ISO 9001
BUREAU VERITAS
Certification

JSC “SMNPO - Engineering”

EQUIPMENT FOR OIL AND GAS INDUSTRY

FRUNZE
ESTABLISHED IN 1896

catalog
of products

PRODUCTS OF JSC "SMNPO - Engineering"

JSC "SMNPO - Engineering" is the leader in manufacturing of equipment for oil and gas industry. The greater part of this equipment comprises turbo-compressor packages. The Company designers have developed more than 100 models of turbo-compressor packages driven by industrialized versions of marine and airderiv-ative gas turbines with power of 4 MW; 6.3 MW; 8 MW; 10 MW; 16 MW and 25 MW, as well as driven by electric motors of 1.0 to 6.3 MW. More than 2100 of such units are operated successfully in Russia, Ukraine, Turkmenistan, Azerbaijan, Iran, Argentina, Turkey and other countries.

GASPROM, JSC is the largest customer of our equipment. The Company has supplied to it over 1500 turbo-compressor packages of different types that comprises over 40 % of total quantity of supplied units operated by GASPROM.

Last years the Company has developed the whole range of new modifications of turbo-compressor packages with marine and airderivative gas turbines of the latest generations ensuring effective efficiency of 34–35.5%. Future plans include developing of drives with complex work cycle that will increase efficiency up to 43–45%.

The company manufactures turbo-compressor package based compressor units used for:

- oil gas compression during gas-lift oil production;
- natural gas transportation, casing-head gas collection and transportation;
- casing-head gas compression in gas treatment plant technology;
- gas injection into bed during gas condensate field development with re-injection process.

The largest gas main compressor stations with 16 MW power units are built on Urengoi – Pomary – Uzhgorod, Urengoi – Centre, Yamburg – Yelets pipelines. They provide continuous gas supply to central regions of Russia, Ukraine and Western Europe.

Compressor stations include the following equipment: turbo-compressor or reciprocating gas transfer units; scrubbers; air coolers; separators, gas dewatering units; units for treatment of fuel gas, starting gas and power gas; vessel equipment, control and shutoff valves; control systems.

In addition to compressor stations and turbo-compressor packages the company manufactures a wide range of other oil and gas industry products. The company manufactures equipment on the turnkey basis for units of complex gas treatment in condensate fields and also for AK-60-type workover rigs, clay separators and centrifugal pumps to keep constant pressure during oil production.

During the last decade JSC "SMNPO - Engineering" developed the system of complete set supply of equipment and turnkey project commissioning. Company experts design and manufacture main and auxiliary equipment considering all requirements of a Customer. All the technical, economical, climatic and seismic conditions of a site are taken into account. The company performs all the civil works, supply, installation, pre-commissioning, commissioning, personnel training, guarantee and post-guarantee maintenance using its own resources.

PRODUCTS OF JSC "SMNPO - Engineering"

Lately the company has constructed and is constructing on turn-key basis the following packaged compressor stations: "Gubkinskaya", "Yaro-Yakhinskaya", "Komsomolskaya", "Severo-Gubkinskaya" (Russia), "Tarutino" (Ukraine), "Bursa" and "Eskisehir" (Turkey), "Severnaya" and "Astara" (Azerbaijan), "Goturdepe", "Yylanly", "Zapadnyy Shatlyk", "Deryalyk", "Goturdepe-2", "Khazar", "Naip" (Turkmenistan), "Zevardy", "Kokdumalak-2", "Gazli" (Uzbekistan), "Hajiabad", "Abshirin" and "Sirjan" (Iran) and complex gas treatment plants for Gubkinskoye, Severo-Komsomolskoye and Tarasovskoye Gas fields of "Rosneft" company (Russia).

The Sumy machine-builders have experience in manufacturing the complete sets of equipment and are ready to construct on turn-key basis the whole range of industrial facilities for oil and gas industry:

- compressor stations;
- complex gas treatment plants;
- condensate conditioning plants;
- oil treatment plants;

- oil refineries with output capacity of 500000 – 1000000 tpy and more;
- terminals for oil products storage.

All the products manufactured by JSC "SMNPO - Engineering" conform to international, Russian and national standards. The company carries out permanent activity on certification of the main types of products for conformity to international standards API, ASME and others. Since 1997 the product quality management system of our company has been certified for conformity to international standard ISO 9001.

Quality and reliability of the produced equipment are ensured by high level of qualification and skill of the managers, engineers, technicians and production workers, availability in the company of the state-of-the-art metal-cutting and welding equipment made by leading foreign machine-tool companies.

Development of new sophisticated high technology equipment for gas and oil industry relative to the main specialization of company requires the experimental improvement of pilot units of the products with the use of up-to-date testing benches, measuring and computing equipment. JSC "SMNPO - Engineering" pays great atten-tion to the development of its testing capacities. For this purpose, the unique testing facilities for full load string tests of compressor equipment were built.

At present the plan on further extension and improvement of testing facilities is being implemented. Research and Development Complex with testing benches and machining area was built which ensures the manufacture of pilot units for new equipment and their tests on the benches.

The Complex allows conducting the research and experimental development works aimed to raise competitiveness of the produced equipment.

The scientific and productive potential of JSC "SMNPO - Engineering" enables to develop and manufacture basically new equipment in the shortest terms.

All these components and more than 120-year experience in production ensure our product high quality and reliability for users.

PRODUCTS
OF JSC "SMNPO - Engineering"

DIAGRAM
of gas-main pipelines, oil, petroleum & gas refining industries projects equipped with products manufactured by JSC "SMNPO - Engineering"

GPA-C-6,3 (6,3A; 6,3B; 6,3V; 6,3S)	**1026 pcs.**
GPA-C-4A	**2 pcs.**
GPA-C-8,0 (8A, 8B, 8V)	**35 pcs.**
GPA-C-10 (10B)	**10 pcs.**
GPA-C-16	**730 pcs.**
GPA-C-16C (16L, 16K, 16P)	**192 pcs.**
GPU-16	**120 pcs.**
GPA-C-25	**44 pcs.**
EGPA-C-6,3	**58 pcs.**
BKKS-GPA-C-6,3	**7 CS (24 pcs.)**
BKKS-GPA-C-8 (TKA-C-8, THA-C-8)	**3 CS (24 pcs.)**
BKKS-GPA-C-16 (TKA-C-16)	**21 CS (70 pcs.)**
Fields, Underground Gas Storage Facilities	

PRODUCTS
OF JSC "SMNPO - Engineering"

COMPRESSOR STATIONS AND PLANTS

Automated compressor stations and plants are designed for:

- natural gas transportation through pipelines;
- oil gas compression during gas-lift oil recovery;
- casing-head gas collection and transportation;
- compression of casing-head gas in gas refining plants production process;
- for gas injection in a bed when mining of gas condensate deposits using cycling process.

Compressor stations and plants comprises functionally connected with each other complexes of main process and auxiliary equipment, operation controll of which is made with the help of modern microprocess systems.

Compressor and turbocompressor units with centrifugal compressors are the basis of stations. Gas turbine derivated engines of aircraft type serve as compressor drives.

Module-container version and maximum factory readiness make it possible to perform constructing and mounting works urgently and with minimum charges.

The equipment can be delivered to be installed in industrial buildings and located indoor.

Compressor stations with complete set of main process equipment and accessories according to Customer's requirements can be designed, manufactured and delivered.

Stations can be constructed under turnkey conditions.

MODULAR COMPRESSOR STATIONS WITH CENTRIFUGAL COMPRESSORS

Description	Purpose or application range	Capacity 1.0332 kgf/cm² and 20°C MMSCMD	Pressure, MPa (kgf/cm²)		Packages quantity, pcs.	Package type	Dehumidification type	Total weight of equipment, t
			suction	discharge				
KS-6.3-CGTP/4-76	Gas transportation	6.3	0.39 (4.0)	5.49–7.50 (56.0–76.0)	3 (2+1)	TKA-C-16/76	With liquid or solid sorbent	2800.0
KS-8.0-CGTP/0.35-5.8	Gas lift oil field recovery	8.0	0.35 (3.5)	5.8 (58.0)	5 (4+1)	TKA-C-16/58	–	4200.0
KS-4.0-CGTP/0.6-12	Gas lift oil field recovery	4.0	0.59 (6.0)	11.7 (120.0)	3 (2+1)	TKA-C-16/120	With liquid sorbent	2300.0
KS-4.0-CGTP/0.49-5.6	Booster	4.0	0.49 (5.0)	5.49 (56.0)	4 (3+1)	TKA-C-6.3/0.5-5.6	–	2500.0
KS-2.4-CGTP/0.4-12	Gas lift oil field recovery	1.6–2.4	0.39 (4.0)	11.7 (120.0)	6 (3+3)	TKA-C-6.3/0.35-2.6 TKA-C-6.3/2.6-12.0	With liquid sorbent	3700.0
KS-1.1-CGTP/0.11-5.6	Modernization of compressor shops at gas processing works	0.67–1.2	0.108 (1.1)	3.90–5.45 (40.0–56.0)	4 (2+2)	TKA-C-6.3/0.1-1.25 TKA-C-6.3/1.25-5.6	–	1500.0
UKSP-16/500	Gas and condensate fields development	4.1	10.58 (105.8)	49.54 (505.0)	1	TKA-C-16/500	–	800.0

