

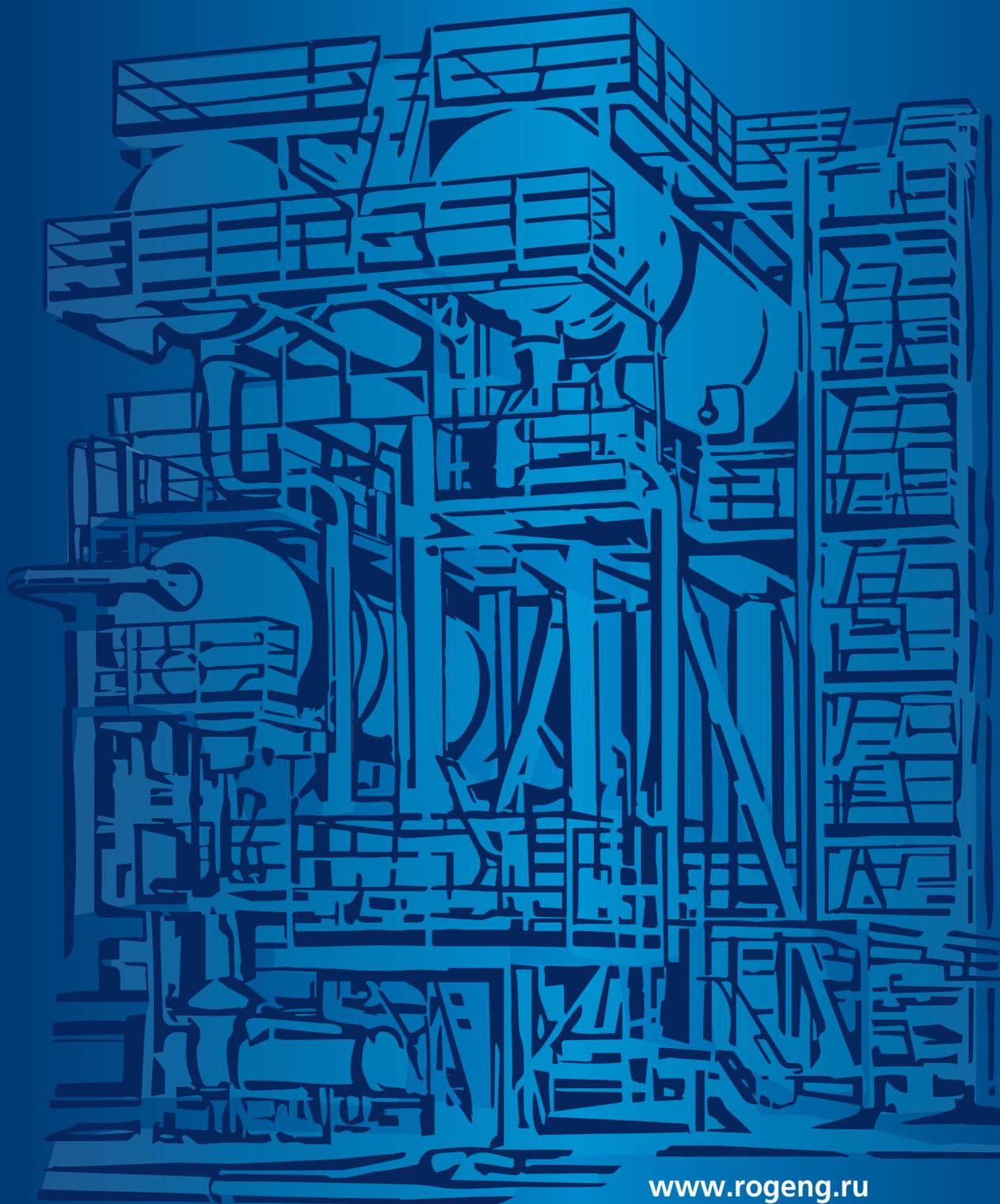


**Yevropeyskaya
Elektrotehnika**

GROUP OF COMPANIES



ROG-Engineering



CATALOG OIL & GAS EQUIPMENT

www.rogeng.ru

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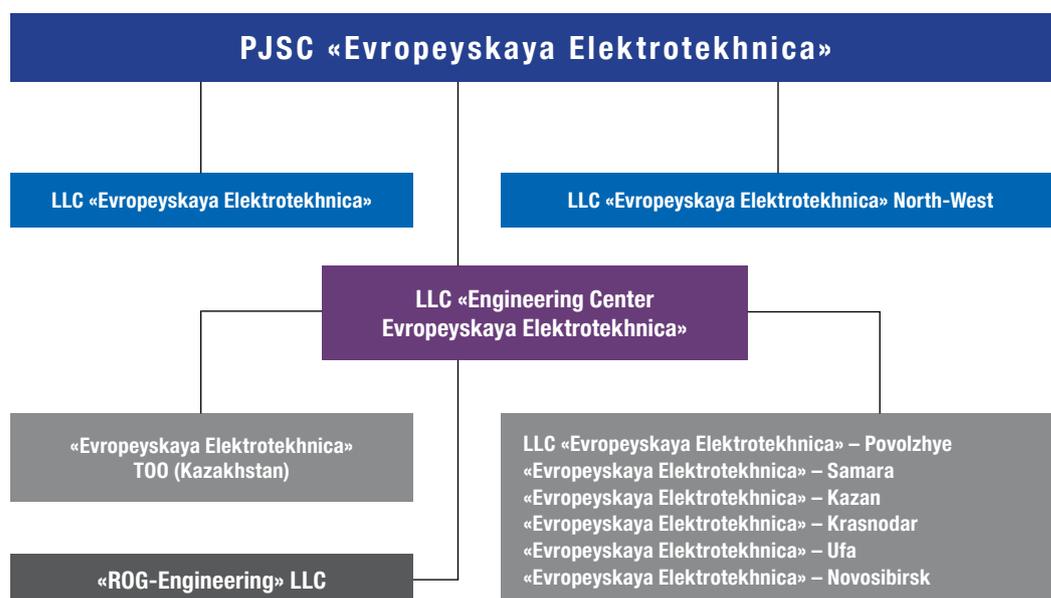
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PJSC «Evropeyskaya Elektrotekhnica» The principle of action for the company is the advanced technology use together with production meeting modern requirements of safety, quality, conservation of energy and environmental compatibility.



Advantages:

- Quality control of supplied equipment and its assembling for all stages;
- High-end professional team of designers, project managers, process engineers, designers, automation engineers, installation personnel and other specialists;
- Advanced logistics provides with shortest terms of equipment delivery to Clients sites on the entire territory of Russia, Kazakhstan, Belarus, CIS countries and remote northern regions including delivery of oversized cargo;
- Health, safety and environment control system;
- Certificates and authorization for self-regulating organizations in design and construction area;
- Wide range of equipment on stock required;
- Flexible financial possibilities.

«ROG-Engineering» LLC is a business unit of PJSC «Evropeyskaya Elektrotekhnica» for design, development and delivery of modern high-performance modular equipment for oil&gas refineries and petrochemical plants.

The company provides a full cycle of operations, including the following:

- object survey and process engineering solution;
- development, design and construction of objects;
- production and supply of complex technology lines, modular units, pump stations of various purpose, mobile platforms for well survey and development, flare units, gas knock-out units, gas treatment units, separate equipment, etc.;
- unit modernization and re-equipment;

- development and implementation of modern APSC hardware and software;
- assembly supervision;
- start-up and commissioning works.

The equipment of «ROG-Engineering» LLC is certified in Federal Agency on Technical Regulating and Metrology as per technical regulations «On safety of machines and equipment».

The combination of a wide range of products and services provided by the company allows quick development and assembly of special and production equipment as well as construction on a turnkey basis.

COMPLEX PROCESS UNITS



Oil treatment units (UPN)

Preliminary water discharge unit (UPSV)

Modernized discharge phase separators (KDFT-M)

Scope

Automated modular oil treatment units (UPN) are designed for collection and treatment of a product from oil producing wells by deep dehydration, desalinization, reduction of oil vapor pressure and achievement of required quality of commercial oil and discharged oilfield water for a further transportation.

Equipment configuration

UPN includes the following modules:

- Inlet manifold system (BVM);
- Demulsifying dosing unit (BR);
- Unit for stimulation of mixing the gas-liquid mixture with demulsifier (Mixing tanks SM);
- Inlet separator unit with water discharge (BVS);
- Oil heating unit (BNN);
- Oil dehydration unit (BON);
- Oil desalting unit (BOSN);
- Fresh water pump unit (BNPPV);
- Terminal separation unit (BKSU);
- Oilfield water treatment unit (BOV);
- Buffering water vessels unit (BEV);
- On-site and out-site oil pumping unit (BV and VP);
- Water pumping unit (BNOV);
- High- and low-pressure gas treatment unit (GS-1 and GS-2);
- Gas metering and regulation unit (BIR);
- Oil Metering unit (BUUN-K);
- Unit of Pipe gas expanders serving ask flare KO drums (TGR-1,2);
- Combined high- and low-pressure flare unit (FCU);
- Field tanks unit for commercial oil (FTU);
- Water metering unit (BUUV);
- Unit for drain tanks (ED), oil leakage (EU),



gas condensate collection (EK) and emergency discharging of oil heating units (EA);

- Light end hydrocarbon vapor recovery unit (UULF);
- Control room unit;
- Chemical laboratory unit;
- Machine shop unit;
- Transforming substation and switch gear unit (BTP and SG);
- Motor Control Center Unit;
- Fire extinguishing pumping station;
- water tank unit;
- Auxiliary facilities;
- Software and hardware automation technologies and APSC.

Oil treatment units can be designed in two versions:

- vessel (tank) type;
- tubular type.

The structure of main facilities for well processing production to be determined for a specific field upon completion of research and development works performed by the company.

UPN Technical specifications

Oil rate, million tons per year:	0,3; 0,5; 1,0; 3,0;
– for oil (design), m ³ /d.	1000; 1600; 3000; 5000; 10 000;
– for gas, mil. mn ³ /d	0,1; 0,16; 0,3; 0,5; 1,0;
Water-in-oil percentage, %wt:	
– inlet	up to 30
– outlet	up to 0,5
Commercial oil requirements	as per GOST R-51858-2002
Content in treated water mg/l:	
– crude products	up to 40 (or less upon customer request)
– mechanical impurities	up to 40 (or less upon customer request)
Ambient temperature, °C	from -60 до +50
Service life, not less than (years):	20

Design, development and delivery of modular oil treatment unit takes 6-8 months to finish up the production with maximum operation compatibility.

Research facility of «ROG-Engineering» LLC developed complex technology lines (KTL) for two or more parallel production chains. Research facility of «ROG-Engineering» LLC developed complex technology lines (KTL) for two or more parallel production chains. KTL can be delivered in vessel or tubular type.

To intensify the processes of gas separation, oil dehydration and water purification the following internal devices are used in equipment design — coalescers, shelf settlers and other hydrodynamic devices.

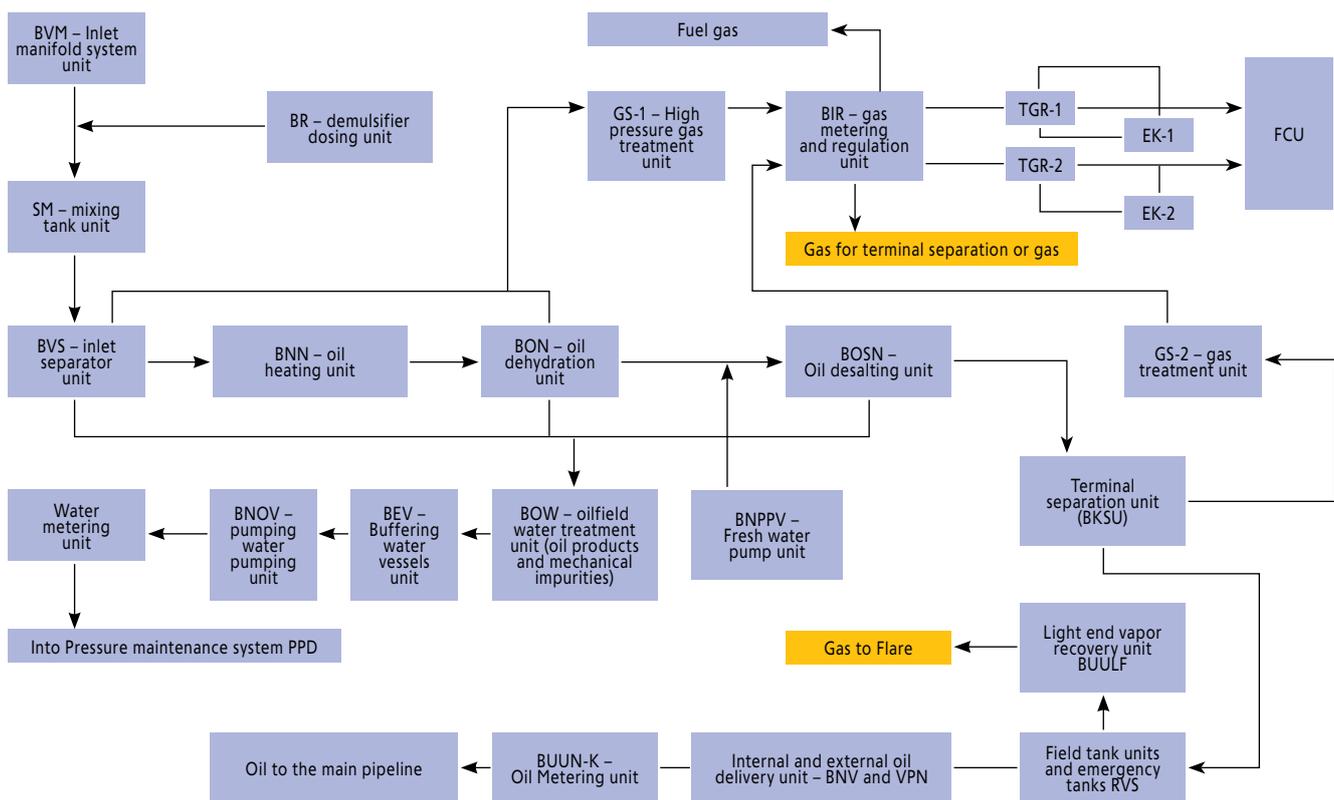
The principles of process diagram development, equipment general arrangement and structural design

together with «know-how» represent as «express technology» of «ROG-Engineering» LLC.

«Express technology» allows to increase project and equipment performance by 2-3 times comparing to standard technology flowrate efficiency, reduction in metal consumption and capital expenses.

UPN arrangement in the form of KTL allows equipment delivery in stages with complete commissioning and start-up complexes (trains) and increase UPN capacity according to field development and efficiently expend funds for construction of facilities.

Complex process diagram of treatment units



Complex process diagram includes the maximum necessary set of units, designed for critical parameters of materials for treatment.

Based on the complex process diagram, mobile package oil treatment units (MUPN) can be manufactured as well.

Scope

Free Water Knock Out units are intended for preliminary oil dehydration in production headers near the most watered well clusters, on lower sections of the route where free water accumulates, in locations of existing oil pumping stations, in well clusters.

UPSV are designed to use in moderate and moderately cold climate as per GOST 15150 with air temperature:

- from 40 °C to –45 °C for moderate climate
- from 40 °C to –60 °C for cold climate

Preliminary water discharge unit (UPSV) designed by «ROG-Engineering» LLC includes all the main intensifying methods of separation process to achieve improved performance compared to traditional technologies (VNTP-3-8, RD 39-0004-90, unified diagrams RD 39-0147311-606-86) This increase of 1,5–2 times is due to:

- optimized use of chemical reagents based on previous studies;
- pipe demulsification and formation of favorable structural forms of liquid gas mixture for high gas-containing and sand jet wells at inlet of UPSV;
- combining of simultaneous gas and water separation processes;
- use of natural heat content of products (without heating);
- use of hydrodynamic effects for intensification of internal devices of separators and settling tanks.

Technical specifications

Productivity (design), m ³ /day:	
– for fluid	500÷30000
– for oil	200÷15000
– for gas, mn ³ /d	0,1÷3,0
Design pressure, MPa, not more than	1,6; 2,5; 4,0; 6,3
Water-in-oil percentage, %wt:	
– inlet	from 30 and more
– outlet	0,5÷10
Content in treated water mg/l:	
– crude products	up to 30÷40
– mechanical impurities	up to 30÷40
Service life, not less than (years):	20



Equipment configuration

The flow chart (see Figure 1) includes:

- inlet manifold unit (BDR);
- reagent input unit BR;
- stabilization header for gas-liquid mixture;
- pipe inlet gas separator-sand trap for hot water tank RGV;
- mixer;
- three-phase separator (gas and oil separator with water discharge);
- oil buffer drums BEN;
- water buffer drums BEV;
- water settling equipment OV;
- oil heaters PN (if necessary);
- oil and water pumping units – NN, NV;
- gas metering and regulation unit GS-BIR;
- production flow meter units – for oil, gas, water – BUN, BUV, BUG;
- Flare unit FU;
- gas utilization unit (gas power plant) – Power plant unit PPU;
- drain tanks – ED;
- operator's room with emergency repair, APSC cabinets;
- warehouse workshop.

