Ladies and Gentlemen!

Competitive advantage of JSC "Turbogaz" at today's stage of development is the talent and intuition of foresight, which precede the implementation of our ideas related to high-technology equipment creation.

When creating a new product we go through three stages of development: a search for an idea, a projection of the idea for the market's demands and its constructive embodiment as a high-technology production under the strictest quality control, which is the consequence of high respect to the demands and expectation of the Client.

All this is possible, when one makes conditions where the talent and intuition become the philosophy of search, aimed at such an activity, which will become a new facet of the diamond called JSC "Turbogaz", since the people, who are the main property of the organization, are even more valuable than the name of the organization.

Recognition of the fact that the main component of the balance assets of the company is such a powerful instrument as the today's working personnel, allows to raise the rate of tasks in creation of world-level equipment.

The sensation of inspiration, creative search and steady growth allows to look into the future with optimism and see the prospects, and it also arouses the feeling of personal responsibility and belonging to the common cause in each of us, which is the expression of our inner self.

The President of JSC "TURBOGAZ"
Oleg S. Iljutko

Dear Sirs!

I present you Public Joint Stock Company "Turbogaz", which has acquired reputation of a reliable manufacturer and supplier of energotechnological equipment for natural gas industry.

Joint-Stock Company "Turbogaz" (its former name is VNPO "Soyuzturbogaz") was established in 1975, according to the decision of the Ministry of Gas Industry of the USSR, as a parent enterprise for construction and implementation of up-to-date energotechnological equipment in this branch of industry.

The enterprise was charged with scientific and research, developmental and technological activities, manufacture and implementation of modular factory-assembled turboexpander refrigerating plants, designed for gas treatment, with gas-turbine drives of aircraft and ship type, gas-pumping units designed for gas transfer, and transportable electric power stations, designed for power-saving at manufacturing plants of the branch of industry or other power consumers, as well as power saving turboexpander generating plants, providing conversion of excess gas pressure energy at gas-distributing and compressor stations into electric power. The enterprise includes: a Design Department (in the city of Kharkov) and an affiliate production plant APP "Pilot plant "Turbogaz" with "Proving Ground".

The activity of the Joint-Stock Company covers all the stages of production from research and development up to supply of complete "turnkey" products. The production with JSC "Turbogaz's" trademark is well known in Ukraine and in many countries of the Commonwealth of Independent States, where it works at numerous sites.

Yours faithfully,
The Chairman of the Board, Director General of JSC "Turbogaz"
Oleg V. Kuprygin

ABOUT US

Joint-stock company "Turbogaz" (its former name is VNPO "Soyuzturbogaz") was established in 1975, according to the decision of the Ministry of Gas Industry of the USSR, as a parent enterprise for creation and implementation of up-to-date energotechnological equipment in this branch of industry. Until the year of 1991 the enterprise had been a part of the Concern "Gazprom".

In 1994 it was reorganized into Joint-Stock Company "Turbogaz", which for the moment consists of the Parent Enterprise (the city of Kharkov), Pilot Plant "Turbogaz" and Proving Ground (Kharkov region).

Joint-Stock Company "Turbogaz" is a scientific-and-research enterprise with a long practical experience in development, production and implementation of energotechnological equipment in oil-and-gas and energy industries.

The Joint-Stock Company confidently occupies the leading place in the oil-and-gas field of Ukraine and the countries of the CIS in solving of numerous tasks of development and implementation of up-to-date machinery and technology of oil and gas treatment and transfer.

The activity of the Joint-Stock Company covers all the stages of production starting from research and development up to supply of complete "turnkey" products, including erection and commissioning works, personnel training, warranty and after-warranty service.

THE RANGE OF THE PRODUCED EQUIPMENT

At present the Joint-Stock Company is designing and manufacturing the following types of equipment for oil-and-gas and energy complexes:

1. Low-temperature turboexpander units for natural gas cooling during its treatment and processing with temperature range from – 1°C to – 100°C;
2. Turboexpander generating plants for conversion of natural gas excess pressure energy into electric power with installed capacity from 8 kW to 12 000 kW and over;
3. Equipment for complex oil and gas treatment and processing;
4. Mobile plants for natural gas well survey without gas release into atmosphere;
5. Track-type vehicles for erection and transportation of drilling units;
6. Natural gas odorization systems.

When designing every new construction, we apply the latest scientific achievements, the best state-of-the-art technologies and newest materials, which allow to work safely in any climatic conditions from the arctic to south latitudes.

According to the results of the year 2004, JSC "Turbogaz" was awarded with a title of "The Best enterprise of Ukraine of 2004" in the nomination of "Oil and gas industry"

In December 2005, JSC "Turbogaz" was recognized as the winner of nomination of "100 best goods of Kharkov region" for the turboexpander generating plant with production capacity of 2500 kW (UDEU-2500-UHL4).

In April 2006, JSC was recognized as the winner of All-Ukrainian Production Quality Contest "100 best goods of Ukraine" in the nomination of "Products of manufacturing and technical destination" for the turboexpander generating plant with production capacity of 2500 kW (UDEU-2500-UHL4).

The qualification of the enterprise is attested by licenses and patents.

The decision of the Board of the Ministry of Fuel and Energy of Ukraine N 2 of March 15, 2003, approved the results of the state certification of the scientific and research (scientific and technical) organizations. According to the results of the certification, Joint-Stock Company "Turbogaz" was reckoned among organizations that form the prospective scientific and technical policy of this field in Ukraine.