MODULAR COMPRESSOR STATIONS WITH CENTRIFUGAL COMPRESSORS

Description	Purpose or application range	Capacity MMNCMD	Pressure, (kgf/cm²)		Packages quantity, pcs.	Package type	Dehumidification type	Total weight of equipment, t
			suction	discharge				
KS-41.0-CGTP/54-76	Booster	41	54	76	4 (3+1)	GPA-C3-16S/76	–	2800
KSL-72.0-CGTP/53-76	Gas main	72.0	52.8	76	3	GPA-C-16S/76-1.44	–	930
KS-4.0-CGTP/8.7-26	Power station fuel gas preparation	1.58	8.7	26	1	GPA-C-6.3V/26-3.0	–	405
KSL-10.6-CGTP/46-79	Gas main	11.4	46.37	79.3	3 (2+1)	GPA-C-8.0A/80-1.71	–	1150
KS-10-CGTP/6-30	Booster	10.0	6	30	8 (6+2)	GPA-C-6.3A/14-2.3 GPA-C-6.3A/30-2.2	–	1560
KS-10-CGTP/32.4-55	Booster	10.0	32.4	55	2	GPA-C-8.0A/55-1.7	With liquid sorbent	2150
KSL-90.0-CGTP/50-76	Gas main	90.0	50	76	5 (4+1)	GPA-C1-16S/76-1.45	–	5200
KSL-4.0-CGTP/43.5-75	Gas main	4.42	43.5	75	2	GPA-C-4A/76-1.7	–	630
KS-0.95-CGTP/5.2-37.8	Booster	0.953	5.2	37.8	2	TKA-C-6.3A/0.52-3.77	–	780
KSL-10.6-CGTP/46-79	Gas main	11.4	49.1	80.35	3 (2+1)	GPA-C-8A/82-1.71	–	1200
KSL-10.6-CGTP/46-79	Gas main	11.4	45.9	80.35	3 (2+1)	GPA-C-8A/82-1.84	–	1100
KS-82.5-CGTP/66-89	Gas main	113	68.5	91	5 (4+1)	GPA-C1-25S/92-135M1	–	2800
KS-3.5-CGTP/5-100	Booster	3.535	1-5	100	2 TKA 1EGPA	TKA-C-16/1.0-10.0 EGPA-C/11-1.92	–	1380
KS-2.0-CGTP/1.2-5.7	Booster	2.0	12	57	2 TKA	TKA-C-6.3A/1.2-5.7	With solid sorbent	1320

MODULAR COMPRESSOR STATIONS WITH PISTON COMPRESSORS

Description	Compressors quantity	Compressor type	Crankshaft rotation speed, rpm	Compressor drive type	Drive power, kW	Capacity thousand NCMD	Pressure, (kgf/cm²)	
							suction	discharge
KU-6GM40-16/100-420	4 (3+1)	6GM40	300	Motor CDKP2-21-69-20UHL4	6300	1680	100	420
GKS-4.0/12-500	3 (2+1)	2GM10-4/40-120S	500	Motor CDKP2-16-29-12KUHL4	400	500	45	120
GKS-4.0/12-1000	6 (4+2)	2GM10-4/40-120S	500	Motor CDKP2-16-29-12KUHL4	400	1000	45	120
GPA-P-0.5/4-46S	2	4GM10-10/4-46S	600	Gas-piston engine 6G1N25/34-2	500	98–100	3–20	46

GAS TURBINE-DRIVEN CENTRIFUGAL COMPRESSOR AND TURBO-COMPRESSOR PACKAGES

Gas Turbine-Driven Centrifugal Compressor packages are designed to compress and transfer natural gas with specified process parameters at compressor stations for gas mains, booster compressor stations and underground gas storage (UGS).

The main advantages are as follows:

- high efficiency and reliability;
- correspondence to update environmental requirements;
- serviceability in any climatic regions with ambient temperature from -55°C to +50°C;
- complete factory readiness of units, delivered to compressor stations;
- packages total automation;
- high field maintainability of assemblies and units;
- possibility to be equipped with heat recovery and other additional systems (heating and ventilation) providing service.

Depending on Customer's requirements the Gas Turbine-Driven Centrifugal Compressor Packages are delivered for different parameters of capacity, discharge pressure and compression ratio.

Unified basic compressor casings ensure obtaining customer specified parameters by setting up of compressor rotor bundles with different number of stages. Compressor designs correspond to requirements of the American Petroleum Institute standard (API 617).

Reliable journal and thrust bearings with self-aligning shoes, unified in compliance with shaft diameter, are used in the compressors. Electromagnetic bearings are used in oil-free compressors.

End seals for compressor shaft are of slot and oil sealing type as well as of two modifications:

- with standard floating rings designed for usage at pressure up to 8 MPa;
- with outside floating rings provided with additional journal bearing shoes designed for usage at higher pressure values.

As to Customer's requirement face gas and dynamic seals distinguished by easy servicing, high reliability, low power supply can be installed.

Usage of derivated gas turbine engines of aircraft or marine types as turbocompressor package drives made it possible to create drive of compact design with relatively not large weight and overall dimensions as well as to provide automatic control of operating parameters for the turbocompressor engine at up-to-date level of effectiveness and high reliability.

The turbocompressor unit automatic control system (ACS) is realized on the basis of microprocessor facilities of new generation. ACS makes it possible to perform the following control actions:

- turbocompressor package automatic start and shut down;
- remote control for actuators;
- control, measuring, recording and signalling for gas compression process parameters;
- emergency protection of the package including record of information causing emergency shutdown;
- antisurge control;
- alarm signalling at non-allowed deviations to specified process parameters;
- automatic signals about state of the package mechanisms;
- automatic start and stop of the package stand-by units;
- control of the package protection systems while operating and non-operating conditions;
- executive mechanisms circuit control;
- communication with compressor station central control systems.

GAS TURBINE–DRIVEN CENTRIFUGAL COMPRESSOR PACKAGES
with airderivative type gas–turbine driven engine D–336–2–4 of 4.0 MW power

Package designation	Compressor station type	Capacity		Pressure, MPa		Nominal rotation speed, rpm	Control range of rpm, %	Weight, t	Overall dimensions, m		
		1.0332 kgf/cm² and 20° MMSCMD	Suction, m³/min	suction	discharge				Length	Width	Height
GPA-C-4A/76-1.7	Gas main	4.5	66.73	4.35	7.45	8200	70-105	110.0	19.9	13.3	14.8

GAS TURBINE-DRIVEN CENTRIFUGAL COMPRESSOR AND TURBO-COMPRESSOR PACKAGES

GAS TURBINE–DRIVEN CENTRIFUGAL AND TURBOCOMPRESSOR PACKAGES with airderivative type gas–turbine driven engine D–336–2 of 6.3 MW power

Package designation	Compressor station type	Capacity		Pressure, MPa		Nominal rotation speed, rpm	Control range of rpm, %	Weight, t	Overall dimensions, m		
		1.0332 kgf/cm² and 20° MMSCMD	Suction, m³/min	suction	discharge				Length	Width	Height
GPA-C-6.3A/74	Gas main	6.6	84.9	5.35	6.33	8200	70 –105	110.0	18.4	18.3	14.8
GPA-C-6.3A/71	Gas main	6.5	79.0	3.60	6.10	8200	70 –105	110.0	18.4	18.3	14.8
GPA-C-6.3A/74	Gas main	6.5	80.1	5.59	7.24	8200	70 –105	110.0	18.4	18.3	14.8
GPA-C-6.3A/74	Gas main	7.7	97.1	5.51	7.26	8200	70 –105	110.0	18.4	18.3	14.8
TKA-C-6.3A/0.55-4.2	Booster	9.32	1.497	0.589	4.07	8200	70 –105	148.0	23.7	15.1	13.5
GPA-C-6.3A/14-2.3	Gas transport	3.5	398.5	0.598	1.402	8200	70 –105	110.0	18.4	18.3	14.8
GPA-C-6.3A/30-2.2	Gas transport	3.5	176.12	1.35	3.0	8200	70 –105	110.0	18.4	18.3	14.8

GPA–C–6.3V, GPA–C–6.3VM, GPA–C–6.3B GAS TURBINE–DRIVEN CENTRIFUGAL COMPRESSOR PACKAGES with airderivative type gas–turbine driven engine NK–14ST of 6.3 MW power

Package designation	Compressor station type	Capacity		Pressure, MPa		Nominal rotation speed, rpm	Control range of rpm, %	Weight, t	Overall dimensions, m		
		1.0332 kgf/cm² and 20° MMSCMD	Suction, m³/min	suction	discharge				Length	Width	Height
GPA-C-6.3B/56-1.45	Gas main	12.1	206.4	3.79	5.49	8200	70-105	77.5	14.3	9.9	10.9
GPA-C-6.3B/61-1.27	Gas main	17.5	233.1	4.71	5.98	8200	70-105	77.5	14.3	9.9	10.9
GPA-C-6.3B/76-1.45	Gas main	12.5	150.6	5.14	7.45	8200	70-105	77.5	14.3	9.9	10.9
GPA-C-6.3VM/41-1.45	Gas main	11.6	271.8	2.77	4.02	8200	70-105	77.5	14.3	9.9	10.9
GPA-C-6.3VM/56-1.45	Gas main	12.1	206.4	3.79	5.49	8200	70-105	77.5	14.3	9.9	10.9
GPA-C-6.3VM/76-1.45	Gas main	12.2	149.4	5.14	7.45	8200	70-105	84.2	14.3	9.9	10.9
GPA-C-6.3VM/125-1.7	Booster and UGS	7.88	65.42	7.212	12.26	8200	70-105	84.2	14.3	9.9	10.9

GAS TURBINE–DRIVEN CENTRIFUGAL COMPRESSOR PACKAGES with driving electric motor STDP–6300–2BUHL4 of 6.3 MW power

Package designation	Compressor station type	Capacity		Pressure, MPa		Nominal rotation speed, rpm	Weight, t	Overall dimensions, m		
		1.0332 kgf/cm² and 20° MMSCMD	Suction, m³/min	suction	discharge			Length	Width	Height
EGPA-C-6.3/32K-1.7	Booster	6.4	230.5	1.84	3.19	8290	125.0	16.4	12.8	6.8
EGPA-C-6.3/32K-2.2	Booster	4.0	187.8	1.43	3.14	8290	125.0	16.4	12.8	6.8
EGPA-C-6.3/67K-2.2	Booster	4.4	94.0	2.98	6.57	8290	125.0	16.4	12.8	6.8
EGPA-C6.3V/76-1.45	Gas main	11.8	144.9	5.14	7.46	8314	100.0	17.2	11.4	6.4
EGPA-C-6.3V/56-1.45	Gas main	11.6	200.1	3.17	5.49	8314	100.0	17.2	11.4	6.4
EGPA-C-6.3V/41-1.45	Gas main	11.0	263.3	2.77	4.02	8314	100.0	17.2	11.4	6.4
EGPA-C-6.3V/29-1.7	Booster	7.1	287.3	1.67	2.84	8314	100.0	17.2	11.4	6.4
EGPA-C-6.3V/56-1.65	Booster	5.7	125.0	3.33	5.49	7974	100.0	17.2	11.4	6.4
EGPA-C-6.3V/36-2.5	Booster	3.4	178.9	1.41	3.53	10900	100.0	17.2	11.4	6.4
EGPA-C-6.3V/125-2.2	Booster and UGS	4.5	50.3	5.57	12.26	7974	114.9	17.8	11.8	7.2
EGPA-C-6.3V/150-2.2	Booster and UGS	4.5	40.25	6.69	14.72	7692	115.0	17.8	11.8	7.2