In process diagrams of «ROG-Engineering» LLC, the following points are usually absent:

- a) oil&gas separators (except cases with use of gas separation and sand trapping devices with high gas content of the product (gas/oil ratio is bigger than 1000–2000 m³/t);
- б) water settling equipment. Water is being prepared in NGSV-M combined devices and can be purified in buffer settling tanks if required.

UPSV can be designed in vessel or tubular type with the use of discharge phase separators (KDFT).

UPSV limitation of scope:

- vessel – oil field development with a long-term dynamic of water cut growth (over 3–5 years);
- piped – oil field development with a high water cut (more than 60–90%) as well as reconstruction of gathering facilities for old oil fields.

The calculation of volume and number of equipment is performed by a manufacturer according to the Datasheets and Customer’s specifications.

Comparison of vessel and tubular water separators is presented in Table 1.

The indicated advantage is formed not only due to the structural improvement of the equipment, but due to a wide extent of previous studies of conditions of equipment use in each specific field to optimize:

- hydrodynamic operating condition of gas-liquid mixture in terminal parts of the gathering system;
- thermochemical stimulation;
- building of flexible process diagram considering dynamics of oil&gas production, water cut growth, change of physical-chemical properties of oil.

Figure 1.
Process diagram of UPSV (vessel version)

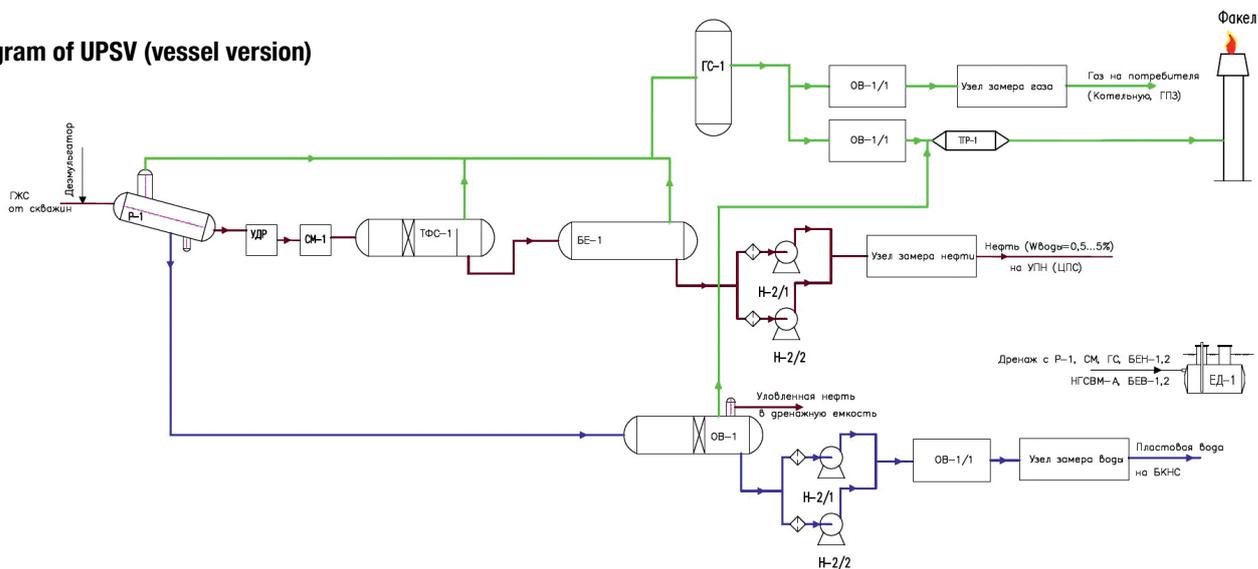


Figure 2.
Process diagram of UPSV (tubular version)

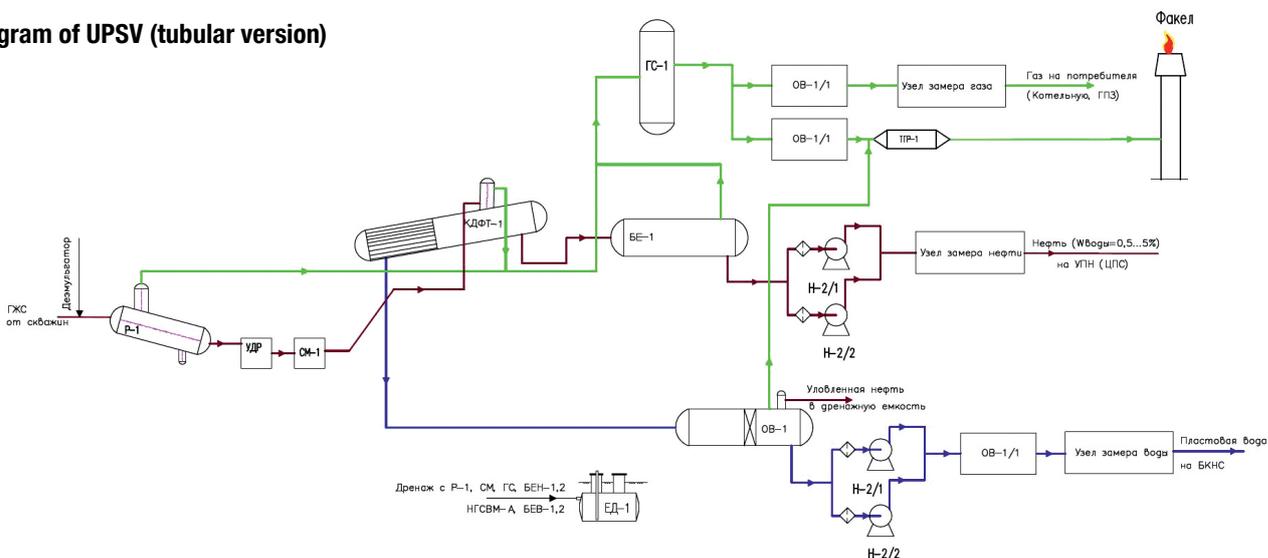


Table 1. Comparison of vessel and tubular water separators

Indicators	vessel type		tubular type	
	NGSV as per GP-868	NGSV-M	KDFT	KDFT-M
1. Specific capacity, m ³ /d/m ³	16.5*	33,3	45,7	68,5
2. Quality of separation: – residual water content, % vol. – water purification quality, mg / l: from mechanical impurities from oil	up to 30 not rated up to 1000	up to 10 up to 50 up to 50	up to 5–10 up to 40 up to 40	up to 2–5 up to 40 up to 40
Note: * – considering volume of an additional settling tank for water purification, which is not added in modernized combined NSGV-M and KDFT.				



Scope

Automated discharge phase separators (KDFT-A) are designed for degassing and preliminary dehydration of oil for the water content not exceeding $0.5 \div 5.0\%$. KDFT-A can be included in UPSV or delivered separately as an input degassing and dehydration stage of UPN or other treatment facilities. Technical specifications are provided in Table 1.

KDFT-A are designed in two types:

Type 1 – KDFT-A as a part of the preliminary water discharge units (UPSV) or oil treatment units (UPN) with associated gas utilization technologies. Main scope is units of separation of gas-liquid mixtures with water cut from 25% to 99% and a gas-oil ration of not more than $600 \text{ m}^3/\text{ton}$. In Type 1 units, the safety valve unit is installed on the slug catcher (UPOG) in the area with the maximum gas volume.

Type 2 – KDFT-A as a part of piped water separators (TVO) for line or cluster discharge of oilfield water with subsequent joint transportation of gas and oil through the pipeline. Main scope is units of separation of gas-liquid mixtures with water cut from 45% to 99% and a gas-oil ration from 0 to $150 \text{ m}^3/\text{ton}$. In Type 2 units, the safety valve unit is installed in the lower part of each vessel case in area of water filling on its upper generating line.

**Equipment configuration**

KDFT-A contain of the following equipment:

- slug catcher (UPOG) designed to extract separated non-associated gas in the inlet header;
- SM mixing tank designed for intensive mixing of liquid flow with demulsifier and coalescence of water drops;
- inclined pipe sections (1, 2 or 4) depending on the capacity, designed to separate water from oil and its degassing;
- internal shelf coalescers-settlers in the lower part of a section, designed for the second stage water treatment from mechanical impurities and oil.

Table 1. KDFT-A Technical specifications

Motive fluid	gas and oil emulsion
Design capacity m^3/d :	
– for fluid, m^3/day	500...35 000
– for oil, m^3/day	300...15 000
– for gas, m^3/d	0,1...3,0
Design pressure, MPa	1,0; 1,6; 2,5; 4,0; 6,3
Water-in-oil percentage, % wt:	
– inlet	10–95
– outlet	$0,5 \div 5,0$
Content in treated water mg/l :	
– crude products	40–50
– mechanical impurities	40–50
Operating environment temperature, $^{\circ}\text{C}$	+20 and higher (min +10)
Ambient temperature, $^{\circ}\text{C}$	from -60 to +50
Service life, not less than (years):	20

KDFT-A automation system consists of two levels:
 – lower level – control instrumentation (KIP) and controllers combined into a distributed local control and management network;
 – upper level – the automated working station (ARM) of an operator (controller) located in the control room.

KDFT-A dimensions and technological volume are determined depending on the liquid output, physical-chemical properties of oil, oilfield water, mode of operation and quality requirements for final product based on the conducted studies of the aggregated consistency of water-oil emulsion.

Designation

Automated piped discharge phase separators are manufactured as per TU 28.99.39-001-20676863-2017.

Reference designation sample for ordering a product: KDFT-A (T) 1400-50-2-P-1-HL1 as per TU 28.99.39-001-20676863-2017, where:
 (T) – pipe execution;
 1400 – nominal case diameter, mm;
 50 – case length, m;
 2 – number of sections;
 1 – design type;
 P – internal anti-corrosion coating;
 HL1 – climatic modification.

Main advantages of modernized KDFT:

- reduction in length and metal consumption by 1,5 times (or a corresponding productivity increase, with the existing dimensions);
- reduction of footprint (up to 1,5 times);
- optimization of structures and unification of internal separation elements;
- hydromatic fluid-wash and mechanical impurities removal system in the equipment;
- modern APSC hardware and software including quality control of oil and water separation.

Comparison of nominal size KDFT and KDFT-M

Number of fluid capacities, m ³ /day.	KDFT Typical nominal size D-L-n	KDFT-M Modernized D-L-n
25 000	1400-60x4	1400-40x4
20 000	1400-50x4	1400-35x4
15 000	1400-40x4	1400-30x4
10 000	1400-50x2	1400-20x4
7 500	1400-40x2	1400-30x2
5 000	1400-30x2	1400-20x2 (10x4)
2 500	1400-20x2	1400-10x2
1 000	1400-12,5x2	1400-10x1





Mobile units for survey, gathering and processing of wells

Mobile platforms for well survey and development (PKIOS)

Mobile preliminary water discharge unit (MUPSV)

Container-type equipment

Scope

Mobile units for survey, gathering and processing of wells are designed for automated measuring of well flow rate at various wellhead pressures, as well as separation of oil from gas and water, followed by filling in tank trucks, feeding into the oil&gas gathering system, flare recycling, gas treatment for own use supply to the gas gathering system or electricity generation on site.

Area of application:

- on well clusters of remote fields at exploration stage, pilot production during well infrastructure development.



Depending on specification and functional purpose, mobile units are manufactured in the following modifications:

- PKIOS – Mobile complex for well survey and development;
- MSU – mobile separation unit – the function is separation of gas from oil for a separate transportation to the collection point;
- MBSNU – mobile separation and filling unit;
- MUPSV – Mobile preliminary water discharge unit;
- MUPN – mobile oil treatment units.

Functions of mobile units	Names of mobile units			
	MUPN	MUPSV	MSU/MBSNU	PKIOS
Well production separation	+	+	+	+
Oil filling into tank trucks	+	+	+	+
Associated gas flaring on a flare unit	+	+	+	+
Automated measurement of quantity and quality of oil	+	+	+	+
Automated measurement of associated petroleum gas	+	+	+	+
Associated gas preparation	+	+	+	–
Associated gas supply to the pipeline system	+	+	+	–
Oil supply to the pipeline system	+	+	–	+
Preparation of oil emulsion for settling (supply of demulsifier reagent)	+	+	–	–
Use of associated gas for technical needs	+	+	–	–
Oilfield water discharge	+	+	–	–
Preparation of oilfield water for required quality parameters	+	+	–	–
Injection of oilfield water into formation pressure maintenance/ absorbing well	+	+	–	–
Thermal utilization of oilfield water on a horizontal flare unit	+	+	–	–
Oilfield water filling into tank trucks	+	+	–	–
Automated measurement of oilfield water	+	+	–	–
Preparation of oil for required quality parameters	+	–	–	–
Oil flaring on a horizontal flare unit	–	–	–	+
Joint transportation of oil and associated gas in gathering facility	–	–	–	+

Primary requirements:

- mobility, transportability, limitations on weight and dimensions;
- maximum factory readiness;
- functional technological flexibility due to combination of several types and unit's quantity;
- automation, providing independent operation within remote maintenance.

Mobile units are applicable in a moderate and moderately cold climate. As per GOST 15150 with air temperature during operation:

- from +40 °C to –40 °C for moderate climate;
- from +40 °C to –60 °C for moderately cold climate.

Parts of mobile units can be installed:

- on skid;
- on chassis;
- on a semitrailer.

Units can be designed open-type on a skid with a frame in the following dimensions:

- standard containers 3x3x12 m;
- sea containers 2,4x2,6x12 m;
- without frames.

Units can also be designed enclosed or skid-mounted according to processor Customer requirements.

Designation

PKIOS designation for ordering and documentation – PKIOS-600 / SH-HL1 TU 28.99.39-002-20676863-2017

PKIOS – name of mobile unit;
600 – fluid capacity of PKIOS, m³/day;
Sh – chassis (S – sled, R – skid, K – container);
HL1 – climatic modification and environmental class.

Advantages of mobile units in comparison with capital construction facilities:

- flexible system of parameters selection and equipment package;
- full factory readiness of the complex unit;
- compact dimensions and aesthetic appearance;
- mobility and ease of movement;
- reduced terms of mounting/dismounting;
- ease of assembly interunit pipes by the quick-release connections;
- operation in remote maintenance mode without the constant presence of personnel.



Scope

Mobile platforms for well survey and development (PKIOS) are designed for automated measurement of the amount of well production extracted at exploration stage and pilot development of oil&gas fields.

As per Customer requirements PKIOS complex can serve for technical solutions of various metrological characteristics in terms of accounting of oil, gas, condensate and water extracted from fields. To ensure the maximum satisfaction of specific customer requirements, a joint technical assignment is performed based on the Datasheets received from customer for development and supply of required equipment.

PKIOS operation is possible with full autonomy, absence of residential road, power lines, oil&gas gathering pipeline in regions with different climatic conditions. It allows to significantly reduce investments at the stage of field development drilling (during exploratory or prospecting drilling) or at the initial stage of field exploitation.

PKIOS functionality

In addition to a wide range of geological and metrological studies of wells at the stage of test and development, PKIOS can perform functions of mini UPSV for preparation, storage and sales of oil or condensate produced during exploration and early exploitation of oil&gas fields.



For that purpose, PKIOS is being supplemented with dehydration units in case of requirements for heating, storage and filling of oil, treatment and disposal of gas by a power unit for generation electricity (by diesel generator with screw type engine or gas turbine unit driven by natural and petroleum gas).

PKIOS maintenance: presence of personnel is necessary for measurements and research, loading and shipping operations. For the rest of the time, remote maintenance is allowed with the data transferring by remote control system to a dispatch service.

Technical specifications

PKIOS modifications	Design load		Design pressure of equipment, MPa	Accuracy of measurements
	for fluid, t per day	gas content, m ³ /t		
type 1 For oil fields	50 ÷ 2 500	up to 200	1,6 – 4,0	Liquid phase ± 2,5
type 2 For oil&gas condensate fields	50 ÷ 500	up to 1 000	4,0 – 10, 0	Gas phase ± 2,5
type 3 For gas condensate fields	5 ÷ 500	Qr = 50 000 – 1 800 000 m ³ /day	16,0	



Scope

Mobile preliminary water discharge units (MUPSV) are designed for preliminary oil dehydration on well clusters, for arrangement of gathering systems for remote and hard-to-reach fields on the early experimental or industrial development stage.