Beside that, in the year of 2004, JSC "Turbogaz" introduced the international quality control system ISO 9001-2000 to its works, and it has been successfully applied since then.

JSC "Turbogaz" also received a certificate on Ecology control system N UA 2.053.02569-07.

According to the decree of the President of Ukraine of 24.08.2005, the President of JSC "Turbogaz", O.S.Iljutko, was awarded with the Order "For Contribution" of the III-d degree for weighty contribution and achievements of JSC "Turbogaz" in development of oil and gas industry of the country as well as for high professionalism.

According to the decree of the President of Ukraine of 24.08.2005, taking into account the significant contribution of JSC "Turbogaz" into the development of the oil and gas industry as well as his personal contribution, the First Vice-President of the Board, the Chief Engineer of JSC "Turbogaz", S.V. Moiseiev, was given a title of "Honoured worker of Ukrainian Industry".

JSC "Turbogaz" has acquired reputation of a reliable manufacturer and supplier of energotechnological equipment for gas industry. The production with JSC "Turbogaz's" trademark is well known both in Ukraine and in many other countries of the Commonwealth of Independent States, where it works at numerous sites.

One of the main activities of JSC "Turbogaz" is construction and implementation of turboexpander plants for natural gas treatment and processing with a temperature range from – 1°C to – 100°C, as well as for conversion of excess natural gas pressure energy into electric power with installed capacity from 8 kW to 12 000 kW and over.

The design documentation development is carried out by design departments of JSC "Turbogaz", with a personnel including over 150 people, among which there are 10 Candidates of science, 4 Corresponding members. High qualification of the employees of the design subdivisions is proved by a successful execution of contracts with a great number of Clients.

At present JSC "Turbogaz" possesses design documentation of its own development on 12 types of low-temperature turboexpander units and on 10 types of turboexpander generating plants. The technical and technological solutions are protected with patents.

Site name	Country	Production capacity	Number of supplied plants	P_{inlet} MPa	P_{outl} MPa	Q n.m³/day.
JSC "TURBOGAZ" TURBOEXPANDER POWER GENERATING PLANTS, IMPLEMENTED FOR THE PERIOD from 1991 to 2007						
GMA "Kharkovtransgaz" AC "Ukrtransgaz", Gas distributing station GDS-7 of Dniepropentovsk LP GMA	Ukraine	2500 kW	1	2,15	1,0	4,5
Minsk heat and power station HPS-4	Republic of Belarus	2500 kW	2	0,9	0,3	2,4
Gas distributing station GDP-, town of Novolukoml'	Republic of Belarus	2500 kW	1	0,9	0,3	2,4
GS "Soloha", GTP "Poltavagazdobicha"	Ukraine	2500 kW	1	5,4	3,1	4,2
GDS, city of Odessa ***	Ukraine	4000 kW	1	2,535	0,461	2,4
GDS, city Zaporozhye ***	Ukraine	4000 kW	1	2,9÷4,2	0,7÷0,75	(2,6-3,02)* 10^6
GDS, city of Severodonetzk***	Ukraine	4000 kW	1	3,27÷4,5	1,1÷1,4	(4,2-5,9)* 10^6
Moscow heat and power station HPS-23	Russian Federation	5000 kW	1	0,6÷1,1	0,07÷0,15	(02,7-4,7)* 10^6
Gomelsk heat and power station HPS-2 **	Republic of Belarus	4000 kW	1	1,2	0,2	2,6
GDS "Smela", GMA "Cherkassitransgaz"***	Ukraine	8 kW	1	1,5÷2,5	0,3÷1,2	0,043*10^6
GDS-1, town of Chirchik***	Republic of Uzbekistan	8 kW	1	1,5÷2,5	0,3÷1,2	0,043*10^6
CS "Zadnieprovskoye" GMA "Cherkassitransgaz"**	Ukraine	300 kW	1	3,5÷7,5	0,8÷2,6	0,5*10^6

** - manufacture is in the processv *** - supply of the equipment is in the process

For the period from 1975 to 1989 JSC "Turbogaz" supplied and implemented 91 low-temperature turboexpander units at complex gas treatment plants (CGTP) with low-temperature separation technology in the following countries: the Russian Federation, Ukraine, Azerbaijan and Turkmenistan.