GAS TURBINE–DRIVEN CENTRIFUGAL COMPRESSOR PACKAGES with airderivative type gas–turbine driven engine NK–12ST of 6.3 MW power

Package designation	Compressor station type	Capacity		Pressure, MPa		Nominal rotation speed, rpm	Control range of rpm, %	Weight, t	Overall dimensions, m		
		1.0332 kgf/cm² and 20° MMSCMD	Suction, m³/min	suction	discharge				Length	Width	Height
GPA-C-6.3V/41-1.45	Gas main	11.6	271.8	2.77	4.02	8200	75 –103.6	77.5	14.3	9.9	10.9
GPA-C-6.3V/56-1.45	Gas main	12.1	206.4	3.79	5.49	8200	75 –103.6	77.5	14.3	9.9	10.9
GPA-C-6.3V/76-1.45 GPA-C-6.3V/76-1.45*	Gas main	12.2	149.4	5.14	7.45	8200	75 –103.6	77.5	14.3	9.9	10.9
GPA-C-6.3V/21-2.2	Booster and UGS	4.6	332.4	0.94	2.06	8200	75 –103.6	83.8	14.3	9.9	10.9
GPA-C-6.3V/29-1.7	Booster and UGS	7.4	296.4	1.67	2.84	8200	75 –103.6	77.5	14.3	9.9	10.9
GPA-C-6.3V/41-2.2	Booster and UGS	4.7	169.7	1.83	4.02	8200	75 –103.6	84.2	14.3	9.9	10.9
GPA-C-6.3V/56-1.7	Booster and UGS	7.9	159.1	3.23	5.49	8200	75 –103.6	77.5	14.3	9.9	10.9
GPA-C-6.3V/76-2.2	Booster and UGS	4.6	86.0	3.39	7.45	8200	75 –103.6	83.1	14.3	9.9	10.9
GPA-C-6.3V/125-1.7	Booster and UGS	7.9	65.4	7.21	12.26	8200	75 –103.6	85.6	14.3	9.9	10.9
GPA-C-6.3V/125-2.2	Booster and UGS	4.9	53.3	5.62	12.36	8200	75 –103.6	85.6	14.3	9.9	10.9
GPA-C-6.3V/210-1.7	Booster and UGS	7.4	34.0	12.18	20.70	8200	75 –103.6	90.0	13,7	9.9	10.6
GPA-C-6.3V/28.2-3.4	Preparation of power station fuel gas	1.755	151.17	0.818	2.766	8200	75 –103.6	77.5	14.3	9.9	10.9
GPA-C-6.3V/76-1.7	Gas transport	7.53	109.01	4.39	7.45	8200	75 –103.6	83.1	14.3	9.9	10.9
GPA-C-6.3V/28-3.4	Gas transport	1.884	156.9	0.818	2.77	8200	75 –103.6	77.5	14.3	9.9	10.9
GPA-C-6.3V/76-1.37M1	Gas transport	10.99	133.6	5.605	7.68	5200	75 –103.6	83.1	14.3	9.9	10.9

Note: * – in elongated casing

GAS TURBINE–DRIVEN CENTRIFUGAL COMPRESSOR PACKAGES with marine type gas–turbine driven engine DT71P3 of 6.3 MW power

Package designation	Compressor station type	Capacity		Pressure, MPa		Nominal rotation speed, rpm	Control range of rpm, %	Weight, t	Overall dimensions, m		
		1.0332 kgf/cm² and 20° MMSCMD	Suction, m³/min	suction	discharge				Length	Width	Height
GPA-C-6.3S/41-1.7	Gas main	7.6	211.8	2.37	4.02	8200	70 –105	115.0	17.3	14.7	12.3
GPA-C-6.3S/56-1.45	Gas main and booster	12.1	206.4	3.79	5.49	8200	70 –105	115.0	17.3	14.7	12.3
GPA-C-6.3S/64-1.7	Gas main and booster	7.9	137.1	3.69	6.28	8200	70 –105	115.0	17.3	14.7	12.3
GPA-C-6.3S/125-2.2	Booster and UGS	4.3	47.7	5.62	12.36	8200	70 –105	115.0	17.3	14.7	12.3
GPA-C-6.3S/150-2.2	Booster and UGS	4.4	39.8	6.69	14.71	8200	70 –105	115.0	17.3	14.7	12.3

GAS TURBINE–DRIVEN CENTRIFUGAL COMPRESSOR PACKAGES with airderivative type gas–turbine driven engine NK–14ST of 8.0 MW power

Package designation	Compressor station type	Capacity		Pressure, MPa		Nominal rotation speed, rpm	Control range of rpm, %	Weight, t	Overall dimensions, m		
		1.0332 kgf/cm² and 20° MMSCMD	Suction, m³/min	suction	discharge				Length	Width	Height
GPA-C-8B/56-1.45	Gas main	14.0	242.7	3.79	5.49	8200	70 –105	77.5	14.3	9.9	10.9
GPA-C-8B/76-1.44	Gas main	16.0	190.1	5.18	7.46	8200	70 –105	77.5	14.3	9.9	10.9
GPA-C-8B/100-2.0	Gas main	5.6	80.4	4.81	9.81	8200	70 –105	84.8	14.3	9.9	10.9
GPA-C-8B/150-2.2	Gas main	5.0	50.9	6.69	14.71	8200	70 –105	85.6	14.3	9.9	10.9
GPA-C-8B/41-2.2	Gas main and booster	4.993	199.01	1.828	4.022	8200	70 –105	77.5	14.3	9.9	10.9
GPA-C-8V/71-1.45	Gas main	9.25	119.63	4.84	7.02	8200	70 –105	77.5	14.3	9.9	10.9
GPA-C-8B/76-1.44	Gas transport	16.85	210.48	5.0798	7.31	8200	70 –105	77.5	14.3	9.9	10.9
GPA-C-8B/41-2.2	Gas transport	5.359	200.1	1.82	4.0207	8200	70 –105	77.5	14.3	9.9	10.9

GAS TURBINE–DRIVEN CENTRIFUGAL COMPRESSOR PACKAGES with airderivative type gas–turbine driven engine AI–336–1–8 of 8.0 MW power

Package designation	Compressor station type	Capacity		Pressure, MPa		Nominal rotation speed, rpm	Control range of rpm, %	Weight, t	Overall dimensions, m		
		1.0332 kgf/cm² and 20° MMSCMD	Suction, m³/min	suction	discharge				Length	Width	Height
GPA-C-8A/80-1.71	Gas main	5.401	79.32	4.517	8.04	8200	70 –105	110.0	14.3	13.3	14.8
GPA-C-8A/55-1.7	Booster	5.0	107.7	3.24	5.5	8200	70 –105	110.0	19.4	13.3	14.9

GAS TURBINE-DRIVEN CENTRIFUGAL COMPRESSOR AND TURBO-COMPRESSOR PACKAGES

GAS TURBINE–DRIVEN CENTRIFUGAL COMPRESSOR PACKAGES
with airderivative type gas–turbine driven engine NK–14ST–10 of 10.0 MW power

Package designation	Compressor station type	Capacity		Pressure, MPa		Nominal rotation speed, rpm	Control range of rpm, %	Weight, t	Overall dimensions, m		
		1.0332 kgf/cm² and 20° MMSCMD	Suction, m³/min	suction	discharge				Length	Width	Height
GPA-C-10B/56-1.35	Gas main	17.324	291.19	3.812	5.49	8200	70–105	198.0	21.1	14.7	20.0
GPA-C-10B/76-1.35	Gas main	22.05	247.01	56.3	76.0	8200	70–105	76.6	18.41	9.93	36.0

GAS TURBINE–DRIVEN CENTRIFUGAL COMPRESSOR PACKAGES
with airderivative type gas–turbine driven engine AL–31ST of 16.0 MW power

Package designation	Compressor station type	Capacity		Pressure, MPa		Nominal rotation speed, rpm	Control range of rpm, %	Weight, t	Overall dimensions, m		
		1.0332 kgf/cm² and 20° MMSCMD	Suction, m³/min	suction	discharge				Length	Width	Height
GPA-C-16L/76-1.44	Gas main	32.2	389.1	5.17	7.45	5300	70–105	228.0	19.6	22.6	20.0

GAS TURBINE–DRIVEN CENTRIFUGAL AND TURBOCOMPRESSOR PACKAGES
with airderivative type gas–turbine driven engine NK–16ST of 16.0 MW power

