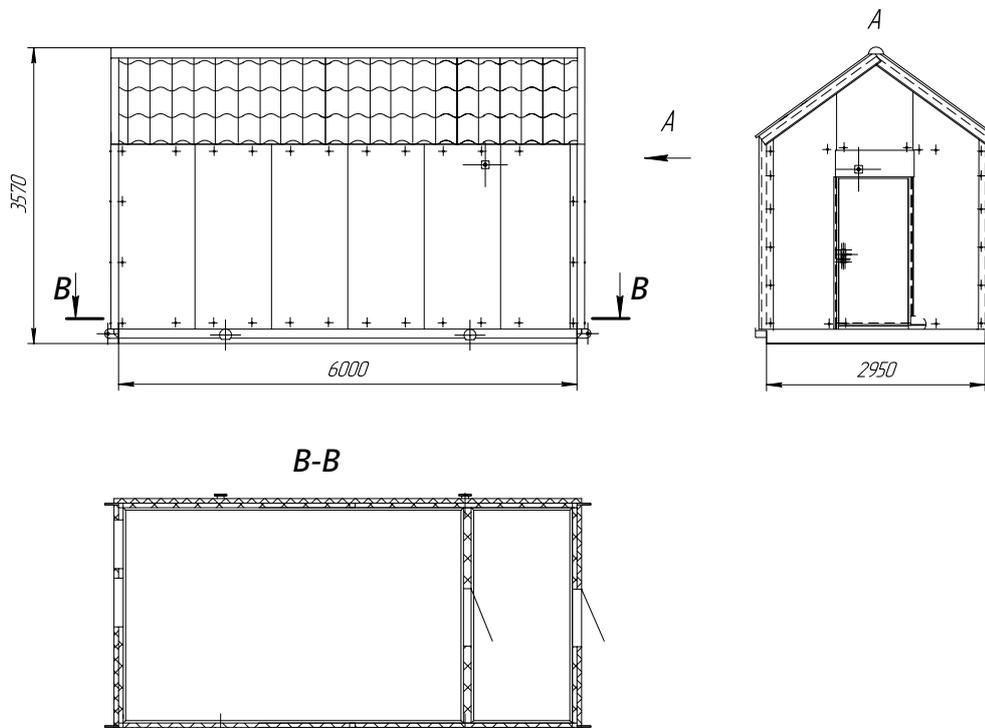
The unit consists of a base, a frame, covered on the outside with three-layer panels with polyurethane foam insulation, inside with a layer of mineral wool insulation covered with fibre-board panels. The unit has metal doors and plastic windows. There are heated floor, covered with linoleum. The ceiling is made of plastic panels. The room is well lit. At the request of the customer, there can be water and sewage; there are washbasin and toilet. Power supply is provided from an external source. Water supply is provided from an external source.

We provide the following at the customer request:

- change of overall dimensions;
- change of layout and interior decoration;
- providing with furniture.



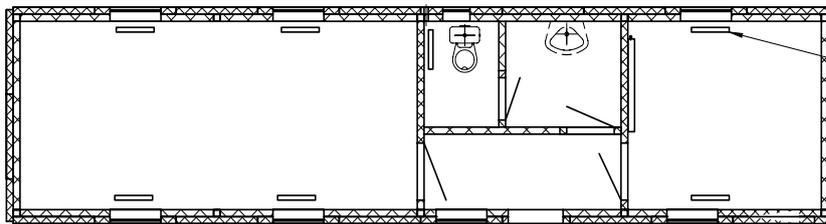
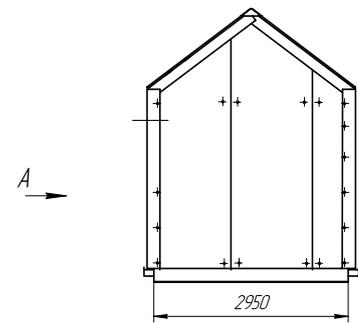
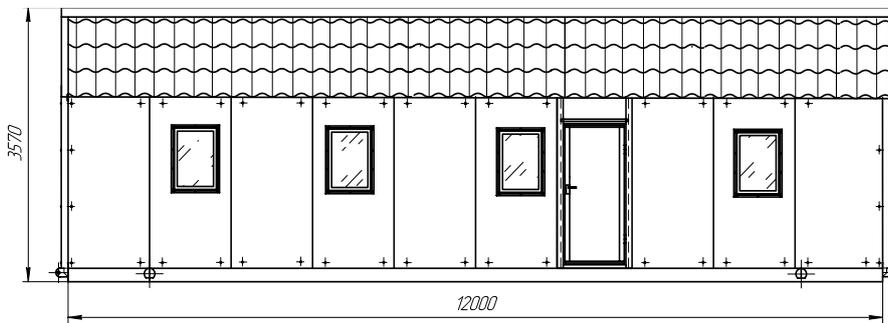
### GENERAL ARRANGEMENT