JSC "TURBOGAZ" LOW TEMPERATURE TURBOEXPANDER UNITS AT COMPLEX GAS TREATMENT PLANTS (CGTP) (installed for the period from 1989 to 2007)											
Site name	Country	Volume flow mln.m³/day	Number of supplied units, pcs.	Expander				Compressor			
				P_{inlet}, MPa	P_{outlet}, MPa	T_{inlet} °C	T_{outlet} °C	P_{inlet} MPa	P_{outlet} MPa	T_{inlet} °C	T_{outlet} °C
CGTP "Yambourggazdobicha"	Russia	8-11	Senoman 63	8,8... 10,6	5,8÷ 7,5	22	-2	8÷9	9÷11	22	39,5÷ 40,5
			Valanjin 14	9,9÷ 13,3	6,2÷9,6	-15÷ +7	-20÷ -30	8,6÷ 11,6	10,25÷ 13,53	15,2÷ 25,2	32,8÷ 49,8
Glebovskoye CGTP "Chernomorneftegaz"	Ukraine	2,5-3,5	3	1,5÷ 3,5	1,05÷ 2,5	0÷ -3	-26÷ -32	3,5	4,2	0	20
GTP "Kharkovgazdobicha" OGF "Yulyevskoye"	Ukraine	2,4	1	6,4	3,24	-27,7	-60,3	3,02	3,7	41,0	59,6
GTP "Poltavagazdobicha", GS "Kotelva"	Ukraine	1,5-2,7	1	5,5÷ 6,4	3,0÷4,0	0÷ -30	-40÷- 70	2,8÷ 3,8	3,0÷ 4,5	40	60
GTP "Schebelinkagazgo-bicha" GS "Krestische"	Ukraine	4	3	3,11	2,7	13,5	6,8	2,38	2,62	38,0	42,4
JSC "O'ztashqineftegaz", OGCF "Kokdumalak"	Uzbekistan	4,9	4	6,94	5,0	8,0	-10	4,75	5,55	41,0	54,4
JSC "O'ztashqineftegaz", OGCF "Kokdumalak"	Uzbekistan	2,9	1	6,94	5,0	8,0	-10	4,75	5,55	41,0	54,4
GS "Soloha", GTP "Poltavagazdobicha"	Ukraine	3-5,5	1	5,0÷ 5,5	2,7÷3,5	-4÷ +8	-30÷ -20	Generator 2,5 MW			
JSC "O'ztashqineftegaz", PBMU-2 "Shurtan"	Uzbekistan	9,0	1	4,44	2,9	-53,0	-75,0	2,49	2,97	38,5	49
JSC "O'ztashqineftegaz", field Zevardi *	Uzbekistan	2,9	4	6,94	5,0	8,0	-10	4,75	5,55	41,0	54,4
JSC "O'ztashqineftegaz", field Pamouk*	Uzbekistan	2,9	4	6,94	5,0	8,0	-10	4,75	5,55	41,0	54,4
JSC "Uzneftegazgobicha" **	Uzbekistan	2,9	12	6,94	5,0	8,0	-10	4,75	5,55	41,0	54,4

* - supply of the equipment is in the process ** - manufacture is in the process

TURBOEXPANDER GENERATING PLANTS (UDEU)

Turboexpander generating plants are used at gas distributing stations and gas distributing points for conversion of excess pressure of natural gas into electric power.

When natural gas passes through the turbine wheel of the turboexpander, gas pressure drops (to the level required for the consumer), and the torque, appearing at the turbine, is transmitted to the electric generator shaft with capacity from 8 kW to 12000 kW.

In 1991 Joint Stock Company "Turbogaz" developed and supplied the first turboexpander power generating plant in the USSR with production capacity of 2500 kW (UDEU-2500) for GDS-7 of Dniepropetrovsk LPU MG, GMA "Khrakovtransgaz", AC "Ukrtansgaz" of NJSC "Neftegaz of Ukraine" according to the agreement N 155 of 21.06.1991 (photo 1).

JSC "Turbogaz" has recently made the supplies on the basis of direct agreements for following sites:

- 1 complete set of Turboexpander plant UDEU-4000, with production capacity of 4000 kW for GDS, the city of Odessa (photo 2).

- 1 complete set of Turboexpander unit UKS-2-300 with production capacity of 300kW for Compressor Station "Zadnieprovskoye " GMA "Cherkassitransgaz".

In 2003 JSC "Turbogaz" together with the Company CJSC "Euroenergo" won a Tender for supply of two complete sets of expander-generator plants with production capacity of 2,5 MW for Misk Heat and power station HPS-4, which was announced by Joint Stock Company "Belenergosnabcomplect", Republic of Belarus.

In 2004 the equipment was supplied and it has been successfully operated till now at the above-mentioned site (photo 3.1, 3.2).

| photo 2 | UDEU – 4000 – UHL4 (Ukraine)

| photo 3.1 | Generator UDEU – 2500 – UHL4

| photo 1 | UDEU – 2500 – UHL3 (Ukraine)

In 2004 JSC "Turbogaz" together with the Company CJSC "Euroenergo" won a Tender for supply of one complete set of expander-generator power plant UDEU-2500-UHL4 for the needs of Lukoml' Hydroelectric Power Station of RUP "Vitebskenergo", which was announced by Joint Stock Company "Belenergosnabcomplect", Republic of Belarus.

In 2005 the equipment was supplied and it has been successfully operated till now at the above-mentioned site (photo 4).

By request of the NJSC "Neftegaz of Ukraine", the joint stock company performed a scientific research in feasibility study of implementation of turboexpander power stations into gas transfer system of Ukraine. The results of the above-mentioned scientific research were reflected in the decree of the Cabinet of Ukraine of June 27, 2006, N 436-p, according to which it is planned to implement 54 turboexpander generating power stations at GDSs of NJSC "Neftegaz of Ukraine" till 2030 for realization of energy strategy of Ukraine.

Within the framework of implementation of the above-mentioned Decree, since 2006 JSC "Turbogaz", as a general contractor, has been performing work in development, supply and erection of two turboexpander generating units with the installed capacity of 4000 kW each at GDS in the city of Zaporozhye and at GDS in the city of Severodonetzk for AC "Ukrtansgaz" of NJSC "Neftegaz of Ukraine" (photo 5).

Implementation of these projects is performed together with CJSC "Energotechnology".

In May 2007 JSC "Turbogaz" became the winner of the tender, announced by "Belresursi" Concern, Republic of Belarus, and concluded a direct contract for supply of one complete set of Expander power generating plant UDEU-4000-UHL4 for the needs of Gomel' heat and power station HPS-2 of RUP "Gomelenergo". At present the supply of the equipment is in the process.