Package designation	Compressor station type	Capacity		Pressure, MPa		Nominal rotation speed, rpm	Control range of rpm, %	Weight, t	Overall dimensions, m		
		1.0332 kgf/cm² and 20° MMSCMD	Suction, m³/min	suction	discharge				Length	Width	Height
GPA-C-16/41-1.44	Gas main	27.2	636.6	2.79	4.02	5300	75–105	150.0	19.8	10.9	10.6
GPA-C-16/56-1.44	Gas main	31.0	519.0	3.81	5.49	5300	75–105	150.0	19.8	10.9	10.6
GPA-C-16/56-1.44	Gas main	31.0	519.0	3.81	5.49	5300	75–105	150.0	20.8	10.9	10.6
GPA-C-16/76-1.5	Gas main	28.6	358.2	4.97	7.45	5300	75–105	150.0	19.8	10.9	10.6
GPA-C-16/76-1.44	Gas main	33.3	395.4	5.18	7.45	5300	75–105	77.5	14.3	9.9	10.6
GPA-C-16/76-1.25	Gas main	54.4	558.0	5.96	7.45	5300	75–105	150.0	19.8	10.9	10.6
GPA-C-16/100-1.44	Gas main	32.7	283.1	6.88	9.91	5300	75–105	150.0	19.8	10.9	10.6
GPA-C-16/21-2.2	Booster	12.4	897.6	0.94	2.06	5300	75–105	158.0	20.8	10.9	10.6
GPA-C-16/41-2.2	Booster	12.7	463.3	1.83	4.02	5300	75–105	158.0	20.8	10.9	10.6
GPA-C-16/47-1.7	Booster	19.4	470.0	2.71	4.60	5300	75–105	158.0	20.8	10.9	10.6
GPA-C1-16/56-1.7	Booster	18.4	370.2	3.23	5.49	5300	75–105	150.0	19.8	10.9	10.6
GPA-C-16/56-2.2	Booster	12.8	340.0	2.45	5.49	5300	75–105	150.0	19.8	10.9	10.6
GPA-C-16/76-2.2	Booster	12.1	231.0	3.39	7.45	5300	75–105	158.0	20.8	10.9	10.6
GPA-C-16/100-1.7	Booster	20.9	214.3	5.83	9.91	5300	75–105	150.0	19.8	10.9	10.6
GPA-C-16/125-1.7	Booster	18.6	160.1	7.27	12.36	5300	75–105	150.0	19.8	10.9	10.6
GPA-C-16/150-2.0	Booster	12.0	97.5	7.36	14.71	5300	75–105	150.0	19.8	10.9	10.6
GPA-C-16/150-1.7	Booster	16.5	111.5	8.66	14.71	5300	75–105	150.0	19.8	10.9	10.6
GPA-C-16/200-1.7	Booster	22.4	108.4	11.54	19.62	5300	75–105	150.0	19.8	10.9	10.6
GPA-C-16/76-1.7	Booster and UGS	20.0	288.5	4.39	7.46	5300	75–105	150.0	20.8	10.9	10.6
TKA-C-16/500	For cycling process	3.916	25.4	10.79	49.05	11095	70–105	140.0	18.2	9.3	6.29
TKA-C-16/3.5-58M	Booster	2.4	360.0	0.34	5.69	10880	70–105	240.5	25.1	18.5	17.7
TKA-C-16/4-76	Gas transportation	2.4	360.0	0.39	7.45	10880	70–105	240.5	25.1	18.5	17.7
TKA-C-16/6-120	Gas transportation	2.0	231.0	0.59	11.77	10880	70–105	240.5	25.1	18.5	17.7
TKA-C-16/4-56	Gas lift oil field recovery	2.2	381.0	0.39	5.49	10880	70–105	240.5	25.1	18.5	17.7

GAS TURBINE–DRIVEN CENTRIFUGAL COMPRESSOR PACKAGES
with marine type gas–turbine driven engine DG–90L2 of 16.0 MW power

Package designation	Compressor station type	Capacity		Pressure, MPa		Nominal rotation speed, rpm	Control range of rpm, %	Weight, t	Overall dimensions, m		
		1.0332 kgf/cm² and 20° MMSCMD	Suction, m³/min	suction	discharge				Length	Width	Height
GPA-C-16S/76-1.5	Gas main	27.0	340.0	4.97	7.45	5200	70 –105	171.0	20.0	15.4	14.0
GPA-C-16S/76-1.7	Booster	20.0	288.5	4.40	7.45	5200	70 –105	269.0	22.6	16.5	26.2
GPA-C1-16S/76-1.44	Gas main	32.4	390.3	5.17	7.45	5200	70 –105	267.0	22.6	16.5	26.2
GPA-C1-16S/85-1.5	Gas main	29.9	332.2	5.56	8.34	5200	70 –105	267.0	22.6	16.5	26.2
GPA-C3-16S/76-1.25	Gas main	52.3	537.3	5.96	7.45	5200	70 –105	269.0	22.6	16.5	26.2
GPA-C3-16S/76-1.44	Gas main	32.4	390.3	5.17	7.45	5200	70 –105	269.0	22.6	16.5	26.2
GPA-C3-16S/85-1.7	Booster and UGS	21.6	275.2	4.91	8.34	5200	70 –105	269.0	22.6	16.5	26.2
GPA-C5-16SD/76-1.25M1	Gas main	47.7	485.14	5.96	7.45	5200	70 –105	243.0	26.5	28.5	18.0
GPA-C5-16SD/76-1,44M1	Gas main	33.25	394.75	5.18	7.45	5200	70 –105	243.0	26.5	28.5	18.0
GPA-C5-16SD/76-1.7	Gas main	19.249	278.11	4.386	7.45	5200	70 –105	243.0	26.5	28.5	18.0
GPA-C5-16SD/76-2.2	Gas main	12.11	231.0	3.389	7.45	5200	70 –105	243.0	26.5	28.5	18.0
GPA-C5-16SD/76-3.0	Gas main	7.364	195.24	2.483	7.45	5200	70 –105	243.0	26.5	28.5	18.0
GPA-C-16S/41-2.2	Gas transport	12.58	468.88	1.83	4.0208	5200	70 –105	171.0	20.0	15.4	14.0
GPA-C-16S/45-1.7	Gas transport	20.29	531.65	2.59	4.41	5200	70 –105	171.0	20.0	15.4	14.0
GPA-C-16S/76-1.45	Gas transport	35.69	472.85	5.14	7.453	5200	70 –105	267.0	22.6	16.5	26.2
GPA-C1-16S/76-1.35M	Gas transport	39.71	492.44	5.492	7.453	5200	70 –105	267.0	22.6	16.5	26.2
GPA-C1-16S/85-1.35M	Gas transport	33.54	352.89	6.47	8.34	5200	70 –105	267.0	22.6	16.5	26.2
GPA-C1-16S/76-1.37M	Gas transport	36.78	411.97	6.0801	8.336	5200	70 –105	267.0	22.6	16.5	26.2
GPA-C1-16S/76-1.35M1	Gas transport	41.1	452.25	6.18	8.38	5200	70 –105	267.0	22.6	16.5	26.2

GAS TURBINE–DRIVEN CENTRIFUGAL COMPRESSOR PACKAGES
with marine type gas–turbine driven engine DJ–59L2 of 16.0 MW power

Package designation	Compressor station type	Capacity		Pressure, MPa		Nominal rotation speed, rpm	Control range of rpm, %	Weight, t	Overall dimensions, m		
		1.0332 kgf/cm² and 20° MMSCMD	Suction, m³/min	suction	discharge				Length	Width	Height
GPU-16/56-1.44	Gas main	30.9	519.0	3.81	5.49	5300	70–105	167.0	18.0	15.4	14.0
GPU-16/74	Gas main	15.2	194.2	4.89	7.30	5300	70–105	167.0	18.0	15.4	14.0
GPU-16/76-1.44	Gas main	33.3	395.4	5.17	7.45	5300	70–105	167.0	18.0	15.4	14.0

GAS TURBINE–DRIVEN CENTRIFUGAL COMPRESSOR PACKAGES with marine type gas–turbine driven engine DU–71 of 16.0 MW power

Package designation	Compressor station type	Capacity		Pressure, MPa		Nominal rotation speed, rpm	Control range of rpm, %	Weight, t	Overall dimensions, m		
		1.0332 kgf/cm² and 20° MMSCMD	Suction, m³/min	suction	discharge				Length	Width	Height
GPA-16K/76-1.44	Gas main	33.3	395.4	5.17	7.45	5300	70–105	155.0	19.2	15.2	15.2

GAS TURBINE–DRIVEN CENTRIFUGAL COMPRESSOR PACKAGES with gas–turbine driven engine DU–80L of 25.0 MW power

Package designation	Compressor station type	Capacity		Pressure, MPa		Nominal rotation speed, rpm	Control range of rpm, %	Weight, t	Overall dimensions, m		
		1.0332 kgf/cm² and 20° MMSCMD	Suction, m³/min	suction	discharge				Length	Width	Height
GPA-C1-25S/92-1.35M1	Gas main	27.149	286.13	6.67	9.1	4900	70–105	195.0	23.43	17.37	22.21
GPA-C-25SD/76-1.44M	Gas main	47.2	569.26	5.17	7.45	4900	70–105	240.0	30.0	29.0	32.0
GPA-C1-25S/74-1.42M1	Gas transport	7.44	106.79	4.75	7.98	5000	70–105	240.0	30.0	29.0	32.0

GAS TURBINE–DRIVEN CENTRIFUGAL COMPRESSOR PACKAGES with airderivative type gas–turbine driven engine NK–36ST of 25.0 MW power

Package designation	Compressor station type	Capacity		Pressure, MPa		Nominal rotation speed, rpm	Control range of rpm, %	Weight, t	Overall dimensions, m		
		1.0332 kgf/cm² and 20° MMSCMD	Suction, m³/min	suction	discharge				Length	Width	Height
GPA-C-25S/76-1.5	Gas main	46.0	380.6	4.97	7.45	5000	70–105	290.0	22.0	25.0	20.0
GPA-C-25BD/76-1.44M	Gas main	46.44	560.99	5.174	7.45	5000	70–105	265.0	26.5	28.5	20.0
GPA-C1-25/6-1.37	Gas transport	61.18	766.84	5.43	7.453	5000	70–105	290.0	22.0	25.0	20.0

SCRUBBERS

The scrubbers are designed for gas purification from mechanical impurities and drop liquid, which are reasons for erosion of process equipment and compressor station piping.

JSC "SMNPO - Engineering" has developed and produces scrubbers for gas capacity from 5 to 25 MMSCMD.

The delivery set consists of the following items:

- scrubber;
- servicing platforms;
- shut-off and control valves;
- instruments.

The scrubber is vertical cylindrical structure of multicyclone type, the operating principle of which is based on extraction of mechanical and liquid impurities from gas flow by the centrifugal forces.

The scrubber is equipped by manhole with quick-acting locking device for convenience of routine maintenance.