MUPSV can be designed in modular option:

- on skid in vessel design with three-phase separators and water settlers;
- in tubular design with automated discharge phase separators KDFT-A;
- in container design with dimensions of 20–40-foot containers in vessel and tubular design.

Technical specifications

Productivity (design), m ³ /day:	
– for fluid	500÷6000
– for oil	100÷4000
– for gas, mn ³ /d	0,1÷1,0
Design pressure, MPa	1,6; 2,5; 4,0; 6,3 (by special order)
Water-in-oil percentage, % wt:	
– inlet	from 30 and more
– outlet	up to 5
Content in treated water mg/l:	
– crude products	up to 40 (5 mg/l as per special customer requirements)
– mechanical impurities	up to 40 (5 mg/l as per special customer requirements)
Ambient temperature, °C	from –60 to +50
Service life, not less than (years):	20



Table 2 contains main parameters of MUPSV with liquid capacity of 500–6000 m³/day. in typical and «container» design.

A separate line shows parameters of UPSV-2500 in tubular design with dimensions for sea container.

Table 2. Characteristics of modular units of UPSV

Designation of types	Design liquid load, m ³ / day.	Design pressure, MPa	Volume and number of vessels, m ³ x n	Unit number		Unit dimensions b x h x L, m	Mass of modular unit, t	Grade of manufacture of
				technological	armature			
Modular (mobile) UPSV in framing units								
MUPSV-3000	3000	1,6; 4,0	25 x 2 plus, GS 6 m ³	2	1	3 x 3 x 12 std. unit	20÷25	full factory readiness
MUPSV-2500	2500	1,6; 4,0	20 x 2 plus, GS 6 m ³	2	1	40 feet container	16÷20	full factory readiness
MUPSV-2500 T (pipe)	2500	1,6; 4,0	KDFT 1400-10 x 2 plus, GS 6 m ³	2	1	40 feet container	12÷16	full factory readiness
MUPSV-1000 T (pipe)	1000	1,6; 4,0	KDFT-1000- 10 x 2	2	-	40 feet container	10÷12	full factory readiness
Modular (mobile) UPSV on skid								
MUPSV-500	500	1,6; 4,0	6,3 x 2 plus, GS 3 m ³	2	-	on skid 3x12	10÷12	full factory readiness
MUPSV-1000	1000	1,6; 4,0	12,5 x 2 plus, GS 4 m ³	2	-	on skid 3x12	12÷16	full factory readiness
MUPSV-1500	1500	1,6; 4,0	20 x 2 plus, GS 6 m ³	1	1	on skid 3x12	14÷18	full factory readiness
UPSV-6000	6000	1,6; 4,0	50 x 2	2	1	on skid 3x12	23÷35	component assembly on site

Versions vary with:

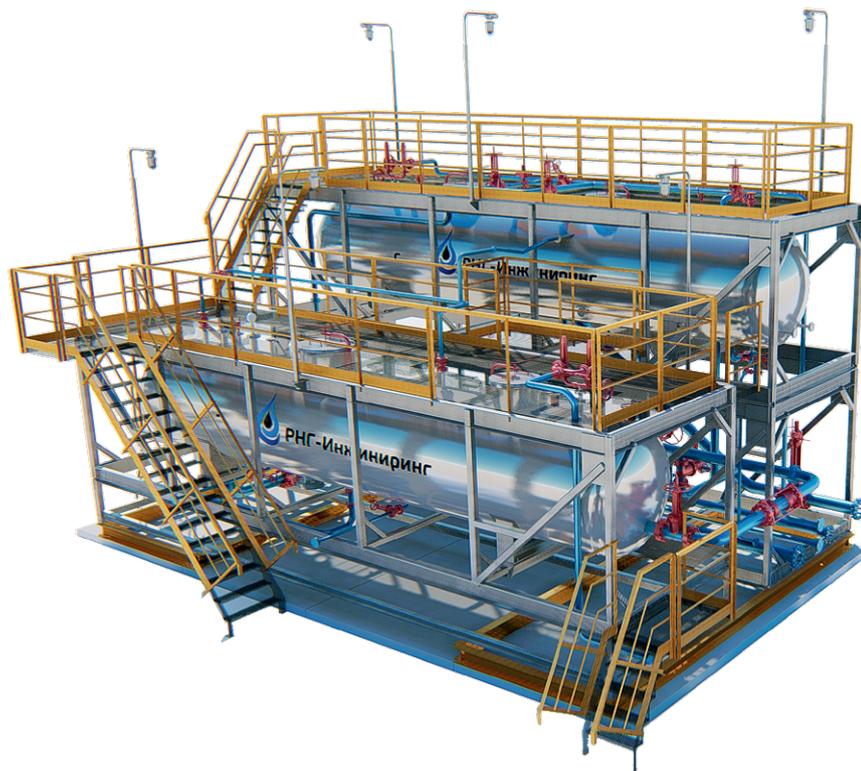
- volume of separators and settlers;
- arrangement: based on possibility of alignment in standard unit dimensions or sea container of equipment with volume 25 m³, 20 m³, piping with isolating valves to be in a separate reinforcement section or inside with the other equipment;
- packaging arrangement influences specific capital costs and total weight of UPSV units.

TYPES OF MUPSV GENERAL ARRANGEMENT

MUPSV – vessel version

I type UPSV-3000
 $V = 25 \text{ m}^3 \times 2$ – standard

II type UPSV-2500
 $V = 20 \text{ m}^3 \times 2$ – container
type



MUPSV – tubular type

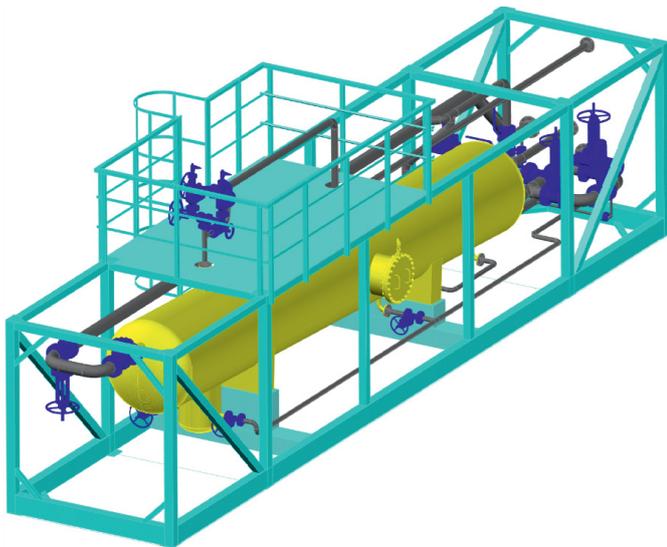
KDFT-1400-10 m x 2
 $Q = 2500 \text{ m}^3/\text{day}$.



SAND SETTLER UNIT (PU)

Scope

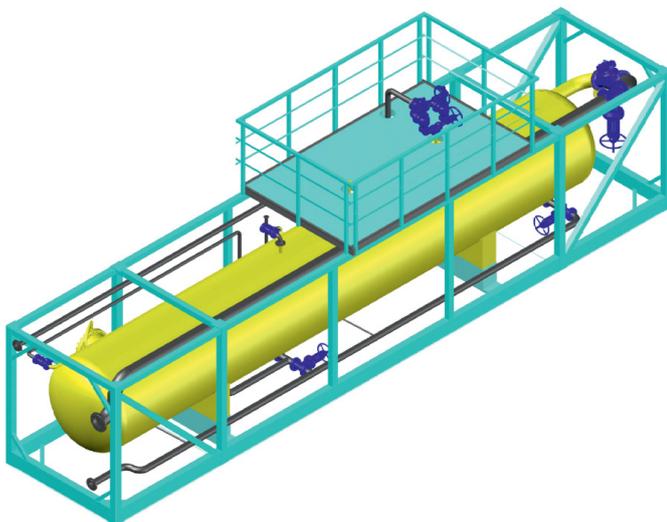
It is used as an inlet separator as a part of UPSV in fields with high content of sand in product as well as in fields where hydraulic fracturing is applied accompanied by proppant and mechanical impurities flow back.



THREE-PHASE SEPARATOR UNIT

Scope

It is used for gas separation and preliminary dehydration of well products as a part of MUPSV.



PU Technical specifications

Motive fluid	Oil emulsion, proppant, sand
Capacity (design / maximum): – for fluid, m ³ /day – for gas, nm ³ /day	1000/1500 100000/150000
Design pressure, MPa	1,6; 4,0
Vessel volume, m ³	16
Content of mechanical impurities and sand, g/l: – inlet – outlet	up to 10,0 up to 0,5
Climatic modification	U1, HL1
Service life, years	20
Dimensions of the container (L x W x H), mm	12192 x 2438 x 2591
Empty unit mass, t	up to 20

It is recommended to use 2 inlet PU units on UPSV – one of each is interchangeably moved for cleaning from caught sludge (sand, proppant).

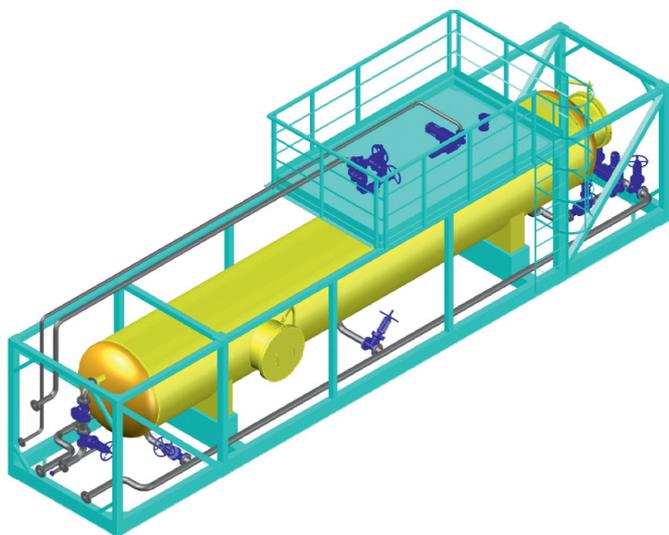
Three-phase separator Technical specifications

Motive fluid	Oil emulsion
Productivity (design), m ³ /day: – for fluid – for oil – for water	2500/3000 up to 1500 up to 2000
Gas factor, nm ³ /m ³	up to 200
Design pressure, MPa	1,6; 4,0
Vessel volume, m ³	20
Emulsion water cut, % vol.: – inlet – outlet	30–90 up to 5
Mechanical impurities in water, mg/l: – inlet – outlet* *in combination with and without water settler (*)	up to 1000 40...(200*)
Dropping liquid in treated gas, g/nm ³ : – outlet	до 0,1
Climatic modification	U1, HL1
Service life, years	20
Dimensions of the container (L x W x H), mm	12192 x 2438 x 2591
Empty unit mass, t	up to 20

SETTLING WATER TANK UNIT

Scope

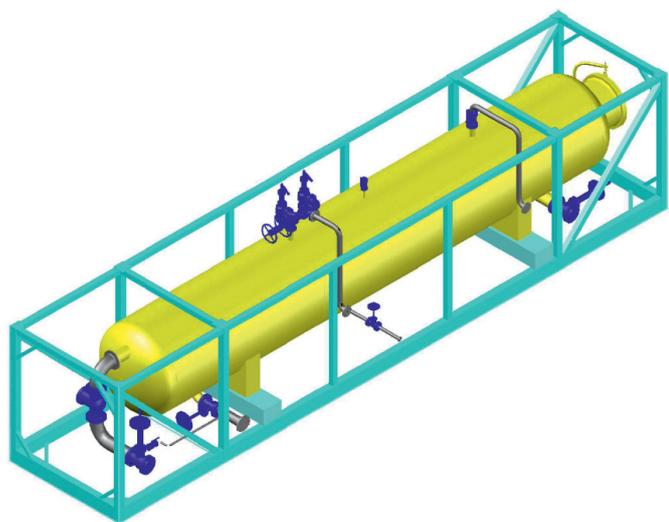
It is used as a part of MUPSV for treatment of oilfield water from oil products and mechanical impurities.



Settling water tank unit Technical specifications

Motive fluid	Oilfield water
Capacity (design/maximum), m ³ /day: – for water	1300/2000
Design pressure, MPa	1,6
Vessel volume, m ³	20
Oil products content, mg/l – inlet – outlet	up to 1000 30–40
Mechanical impurities content, mg/l: – inlet – outlet	1000/200 30–40
Climatic modification	U1, HL1
Service life, years	20
Dimensions of the container (L x W x H), mm	12192 x 2438 x 2591
Empty unit mass, t	up to 20

PETROLEUM (WATER) STORAGE TANK UNIT BEN (BEV)



Petroleum (water) storage tank unit BEN (BEV) Technical specifications

Motive fluid	Oil, water
Capacity, m ³ /day: – for fluid	Inflow and pumping out mode up to 3000 m ³ /day.
Design pressure, MPa	0,6
Vessel volume, m ³	25–40
Climatic modification	U1, HL1
Service life, years	20
Dimensions of the container (L x W x H), mm	12192 x 2438 x 2591
Empty unit mass, t	up to 20



Gas treatment units

Scope

Gas treatment units are designed to treat associated petroleum, natural, fuel gas and condensate up to quality as per GOST 5542, STO Gazprom 089-2010, ST RK 1666, to increase the methane index for gas engine generator plant (hereinafter referred to as GPES) and other requirements, using various technologies (throttling process, cooling by refrigeration units, cleaning with absorbent fluid, dry-desiccant dehydration, gas fractionation to obtain final product and conform to requirements of the Customer.

Gas treatment units can be designed in the following types depending on a scope:

- gas treatment units (UPG);
- gas process units (BPG);
- complex gas treatment units;
- primary gas separation plants USPG;
- primary gas separation units BPSG;
- fuel gas preparation facilities UPTG;
- fuel gas preparation units BPTG;
- associated petroleum gas treatment facility UPPNG;
- associated petroleum gas treatment units BPPNG;
- preliminary gas processing terminal UPPG;
- preliminary gas processing unit BPPG.



Preliminary gas processing terminal,

Q gas = 2 000 000 m³/day.

Technology: throttling process.

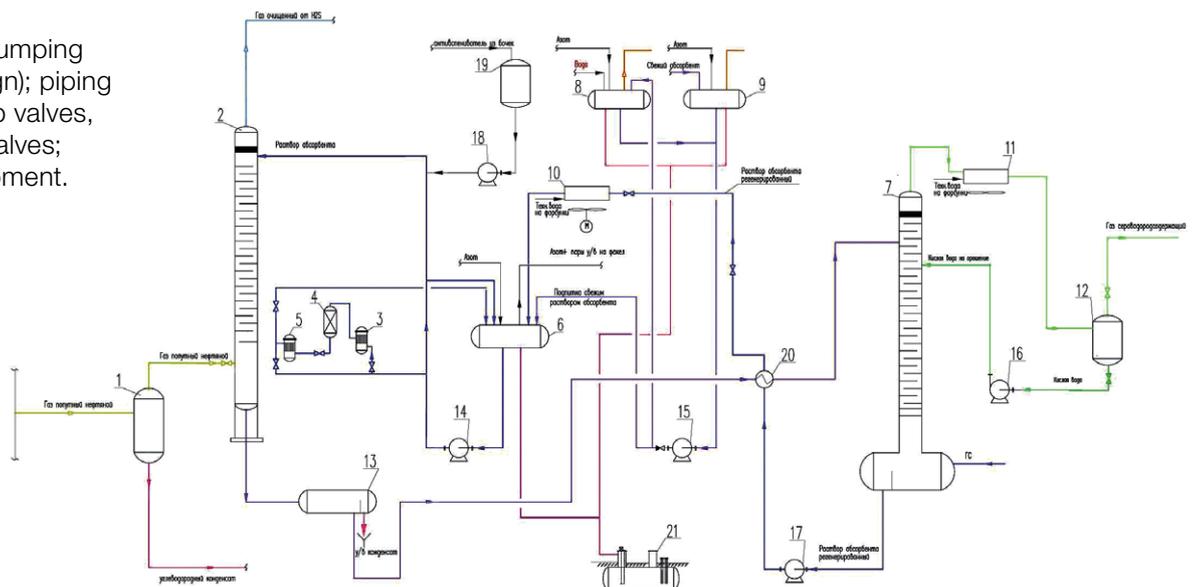
Gas treatment options:

- HS2 and CO₂ Adsorption refining with liquid absorbent;
- Adsorption dryer with dry desiccant (silica gel, zeolites);
- Low temperature separator unit with throttling process and refrigeration units;
- Gas fractionation plant (deethanization, debutanization);
- Primary gas separation plant;
- Gas heating, metering and distribution.