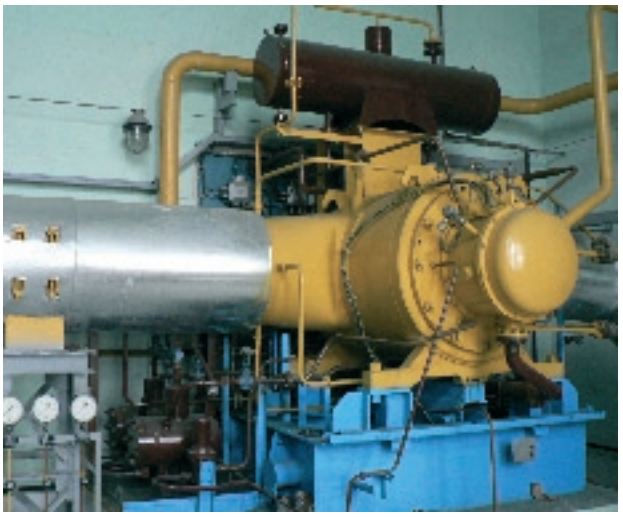


photo 4 | UDEU – 2500 – UHL4 (Republic of Belarus)

photo 5 | Blocks of UDEU – 4000 – UHL4 (Ukraine)

photo 3.2 | UDEU – 2500 – UHL4 (Republic of Belarus)

LOW-TEMPERATURE TURBOEXPANDER UNITS (NTDA, MTDA)

Low-temperature turboexpander units are used as a source of cold for conversion of natural gas and associated oil gases by means of low-temperature gas separation method.

This type of turboexpander unit has found a wide application in the following fields:

- Gas fractionating units for natural gas and associated oil gases with target extraction of helium, ethane, propane-butane, wide spread of light hydrocarbons, etc.
- Natural gas conversion and liquefaction plants, including small-sized plants.
- Natural gas dewatering and treating plants.
- Gas separation plants.

Depending on the initial gas composition, the following target products can be obtained:

- Combustible natural gas;
- Ethane fraction;
- Technical propane-butane mixture;
- Automobile propane and propane-butane;
- Wide spread of light hydrocarbons;
- Stable natural-gas gasoline;
- Isobutane;
- Normal butane;
- Isopentane;
- Normal pentane;
- Pentane-hexane fraction.

photo 6 | NTDA – 2.4 – 6.4 – UHL2 (Ukraine)

photo 7 | NTDA – 2.4 – 6.4 – UHL2 (Ukraine)

photo 8 | TDA – 4,0 – 3,0 – UHL2 (Ukraine)

JSC "Turbogaz" has recently made the supplies on the basis of direct agreements for following sites:

- 1 complete set of Low-temperature turboexpander unit NTDA-2,4-6,4-UHL2 with production capacity of 2,4 mln m^3/day for GTP "Kharkovgazdobicha", OGF "Yulievskoye", where the equipment has been successfully operated since 2002 (photo 6).

- 2 complete set of Low-temperature turboexpander unit NTDA-2,4-6,4-UHL2 with production capacity of 2,4 mln m^3/day for GTP "Poltavagazdobicha", GS "Kotelva", where the equipment has been successfully operated since 2002 (photo 7).

- 3 complete sets of Turboexpander unit TDA-4,0-3,0-UHL2 with production capacity of 4 mln m^3/day for GTP "Schebelinkagazdobicha", GS "Krestische", where the equipment has been successfully operated since 2002 (photo 8).

In 2005, JSC "Turbogaz" became the winner of the tender for supply and commissioning of a turboexpander for GS "Soloha", GTP "Poltavagazdobicha" of AC "Urktransgaz" of NJSC "Neftegaz of Ukraine". For the moment, at the site we have completed the commissioning of turboexpander plant with production capacity of 2500kW, designed for production of cold in the low-temperature adsorption system with simultaneous power generation (photo 9).

In June 2005 JSC "Turbogaz" became the winner of the Tender N 38/05 of March 30, 2005 for supply of 5 low-temperature gas separation turboexpander units for National Holding Company "Uzbekneftegaz" of "O'ztashqineftegaz", at OGCF "Kokdumalak" (Republic of Uzbekistan).

At the end of August 2006 all the five units were successfully put into commercial operation at the site (photo 10).

In December 2005, according to the decision of the Interdepartmental Tender Commission, JSC "Turbogaz" together with "Zeromax" Company (Switzerland) were announced the winners of the tender N 94/05 for supply of a low-temperature turboexpander unit for construction of PBMU-3 at UDP "Shurtanneftegaz" of JSC "Uzbekneftegazdobicha", which was announced by National Holding Company "Uzbekneftegaz" of PJSC "O'ztashqineftegaz" (Republic of Uzbekistan) (photo 11).

In August 2007, the turboexpander unit was successfully put into commercial operation.

In February 2006, according to the decision of the Interdepartmental Tender Commission, JSC "Turbogaz" together with "Zeromax" Company (Switzerland) were announced the winners of the tender N 96/05 of November 11, 2005, announced by National Holding Company "Uzbekneftegaz" of PJSC "O'ztashqineftegaz" (Republic of Uzbekistan), for supply of 8 turboexpander units for Zevardi and Pamuk fields.

Since June 2007 the supply of equipment to the site has been in process.

Within the framework of National Program of the Republic of Uzbekistan for increase in production of hydrocarbon raw materials and propane-butane fractions, on the basis of direct negotiations and taking into account the successful experience of application of low-temperature turboexpander units, JSC "Uzneftegazdobicha" signed an agreement with JSC "Turbogaz" for supply of 25 turboexpander units. The first 12 complete sets of turboexpander units are being produced now.