Separated liquid drain out of cubic part is made automatically. To prevent liquid freezing the cubic part of the scrubber is equipped with heating coil.

Capacity increasing is reached by parallel installation of several scrubbers.

The equipment is mounted out-doors and can be operated in different climatic zones.

The apparatus can be developed upon Customer's initial requirements

SPECIFICATION

Capacity, m^3/h (nm^3/day)	from 2.08×10^5 (5×10^6) up to 1.04×10^6 (25×10^6)
Working pressure, MPa	from 1.8 up to 9.0
Working temperature, °C	from - 60 up to 80
Weight, ton	from 10 up to 34
Filtering efficiency for particle size of 40 μm, %	100
Filtering efficiency for particle size of 20 μm, %	99
Filtering efficiency for particle size of 10 μm, %	70

FUEL, START AND POWER GAS TREATMENT UNITS

The units are designed to treat gas, transferred by compressor stations of gas mains, for the purpose of its usage as:

- fuel gas for gas turbine start-up in gas turbocompressor packages (GPA);
- starting gas for gas turbine of GPA;
- impulse gas to control pneumatically-operated valves of compressor station (CS);
- fuel for compressor station own and residential settlement needs.

All equipment is manufactured as module article of full factory readiness.

The set of equipment comprises the following:

Gas cleaning plant is designed to clean gas from liquid drops and mechanical impurities at inlet of fuel, start and power gas treatment unit. The plant incorporates two process lines (main and stand-by), comprising filter-separators, pipelines with shut-off and control valves and instrumentation facilities.

Gas measuring plant is designed to measure total amount of incoming to station gas as well as fuel and start gas amount. The plant incorporates process lines for measurement of total gas amount and heated fuel gas amount. They are equipped with control, shut-off valves and instruments. The switching from working line to stand-by or by-pass one is provided for the unit.

Fuel gas heater incorporates a heater (electric or gas) with intermediate heat carrier. Additionally, to supply the unit with regeneration gas (t=300°C) in heaters, it is equipped with "gas-gas" heat exchanger of PN=10 MPa with gas heater.

Fuel gas treatment plants serve for reduction and keeping fuel gas specified pressure. The whole range of plants for treatment of fuel gas have been developed. They are distinguished by functional purpose, equipment composition and location category.

In the general case the plants for fuel gas treatment comprise the following:

- two lines (main and stand-by) for fuel gas reduction which supply gas turbine with fuel gas;
- a line of start gas reduction for gas turbine start-up;
- two lines (main and stand-by) of gas reduction for own needs to supply the station with mean pressure gas.

At Customer's request the plants can be additionally completed by separators for fuel gas cleaning from mechanical impurities and drop liquid and by heat exchangers for fuel gas heating.

Power gas dehumidification and storage plant is designed for power gas dehumidification up to dew point by moisture of -55°C at working pressure, as well as for power gas accumulation in receiver and its distribution, as required, for control of compressor station pneumatically operated valves. The experts of the Company have developed and manufacture power gas dehumidification and storage plants with flame and electric heating of regenerated gas.

Local and remote measurement of operating parameters is provided for plants.

The unit equipment control is performed by automatic control system of the station.

SPECIFICATION

Parameter	Fuel gas	Start gas	Power gas
Capacity, kg/h	650 –40000	150 – 12600	On request
Gas suction pressure, MPa	2.4 – 8.25	0.8 – 7.6	2.5 – 8.25
Gas discharge pressure, MPa	2.4 – 3.0	0.25 – 0.5	1.0 – 8.25
Weight, kg	800 – 23500		
Climatic version	U1, HL1		

INLET SEPARATORS

The inlet separators are designed for oil casing-head gas purification from mechanical impurities and drop liquid, as well as for liquid "volley" supply catching.

JSC "SMNPO - Engineering" has developed and mastered the serial production of inlet separator sets, designed for liquid supply of volume up to 80 m^3.

The delivery set consists of:

- separator;
- servicing platforms;
- process pipelines with shut-off, safety valves;
- instruments.

The separator is horizontal cylindrical structure inside of which the separation element of breaking type is mounted. The operating principle of separator is based on extraction of mechanical and liquid impurities from gas flow under the action of centrifugal forces.

Separated liquid is drained automatically. To prevent liquid freezing the separator is equipped with heating coil.

Capacity increasing is reached by parallel installation of several separators.

The equipment is mounted out-doors and can be operated in different climatic zones.

Inlet separators can be developed upon Customer's initial requirements.

SPECIFICATION

Capacity, SCMH (SCMD)	7.2 x10^5 (17 x 10^6)
Working pressure, MPa	up to 3.2
Working temperature, °C	from - 60 up to 80
Total volume, m^3	up to 80
Weight, ton	17 – 30
Efficiency of filtering, %	up to 98 – 100

FINE CLEANING SEPARATORS

Fine cleaning separators are designed for process gas purification from drop liquid and mechanical impurities in the process of oil casing-head gas compression.

The delivery set consists of:

- separator;
- process pipelines with shut-off, control valves;
- instruments mounted in the heated container.

The separator is a vertical structure, in the upper part of which the separation element of slotted or multicyclone type is mounted. The operating principle of separator is based on extraction of mechanical and liquid impurities from gas flow under the action of centrifugal forces.

Unions for condensate drain and instruments connection are provided for separator casing. Separated liquid drain out of the cubic part is made automatically. To prevent liquid freezing the cubic part of the separator is equipped with heating coil.

The whole equipment is mounted on the common frame, installed on open platform and can be operated in different climatic zones.

Design and technical parameters of fine cleaning separator are calculated individually for each process of compressor station.

Fine cleaning separators can be developed upon Customer's initial requirements.

SPECIFICATION

Multicyclone separators (MCS)	MCS-100-56/2.5	MCS-100-20/6.3	MCS-100-19/25	MCS-100-10/6.3
Capacity, SCMD	3.0×10^6	3.0×10^6	0.75×10^6	0.75×10^6
Working pressure (max.), MPa	2.5	6.3	2.0	5.0
Working temperature, °C	from - 40 up to 80		from - 60 up to 80	
Weight, ton	5000	5600	4500	4900
Filtering efficiency for particle size more than 40 μm, %	to 100			

SPECIFICATION

Slotted separators (SS)	SS 1400/16	SS 700/30	SS 700/80	SS 11/2A
Capacity, SCMD	2.5×10^6	2×10^6	1.5×10^6	1.2×10^6
Working pressure (max.), MPa	1.6	3.0	8.0	12.0
Working temperature, °C	from - 60 up to 80			
Weight, ton	7200	4500	3100	4400
Filtering efficiency for particle size more than 40 μm, %	to 100			

FILTER-SEPARATORS

The filter-separators are designed for increase of purification degree of natural gas from mechanical impurities and drop liquid, which are reasons for erosion of process equipment and compressor station pipelines.

JSC "SMNPO - Engineering" has developed and mastered the serial production of filter-separators for gas capacity from 5 to 25 MMSCMD.

The delivery set consists of:

- filter-separator;
- the cubic vessel;
- servicing platforms, process pipelines with shut-off, control valves;
- instruments.

The filter-separator shell is divided into two process sections:

- section with filtering elements, designed for solid particles filtration and liquid coagulation;
- section with separation nozzle of gauze cartridge, designed for drop liquid separation.

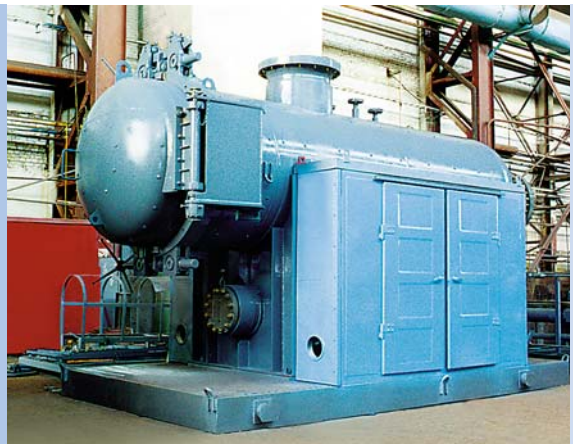
The sets are equipped with instruments allowing to control parameters of in-going gas, purification process and level of separated liquid.

Separated liquid drain out of cubic vessel is made automatically. To prevent liquid freezing the cubic vessel is equipped with heating coil.

Capacity increasing is reached by parallel installation of several separators.

The equipment is mounted on open platform and can be operated in different climatic zones.

Filter-separators can be developed upon Customer's initial requirements.



SPECIFICATION

Capacity, SCMH (SCMD)	from 2.08 x 10^5 (5 x 10^6) up to 1.04 x 10^6 (25 x 10^6)
Working pressure, MPa	9.0
Working temperature, °C	from - 60 up to 80
Weight, ton	from 10 up to 30
Filtering efficiency for particle size more than 10 μm, %	to 100
Hydraulic resistance, MPa	to 0.05

AIR COOLING EQUIPMENT FOR GAS

Air cooling equipment is designed for natural and oil casing-head gas cooling in systems of compressor stations for different services, as well as for other gaseous and liquid media cooling in gas, chemical and petrochemical industries.

The equipment is manufactured with horizontal, vertical or zigzag arrangement of sections, in required material version, and designed for cooled medium pressure up to 120 kgf/cm^2.

The construction of air cooling equipment is designed for several devices in-line arrangement. The special platforms are provided for convenience of equipment servicing.

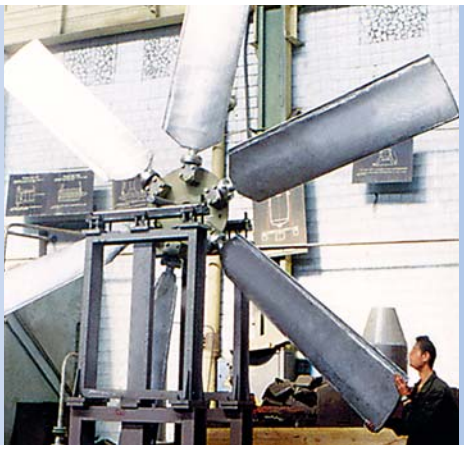
Air cooling equipment can be used in the areas with different climatic conditions, seismicity up to 7 on Richter scale.