1. ABSORPTION GAS TREATMENT UNIT

List of process equipment unit:

Absorption unit; desorption unit; thermal fluid preparation unit, pumping unit (modular design); piping unit and set of stop valves, control and relief valves; non-process equipment.

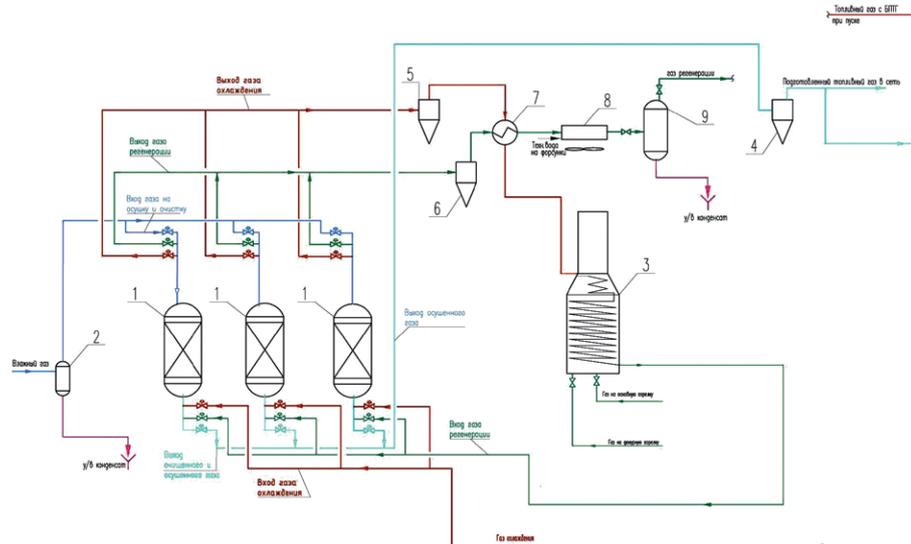


Assembly includes the following stages:

- absorption from associated petroleum gas by H₂s and CO₂ amines solutions;
- reactivation of saturated amine solution;
- heating and circulation of thermal liquid;
- preparation of amine solution;
- drain gathering facility from equipment and pipelines.

2. ADSORPTION TREATMENT UNIT

adsorption purification flow chart



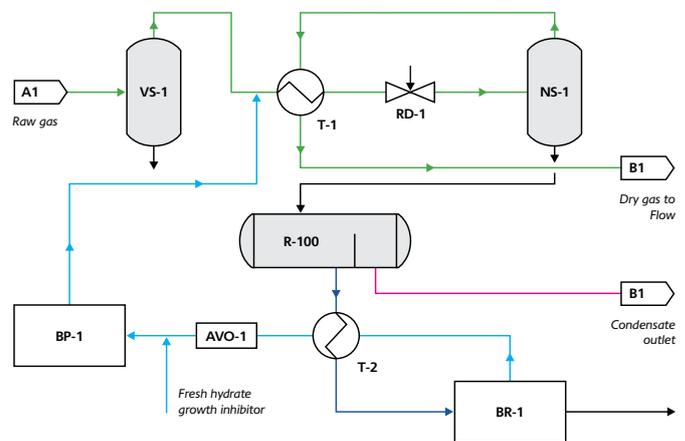
List of process equipment unit:

Separators, absorbers, furnace, air cooling unit, pumps with piping and set of stop valves, control and relief valves, automation and instrumentation.



Gas treatment and condensate stabilization unit,

Q gas = 4 000 000 nm³/day, Q condens. = 700 tons/day.
Technology: Low temperature separator throttling process.



- Gases
- Saturated hydrate formation
- Regenerated hydrate formation inhibitor
- Unstable condensate

3. LOW TEMPERATURE SEPARATOR NTS

Low temperature separator (NTS) are designed to extract gas condensate and moisture removal from gas by Joule-Thompson effect.

Low temperature separator contains of:

- separators;
- heat exchangers;
- air coolers units;
- methanol supply module.

4. LOW TEMPERATURE CONDENSATION UNIT (NTK)



fuel gas preparation unit FGPU,

$Q = 46\,800\text{ nm}^3/\text{day}$.

Technology: NTK with refrigeration unit

5. DEETHANIZER PLANT (DE)

Deethanizer plant is designed to separate hydrocarbon fluid into commercial ethane and natural gas liquids.

Facility includes:

- deethanizer;
- evaporator;
- reflux tank;
- reboiler;
- pumps with piping and set of stop valves, control and relief valves, automation and instrumentation.

6. PRIMARY GAS SEPARATION PLANT (UPSG)



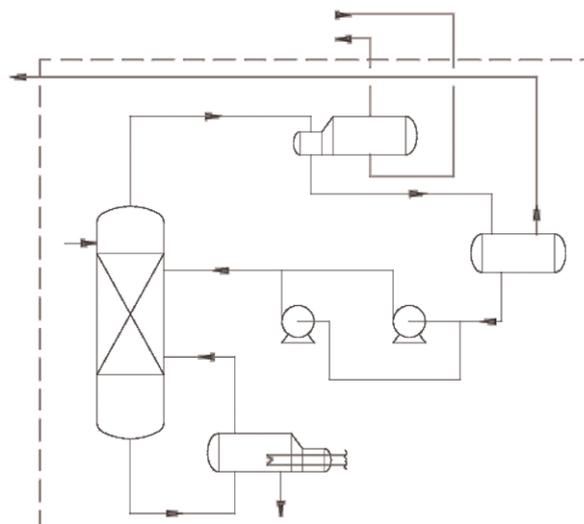
Complete primary gas separation plant,

$Q_{\text{gas}} = 780\,000 - 10\,400\,000\text{ nm}^3/\text{day}$.

NTK equipment is designed to separate dry gas treated from acid compounds of associated petroleum gas to dry stripped gas and liquid hydrocarbon cut (C₂₊) from raw gas and condensate flow using refrigeration units.

Facility includes:

- heat exchangers;
- demethanizer;
- evaporators;
- low temperature separator;
- reboiler;
- pumps with piping and set of stop valves, control and relief valves, automation and instrumentation.



Designed for primary separation of raw gas from liquid phase (oilfield and condensation water, gas condensate, methanol), trapping of liquid plugs, discharge and removal of sediment (mechanical impurities).

Facility includes:

- slug catcher;
- tank for collecting liquids and impurities;
- tank - sludge collector;
- intermediate capacity;
- loading tank;
- pumps with piping and set of stop valves, control and relief valves, automation and instrumentation.



Flare units (FU)

Horizontal flare units (GFU)

Gas vent stack (SR)

Pipe gas expanders (TGR)

Scope

Flare units are designed for emergency and continuous combustion of associated petroleum gas and natural gas or other combustible gases on gathering sites, treatment of oil&gas, as well as at oil refineries and chemical plants.

Equipment configuration

Flare units are completed with (depending on customer requirements):

- modern flare tips of domestic and foreign production to provide smokeless gas combustion (as per environmental safety standards), automatic ignition system and combustion control of domestic and foreign production with a warranty period of 15–30 years;
- flare KO drums of vessel and tubular design (pipe gas expanders) of a new type, designed to separate gas from dropping liquid and mechanical impurities, destruction of liquid plugs generating in gas pipelines;
- stop valves, instrumentation, ladders and service platforms.

Upon customer request the Flare units can be delivered with:

- 1) with separate risers for high- and low-pressure gas combustion (FU type);
- 2) combined – with two or more risers (FCU type);
- 3) complete with lifting gears to bring risers to a horizontal position for repair or replacement of flare tips (UFOS type);
- 4) complete with lifting gears for lowering flare tips (UFO type);
- 5) open and closed surface flare systems.

Mobile flare units on the chassis or skid are also available for manufacturing.

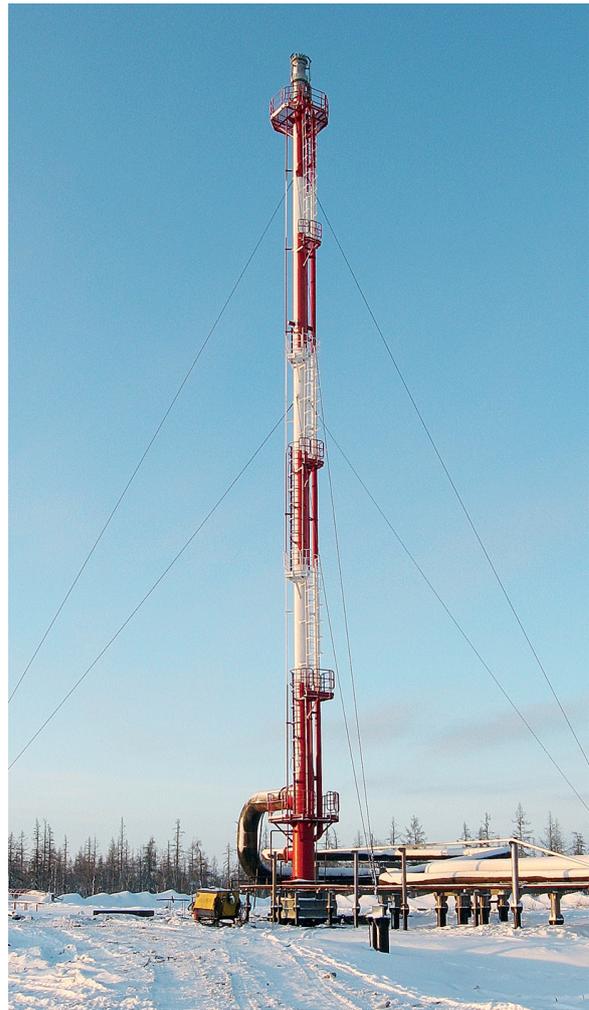
Product range of flare units is given below.

Designation

Flare units are developed and manufactured as per TU 28.99.39-003-20676863-2017

Designation sample for ordering of a product:
Flare unit FU-1,0-HL1 TU 28.99.39-003-20676863-2017;
flare unit FCU-1,0-HL1 TU 28.99.39-003-20676863-2017,
where:

- FU – flare unit;
- FCU – combined flare unit;
- 1,0 – amount of gas discharged, million m³/day;
- HL1 – climatic modification.



Technical specifications

Motive fluid	natural, petroleum gas and other combustible gases
Capacity for gas, thousand nm ³ /day	from 1 to 24 000
Fuel gas consumption for pilot burners, nm ³ /h	from 1,5÷16
Riser diameter, mm	from 150 to 2000
Flare unit height, m	from 10 to 120
Service life, not less than (years):	30

Product range of flare units

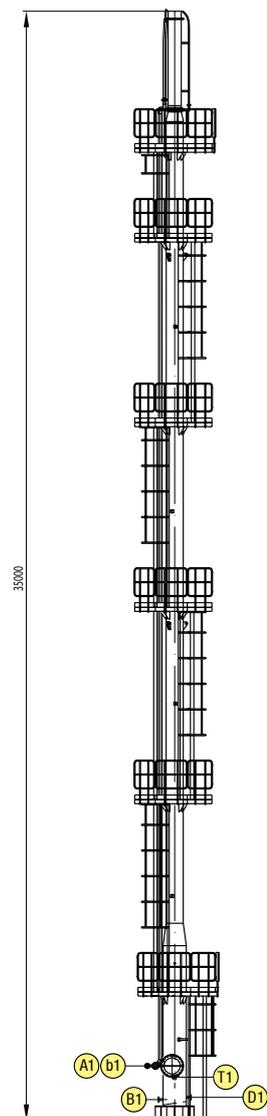
Parameters	Types							
	FU, FCU, UFOS, UFO							
Amount of gas discharged, million m ³ /day.	From 0 up to and including 0,5	Over 0,05 up to and including 0,1	Over 0,1 up to and including 0,2	Over 0,2 up to and including 0,7	Over 0,7 up to and including 1,0	Over 1,0 up to and including 1,5	Over 1,5 up to and including 2,0	Over 2,0 up to and including 20
Main riser diameter D ₂ , mm	150 – 300	150 – 400	150 – 400	200 – 800	400 – 1000	500 – 1000	500 – 1400	700 – 2000
Riser height, H, m (for sulfur-containing gases)	10 or more (30 or more)	10 or more (30 or more)	10 or more (30 or more)	20–30 (30 or more)	35 or more	40 or more	40 or more	50 or more
Number of pilot burners, pcs.	1	1	1	2	2	3	4	4

Note:
The height of a flare system is calculated and suggested by a manufacturer of the flare unit, considering requirements of the customer and permissible values of IR emission and dispersion of hazardous substances.

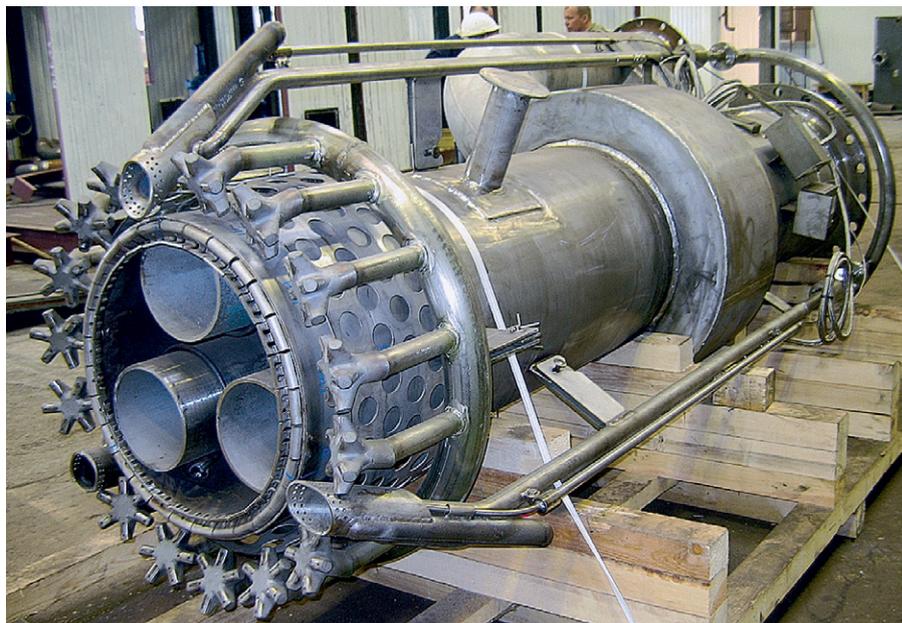
Connecting pipe explication

Design.	Scope	Qty
A1	Pilot burner gas	1
B1	Flare gas inlet	1
B1	Condensate drainage	1
G1	For instrumentation	1
D1	For instrumentation	1

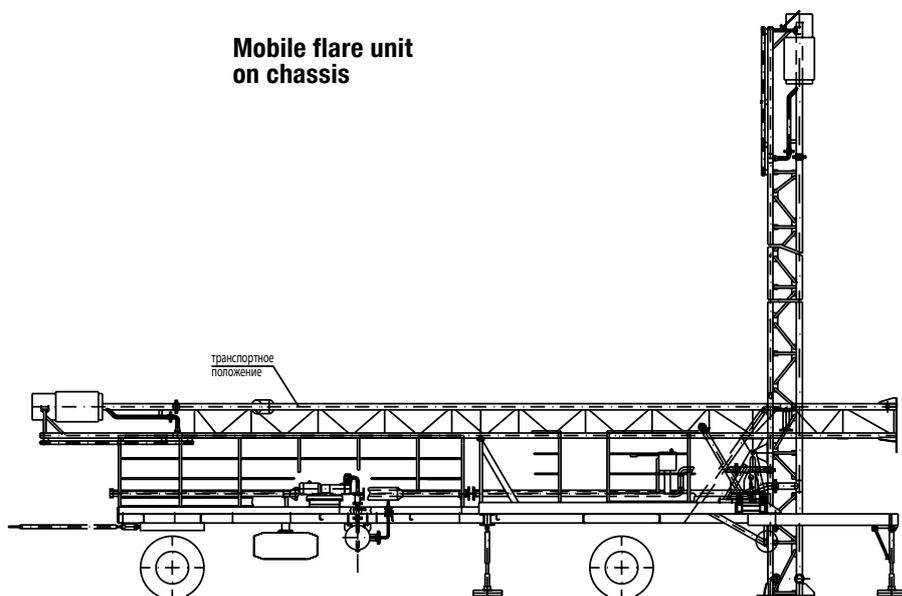
**Flare unit FU-0,5-h1;
DN 500, H=35 m,
Q_{gas} =700 000 nm³/day**

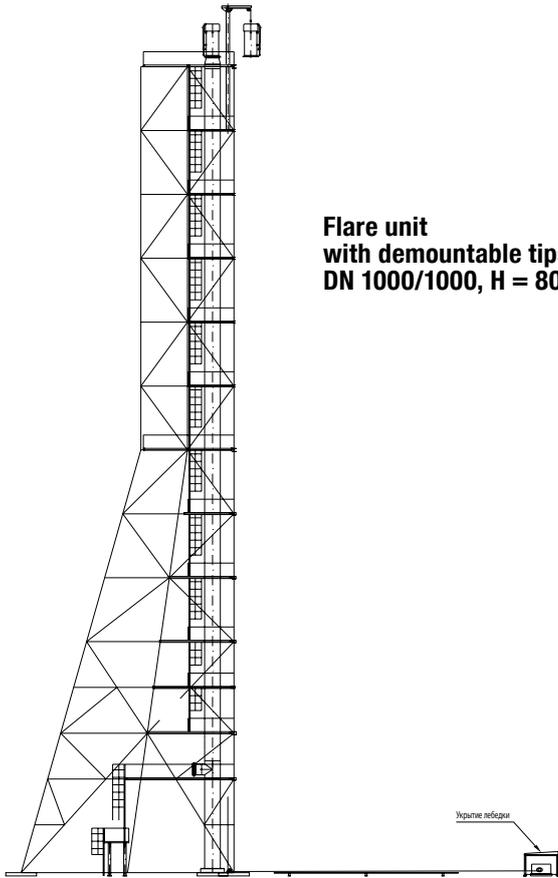


Flare unit FU-2,3-HL1 with steam supply,
DN 800, H=80 m, Q_{gas}=2 300 000 nm³/day.