Only for the period from 2004 to 2007 JSC "Turbogaz" has concluded direct agreements for supply of 10 turboexpander units and tender-based agreements for supply of 33 turboexpander units.

photo 9 | UDEU – 2500 – UHL2 (Ukraine)

photo 10 | TDA – 4,9 – 6,8 – U1 (Republic of Uzbekistan)

photo 11 | MTDA – 9,0 – 4,5 – U1 (Republic of Uzbekistan)

THE MOBILE GAS WELL SURVEY PLANT (PUIS)

The mobile gas well survey plant PUIS-300-16-U1 has been designed for operative survey of underground storage facilities (USF) without gas release into atmosphere. After minor changes in complete set the plant can be used for well survey at gas-condensate fields (photo 13).

The first plant PUIS-300-16-U1 (hereinafter referred as "the plant") was developed, manufactured and supplied to USF "Proletarskoye" of GMA "Kharkovtransgaz", where it passed the acceptance and field tests in June 2004.

The climatic performance of the plant is У and the category of location is 1 according to GOST 15150-69. It is permitted to operate the plant at the outdoor temperature from 243 K (minus 30 °C) to 313 K (40 °C) and relative air humidity up to 100% at 298 K (25 °C), as well as in the presence of dust and atmospheric precipitations.

photo 12 | PUIS – 300 – 16 – U1 (Ukraine)

FUNCTIONAL CHARACTERISTICS	
Surveyed medium	Composition: hydracarbon gas, condensate, deposit water, methanol, diethyleneglycol (DEG)
Method of well surveying	Without gas release into atmosphere
Characteristics of the surveyed wells	Wells with wide range of flow rate, pressure and gas composition
Nominal flow capacity of the plant's separator, nm^3/day	300 000
Maximum flow capacity of the plant's separator, nm^3/day	500 000
Design plant inlet gas pressure, MPa	16
Operating plant inlet gas pressure, MPa, max.	15
Efficiency of separation of the separator, %, min.	95
Capacity of the condensate tank, L	200
Temperature range for the surveyed and ambient mediums, at which the plant maintains its serviceability, °C	from 30 to 40
Weight of the plant, t, max.	8,0
Overall dimensions of the plant during transportation, mm, maximum: - length - width - height	 8300 2600 4000

MAIN ADVANTAGES OF THE PLANT

- accomplishment of well survey cycle in stationary modes without gas release into atmosphere;
- offered plant provides for a possibility of well survey with wider range and it is more mobile in comparison with the analogous equipment;
- presence of a notebook with a uninterruptible power supply unit and software for data processing in the complete set allows to perform on-line visual control with printout of the reports;
- the system allows to reduce the test time at the expense of timely corrections of the surveyed program;
- original construction of quick-connect pipelines, elbows and new-type metal seals, reliable from the point of view of flow safety, allows to connect the plant to the well very quickly;
- original construction of a quick-connect restriction allows to replace measuring diaphragms in a very short time.

GAS ODORIZATION SYSTEM "ODOTRONIC"

Gas odorization system "ODOTRONIC" has been designed for adding special additives, odorants, to the natural gas, supplied to the consumers, in the amount, proportional to gas flow rate, with the purpose of giving it a specific odour, required for leakage detection.

The system has been designed for operation as a part of odorization assembly of gas distributing stations (GDS) of main pipelines. The system may be either connected via shutoff valves to the dripping-type odorization unit, existing at GDS, or completed with such a unit by the Client's request.

The system has a number of constructive modification for different gas flow rates passing through GDS. The difference between the modifications is in the capacity of the odorization unit supply tank and in the quantity of a single odorant dose. In addition to that, each gas flow rate modification has two versions according to the method of supply tank refilling with odorant, which is an automatic or manual one (photo 14).

| photo 14 | Gas odorization system "ODOTRONIC"

MAIN SPECIFICATIONS	
Ambient temperature during operation, ^{0}C	from minus 40 to + 40
Odorated gas flow, m^3/hr	50÷500 000
Odorated gas pressure, MPa	0,1÷1,2
Gas pressure at the inlet gas pipeline of GDS, MPa	up to 7,0
The range of odorization norm regulation (odorant concentration in gas) when ethyl mercaptan is used as an odorant, g/ths.m^3	5÷16
Precision of the specified concentration maintaining, min., %	±5
Power supply: - main (AC network) - standby (storage battery)	 220 V, 50 Hz 12-27 V
Overall dimensions (length/width/height) of the component parts of the system, max., mm: - OB - OCB	 1600/1400/300 500/350/650
Weight, max., kg: - OB - OCB	 200 30

COMPLEX GAS TREATMENT PLANT

performed as modular factory-assembled units for gas and oil and gas fields with production capacity of 500÷1500 ths. m³/day UPGM–220–25

It has been designed for gas processing before its transfer to different consumers as well as for production of stable condensate according to the low-temperature separation scheme with usage of cold at the expense of throttle effect.

The plant can be used for gas supply both to the local consumers (municipal, agricultural and industrial establishments of inhabited locality within the radius of 50 km) and to the main gas pipeline.

The plant is performed in a form of modular factory-assembled units, and it is remarkable for its mobility, compactness and simplicity of the construction. It is equipped with automatic control, regulation and protection systems based on a specialized microprocessor controller (photo 15, 16, 17).

The plant is fit for operation in moderate macroclimate regions with the climatic performance "U1" and the category of location "1" according to GOST 15150-69.