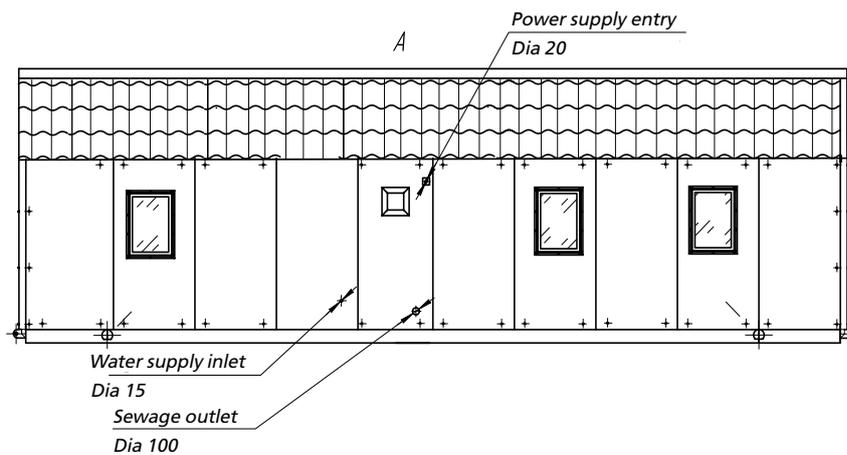
# WARM UP UNITS FOR THE FIELD PERSONNEL

SPECIFICATIONS	
Parameter	Value
Climatic design	UHL1
Fire resistance according to SNiP	IV
Air temperature in the room, °C, not less	+18
Overall base dimensions, mm	
- length	6000 ... 12000
- width	2950
- height	3570

## GENERAL ARRANGEMENT



Oil-filled electric radiator  
ERM PB 1.5/220 – 7 pcs.



## MODULAR BOXES FOR UTILIZATION OF BARRELS



### PURPOSE

The modular box for utilization of barrels (hereinafter the module) is intended for steaming and pressing steel barrels with a capacity of 200 liters which are used for storage of chemicals.

### PRINCIPLE OF OPERATION

The process of barrels disposal includes steaming (cleaning of chemicals) and pressing the cleaned barrels by a hydraulic press.

Steaming of barrels are performed at the temperature of 115 °C to 158 °C on the steaming unit comprising a metal cabinet mounted on supports with hinged doors for loading barrels, with nozzles for supplying steam, draining of steaming products and a vent tube.

The collapse of the barrels is performed by a hydraulic press with pressing power of 30 tons; loading of the barrels into the operating chamber of the press is performed manually; the barrels are installed vertically, with the lids up. The height of the pressed barrel is 100 mm.

### DESIGN

A module is a building mounted in place with use of some individual blocks. The module consists of a base, roof, frame, and surrounding panels.

The walls and partitions of the module are covered with three-layer wall panels; the ceiling is made of profiled sheets. The unit is equipped with water Warm up, lighting, and mechanical ventilation.

### ITEMS SUPPLIED

The following production and auxiliary premises are provided in the modular box:

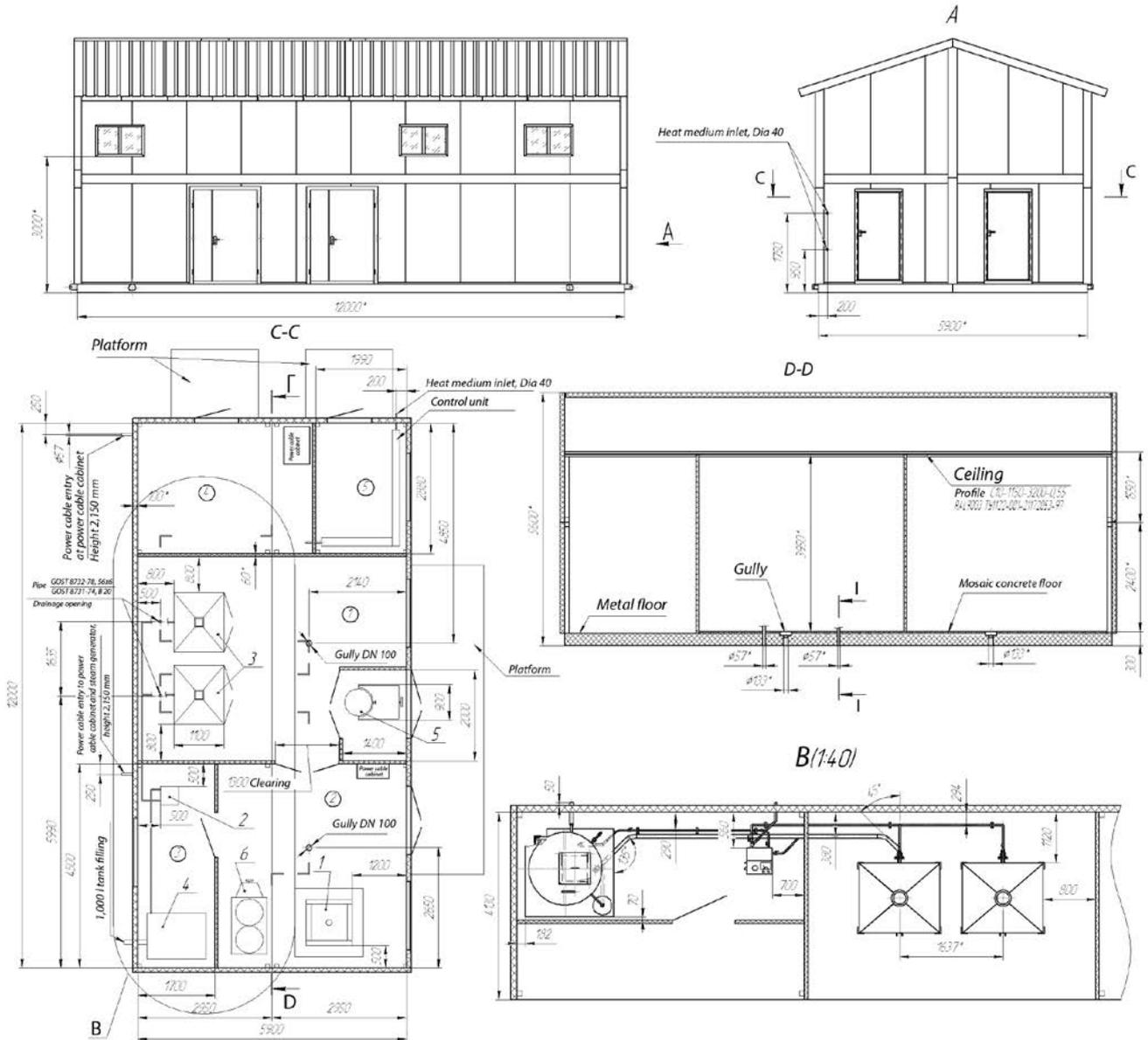
- section of barrel steaming;
- section of barrel pressing;
- steam generator room;
- ventilation chamber;
- heat generating section;
- air lock.

### SPECIFICATIONS

Parameter	Value
Climatic design	HL
Air temperature in the room, °C, not less	
- section of barrel steaming	16
- section of barrel pressing	18
- steam generator room	5
- room of ventilation chamber and thermal generating unit	10
Design parameters of outdoor air, °C	- 49
Design temperature of the coldest five-day period with reliability, °C	
- 0.92	- 49
- 0.98	- 50
Design temperature of the coldest 24 hour period with reliability, °C	
- 0.92	- 53
- 0.98	- 54
Average daily amplitude of air temperature during the coldest month, °C	9.2
Average daily amplitude of air temperature during the warmest month, °C	9.9
Design barometric air pressure, mm. Hg	760
Wind load, kgf/m <sup>2</sup> , max	38
Snow load, kgf/m <sup>2</sup> , max	400
Average annual wind speed, m/s	4
The maximum height of snow cover with reliability of 5%, m	0.9
Humidity zone	normal
Area seismicity, Richter scale magnitude, less than	6
Functional fire hazard class according to SNiP 21-01-97	F3.6
Fire resistance according to SNiP 21-01-97	IV
Boiling temperature, °C	115 to 158
Pressure, MPa	0.1 to 0.5
Productivity, kg of steam per hour	50
Overall dimensions of the building, mm, max	
- length	12360
- width	6200
- height	5600
Dimensions of the building at the base, max, mm	
- length	12000
- width	5900