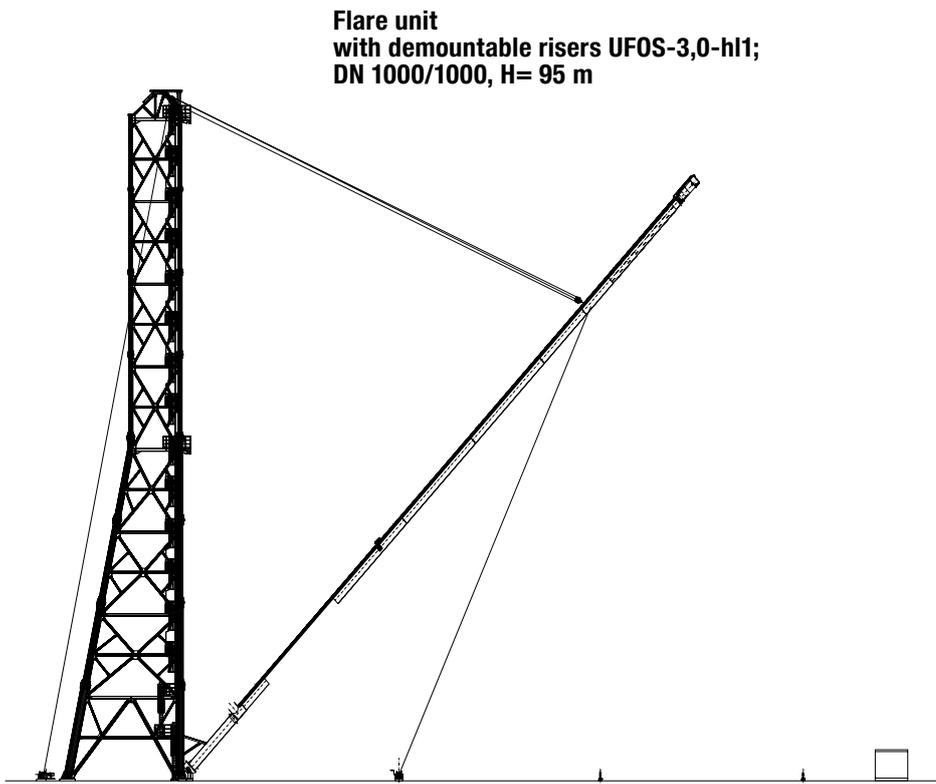
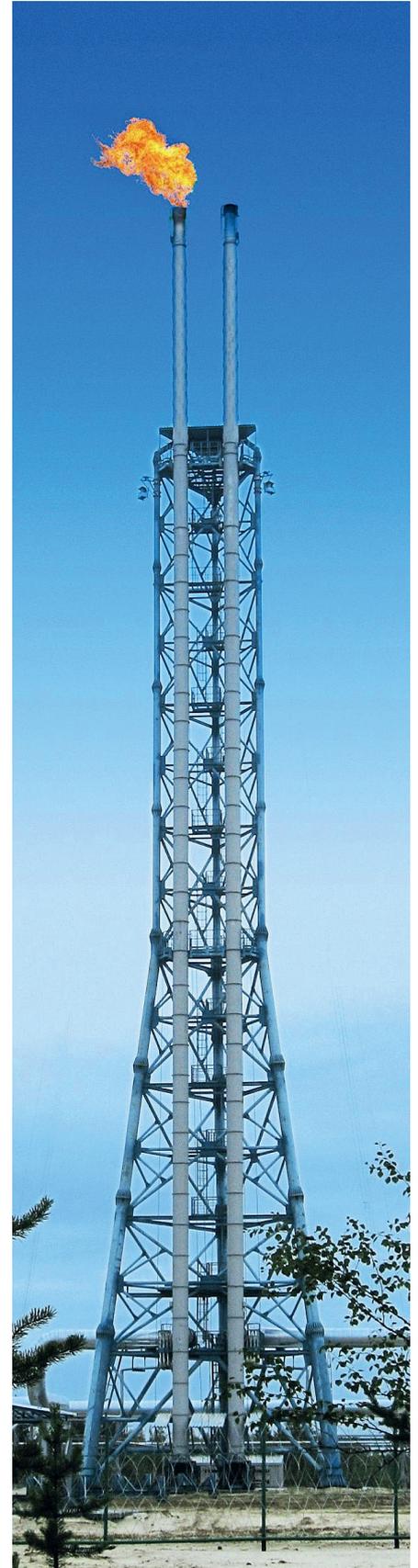


Mobile flare unit
on chassis





**Flare unit
with demountable tips UFO-2,0-h11;
DN 1000/1000, H = 80 m**



**Flare unit
with demountable risers UFOS-3,0-h11;
DN 1000/1000, H= 95 m**



Scope

Horizontal flare units (GFU) with remote ignition and control are intended for flaring (utilization by combustion) of gases, vapors and liquids during emergency, continuous and periodic discharges at field production and preparation of oil, gas and water in oil&gas fields, enterprises of chemical, petrochemical and oil refining industries.

Climatic modification and environmental class as per GOST 15150.

Horizontal flare units are developed and manufactured as per TU 28.99.39-005-20676863-2017.

Depending on purpose and type of discharges, GFU are divided into the following types:

- GFU-V is a horizontal high-pressure flare unit designed for flaring of hydrocarbon gases with discharge excess pressure of 0,2 MPa or more (gas from initial stages of oil separation, purge gases from gas fields during blowdown of flowlines, emergency depressurizing);

- GFU-N is a horizontal high-pressure flare unit designed for flaring of hydrocarbon gases with discharge excess pressure less than 0,2 MPa (gas from terminal stages of oil separation, safety valves and purge lines discharges);

- GFU-ZH is a horizontal flare unit for thermal utilization (neutralization, treatment) of non-combustible industrial effluents (by contact heating and vaporization in flare simultaneously with flaring of dissolved organic matter);

- GFU-ZHU is a horizontal flare unit for flaring of liquid hydrocarbons (oil, gas condensate) and other combustible liquids. Combined GFU for utilization of various types of discharges are available for manufacturing, for example: GFU-V-N, GFU-ZH-V-N, GFU-ZH-N, GFU-ZH-V.

Designation

a) horizontal flare unit

GFU-V-50-HL1 TU 28.99.39-005-20676863-2017, where:

V – type of discharge – hydrocarbon gases and high-pressure vapors;

50 – flare gas consumption, thousand nm^3/h ;

HL1 – climatic modification and environmental class.

b) horizontal flare unit

GFU-N-650-HL1 TU 28.99.39-005-20676863-2017, where:

N – type of discharge – hydrocarbon gases and low-pressure vapors;

650 – flare gas consumption, thousand nm^3/day ;

HL1 – climatic modification and environmental class.

c) horizontal flare unit

GFU-ZH-3-HL1 TU 28.99.39-005-20676863-2017, where:

ZH – type of discharge – liquid non-combustible industrial effluents;

3 – utilized industrial effluents flow rate, m^3/h ;

HL1 – climatic modification and environmental class.

d) horizontal flare unit

GFU-ZHU-8-HL1 TU 28.99.39-005-20676863-2017, where:

ZHU – type of discharge – liquid hydrocarbons;

6 – consumption of recycled liquid hydrocarbons, m^3/h ;

HL1 – climatic modification and environmental class.

e) combined horizontal flare unit

GFU-ZH-3-L-75-U1 TU 28.99.39-005-20676863-2017, where:

ZH and N – type of discharge – liquid non-combustible industrial effluents and hydrocarbon gases and low-pressure vapors;

3 – industrial effluents flow rate, m^3/h ;

75 – hydrocarbon gases and low-pressure vapors flow rate, thousand nm^3/day ;

U1 – climatic modification and environmental class.

Table 1.1 Main schedule-size of GFU-V

Parameters	Nominal size			
	GFU-V-10	GFU-V-50	GFU-V-100	GFU-V-200
Flare gas flow rate, thousand nm ³ /day	до 10	10÷50	50÷100	100÷200
Relief pressure, not more, MPa (g)	16			
Type of flare burner used (supersonic / subsonic)	supersonic burner			
Gas pressure before the gas regulation unit, not more than, MPa (g)	16**			
Number of flare burners, pcs.	1			2
Nominal diameter of the inlet pipeline, mm	80	100		250
Number of pilot burners, pcs.	1		1***	1***
Mode of operation	Periodic (cyclic) with continuous operation of the pilot burner			
Material design of the flare burner	High alloy steel			
Overall dimensions**, mm	1280x1180x1000			1300x1280x1100
Mass**, not more than, t	0,8		1,0	1,2

Note:

* maximum capacity is provided at the maximum design gas pressure at the inlet of GFU-V;

** to be specified during design;

*** upon customer request

Table 1.2 Main nominal size of GFU-N

Parameters	Nominal size						
	GFU-N-75	GFU-N-150	GFU-N-300	GFU-N-450	GFU-N-650	GFU-N-900	GFU-N-1200
Flare gas flow rate, million nm ³ /day	0,075	0,150	0,300	0,450	0,650	0,900	1,200
Relief pressure, MPa (g)	0–0,2*						
Number of pilot burners, pcs.	1			2			

Table 1.3 Main nominal size of GFU-ZH

Parameters	Nominal size					
	GFU-ZH-3	GFU-ZH-6	GFU-ZH-9	GFU-ZH-12	GFU-ZH-15	GFU-ZH-18
Capacity on industrial effluents, m ³ /h	up to 3	3÷6	6÷9	9÷12	12÷15	15÷18
Industrial effluent pressure, not more than, MPa (g)	16					
Required flare gas flow rate, nm ³ /h	1500÷2100*	1500÷4200*	3000÷6300*	4500÷8400*	6000÷10500*	7500÷12600*
Flare gas pressure**, not more than, MPa (g)	1,4					
Gas flow per 1 m ³ of industrial effluent, nm ³ /h with simultaneous discharge	500÷700					
Number of flare burners, pcs.	1			2		
Flare gas inlet piping diameter, mm	80		100		150	
Mode of operation	Periodic (cyclic) with continuous operation of the pilot burner					
Number of pilot burners, pcs.	1					
Overall dimensions**, mm	1800x1090x1000				1880x1460x1100	
Mass**, not more than, t	0,8				1,2	

Note:

*required gas flow rate is determined based on the condition of design capacity of industrial effluents.

** minimum required flare gas pressure for efficient operation of GFU-ZH is equal to 0,2 MPa (g) as per condition Pind. effluents > P flare gas (at least for 0,2 MPa) ≥ 0,2 MPa (g)

*** to be specified during design.

Table 1.4 Main nominal size of GFU-LH

Parameters	Nominal size			
	GFU-ZHU-8	GFU-ZHU-16	GFU-ZHU-50	GFU-ZHU-80
Number of combustible liquid hydrocarbons, m ³ /h	3÷8	8÷16	16÷50	50÷80*
Number of flare burners, pcs.	1-2	2-4	4-6	6-10
Relief pressure, MPa (g)	up to 1,6			
Water cut of burnt liquid**, not more than % vol.	25			
Required compressed air flow rate***, not less than, nm ³ /min	30	50	220	270
Air pressure, MPa (g)	0,6-1,0			
Nominal diameter of the inlet pipeline, mm: — liquid hydrocarbons — compressed air	50 50	50 80	80 100	100 150
Material design — of flare burners — of the skid	high alloyed / heat resistant steel high alloyed steel			
Mode of operation	Periodic (cyclic) with continuous operation of the pilot burner			
Number of pilot burners, pcs.	1	1	1-2	1-2
Overall dimensions****, mm	1000x1500x1500			
Mass****, not more than, t	1,0	1,2	1,4	1,6

Note:

*at request, the maximum capacity can be increased up to 100 m³/h;

** content of produced water in emulsified (dispersed) state is possible; no free aqueous phase is allowed;

*** flow rate with maximum performance for liquid hydrocarbons;

**** to be specified during design.



Scope

Gas vent stacks are facilities designed for disposal of emergency gas and vapor discharges by its dispersion; within discharge from safety valves mounted on vessels operation with media not related to explosive or harmful substances as well as during light gas discharge (methane, natural gas, H₂-bearing gas with gas to air density ratio not more than 0,8); general layout of GS is given on Figure 1.

Designation

Gas vent stack SR-0,5-HL1
as per to TU 28.99.39-003-20676863-2017, where:
0,5 – amount of gas discharged, million m³/day;
SR – type FU;
HL1 – climatic modification.

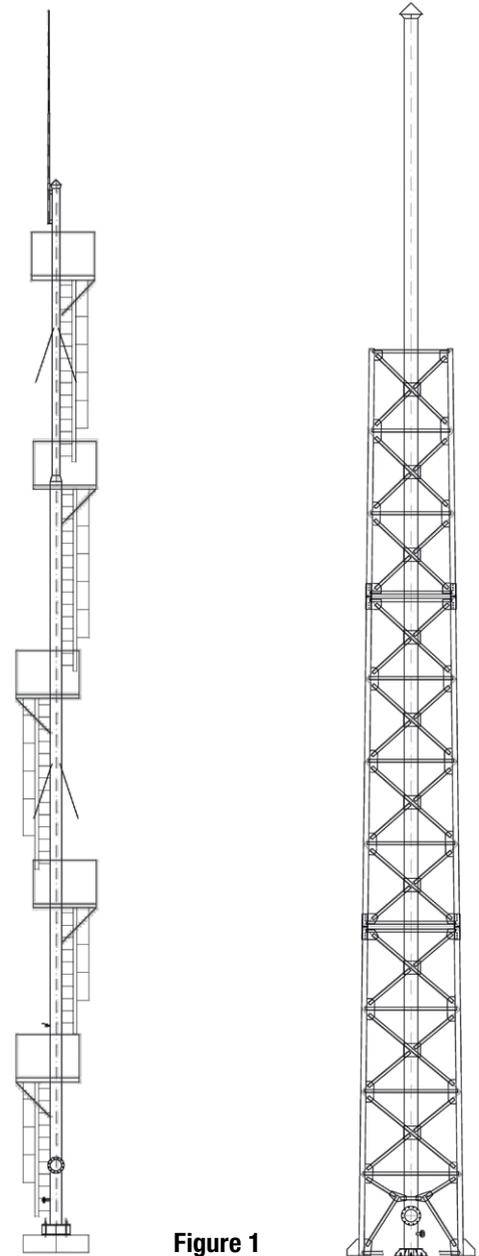


Figure 1

Product range of gas vent stacks

Parameters	SR type							
	From 0 to 0,05 including	Over 0,05 up to and including 0,1	Over 0,1 up to and including 0,2	Over 0,2 up to and including 0,7	Over 0,7 up to and including 1,0	Over 1,0 up to and including 1,5	Over 1,5 up to and including 2,0	Over 2,0 up to and including 12
Amount of gas discharged, million, m ³ /day								
Nominal diameter of the main riser, D2, mm	150–300	150–400	150–400	200–800	400–1000	500–1000	500–1400	700–1400
Riser height, H, m	10 or more							



Scope

Pipe gas expanders are designed to separate gas from dropping liquid and mechanical impurities, catching of liquid plugs generating in gas pipelines; Included into flare system of oil treatment units (UPN), UPSV, CPPS, DNS and other surface facilities of oil&gas producing enterprises.

Equipment configuration

TGR are completed with internal equipment for catching of dropping and film liquids as well as liquid plugs generating in gas pipelines. Product range and Technical specifications of manufactured pipe gas expanders is given below.