Block transportation of the plant UPGM–220–25 may be performed by means of rail, motor and water transport.

photo 15 | Compact complex gas treatment plant for small gas-condensate fields

We offer the supply of the following complete set

1. Filling units
2. Heat exchanger units
3. Inlet separators units (ISU) BS-1
4. Low-temperature separators units
5. Metering assembly units (MAU) BZU-U1
6. Disconnect devices units (DDU) BO-16-280-103UG from 1 to 15 wells
7. Metering separator units
8. Inhibitor pumping unit (IPU) BNI-520-16U1
9. Pumped supplies of condensate and waste methanol, deposit water and condensate
10. Pumped supplies of heat carriers
11. Methanol storing tanks units
12. Units of industrial wastewater collection and degassing tanks
13. Turboexpander unit with a compressor or a generator

photo 16 | Compact complex gas treatment plant for small gas-condensate fields

photo 17 | Compact complex gas treatment plant for small gas-condensate fields

* - the complete set of the supply may alter depending on the Client's requests

HEAT EXCHANGER FOR COMPACT GAS TREATMENT PLANTS

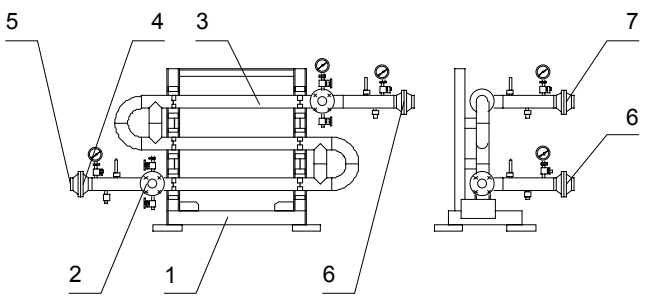
Heat exchangers are heat exchanging devices, the main purpose of which is to provide a heat transfer from one heat accumulator to another one in order to ensure temperature conditions for the work processes.

Heat exchangers have been designed for heat transfer from one fluid or gas flow to another one without mixing up these mediums.

At present JSC "Turbogaz" produces the following heat exchangers (pipe-in-pipe):

JSC "Turbogaz" also carries out repairs and modernization of shell-and-tube heat exchangers, which are now in operation (photo 18).

photo 18 | Heat exchanger



1 frame; 2 metering assembly; 3 sections; 4 flanges; 5 DEG inlet; 6 DEG outlet; 7 gas inlet; 8 gas outlet.

MAIN SPECIFICATIONS

Designation	Gas or condensate flow rate m^3/day	Gas or condensate inlet temperature, °C	Gas or condensate outlet temperature, °C	Second heat carrier inlet temperature, °C	Gas or condensate pressure, MPa	Second heat carrier pressure, MPa	Heat exchanger surface, m^2	Dimensions, mm	Weight, kg
TT3,TT-168-32/7-10/1, gas-gas	$0,5 \cdot 10^6$	-20	-5	-20	160	6,4	42,0	6765×900×2790	8000
TT1, TT-168-32/7-10/1, gas-gas	$0,5 \cdot 10^6$	20	0	-12	13,5	5,6	49,0	7780×1800×2850	9400
TT1, TT1-159-32/7-4/1,gas-DEG	$0,15 \cdot 10^6$	-26	0	80	6,1	0,5	8,4	3605×1810×512	960,0
TT1-159-32/7-3/1 X2, gas-DEG	$0,15 \cdot 10^6$	-29	5	80	1,7	0,5	12,7	4200×1360×1120	1440
TT1-89-25/3-3/7, condensate-DEG	5,6	-32	10	80	6,1	0,5	1,4	2425×740×405	262,0
TT-89-25/3-8/7, gas-DEG	690	-8,7	12	80	10,0	0,5	5,5	3340×1910×340	690,0
TT-89-25/3-7/7, gas-DEG	1700	-10,4	17	80	5,4	0,5	5,0	3330×1440×462	630,0
TT-159-32/7-4/1, gas-DEG	870	-27	0	80	6,4	0,5	8,4	3605×1810×512	960,0
TT1-168-32/7-6/1, gas-DEG	$0,5 \cdot 10^6$	-10	10	80	16,0	6,4	25,0	7085×2290×1800	3900

TT – is heat exchanger; 168 (153,89) is the diameter of the casing, mm; 32 (25) is the diameter of the heat-exchanging pipes, mm; /7 (3) is the number of heat-exchanging pipes, pcs.; 10/1 (4/1, 3/1, 3/7, 8/7) is the number of sections/ number of channels in the pipe space.

VALVE K–203P

The valve has been designed for the systems of automatic regulation of liquid flow in the main pipeline depending on the remote industrial process control commands (photo 19).

Operating medium is oil products, inhibitor, deposit water.

The valve is a system, consisting of an actuator, limit level indicator and level gauge chamber.

The actuator includes two diaphragm pneumatic control valves, a rotation gear and a gate.

The limit level indicator is installed in the level gauge chamber.