# MODULAR BOX FOR UTILIZATION OF BARRELS

## GENERAL ARRANGEMENT



- 1 – vertical hydraulic press
- 2 – electric electrode steam generator
- 3 – unit for steaming barrels
- 4 – water tank
- 5 – manual hydraulic barrel dumper
- 6 – manual hydraulic cart

- ① – section of barrel steaming
- ② – section of barrel pressing
- ③ – steam generator room
- ④ – ventilation chamber
- ⑤ – heat generating section

## FRONT SECURITY DESKS



### PURPOSE

The front security desk is intended to provide comfortable conditions for staff.

### ITEMS SUPPLIED

The building has a block structure.

The unit consist of a base, a frame, covered on the outside with three-layer panels with polyurethane foam insulation, inside with a layer of mineral wool insulation and plastic panels.

The doors and windows are plastic, with triple glazing. There are heated floor, covered with linoleum. Power supply is provided from an external source. Warm up is electric type, with the use of electric heaters.

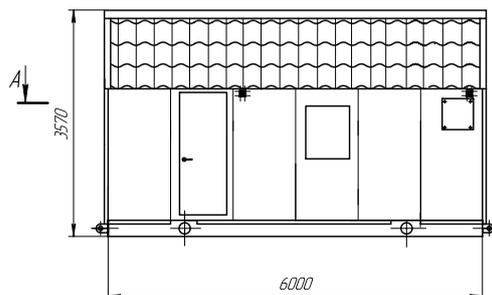
We provide the following at the customer request:

- change of overall dimensions;
- layout;
- interior decoration;
- water Warm up.

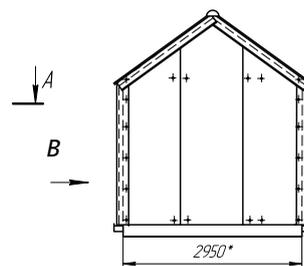
### SPECIFICATIONS

Parameter	Value
Climatic design	UHL1
Fire resistance according to SNiP	IV
Air temperature in the room, °C, not less	21
Rated power, kW - for the Warm up system - for the lighting system	3 0.5
Overall base dimensions, mm - length - width - height	3000 ... 6000 2950 3570

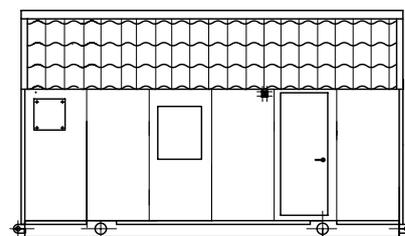
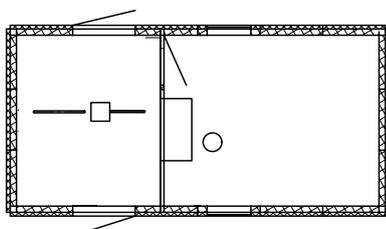
### GENERAL ARRANGEMENT



A-A



B



## PIG LAUNCHER AND RECEIVER TRAPS

### PURPOSE

The pig launcher and receiver trap (hereinafter the device) is intended for installation in gas mains and field piping; it serves for pe-riodical launching and receiving pipeline pigs and smart pigs, cleaning pigs, and other tools.

The device is manufactured upon the customer's request, taking into account the specific technical parameters and characteristics set forth in the technical specifications or other documents replacing the technical specifications, provided that they do not contradict the requirements of the current regulatory documentation and the rules for the design and safe operation of these devices. The devices are intended for operation in conditions of macroclimatic areas according to GOST 15150.



### ITEMS SUPPLIED

The device includes:

- receiving/launch traps;
- piping, fittings and connecting parts;
- mechanism for extracting, moving and storing of cleaning and diagnostic tools.

In coordination with a customer, the scope of delivery may include:

- signaling devices for the passage of cleaning and diagnostics tools;
- metal structures (service platforms, ladders, frame, etc.);
- tank for drainage of oil from receiving/launch traps;
- instrumentation, including temperature sensors, pressure sensors;
- safety valve.