Designation

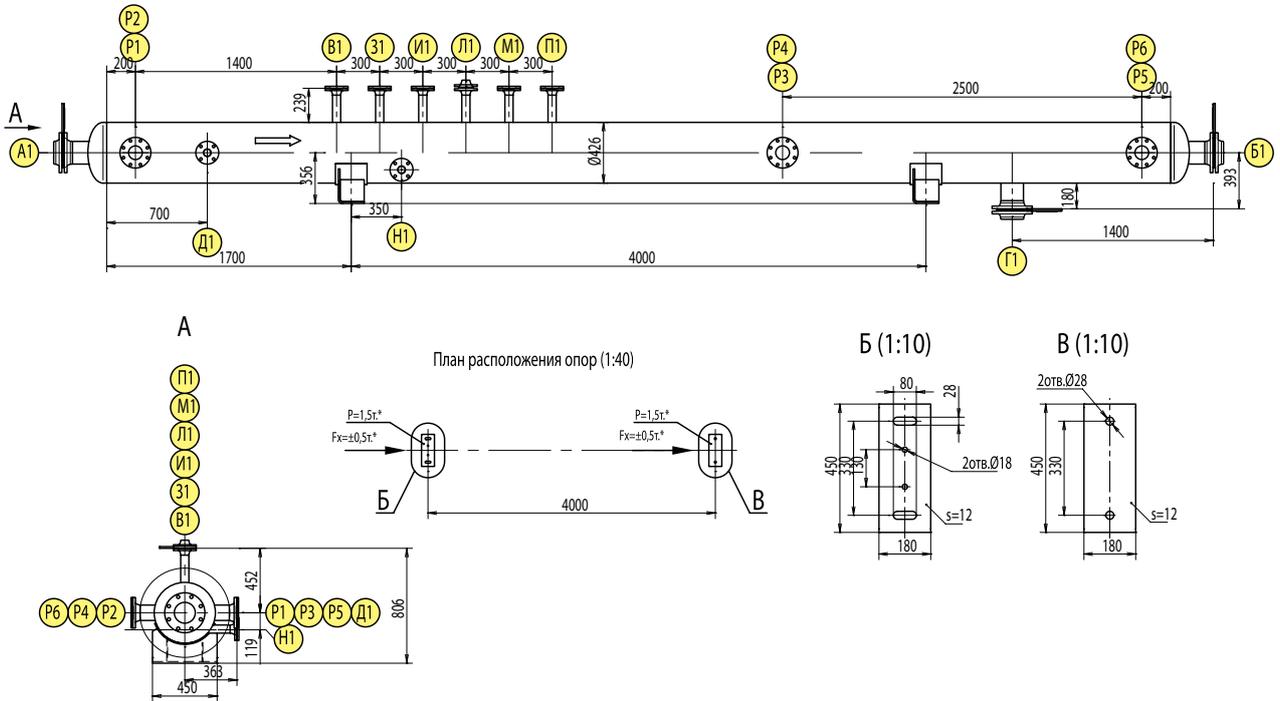
Pipe gas expanders are developed and manufactured as per TU 28.99.39-008-20676863-2017 in accordance with requirements of technical regulation of Customs union «On safety of equipment operating under excessive pressure» (TR CU 032/2013), requirements of FRR GSR «Regulations of industrial safety for hazardous facilities using equipment working under excess pressure» dated March 25, 2014 No. 116, GOST R 52630, OST 26.260.18, OST 26.260.758.

Designation sample for ordering of a product:
 Pipe gas expander TGR-400-HL1
 TU 28.99.39-008-20676863-2017, where
 400 – nominal case diameter, mm;
 HL1 – climatic modification.

Technical specifications

Parameters	Nominal size									
	TGR-400		TGR-500		TGR-600		TGR-800	TGR-1000	TGR-1400	TGR-2000
Diameter of the expander case, DN, D2, mm	400		500		600		800	1000	1400	1400
Case volume, m ³	0,7	1	1,1	1,5	1,6	2,1	3,8	5,7	11	25
Expander length, L, mm	6000	8000	6000	8000	6000	8000	8000			
Diameter of inlet / outlet piping connections, DN, D1, mm	150		200		250		300	400	500	1000
Flow rate (at pressure 0,05 MPa (g), thousand nm ³ /day, maximum	60		110		175		250	455	710	2840
Design temperature of case wall, °C	150									
Design pressure, MPa	0,6; 1,0; 1,6; 2,5; 4,0									
Note: Diameter of inlet \ outlet piping connections can be changed upon customer request.										

Pipe gas expander TGR-400-h11



PROCESS EQUIPMENT



Input pipe expanders, mixers

Tanks (SM)

Slug catchers (UPOG, UPOG-M)

Modernized gas and oil separators (NGS-M)

Modernized gas and oil separators with water discharge (NGSV-M)

Modernized oil Settlers (ONM)

Modernized water settlers (OVM)

Advanced water filtration unit (UGOV)

Modernized knock-out drums (GSM)

Centrifugal knock-out drums (GSC)

CenaSeparation units for oil with high gas ratio (SBVG)

Flare separators (FS)



Scope

Inlet pipe expanders (RTV, knockout separators) are designed to catch and remove gas plugs, flow blending and catching of large mechanical impurities (sand and sludge) from the oil&gas mixture before inlet to UPSV.

Available in climatic modification U1 and HL1 as per GOST 15150 with the following air temperature during operation:

- for U1 – from minus 45 °C to plus 40 °C
- for HL1 – from minus 60 °C to plus 40 °C

Equipment configuration

Inlet pipe expanders can be delivered with or without skid, with piping, shut-off valves, instrumentation, maintenance platform and inlet equalization header. Manufacturer to specify structural dimensions of IPE according to Customer’s data sheet.

Designation

Reference designation sample for ordering a product:

IPE – 1400-1,6-10-7,5-U1

as per TU 28.99.39-017-20676863-2017, where

IPE – inlet pipe expander;

1400 – nominal case diameter, mm;

1,6 – design pressure, MPa;

10 – case length, m;

7,5 – production stream capacity for fluids, thousand m³/day;

U1 – climatic modification.

Technical specifications

Mean time between failures, not less than	9 000 h
Average overhaul life, not less than	43 000 h
Design-to-life cycle	20 years
Equipment	repairable

Comparative indexes of pipe inlet gas separator-sand traps

Index name	Typical option	Modernized version
Load: – for gas, thousand m ³ /day – for fluid, m ³ /day	300–3 000* 1 000–10 000	
Design pressure, MPa	1,6–6,3	
Degree of gas separation, %	60	90–95
Gas withdrawal control	manual	automated
Demisting pad	no	yes
Liquid content in gas at gas output	not rated	up to 1 g/m ³
Non-associated gas in liquid at outlet, % vol.	not rated	up to 5
Sand trap function	not applicable	separation of sand and sludge from 300–500 microns and above
Package	component delivery	modular
Dimensions: – diameter, mm – length, mm	700–1400 6 000–10 000	
* to be adjusted to meet operating conditions (P, T)		



Scope

Mixers (M) are designed to mix demulsifier with the oil&gas mixture for demulsification of oil-water emulsion in the supply pipeline before preliminary water discharge units (UPSV) and oil preparation units (UPN). The use of SM mixers as part of UPN and UPSV provides significant time reduction of dynamic settling in oil treatment vessels.

Mixers are also used for mixing oil with fresh water as part of oil desalting units.

Available in climatic modification U1 and HL1 as per GOST 15150 with the following air temperature during operation:

for U1 – from minus 45 °C to plus 40 °C

for HL1 – from minus 60 °C to plus 40 °C

Equipment configuration

The mixer can be delivered with or without skid, complete with piping, shut-off valves, instrumentation, maintenance platform.

Design of the mixer is determined based on required capacity, physical-chemical properties of oil, oilfield water, content and nature of solid inclusions (mechanical impurities). Manufacturer to specify structural dimensions of the mixer according to Customer's data sheet and specifications.

Designation

Reference designation sample for ordering a product:

JM – 700-1,6-5-HL1

as per TU 28.99.39-013-20676863-2017, where

JM – jet mixer;

700 – nominal case diameter, mm;

1,6 – nominal pressure, MPa;

5 – case length, m;

HL1 – climatic modification.

Technical specifications

Average overhaul life, not less than	43 000 h
Design-to-life cycle	20
Years Item	repairable

Basic parameters and dimensions of mixers

Mixer designation	Design pressure, MPa	Fluid flow capacity, m ³ /day	Diameter of mixer, D mm	Length L, m
JM-500	1,0 1,6 2,5 4,0 6,3	up to 15 000	>500	2÷5
JM-400		8000÷10000	400	
PTM-700			700	
JM-350		5500÷7500	350	2÷5
PTM-600			600	
JM-300		4000÷5000	300	2÷5
PTM-500			500	
JM-250		3000÷3500	250	2÷5
PTM-400			400	
JM-200		1500÷2500	200	2÷5
PTM-300			300	
JM-150		500÷1000	150	2÷5
PTM-250			250	
JM-80		300÷500	80	2÷5
PTM-150			150	



Scope

Slug catcher equipment is designed for withdrawal of non-associated gas from oil-gas mixture and elimination of flow and pressure pulsations. Slug catcher to be installed before the separators (NGS, NGSV), discharge phase separator (KDFT) at the input of DNS, UPSV, UPN.

Produced as per TU 28.99.39-018-20676863-2017 of two types:

Type 1 – with gas withdrawal from the upper horizontal section of pipe section at the inlet of NGSV, KDFT;

Type 2 – with production feed into the vertical riser at the inlet of NGS, NGSV, KDFT.

Available in climatic modification U1 and HL1 as per GOST 15150 with the following air temperature during operation:

for U1 – from minus 45 °C to plus 40 °C

for HL1 – from minus 60 °C to plus 40 °C.

Equipment configuration

Slug catcher is packaged with piping and shut-off valves, gauge pressure transmitter, thermal transducers, structural sections and maintenance platforms.

The inner surface of UPOG is treated with the anti-corrosion coating that allows extending technical lifetime up to 20 years.

UPOG dimensions and volume are to be specified depending on capacity, physical-chemical properties and gas-oil ratio.

UPOG is demountable and to be delivered in pipe sections and supporting structures that to be assembled on the site.

Designation

Reference designation sample for ordering a product:

UPOG 700-1,6-V1-C-HL1

as per TU 28.99.39-018-20676863-2017, where

700 – nominal case diameter, mm;

1,6 – design pressure, MPa;

V1, 2 – type 1, type 2;

P – internal anti-corrosion coating;

HL1 – climatic modification as per GOST 15150.

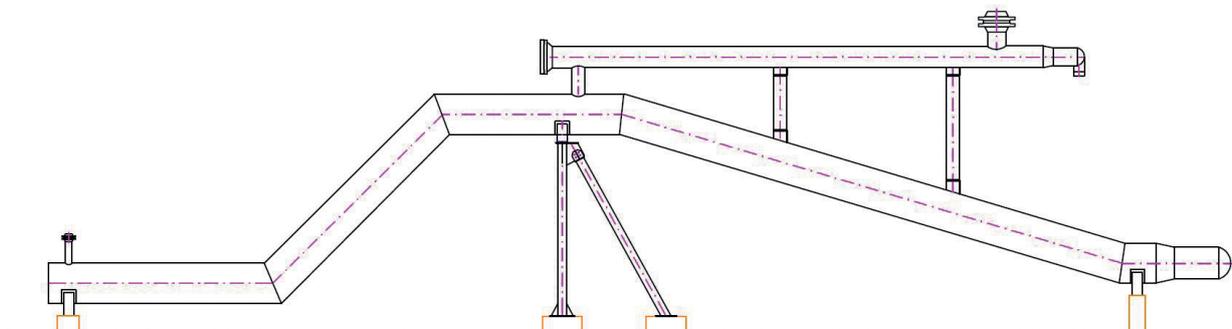
Technical specifications

Mean time between failures, not less than	9 000 h
Average overhaul life, not less than	43 000 h
Designed life, not less than	100 000 h
Design-to-life cycle	20 years
Equipment	repairable

UPOG – Type 1 is used for separate-wave structures of gas-liquid mixture with volumetric gas content $\beta = 0,7-0,85$ ($GF \leq 200 \text{ m}^3/\text{day}$), in the range of flow rate in the supply pipeline from 2 to 4 m/s.

UPOG-M – Type 2 is used for high gas content of the gas-liquid mixture $>0,85 \div 0,9$ characterized by dispersed or film-dispersed flow structure in the supply pipe at a flow rate of $V = 4-8 \text{ m/s}$ (gas factor is more than $200 \text{ m}^3/\text{t}$).

Figure 1. UPOG type 1



UPOG type 1 basic parameters and dimensions

Liquid load, m ³ /day	Pressure, MPa	Design parameters			Diameter of UPOG, mm			
		Temperature, °C	Water cut, %	Gas factor, m ³ /t	$\beta=0,7$	$\beta=0,75$	$\beta=0,8$	$\beta=0,85$
1000	1,6 2,5 4,0 6,3	20	50÷90	up to 200	200	200	250	300
3000					250	250	300	400
5000					300	300	400	500
7000					300	400	500	600
10000					400	400	500	700
15000					500	500	700	1000
20000					700	700	1000	1200

Note:

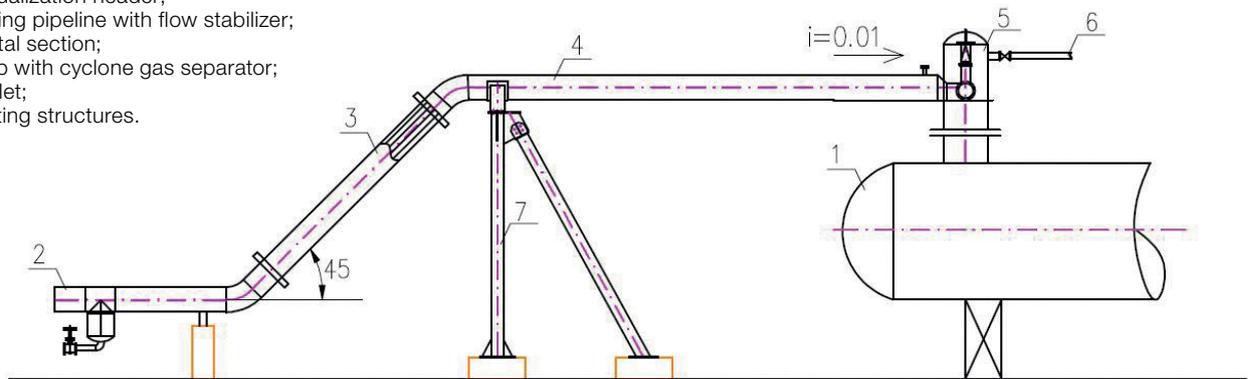
- Figure 1 shows dimensions in compliance with detailed construction documentation as per TU;
- Diameter to be designed considering load dynamics and subsequent increase in water cut and a decrease in volumetric gas content.



Figure 2. UPOG type 2

Designations:

- 1 – separator (NGS, NGSV or KDFT);
- 2 – inlet equalization header;
- 3 – ascending pipeline with flow stabilizer;
- 4 – horizontal section;
- 5 – inlet cap with cyclone gas separator;
- 6 – gas outlet;
- 7 – supporting structures.



UPOG-M type-2 basic dimensions

Liquid load, m ³ /day	Pressure, MPa	Design parameters			UPOG-M dimensions
		Temperature, °C	Water cut, %	Gas factor, m ³ /t	D, mm
1000	1,6 2,5 4,0 6,3	20	50-90	from 200	200
3000					300
5000					400
7500					500*
10000					700*
15000					800*

*Considering the large volumes of gas-liquid mixture at high gas content, load after the UPOG-M to be divided among 2 (or more) separators or divided initially into 2 streams with 2 UPOG-M of smaller optimal dimensions.

For order, dimensions are specified by the Supplier, considering dynamics of gas and liquid flow rates

1) One set of UPOG-M can be used for one or two vessels with connection of liquid and gas sections to the vessels considering symmetry with use of a U-shaped or – shaped inlet device.





Scope

Modernized gas and oil separators (NGSM) are designed for oil degassing and associated gas treatment. Used in the input, medium and terminal stages of separation. Modernized gas and oil NGSM separators have improved capacity and separation quality and complete with defoaming and stimulating nozzles and equipment for medium and heavy oil.

Equipment configuration

Modernized gas and oil separators are designed with the following structures and components:

- inlet unit for distribution of liquid-gas mixture;
- internal coalescing defoaming nozzle;
- internal KO drum installed at the gas outlet of a vessel.

Separators are manufactured with or without heat treatment, with or without brackets for thermal insulation depending on operating conditions.