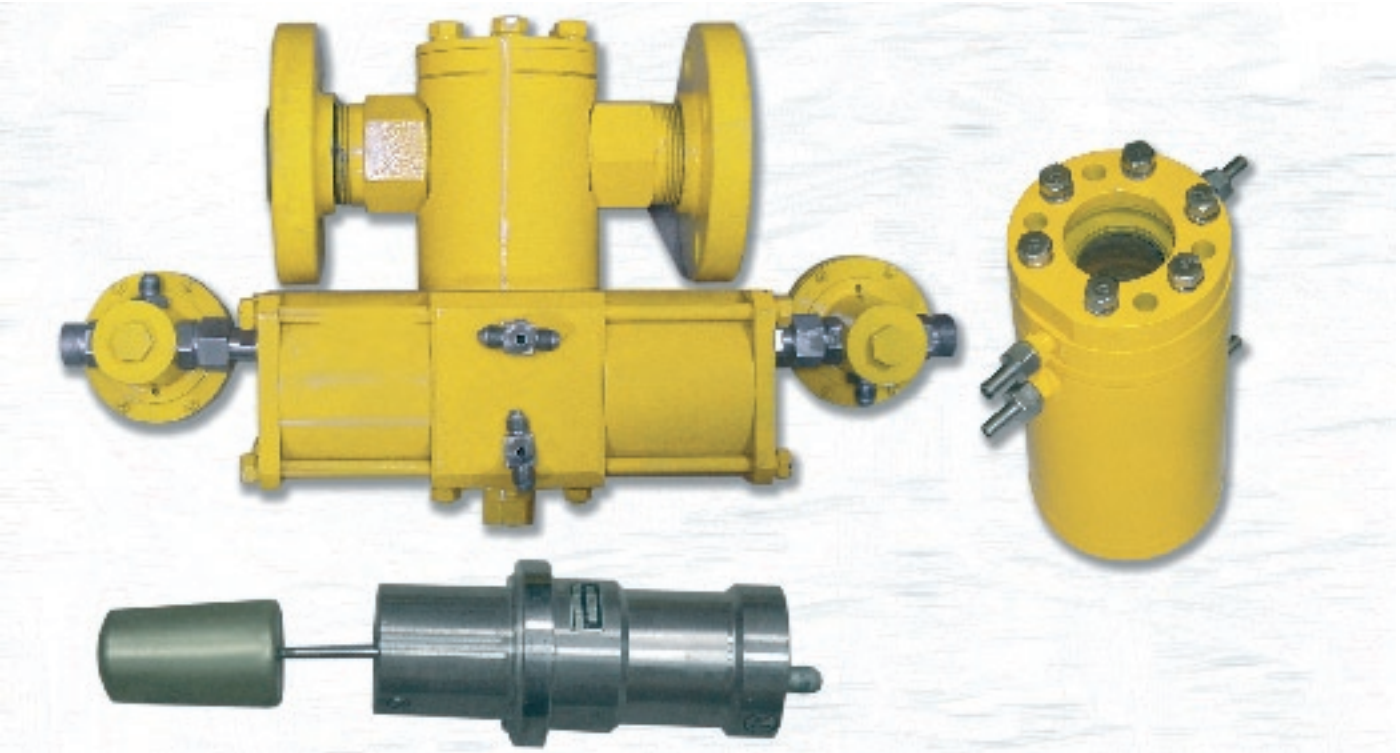
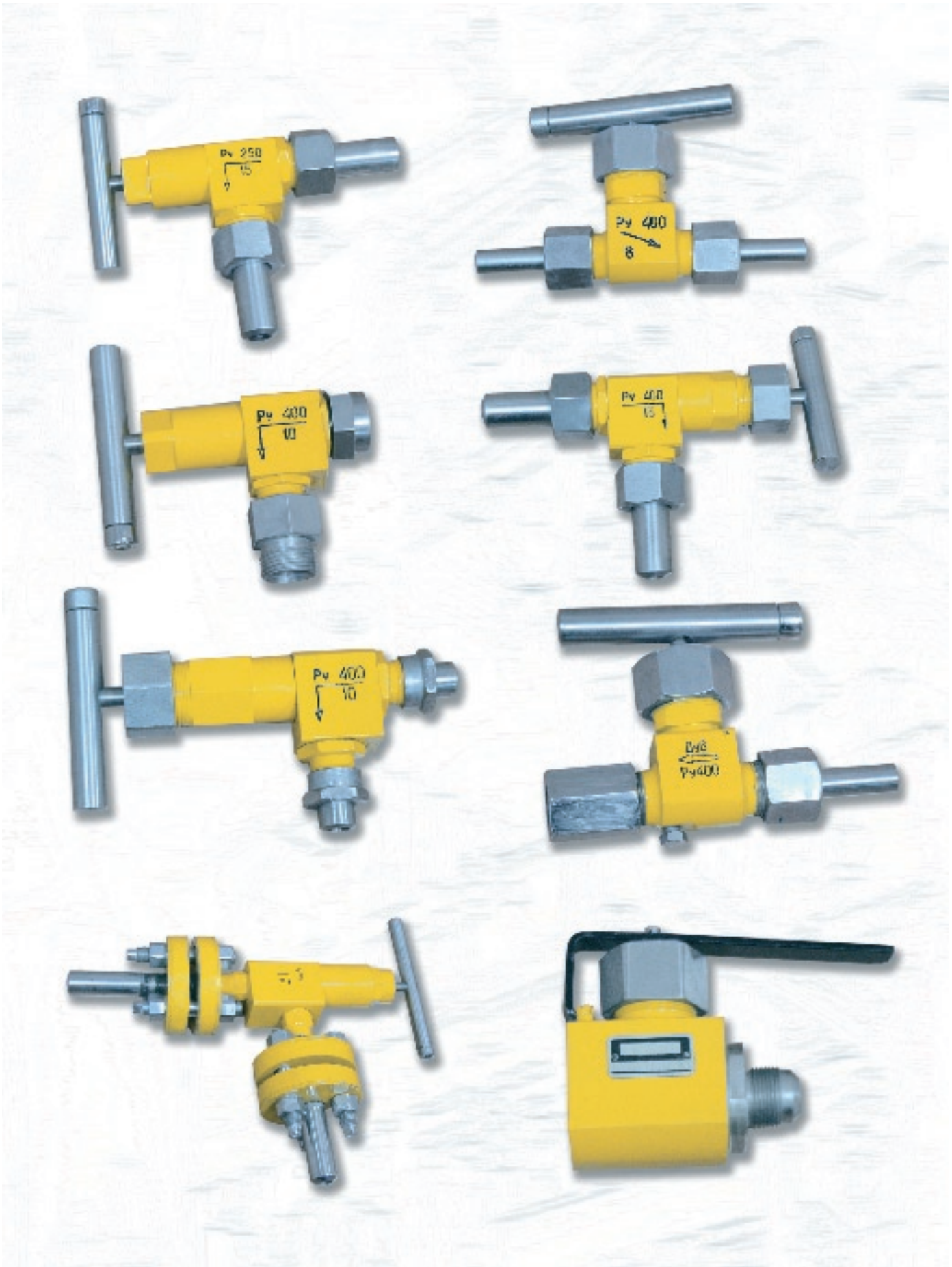