### SPECIFICATIONS

Parameter	Value
Operating pressure, MPa, max	12.0
Minimum medium temperature, °C	-20
Maximum medium temperature, °C	+80
Operating medium name	gas/oil
Hazard class according to GOST 12.1.007-76	3
Category of explosion hazard according to GOST R 51330.11-99	IIA
Group of explosive mixture in accordance with GOST 51330.5-99	T3

# OIL WELL SHELTERS

## PURPOSE

The oil well shelter (hereinafter the shelter) is intended to protect oil production and injection wells from effects of environmental climatic factors.

## DESIGN

The oil well shelter is a block structure. Heat insulated three-layer panels are used as surrounding structures of the unit. The unit room area is sufficient to create a safe and convenient maintenance of the equipment for wellhead connections. Electrical equipment is made in explosion-proof version.

## ITEMS SUPPLIED

The shelter includes:

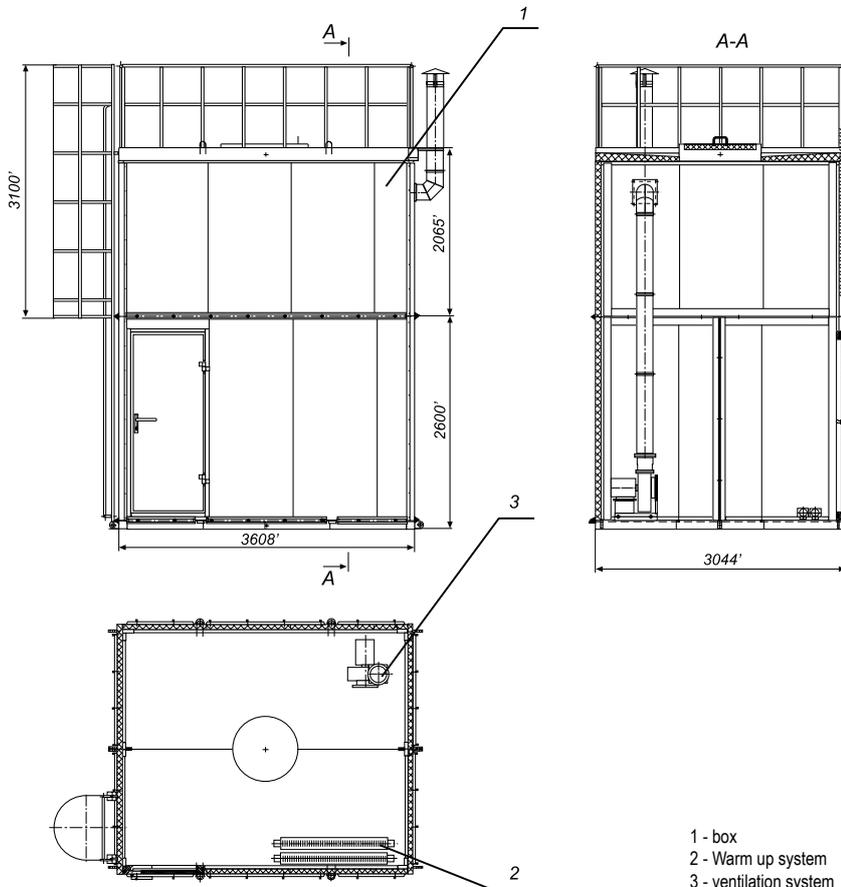
- box;
- Warm up system (electric);
- ventilation system;
- lighting system (incandescent lamps);
- service platform.



## SPECIFICATIONS

Parameter	Value
Explosive area class as per PUE	V-1a
Fire resistance of the building	II
Air temperature in the room, °C, not less	+13
Overall dimensions, mm, max:	
- length	4000 ... 4850
- width	3190
- height	2680 ... 5690

## GENERAL ARRANGEMENT



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The information given in this catalog is for reference only and allows you to select the necessary products, which are developed and manufactured by HMS Neftemash JSC. Full technical information on all products is specified in the relevant technical manuals. We strongly recommend to use the data from the technical manuals as the basic data for project development, mounting and operation the products of HMS Neftemash JSC. HMS Neftemash JSC reserves the right to upgrade its products and make changes to the product catalog without prior notification. The company is not responsible for typographical errors in catalogs, brochures and other promotional materials.

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