Technical specifications

Motive fluid	oil, gas, oilfield water
Vessel volume, m ³	6; 12,5; 25; 50; 100; 150
Operating pressure (design), MPa, not more than	0,6; 1,0; 1,6; 4,0; 6,3
Fluid capacity, m ³ /day	from 500 to 15 000
Gas capacity, nm ³ /day	up to 500 nm ³ /day
Mass concentration of liquid in processed gas, g/m ³	0,05–0,1
Ambient temperature, °C	from –60 to +50
Service life, not less than (years):	20

Separators can be delivered with piping, shut-off valves, instrumentation, maintenance platform and corrosion-resistant coating (NGS-M-A package) upon customer request.

Designation

Reference designation sample for ordering (and for documentation) of NGSM-A with automation system:

Separator NGSM-A 50-1,6-T-I-P-HL1
as per TU 28.99.39-008-20676863-2017, where:

- A – with automation system;
- 50 – volume of the apparatus, m³;
- 1,6 – design pressure, MPa;
- H – heat treatment;
- I – bracket for mounting insulation;
- P – internal anti-corrosion coating;
- HL1 – climatic modification.

Change of separator design in terms of installation of additional internal equipment and location of connecting pipes is acceptable upon customer request.

Climatic modification:

U1 and HL1 as per GOST 15150-69 with air temperature during operation from +40 °C to –40 °C and from +50 °C to –60 °C accordingly.

Scope

For the separation of well production into oil, gas and water at UPSV and UPN facilities.

Equipment configuration

Three-phase modernized gas and oil separators are designed with the following structures and components:

- inlet unit for distribution of liquid-gas mixture;
- expanded steel sheet baffles;
- point of transferring oil into oil compartment;
- built-in metering pillar for mount of a liquid level gauge «oil-water»;
- coalescing device is installed to improve process of separating liquids into oil and water.

NGSV-M designed for operating environment containing corrosive components (including hydrogen sulphide) are packaged with internal equipment made of stainless steel or polymeric materials.

Heat treatment and internal anti-corrosion coating are foreseen to ensure reliability and durability.

The automation system provides measurement, control and archiving of the following technological parameters: temperature, pressure, phase separation level, oil level.

Upon customer request the separator can be complete with piping, maintenance platform, supports, shut-off valves and instrumentation and automation set (NGSV-M-A module package).



Designation

Reference designation sample for ordering NGSV-M-A with automation system for ordering and other documentation:

Separator NGSV-M-A 50-1,6-T-I-P-HL1 as per TU 28.99.39-008-20676863-2017, where:

A – with automation system;

50 – volume, m³;

1,6 – design pressure, MPa;

H – heat treatment;

I – bracket for mounting insulation;

P – internal anti-corrosion coating;

HL1 – climatic modification.

Upon customer request the NGSV-M can be manufactured without automation system.

Designation for ordering and other documentation for such case:

Separator NGSV-M-1-50-1,6-T-I-P-HL1

as per TU 28.99.39-008-20676863-2017.

Comparative indexes of oil&gas separators NGSV-M

Index name	Standard option on GP 868.00.000	Modernized option of NGSV-M (by «ROG-Engineering» LLC)
Vessel volume, m ³	25; 50; 100; 200	12,5; 25; 50; 100; 200
Design pressure, MPa	0,6; 1,0; 1,6; 2,5; 4,0	1,0; 1,6; 2,5*; 4,0* (*except for vessels V = 200 m ³)
Design capacity: – fluid, m ³ /day – gas, thousand m ³ /day	675...5400 GF = 130 ÷ 360 m ³ /m ³	420...6750 HF = up to 500 m ³ /m ³
Oil water cut at outlet, % vol.	up to 30,0	up to 5,0
Mass concentration of oil in water: – at outlet, g/m ³ – mechanical impurities, g/m ³	up to 100 not rated	up to 40 up to 40
UPOG requirement: – with volumetric gas content $\beta < 0,7$ – with $\beta > 0,7 \div 0,9$ – with $\beta > 0,9$ – with $\beta \geq 0,95$	is not recommended typical UPOG typical UPOG gas separator or AK	is not recommended Compact UPOG-M pipe gas separator pipe inlet gas separator RGV
Use as dehydration settler	Recommended (without UPOG)	Recommended (without UPOG)



Scope

Modernized oil settlers (ONM) as a part of UPSV, UPN and similar equipment are designed for dehydration and desalting of oil.

Equipment configuration

Modernized oil settlers contain of following structures and components:

- inlet unit for distribution of oil emulsion;
- expanded steel sheet baffles;
- built-in metering pillar for mount of an interface level gauge «oil-water»;
- coalescing (separating) device for improving oil dehydration, preventing of intermediate phase;
- steam and drainage system.

Oil settlers designed for operating environment containing corrosive components (including hydrogen sulphide) are packages with internal equipment made of stainless steel or polymeric materials.

Heat treatment and internal anti-corrosion coating of equipment is applicable as protection against corrosion.

Oil settlers can be delivered with piping, shut-off valves and instrumentation and automation set (ONM module package) upon customer request.

Designation

Reference designation sample for ordering ONM:

Modernized oil settler ONM-50-1,6-T-I-P-HL1

as per TU 28.99.39-008-20676863-2017, where:

50 – volume, m³;

1.6 – design pressure, MPa;

H – heat treatment;

I – bracket for mounting insulation;

P – internal anti-corrosion coating;

HL1 – climatic modification and environmental class.

Technical specifications

Motive fluid	oil, gas, oilfield water
Vessel volume, m ³	12,5; 25; 50; 100; 200
Design pressure, MPa, not more than	1,0; 1,6; 2,5; 4,0
Fluid capacity, m ³ /day	up to 15 000
Water-in-oil percentage at outlet, % wt:	up to 0,5
Content in oilfield water at outlet, mg/l:	
– crude products	30÷40
– mechanical impurities	30÷40
Operating environment temperature, °C	from +30 to +90
Ambient temperature, °C	from –60 to +50
Service life, not less than (years):	20

Scope

Modernized water settlers are designed to separate oilfield water from oil products and mechanical impurities to provide required quality of the product for pumping into reservoir-pressure maintenance.

Equipment configuration

Modernized oilfield water settlers are available in the following configuration: horizontal tank, set of instrumentation and automation equipment, internal settlers for water treatment and an upper cap for collecting and draining of recovered oil.

Dimensions and technological volume are determined depending on capacity, physical-chemical properties of oil, oilfield water, mode of operation and quality requirements for water treatment.

Internal anti-corrosion coating of equipment is applicable as protection against corrosion. Settlers designed for operating environment containing corrosive components (including hydrogen sulphide) are packages with internal equipment made of stainless molybdenum steel. The automation system provides measurement, control and archiving of the following technological parameters: temperature, pressure, phase separation level «oil-water».



Settler can be delivered with piping, shut-off valves, instrumentation, maintenance platform and structural supports (OVM package) upon customer request.

Designation

Reference designation sample of OVM (OV) for ordering or other documentation:

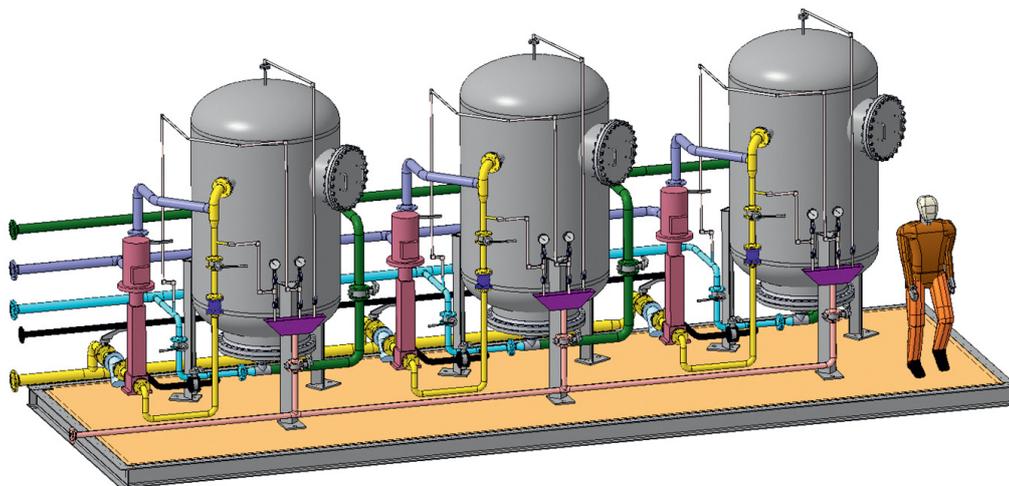
Modernized water settler (OVM) 50-1,6-T-I-P-HL1 as per TU 28.99.39-008-20676863-2017, where:

- 50 – volume, m³;
- 1,6 – design pressure, MPa;
- H – heat treatment;
- I – bracket for mounting insulation;
- P – internal anti-corrosion coating;
- HL1 – climatic modification.

Technical specifications

Motive fluid	oilfield water
Vessel volume, m ³	12,5; 25; 50; 100; 200
Design pressure, MPa	0,6; 1,0; 1,6; 2,5
Capacity, m ³ /day	400–10 000
Content in oilfield water at inlet, mg/l:	
– oil	up to 1000
– mechanical impurities	up to 200
Content in oilfield water at outlet, mg/l:	
– oil	no more than 40
– mechanical impurities	no more than 40
Ambient temperature, °C	from –60 to +50
Service life, not less than (years):	20

Accumulated oil&gas skim is periodically discharged into drain tank.



**model of adsorption filter
section of advanced water
filtration facility**
(base dimension
3000x9000 mm)

Scope

Advanced water filtration facilities (UGOV) are designed for additional treatment of oilfield water after water treatment to residual content at outlet of oil and mechanical impurities not more than 5–10 mg/dm³ for further use in reservoir-pressure maintenance system.

Additional treatment of oilfield water is performed while passing it through the adsorbent layer by combination of reversible physical adsorption and volume adhesive filtration. In this case, oil and mechanical impurities are trapped on surface and in pores of adsorbent particle. Adsorbent is placed in special vertical vessels – adsorber filters with internal diameter from 1000 to 2000 mm. Oilfield water ion composition does not change during treatment.

Internal adsorber filters are designed to hold and equally distribute oilfield water flow along cross-section of a vessel.

Pollution saturation degree of adsorbent during treatment is controlled by pressure drop between inlet and outlet pipelines of adsorber filters.

Filters are to be switched off at saturation with contaminants and to be regenerated by back flushing prior to next activation.

Regeneration products or suspension of caught mechanical impurities and oil in water to be drained from technological process by UGOV or disposed.

Adsorber can be used for a long time and to be replaced not more frequently than once in 3–5 years (depending on operating conditions). Used and regenerated adsorbent has no environmental risks and to be utilized as solid industrial waste of the fourth hazard category as per GOST 12.1.007.

Equipment configuration

UGOV consists of adsorber filters and equipment for its regeneration being selected individually based on capacity and operating conditions.

UGOV capacity depends on quantity and internal diameter of adsorber filters in simultaneous operation.

Scope

Modernized gas separators (GSM) are intended for high-quality purification of associated petroleum gas from dropping liquid (condensate, hydrate formation inhibitor, oil, water) in oil&gas treatment facilities for transportation to a consumer.

Modernization includes:

1. Use of high-performance wing type drop catchers, cyclones and filters;
2. Use of modern instrumentation.

Equipment configuration

GSM can be delivered with shut-off and safety valves, instrumentation and automation upon customer request. Operating temperature is from -50 to +80 °C.

Designation

Reference designation sample for ordering a product:

Modernized gas separator
 GSM-1,6-2400-1-T-I-P-HL1, where:
 GSM – modernized gas separator;
 1,6 – design pressure, MPa;
 2400 – internal diameter, mm;
 1 – type (1-vertical, 2-horizontal);
 T – heat treatment;
 I – bracket for mounting insulation;
 P – internal anti-corrosion coating;
 HL1 – climatic modification.



Technical specifications

Motive fluid	associated petroleum and natural gas
Vessel volume, m ³	from 0,5 to 100
Design pressure, MPa	1,0; 1,6; 2,5; 4,0; 6,3; 8,8 10,0; 16,0
Capacity, nm ³ /day	up to 3 600 000
Ambient temperature, °C	from -60 to +50
Liquid carryover from vessel, not more, mg/m ³	50 (20 upon customer request)
Service life, not less than (years):	30



Scope

Centrifugal knock-out drums (GSC) manufactured by «ROG-Engineering» LLC are designed for deep treatment of gas flow from dropping, finely dispersed, aerosol liquid, oil and solid impurities. Used in oil&gas production and oil&gas refining enterprises.

GSC design feature allows to tangentially direct the incoming flow while translation energy of gas-liquid flow transforms into rotative motion.

GSC is a centrifugal separator. GSC can be used separately or together with horizontal oil&gas separator. GSC can be built into main vessel vertically and mounted with intermediate flanged connection. In GSC separation of gas and fluid are being separated simultaneously in centrifugal force field. Fluid separated from a gas flows into the cavity of the main vessel. Lower part of GSC is immersed below fluid level and rests on the bottom of the main vessel shaping a water seal preventing gas from passing into main vessel cavity. To ensure the removal

of residual gas released from fluid in the main vessel, a ventilation pipe connecting the gas space of the main vessel with a central tail pipe of cyclone separator that allows a gas released from the fluid to vent through the GSC with the main gas flow.

Centrifugal KO drums are developed and manufactured as per TU 28.99.39-008-20676863-2017 in accordance with requirements of technical regulation of Customs union «On safety of equipment operating under excessive pressure» (TR CU 032/2013), GOST R 52630, OST 26.260.18, 26.260.758.

Main advantages of the separator:

- high separation efficiency over the entire load range for liquid and gas phases;
- operating environment – associated gas, natural gas, gas-liquid mixture;
- separation efficiency – 99.9%;
- pressure loss MPa – not higher than 0.003;
- small size, weight;
- operational stability with plug flow;
- warranty operating life – at least 30 years.

High separation efficiency (99.9%) over the entire load range in the liquid and gas phases, operational stability with plug flow with specified separation degree achieved due to several separation steps sequentially functioning downstream with the gas flow rotation.

Designation

Reference designation sample for ordering a product:

Centrifugal KO drum GSC-273-1.0-T-I-P-HL1, where:

GSC – centrifugal KO drum;

273 – case diameter, mm;

1,0 – design pressure, MPa;

H – heat treatment;

I – bracket for mounting insulation;

P – internal anti-corrosion coating;

HL1 – climatic modification.

GSC with horizontal oil&gas separator



Technical specifications

Nominal size	Parameters					
	Case diameter, mm	Volume, m ³	Capacity*, thousand nm ³ /day	Operating pressure, MPa (g)	Design temperature case wall, °C	Design pressure, MPa
GSC-219	219	0,05	50	0,4	100	0,6; 1,0; 1,6; 2,5; 4,0; 6,3; 8,0; 10,0; 12,0; 14,0; 16,0
GSC-273	273	0,06	75			
GSC-325	325	0,2	110			
GSC-377	377	0,2	150			
GSC-426	426	0,2	200			
GSC-530	530	0,5	315			
GSC-630	630	0,7	455			
GSC-720	720	1,0	615			
GSC-820	820	1,3	805			
GSC-1020	1020	2,0	1260			
GSC-1220	1220	2,8	1815			
GSC-1420	1420	3,8	2475			
GSC-1620	1620	5,0	3235			
GSC-1820	1820	6,4	4095			
GSC-2020	2020	7,9	5055			

Note: *With operating pressure of 0,4 MPa (g). Capacity with different value of operating pressure to be recalculated.



Scope

Separation units for oil with high gas factor (SBVG) are designed for preliminary water discharge and degassing of oils with high gas factor (from 200 to 2000 m³/t).

Equipment configuration

The separation unit includes internal cyclone separator for separation of liquid and gas phases and a vessel — storage tank.

Inlet cyclone separator provides separation of 99% of non-associated gas and fluid injection into storage tank for subsequent separation including preliminary dehydration with corresponding properties of water-oil emulsion.

SBVG can be delivered on skid with piping, maintenance platform, shut-off valves and instrumentation set.

Upon customer request, with internal anti-corrosion coating and heat treatment.

Dimensions of unit and volume of the storage tank are determined depending on capacity and physical-chemical properties of oil and oilfield water

Designation

Reference designation sample for ordering a product: SBVG-500-2,5-HL1 TU 28.99.39-008-20676863-2017, where:

SBVG – separation units for oil with high gas factor;
500 – separation unit capacity for fluid, m³/day;
2,5 – pressure, MPa;
HL1 – climatic modification.