Air cooling equipment in modular design (gas coolers) is provided to cool gases with high temperature of hydrates formation. Modular design ensures recycling of cooling air at start-up period. Control of recycling chamber shutters is automated or manual.

Air cooling equipment is completed by aluminum alloy fans of the company's own production with impeller diameter of 800, 2800 and 4450 mm.

The construction of air cooling equipment with fan impeller diameter of 4450 mm is provided for angle change of blade setting from 0° to 25° in manual and automatic modes.

At Customer's request air cooling equipment can be completed by headers and shut-off valves.



SPECIFICATION

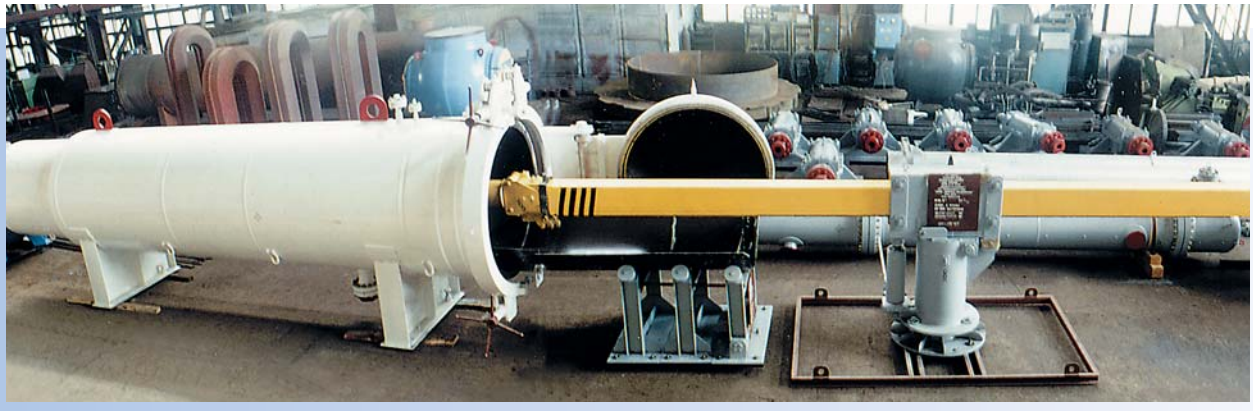
	AVMG-9-Zh-2.5-B5-B/4-4-1.5	AVMG-9-Zh-1.6-B1-B/6-6-3	AVG 20-Zh-1.6/6-1-4	AVG 20-Zh-2.5	AVG 20-Zh-8.0/4-4-4	AVO	Unit of gas coolers ND	Unit of gas coolers VD	Unit of gas coolers VD	2AVG-75	AVGM-85	Air Cooler Condenser	HP Air Cooler	HP Gas Coolers Unit
Cooled medium conditional pressure, MPa	2.5	1.6	1.6	2.5	8.0	7.6	3.5	7.6	12.5	7.5	8.5	0.6	4.0	16
Total area of heat-transfer surface, m^2	105	325	2400	3560	1700	6820	5954	5690	5680	9730	10530	520	15420	5380
Length of finned pipe, m	1.5	3	4	6	4	8	10	10	10	12	12	3	12	12.2
Fan motor power, kW	7.5	5.5	30	7.5	30	37	7.5	7.5	7.5	37	13	5.5	13	22
Diameter of fan wheel, m	0.8	0.8	2.8	0.8	2.8	2.8	0,8	0.8	0.8	4.45	2.7	0.8	2.7	4.45
Quantity of fans	1	2	1	6	1	2	10	10	10	2	6	2	9	2

PIG LAUNCHER AND RECEIVER STATIONS

PIG launcher and receiver stations are designed for periodic passing of pigs and flaw detectors through gas pipelines. Operated gas pipelines require cleaning and internals condition checking.

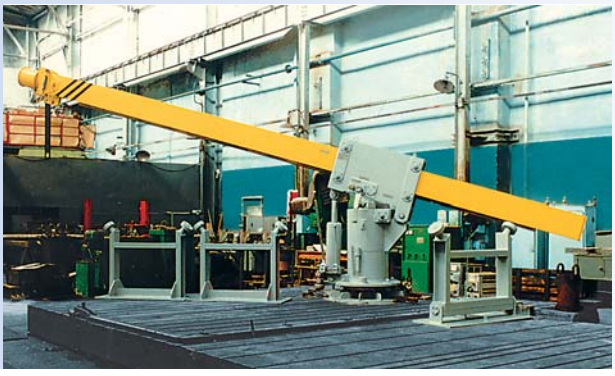
The station comprises chambers for launcher and receiver pigs as well as the multipurpose manipulator, designed for pig removal from receiver chamber, its moving and supply into the launcher chamber as well as loading and unloading operations with pigs during their possible transportation.

All mechanisms of the station are equipped with manually operated drives with mechanic and hydraulic actuators that guarantees their normal operation in the field conditions without power resources.



SPECIFICATION

For gas pipelines of DN, mm	500; 700; 1000; 1200; 1400
Working pressure, MPa	100
Working temperature, °C	from - 80 up to 80
Max. lifting capacity of manipulator, kg	depending on weight of pig or flaw detector

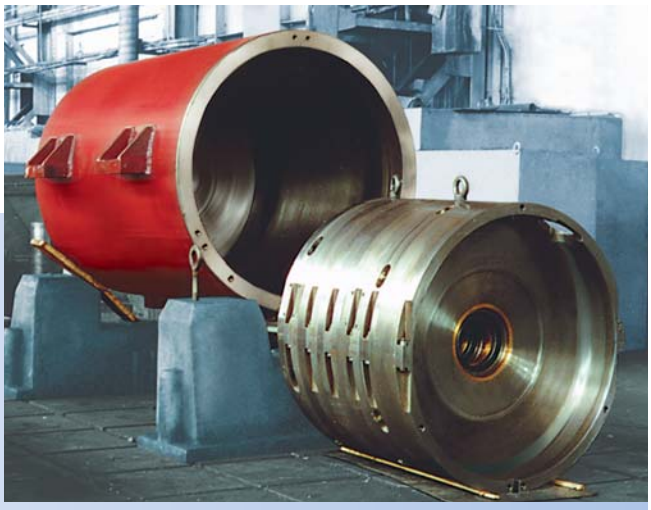


DETACHABLE ROTOR BUNDLES

They are intended for re-equipment of existing fleet of gas transfer turbocompressor packages:

- at booster compressor stations to provide stable gas production under conditions of intensive bed pressure decreasing on the final stages of fields development;
- at gas main compressor stations of gas mains to optimize their modes of operation;
- at underground storage (UGS) for efficient equipment application under conditions of varying modes of gas discharging/injection.

Detachable rotor bundles comprise compressor rotor and stator parts installed instead of standard ones at site of gas transfer turbocompressor packages operation.



SPECIFICATION

DRB type	Nominal power, MW	DRB polytropic efficiency, %	Pressure ratio	Commercial output, sm^3/h	Shaft nominal rotational speed, R.P.M.	Impellers number	Maximum final casing pressure, MPa	Engine type	Remarks
DRB-6.3-47/57-125	6.3	70	2.2	192700	8200	6	14.72	DT-71P3	
DRB-6.3-150/2.2	6.3	70	2.2	157200	8200	6	14.72	NK-12ST	
DRB-6.3-210/1.7	6.3	68	1.7	306200	8200	4	20.58	NK-12ST	
DRB-6.3-67K/1.7	6.3	80	1.7	329500	8200	3	7.46	NK-12ST	Hydrogen sulphide
DRB-6.3-67K/2.2	6.3	75	2.2	194100	8200	4	7.46	NK-12ST	Hydrogen sulphide
DRB-8/56-1.3	8.0	80	1.3	830300	8200	1	7.46	NK-14ST	
DRB-8/56-1.45	8.0	82	1.45	573700	8200	2	7.46	NK-14ST	
DRB-8/76-1.45	8.0	83	1.45	661400	8200	2	7.46	NK-14ST	
DRB-8/100-2	8.0	71	2.0	236000	8200	4	14.72	NK-14ST	
DRB-52/66.5-160M2	8.0	75	2.4	203300	9000	6	15.7	PS-90GP3	
DRB-16-100/1.7	16.0	78	1.7	855000	5300	3	9.81	NK-16ST	
DRB-16-300/6-120	16.0	80	2.0	104800	10400	12	11.77	NK-16ST	
DRB-16/150-1.7	16.0	70	1.7	677100	5200	4	14.72	NK-16ST	
DRB-16/200-1.7	16.0	80	1.7	920800	5100	6	19.62	NK-16ST	
DRB-16-125/1.7	16.0	77	1.7	762000	5300	3	12.26	NK-16ST	
DRB-580/51-76	25.0	84	1.5	1891000	5000	2	9.22	NK-36ST	
GC2-350/58-94	25.0	78	1.61	1200000	5000	-	10.0	DU80L	
DRB-0.4-15/30-38	0.4	65	1.23	34600	9150	2	7.85	VA02-450LB-2U2	Electric motor drive
DRB-6.3/32K-2.2	6.3	76	2.2	163300	8290	4	7.46	STDP-6300-2BCUHL4	Hydrogen sulphide, electric motor drive
DRB-6.3-150/2.2	6.3	73	2.2	185700	7974	6	14.72	STDP-6300-2BCUHL4	Electric motor drive

Notes: standard models of detachable rotor bundles (DRB) are shown in the Table. At Customer's request the Company can manufacture DRB with required parameters.

GAS COMPLEX TREATMENT PLANTS

- condensate stabilization unit, including column equipment, heat exchangers, process heater, pumping equipment, assemblies for gas and condensate consumption measurement;
- methanol regeneration unit.

UKPG auxiliary system comprises the following items:

- flare system;
- unit of air treatment for instruments;
- condensate emergency drain system;
- stock of finished products;
- inert gas storage.