photo 19 | Valve K-203P

MAIN SPECIFICATIONS	
Designation	Value
Internal diameter, mm	40
Operating fluid temperature, °C	from 30 to 80
Ambient air temperature, °C	from 30 to 50
Relative ambient air humidity throughout the whole span of temperatures, %	30...98
Ambient air pollution class according to GOST 17433-80	5
Gas pressure in the valve control system, kgs/cm^2	5±1
Maximum operating medium pressure in the main pipeline, kgs/cm^2, max.	160
Leakproofness of the gate according to GOST 9544 -93	C
Weight, kg, max.	45
Connection type	Flanged, under lens seal
Service life time before retirement, years, min.	5
Mean life before retirement, cycles, min.	5 000
Mean-time-between-failures, cycles, min.	1600
Mean life before the first failure, cycles, min.	1700
Mean recovery time, hours, max.	12

SHUTOFF AND REGULATING VALVES



tem №	Designation Designation	Specification				Material of casing	Leakproofness of gate	Weight, kg
		Pressure, MPa (kgs/cm²)	Internal diameter, mm	Operating medium	Ambient air temperature, °C			
1	Shuttoff valve, nipple (SVN) VZN 6/250	25 (250)	6	Natural gas, hydrocarbon oils, corrosive liquids, emulsion, suspension	-30 to 80	Casing is produced of material, required for the specified operating medium	According to GOST 9544-93 class A	0,40
2	Shutoff valve, nipple (SVN) VZN 6/400	40 (400)	6					0,45
3	Shutoff valve, nipple (SVN) VZN 10/400-01	40 (400)	10					0,50
4	Angle valve (AV) VU 10/250	25 (250)	10					1,10
5	Angle valve (AV) VU 10/400	40 (400)	10					1,20
6	Angle valve with check valve (AV CV) VU 10/400-OK	40 (400)	10					1,30
7	Angle valve (AV) VU 10/700	70 (700)	10					2,30
8	Angle valve (AV) VU 15/250	25 (250)	15					1,15
9	Angle valve (AV) VU 15/400	40 (400)	15					1,20
10	Angle valve (AV) VU 15/400-01	40 (400)	15					1,20
11	Two-way valve (TWV) KKN 20	6,3 (63)	20				According to GOST 9544-93 class C	1,25
12	Four-way valve (FWV) KSh 20/100	10(100)	20					1,75
13	Straight-through ball valve (STBV) KR-1	32 (320)	10	Natural gas, hydrocarbon oils	-50 to 80			1,80
14	Three-way ball vavle (TWBV) KR-2	32 (320)	10					3,50
15	Straight-through ball valves (STBV): KRP-1,6-15 (G1/2") KRP-1,6-25 (G1") KRP-1,6-50(for welding) KRP-1,6-50 (flanged)	1,6 (16) 1,6 (16) 1,6 (16) 1,6 (16)	15 25 50 50	Natural gas, hydrocarbon oils, corrosive liquids, emulsion, suspension	-30 to 50			0,70 1,60 8,60 10,0
16	Valve 6/250 for pressure gauge	25 (250)	6		-30 to 80		According to GOST 9544-93 class A	0,40
17	Valve 6/400 for pressure gauge	40 (400)	6					0,45

PROSPECTIVE ACTIVITY OF JSC "TURBOGAZ" IN IMPLEMENTATION OF TURBOEXPANDER UNITS

In November 2006, a joint venture "Turbogaz-Cryokor" (Moscow) was established for the purpose of closer collaboration with the consumers of oil and gas branch of industry of the Russian Federation.

In February 2007, a representative office of JSC "Turbogaz" was established in the Republic of Uzbekistan for maintenance of JSC "Turbogaz's" equipment at the sites of Uzbekistan.

In addition to that, a number of agreements have been signed with agents on promotion of JSC "Turbogaz's" production in the territory of Bulgaria, Turkey, Iran and Pakistan.

Over 30-years' experience in creation and implementation of turboexpander plants, gained by JSC "Turbogaz", is unique.

The main ideology of our Company's work is creation of plants for a specific site and a specific client while performing the whole cycle of design, manufacturing, supervisory erection, commissioning, warranty and after-warranty services, which allowed JSC "Turbogaz" to become the world's leader in supply of such plants.

Contact person: Director of Marketing and Sales of JSC "Turbogaz"

Vladymyr V. Paliy

tel./fax: +38 057 752 09 98

tel.: +38 057 752 09 90

e-mail: oao@turbogaz.kharkov-ua.com