Technical specifications

Parameters	Nominal size				
	SBVG-500	SBVG-1000	SBVG-1500	SBVG-2000	SBVG-2500
Capacity:					
For liquid, m ³ /day, not more than	500	1000	1500	2000	2500
for gas, thousand nm ³ /day, not more than	500	1000	1500	2000	2500
Design pressure, MPa	1,6; 2,5; 4,0; 6,3				
Motive fluid	Oil, gas, water				
Water-in-oil percentage, %					
– inlet	95				
– outlet	Up to 5-10				

Scope

Flare KO drums are designed to separate gas from dropping liquid and mechanical impurities, catching of liquid plugs generating in gas pipelines; Included into flare system of oil treatment units (UPN), CPPS, UPSV, UPG, GSU, KPG, DNS and other surface facilities of oil&gas producing enterprises, other surface facilities of oil&gas producing enterprises.

Equipment configuration

Vessel flare KO drums (FSE) are assembled with internal equipment designed to separate gas from dropping liquid and mechanical impurities, destruction of liquid plugs generating in gas pipelines; Can be delivered with piping, shut-off valves, instrumentation, maintenance platform with ladder and condensate pumps upon customer request.

Designation

Flare KO drums are designed and manufactured as per TU 28.99.39-008-20676863-2017 in accordance with requirements of technical regulation of Customs union «On safety of equipment operating under excessive pressure» (TR TS 032/2013), GOST R 52630, OST 26.260.18, OST 26.260.758.



Designation sample for ordering of a product:
 Flare KO Drum FS -1000-2-T-I
 TU 28.99.39-008-20676863-2017, where:
 FS – flare KO drum;
 1000 – internal diameter, mm;
 2 – material design,
 (1 – up to -40 °C, 2 – up to -60 °C);
 T – heat treatment;
 I – bracket for mounting insulation.

Technical specifications

Nominal size	Parameters					
	Internal diameter of the case, mm	Device volume, m³	Capacity* thousand, nm³/day	Operating pressure*, MPa (g)	Design pressure, MPa	Design temperature of case wall, °C
FS-1000	1000	4	950	0,05	0,6; 1,0; 1,6; 2,5	100
FS-1200	1200	6,3	1365			
FS-1400	1400	11	1857			
FS-1600	1600	12,5	2425			
FS-1800	1800	25	3070			
FS-2400	2400	50	5460			
FS-2800	2800	80	7430			
FS-3000	3000	100	8530			
FS-3200	3200	140	9705			
FS-3400	3400	200	10950			

Note: *With operating pressure of 0,05 MPa. Capacity with different value of operating pressure to be recalculated.



Modular pump station (BNS)

Line heaters

Technical upgrade of existing equipment

Scope

Modular pump station is designed:

BNS-N – for pumping of oil and oil products;

BNS-V – for pumping of oilfield and treated field wastewater and degassed water from water supply well into injection wells of oil-gas fields, for pumping water in gathering and processing systems of oil-and-gas production enterprises and also in systems of process and backwater supply systems on enterprises of various profiles;

BNS-P – for pumping of fire extinguishing water or foam during extinguishing.

Equipment configuration

BNS contains of:

- pumping section:
 - pumping unit with piping;
 - balanced ventilation;
 - racks with primary instrumentation
- booster pump section:
 - drain communication system to provide discharge product transfer into closed disposal system;
 - heating system;
- oil system section:
 - oil pumps;
 - filters;
 - ball valves piping;
 - expansion tanks;
 - air-cooled oil coolers with electric fans;
 - racks with instrumentation, automation and local control for each unit;
 - explosion – proof lamps;
 - primary control instrumentation;
- control unit:
 - internal equipment of the control unit;
 - electrical panel;
 - oil heaters with a thermo-regulator;
 - control cabinets;
 - cable lines with control and power cables in separate metal boxes;
 - power and electricity supply unit;
 - main shelter unit;
 - hardware unit;
 - control unit;
 - frequency converters unit;
 - transformer unit;



- switchgear units;
- spare parts kit for commissioning;
- spare parts kit for 2 years of equipment operation;
- process pipelines;
- steel pipelines with flange or quick release connections for section.

Designation

Modular pumping stations are manufactured as per TU 28.99.39-007-20676863-2018. Reference designation sample for ordering a product: BNS-N(V, P)-350-HL1, where:
 BNS – Modular pump station;
 N – type of pumping station (for pumping oil and oil products);
 350 – pumping station capacity, m³/h;
 HL1 – climatic modification as per GOST 15150.

BNS technical data

Estimated mean time between failures, not less than	9000 h
Average overhaul life, not less than	45000 h
Design-to-life cycle	25 years
Equipment	repairable
Premises category for explosion and fire hazard as per Safety code 12.13130	
BNS-N – A	
BNS-V, BNS-P – V4, D	
Unit fire resistance as per construction codes and regulations SNip 21-01	III
Explosion and fire hazardous areas according to Rules of Electrical installation PUE	V-1a

Basic parameters and dimensions of BNS

Parameters	BNS-N	BNS-V	BNS-P
Capacity*, m ³ /hour	from 80 to 350	from 80 to 350	up to 350
Discharge pressure, MPa	from 0,1 to 6,3	from 0,1 to 24	up to 15
Number of pumps**, pcs	One or more	One or more	Three main pumps and two circulating
Motive fluid	Oil, petroleum products, solvents	Oilfield and treated field wastewater	Fire water

BNS can be mounted in block-box (enclosed design) or on skid (open design). Pumping stations room is built of modules with dimensions of 3x6x2,95 m, 3x9x2,95 m, 3x12x2,95 m, which can be connected and completed in any option.

Used pumping units depending on type of pumped liquid

Type of pumped liquid	Recommended pump type
Oil and petroleum products	A1 3V, A2 3V, ASVN, ASCL, NK, NM, NMSh, VKS, CNSN, Sh
Diesel fuel	ASVN, ASCL, NMSH, NMShF, Sh
Kerosene	ASVN, ASCL, NK, CR
Solvents	ND, HM
Petrol	VK, VKS, NK, CN, YQB
Oil	NMSh, NMShF, Sh
Oil residue	NMSh, NMShF, NMShG, Sh
Water cut oil, gas saturated	CNSN, UENC
Water	CN KGV, CVK, CNS, CNS, UPS, CR, ANS, S, NCV, NCG, K, KM, KMP, CVS, D, 1D, AD, 1V, SD, SDV, NCS, UENC



Advantages

Project development with modern technologies;

Wide range of pumping units, electrical and process equipment of domestic/foreign production;

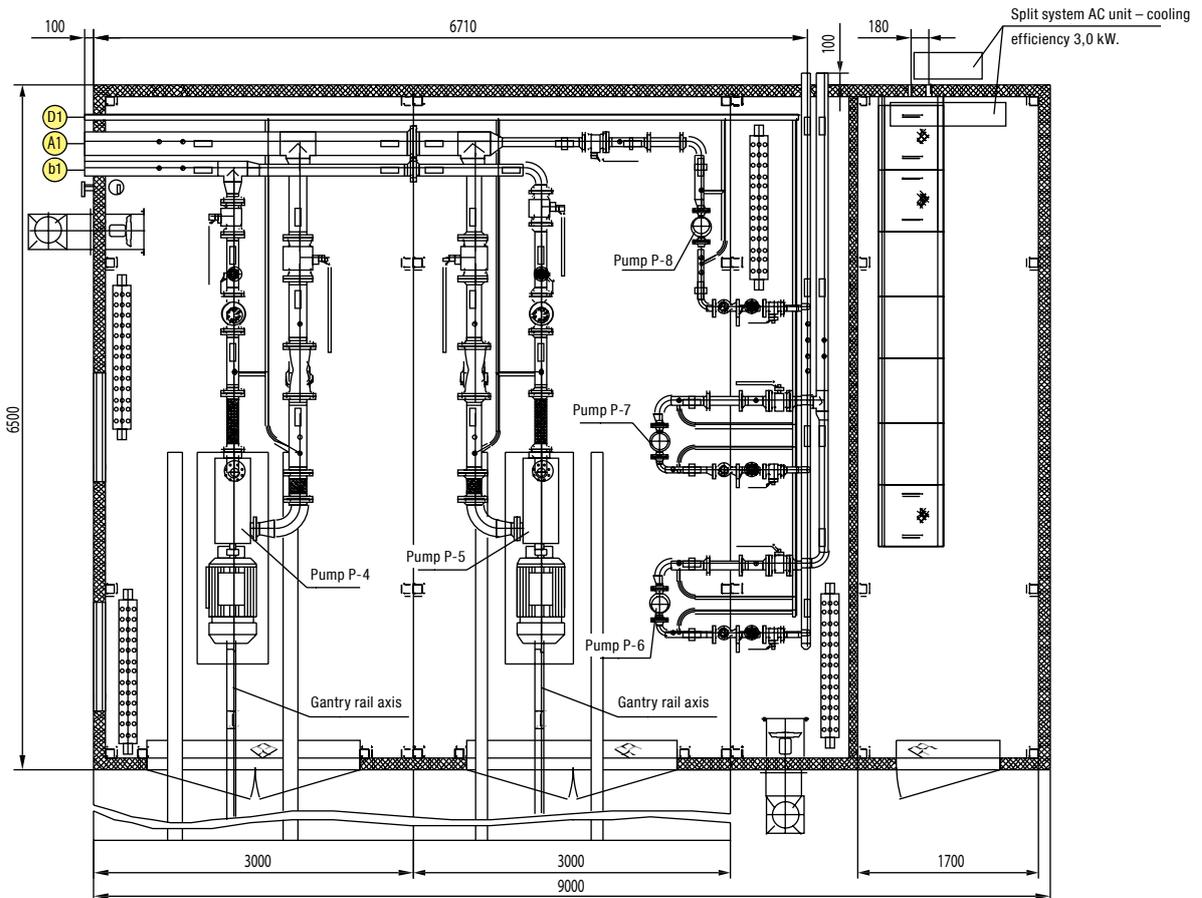
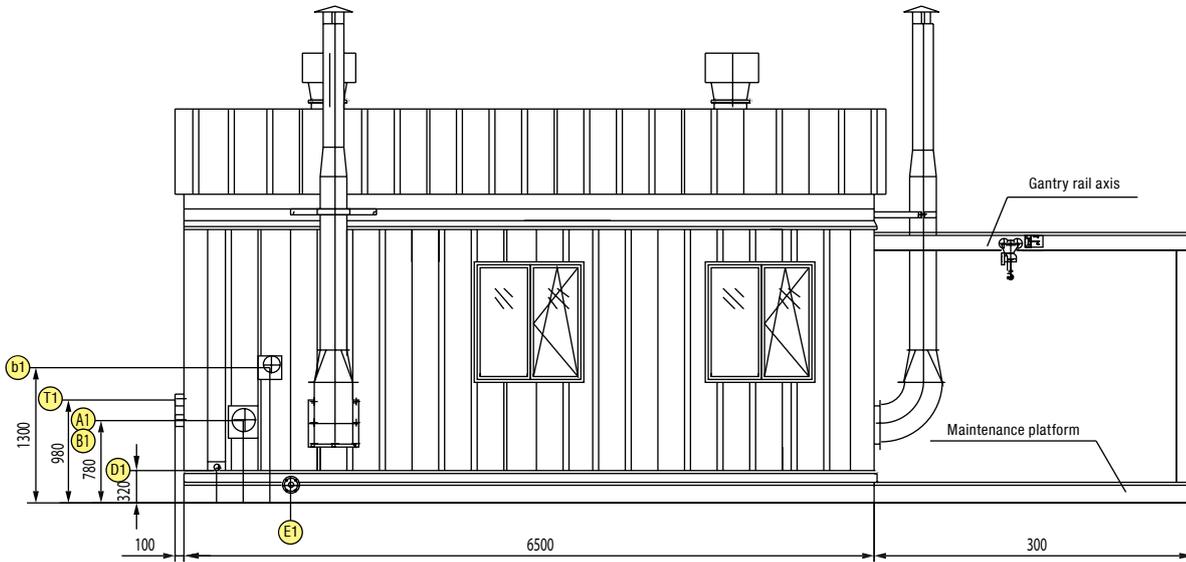
Modern controllers for pumping units and parameters control with possible data transfer over wireless link (Direct Logic, SCADA Pack, Siemens, Delta V, Rock, ABB, Gamma, Micro TEK, etc.).

Design of detailed construction documentation considers Customer requirements for maintenance system;

Technical assignment and specification are confirmed with Customer.

Maximum factory readiness, supervised installation and commissioning.

Water pumping station with centrifugal pumps 105-245 (example)





Scope

Automated line heaters are designed for heating oil, oil emulsions, gas, oilfield water, intermediate heat carrier, process and heating water at production fields, transportation and (or) primary oil preparation fields.

Produced as per TU 28.99.39-021-20676863-2018 of the following types:

PP-0,63 A, PP-0,63 AL, PP-0,63 AMZHГ, PP-1,6 A, PP-1,6 AF, PP-1,6 AMZhG, PBT-1,6 A, PBT-1,6 AZh, PBT-1,6 AMZHГ, PPT-0,2 A, PPT-0,2 AZh, PPT-0,2 AMZhG.

AMZhG – heater type designed for operation on natural or associated gas and liquid fuels (crude oil, heating oil and diesel fuel), A – operation on natural or associated gas, AZh – on liquid fuel only.

LH-0,63 furnace is manufactured as single-circuit and double-circuit (with one or two coiled pipes) for oil emulsion and fresh water heating.

Climatic modification:

Available in climatic modification U1 and HL1 as per GOST 15150 with the following air temperature during operation:

for U1 – from $-45\text{ }^{\circ}\text{C}$ to $+40\text{ }^{\circ}\text{C}$
for HL1 – from $-60\text{ }^{\circ}\text{C}$ to $+40\text{ }^{\circ}\text{C}$.

Equipment configuration

Heaters consist of a vessel, coiled pipe (one or two), firebox, burner unit and chimney.

Heaters are supplied on skid complete with liquid fuel treatment unit (if required), fan unit, automation system.

Designation

Designation sample for ordering:

PP – 0,63 AMZhG

as per TU 28.99.39-021-20676863-2018, where

PP – line heater;

0,63 – thermal power, Mkal/hr;

AMZhG – heater designed for operation on natural or associated gas and liquid fuel (crude oil, oven fuel and diesel fuel).

Technical specifications

Mean time between failures	not less than 17 000 h
Average overhaul life,	not less than 70 000 h
Design-to-life cycle	25 years
Item	repairable

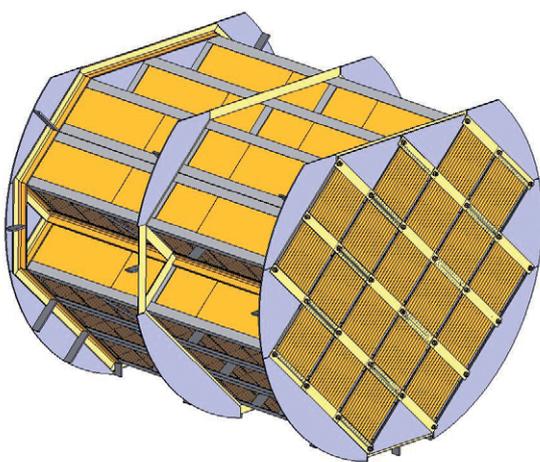
Modernization (technical upgrade) of preliminary water knock-out and Oil treatment facilities is one of important profiles of «ROG-Engineering» LLC:

- replacement of internal, out-of-action internal elements of technological equipment: input devices, coalescers, KO drums, instrumentation and automation, washing and steaming systems;
- upgrade of vessels aimed at changing equipment service, including preliminary water discharge and treatment, reducing or increasing of separation stages number;
- KDFT technical upgrade:
 - a) reconstruction of water treatment section;
 - b) devices from the system of hydrodynamic wash and removal of sediments of mechanical impurities without pipe vessels penetration and personnel participation;
 - c) automation control.

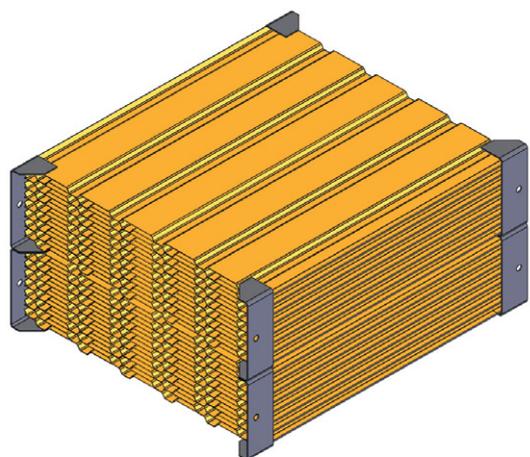
Technical upgrade is accompanied by inspection of pressure vessels, internal and external repairs, use of unified modules made of corrosion-resistant steels and polymeric materials.



Technical upgrade has the following advantage – compared to commissioning of additional vessels it cuts in half the cost for capital expenditure due to saving space of construction and lack of necessity to modify piping or install additional valves.



Internal device general layout



Thin-layered module general layout