Complex gas treatment plants (UKPG) are designed:

- for treatment of high-pressure natural gas by method of low-temperature separation with methanol injection and reaching the dew point as per water and carbohydrate on conformity with OST 51.40-98 requirements with subsequent delivery into main gas pipeline;
- for obtaining stable carbohydrate condensate in conformity with OST 51.65-80 requirements.

UKPG main process equipment comprises the following items:

- low-temperature separation unit with the block of inlet separator and assemblies for gas consumption measurements;

The plants can be developed for different gas capacity, with application of different gas treatment procedures.

Multistage layout of process units on the stack, assembled steel sections of which are incorporated in the delivery scope, is used for equipment compact arrangement.

Modular design and maximum factory readiness permit to carry out equipment installation undertime.

Every block is the assembly of open or close type, convinient for rail transport. It includes processing and auxiliary equipment, piping and communications, mounted on rigid load-bearing frame.

The plants are designed for operation in climatic zones with temperature from - 60°C up to 45°C.

SPECIFICATIONS AS EXAMPLE OF UKPG–2.0 AND UKPG–3.0

Parameter	UKPG-2.0	UKPG-3.0
Gas capacity, MMSCMD	1.0 – 2.0	2.0 – 3.0
Condensate capacity, t/h	8.0 – 12.0	15.0 – 30.0
Gas pressure:		
– inlet, MPa	8.5 – 16.0	8.5 – 16.0
– outlet, MPa	5.5 – 7.5	5.5 – 7.5
Condensate outlet pressure, MPa	0.6*	0.6*

Note: * – to be clarified on Customer's demand

The Company can design and manufacture the gas complex treatment plants with gas capacity of 200 000 m^3/day and over.

GAS TREATMENT PLANTS

Complex gas treatment plants (UPG) are designed for extracting a wide fraction of light hydrocarbon from associated oil gas.

In general the following operations are performed at GTP:

- treatment of natural gas, including purification and drying as per moisture;
- gas stripping, i.e. extraction of raw natural gasoline;
- reception, storage, and shipment of liquid products by rail, motor transport or by pipelines.

Depending on volume of oil gas to be refined, integral components contents, specified depth of integral components extraction and other factors, different stripping methods can be applied, causing different scope of process equipment.

On Customer's demand UPG can be additionally equipped with units of unstable gasoline division into casing-head gasoline and individual pure hydrocarbons (propane, isobutane, etc.)

The plant delivery scope includes the following items:

- compressor, column, pumping equipment, heat exchangers, pressure vessels;
- boards with electric equipment;
- automatic control systems.

The plants can be developed for different gas capacity, with different gas preparation procedures application.

Multistage layout of process units on the stack, assembled steel sections of which are incorporated in the delivery scope, is used for equipment compact arrangement.

Modular design and maximum factory readiness permit to carry out equipment installation undertime.

Every block is the assembly of open or close type, convinient for rail transport. It includes processing and auxiliary equipment, piping and communications, mounted on rigid load-bearing frame.

The plants are designed for operation in climatic zones with temperature from - 60°C up to 45°C.

SPECIFICATIONS AS EXAMPLE OF UPG–50 AND UPG–500

Parameter	UPG-50	UPG-500
Applied procedure	Heavy hydrocarbons oil absorption	Low temperature separation
Gas capacity, mln. m^3/year	50	500
Commodity output	natural gas as to OST 51.40-98 liquefied propane-butane stabilized casing-head gasoline	
Site area, hectare	0.6	1.6

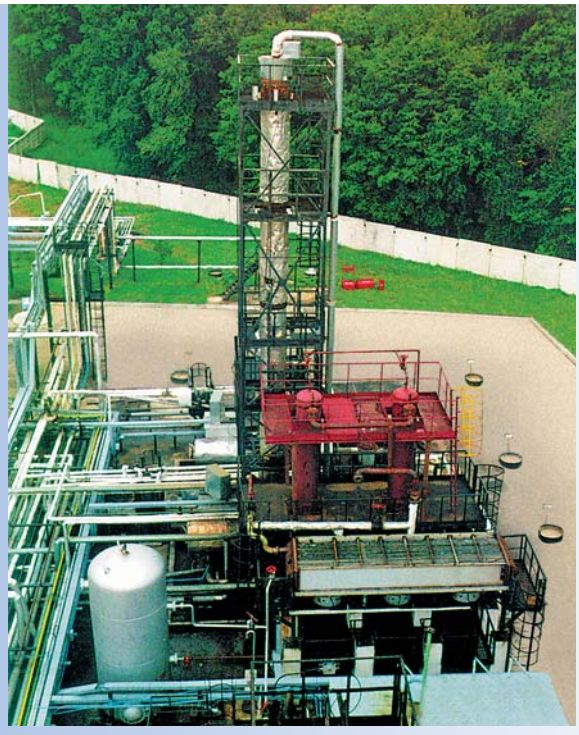
The Company can design and manufacture the gas treatment plants of different capacity.

CONDENSATE AND OIL PROCESSING PLANTS WITH THE CAPACITY FROM 5 TO 500 THOUSAND TONS PER YEAR

Oil (condensate) processing plants are designed for oil (condensate) processing with the crude oil annual processing capacity of 5,000 t; 10,000 t; 25,000 t; 40,000 t; 50,000 t; 100,000 t; 150,000 t; 200,000 t; 300,000 t; 500,000 t and obtaining straight-run gasoline, diesel fuel, and residual fuel oil.

Raw material separation in the plants is carried out by the method of rectification. Oil or condensate with density 650–850 kg/m^3 serve as raw material.

Products quantitative ratio and fractions qualitative coefficients are specified by feedstock.



The plants comprise the following processing equipment:

- Feed pumps unit, reservoirs for raw material and commodity output (supplied on Customer's request);
- Salting-out unit (if necessary), including pumping equipment, pressurized vessels, heat exchangers, electric dehydrators. This unit is designed for water and salt extraction from raw material (salt maximum content in raw material after salting-out does not exceed 10 mg/l, water content – no more than 0.08 – 0.12 % of weight.);
- Condensate stabilization unit (if necessary), including stabilization column with evaporator to provide stabilization of raw material with saturated vapour pressure no more than 500 mm Hg at temperature 30°C;
- Topping unit, including rectifying column (operated under atmospheric pressure) with evaporator, for distilled petrol receipt. Masout is the residual of rectifying column;
- Spraying unit, including pressurized vessels and pumping equipment;
- Diesel fraction unit, including stripper with evaporator, for light fractions pre-stripping and diesel fuel receipt;
- Raw material processing heater with tank and heat carrier pumps;
- Petrol, diesel fuel and masout air cooling devices of fin-tube type;
- Recuperative heat exchangers of shell-and-tube type;
- Control air preparation unit designed for air supply of valve pneumatic operators and instruments;
- Control unit designed for manufacturing method control, inspection and regulation of process on the plant.

Modular design and maximum factory readiness allow performing equipment mounting in the shortest terms.

The plants are designed for operation in climatic areas with air temperature from - 60°C up to 45°C.

COMPLEX OF PROCESS EQUIPMENT FOR REFINERIES

It is intended for complete delivery and construction on turnkey basis of refinery with capacity (as to raw material) from 10000 to 4000000 tons per year.

Equipment is manufactured as processing units according to designs of JSC "SMNPO - Engineering" as well as according to designs submitted by Customers.

- **Raw materials stabilization unit** is intended for stripping of hydrocarbon gases from oil when their content is high. It comprises heater of raw materials, stabilization tower and sediment evaporator.
- **Atmospheric oil refining unit** is intended for production of straight-run petrol, kerosene, diesel oil and fuel oil. It comprises main rectification tower and steam-stripping columns, process heater, recuperative heat-exchangers, air coolers, intermediate tanks and pumps.

In addition, refinery comprises automated control system and the following auxiliary equipment:

- Air supply unit;
- Process heaters unit;
- Electrical unit;
- Tank farm.

The following equipment is manufactured as units according to designs submitted by Customer:

- **High-octane petrol producing** (furnaces, adiabatic reactors, columns, heat-exchangers, vessel and pumping equipment);
- **Fuel oil vacuum processing** (furnaces, vacuum columns with circulating reflux, vacuum generating device, heat-exchangers and pumping equipment);
- **Purification of commercial products** (columns, vessel and pumping equipment);
- **Electrical desalting** (raw material heaters, electric dehydrators).

EQUIPMENT FOR OIL TERMINALS

Designed for complete delivery and commissioning under turnkey conditions of oil terminals, including tanks for oil and oil products storage.

The tanks are the main equipment for oil terminals and designed:

- for receiving, storage, distribution, registration (quantitative and quality) of oil and oil products;
- for water and mechanical impurities setting;
- for oils and oil products mixing as well as other technological processes connected with transportation and storage.

Depending on service conditions and Customer's requirements tanks can have fixed or floating roof, equipped with pontoons, gas piping, system for heating of product to be stored, etc.

Tank and pontoon bottoms and walls are delivered as sheets in dimensional coils.

To complete the oil terminals the Company manufactures the following items:

Tank equipment, including breathing valves; siphon valves; skylights; holes for measurement; fire extinguishing devices.

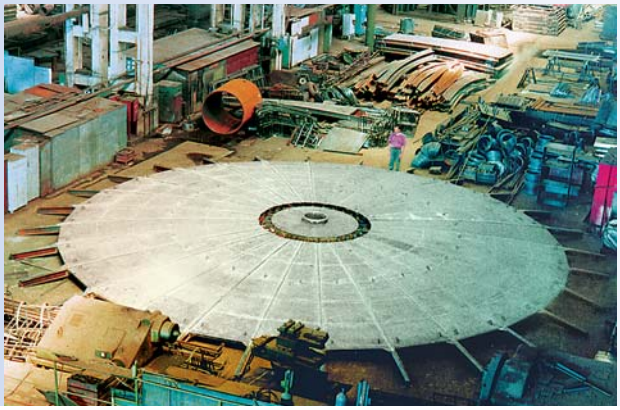
Drain and filling equipment, including device for oil products filling into railway tank-cars; units for lower drain from railway tank-cars.

Process equipment, including drain tanks for oil products overflow when header cleaning; heat exchangers for water heating.

Shut-off valves, including wedge plugs; ball valves; coupling valves; check valves, as well as other special valves.

Pumping equipment: centrifugal pumping units for oil and oil products pumping and for application in fire-extinguishing systems.

Piping: T-pieces, branches, supports, carbon steel reducers made in stamp-welding design. Joint welds are subjected to X-ray and ultrasonic inspection.



TANKS SPECIFICATIONS

Type of tank	vertical, cylindrical
Nominal volume	100 – 50000 m^3
Type of fluids to be stored	oil and oil products with saturated steams pressure no more than 93.3 kPa at temperature 20°C
Density of fluids to be stored	up to 1.015 t/m^3
Maximum temperature of fluids to be stored	up to 90°C
Internal excessive pressure	up to 2 kPa, inclusive
Vacuum	no less than 0.2 kPa
Seismicity of construction area	up to 9 on Richter scale

CYLINDRICAL PRESSURE VESSELS FOR GASEOUS AND LIQUID MEDIUMS

Horizontal and vertical pressure vessels are designed for:

- storage of explosive and flammable fluids;
- storage of liquid and gaseous non-explosive products;
- gathering of the liquid after filters-separators and other process equipment;
- drain of oil products residues from vessels and process lines on the gas and oil industry objects.

All vessel equipment is made in accordance with OST 26-291-94 and "Regulations of pressure vessels design and safety operation".

Pressure vessels can be used for:

- any climatic zones;
- seismic zones (to 9.0 on the Richter scale);
- operation in the cyclic loads;
- any environments, including followed to corrosion cracking of metals.

The equipment can be provided with internal or external heater, if it is necessary.

The medium removal from the vessels can be carried out by removing under pressure or by submerged pump units.

The development of equipment is possible in modular design with valves, instrumentation, servicing platforms and frame.

During equipment designing all operating parameters are specified by request of a Customer.

TECHNICAL SPECIFICATIONS

Working pressure, MPa	from 0.05 to 16
Volume, m^3	to 90
Shell diameter, mm	from 500 to 3000
Shell thickness, mm	from 4 to 100
Weight, kg	from 135 to 49100

MODERNIZED SECTIONAL CENTRIFUGAL PUMPS OF CNS TYPE

This kind of pumps is designed for injection of aggressive oil field waters, including H_2S containing waters, in oil-bearing beds for formation pressure keeping. They can be used to transfer pure and weak-polluted water. The fields of application are: oil-producing, oil-refining and petrochemical industries.

More than 10000 pumps have been manufactured by the company. Having studied long-term operation experience and taking into account requests of customers, the Company carried out large-scale modernization of given type of pumps to increase their life span, reliability and maintainability. The pumps conform to API 610 Standard requirements.

Directions of modernization:

- upgrading of flowing part in order to increase efficiency, to enlarge operating capacity range, decreasing vibration;
- installation of mechanical seals, meeting requirements of API 682 Standard, with the system of washing out products of erosion, corrosion and other impurities or stuffing-box seals of "Graflex" type;
- installation of elastic plate coupling instead of gear one to decrease vibration;
- increasing impeller inter-stage seal service life;
- installation axial displacement transducer to protect the pump against severe damage;
- hydraulic device optimization in order to increase reliability and to gain proper level of leakage through it;
- introduction of protection against leakage through seal between the impeller and the shaft to avoid erosion of the shaft.

SPECIFICATION

Parameter	CNS 120-3	CNS 180-3	CNS 240-3
Rated capacity, m^3/h	120	180	240
Minimum capacity, m^3/h	80	80	80
Maximum capacity, m^3/h	180	220	240 – 260
Allowable head deviation, %	from +5 to -3		
Allowable pressure at the pump inlet, kgf/cm^2, max.	from 1 to 31		
Allowable NPSH, m, max.	7		
Head, m	1050 – 1900	1050 – 1900	945 – 1900
Pump rated power, kW, max.	505 – 913	677 – 1225	792 – 1593
Pump maximum power, kW, max.	615 – 1140	700 – 1330	810 – 1593
Efficiency, %, min.	68	76	78
Weight, kg	from 2500 to 3800		

Note: pump flowing part is manufactured of 20Cr13 steel, M modifications – of 12Cr18Ni12Mo3Ti steel.

CLAY SEPARATOR ON CENTRIFUGE BASIS

Clay separator on a centrifuge basis is designed for treatment of drilling nonweighted muds from excessive clay amount and a regeneration of weighted muds when drilling of gas and oil wells.

The clay separator incorporates:

- centrifuge unit;
- pump unit;
- homogenizer;
- starting electric devices;
- connection hoses with easy removable links.

Its basic unit is a horizontal settling centrifuge with sediment scroll-discharge.

Separation of solid phase from liquid one takes place due to centrifugal forces when the drilling mud delivering into the centrifuge. Discharge and the centrifuge effluent drain (clarified liquid phase) are made continuously.

This plant is completed with a conveyer, providing sediment removal out its boundaries. The pump unit incorporates screw conveyer pump, which is motor driven through a V-belt drive.

The pouring-over device is by-pass, permitting to adjust mud supply into the centrifuge with a constant mud supply by a pump unit due to partial mud discharge into the tank.

The homogenizer provides uniform mass of a dewatered sediment receiving.

SPECIFICATION

Volumetic feed of initial product for a clay separator, m^3/h, no more than:	
when removing clay from weighted mud with a density to 1.1 g/cm^3	18
when regenerating weighted mud with a density:	
to 1.5 g/cm^3	6
to 2.0 g/cm^3	3
Degree of clay removal, %, no less than	80
Degree of barytic weighting agent regeneration, %, no less than	90
Maximum inner centrifuge diameter, mm	500
Ratio of rotor working length to inner diameter	1.86
Rated power, kW, no more than	37
Weight, kg, no more than	4000

WELL WORKOVER AND COMPLETION RIG OF AK-60 TYPE

The equipment is designed for completion and workover of oil and gas wells of depth up to 3000 m located either in well clusters or separately. It allows performing drilling works at depth up to 1600 m.

Lifting capacity up to 80 t allows to avoid emergency situations during well workover without involving equipment of higher capacity.

The rig is designed for service in moderate and cold climate (operating temperature up to minus 45°C, storage temperature up to minus 55°C).

Set of delivery (basis version) comprises:

1. The rig in assembly with monkey board for derrickman and servicing platform;
2. Suspended hydraulic power tong;
3. Spider with pneumatic control system;
4. Derrickman evacuation device;
5. Set of tools, changeable and spare parts.

The following equipment is supplied additionally: drilling rotor with hydraulic drive (hole diameter 360 mm, to be installed on frame); drilling rotor with hydraulic drive (landing flange); drilling swivel (80 t); washover swivel (80 t); kelly (10 m); bails (80 t); body elevators of type KM for ∅ 73, ∅ 89, ∅ 114 mm pipes; elevator ETA-50; breakout tongs; chain tongs; hydraulic rotor (A-50 type).

The rig AK-60 may be supplied complete with the following additional equipment: blowout preventer equipment; drilling mud preparation, storage and purification system; equipment for pumping of mud.

The rig AK-60 corresponds to the safety requirements for oil and gas industry put into force by Gosgortechnadzor of Russian Federation on 01.09.1998. JSC "SMNPO-Engineering" was granted with Certificate of Conformity with State Standard of Russian Federation for workover rig.

SPECIFICATION

Wheelbase	Chassis KrAZ-63221-01 (6x6)
Nominal lifting capacity, kN (t)	600 (60)
Maximum lifting capacity (during releasing of stuck pipes), kN (t)	800 (80)
Power of winch drive, kW	165.4
Lifting speed, m/s	0.21 – 1.6
Derrick height from the ground to crown block axis, m	20
Rotor table opening diameter, mm	360
Rotor P-165 opening diameter, mm	165
Static load on rotor table, kN (tf)	800 (80)
Rotor power with hydraulic drive, kW	80
Rotational speed, rpm	20 – 100
Overall dimensions in transported position, m	16.5 x 3.2 x 4.5
Total weight of the rig in assembly, ton	34.2

WELL WORKOVER AND COMPLETION RIG OF KORO 1-80 TYPE

It is designed to perform round trip operations with oil well tubing and drill pipes, for cutting and reaming during fishing operations as well as injection of process fluids into wells during their completion and workover.

KORO 1-80 equipment is designed to be operated in areas with temperate and cold climate.

Self-propelled rig equipment is mounted on powerful tetra-axial motor vehicle of MAZ-537G type (8x8) having cross-country capacity and all driving axles.

Delivery Set (base version):

1. Self-propelled pulling unit mounted on MAZ-537G motor vehicle chassis comprising: derrick, traveling block, hook, monkey board, device for derrickman evacuation, hydromast weight indicator;
2. Servicing platform on frame foundation including R-360 rotor and support base plate for the derrick;
3. Catwalks on sliding;
4. Suspended hydraulic power tong;
5. Spider with pneumatic control;
6. Tool dolly on MAZ-8926 trailer;
7. Set of tools, replacement and spare parts.

The following equipment can be supplied additionally: drilling swivel (80 t); washover swivel (80 t); kelly (10 m); bails (80 t); body elevators of KM-type for ∅ 73, ∅ 89, ∅ 114 mm pipes; breakout tongs; chain tongs.

KORO 1-80 rig can be additionally completed with the following equipment: set of blowout preventer equipment with control panel; pumping unit; mobile diesel-generator power plant for 100 kW.

SPECIFICATION

Wheelbase	MAZ-537G chassis (8 x 8)
Nominal lifting capacity, kN (t)	800 (80)
Short-time lifting capacity (during releasing of stuck pipes), kN (t)	1000 (100)
Hoisting speed, m/s:	0.23 – 1.33
Drive power, kW	426
Derrick height from the ground to crown block axis, m	30
Servicing platform height near wellhead, m	3.75
Rotor table opening, mm	360
Rotor power with hydraulic drive, kW	90
Maximum pump pressure, MPa	16
Speed of carrier moving, km/h	30
Overall dimensions in transported position, m	17.5 x 3.2 x 4.7
Total weight of the rig assembled, ton	10

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