Atomenergomash JSC

EQUIPMENT FOR OIL & GAS INDUSTRY

ABOUT COMPANY



Atomenergomash (AEM)

is a machine-building division of the State Atomic Energy Corporation Rosatom. AEM is a global machine-building holding company represented in key industries.

We contribute to our customers high performance by creating new technologies and modern technical solutions that ensure efficient and safe operation of equipment throughout its entire lifecycle.

- We combine leading scientific research, engineering, manufacturing centers in Russia, CIS and European Union countries.
- Our products are presented in nuclear and thermal power,oil & gas industries, shipbuilding, special steel market, in small hydro generation and other economic and industrial sectors.
- Our mission is to improve the welfare of people today and tomorrow in cooperation with our partners and customers.



ATOMENERGOMASH FOR OIL & GAS INDUSTRY

Atomenergomash is one of the largest suppliers of efficient technological solutions for oil and gas industry in Russia and abroad. Our enterprises have many years of experience in the design and production of equipment for oil, gas, petrochemicals, energy transportation, water treatment and purification.

Key products

Static equipment	Pumping equipment	Pipe valves and fittings
Columns	Canned motor pumps API 685	Gate valves
Reactors	Process pumps API 610	Filters
Tanks	Cryogenic pumps	Shut-off and control valves
Heat exchangers	All-purpose pumps	Ball valves



STATIC EQUIPMENT



Reactor





Column

Heat exchanger

	The branch of AEM-technology "ATOMMASH"	The branch of AEM-technology "Petrozavodskmash"	ZiO-Podolsk
Maximum dimensions (WxHxL), m	14 x 14 x 100	7,5 x 7,5 x 100	4,5 x 4,5 x 30
Equipment unit weight, tons	20—1350	20—570	10—400
Capacities, tons / year	15 000	10 000	15 000*
Shipment by water from workshop	Yes	Yes	No



REACTORS

The main types of industrial reactors:

- hydrocracking
- hydrotreating
- coke drums
- isomerization
- reforming

COLUMNS

The main types of manufactured columns:

- fractional, vacuum, crude distillation columns
- carbonating columns
- condensate cleaning columns
- plants for the production of hydrogen peroxide
- absorbers, adsorbers, separators, extractors

HEAT-EXCHANGE EQUIPMENT

Types of heat exchangers:

- refrigerant condensers
- vacuum condensers
- evaporators and teapot-type evaporators with tube bundles
- heat exchangers with a double pipe
- heat exchangers with a floating head
- heat exchangers with gas-supply tube
- heat exchangers with fixed tube sheets

SUPPORT STRUCTURES OF MARINE PLATFORMS FOR OIL AND GAS PRODUCTION

- pile guides
- piles
- sleeves









PUMPING EQUIPMENT

Canned motor pumps API 685

Atomenergomash JSC has developed a line of canned motor pumps with a shielded motor. Pumps are designed for pumping toxic, explosive and fire hazardous liquids, liquefied gases with temperatures from -50 to $+350^{\circ}$ C.

Characteristics

Built-in electric motor capacity	5 to 300 kW (5; 10; 22; 50; 70; 120; 180; 300 kW)
Flow rate	up to 600 m³/h
Head	up to 500 m
Pumped fluid	toxic, explosive and fire hazardous liquids, liquefied gases

Advantages:

- high reliability in operation
- domestic production base
- technical support during operation
- the possibility of conducting technical examination and extending the design operation life and service life.

Operation life indicators

- Design operation life (without disassembly and repair) is 40 000 hours, which can be extended upon its expiry according to the examination results.
- The design service life is 10 years.
- The on-stream period is from 2 to 5 years.







GEN 10,40

GEN 50-250-1

GEN 170,190

PRODUCT RANGE OF CANNED MOTOR PUMPS

Characteristics of electric pumps

Pump	Rated flow, m³/h	Rated head, m	Permissible NPSH, m, at least	Design pressure, MPa	Temperature of the pumped fluid, °C, not more than	Motor capacity, kW	Weight, kg
KhGN-1	210	220	5	3,5	90	305	4700
GEN 170/190	170	170	4	3	180	120	3900
GEN 60/150	60	165	2	3	350	120	3900
GEN 80/220M	80	220	2	3	350	120	3900
GEN 50/400	50	400	3	4	90	120	3500
GEN 400/170	400	170	5	4	-30+50	300	3200
GEN 50/125-02	50	125	3	4	-30+50	44	900
GEN 50/125-03	50	150	3	4	-30+50	44	900
GEN 50/125-04	50	100	3	4	-30+50	44	900
GEN 100/80	100	80	4	4	-30+50	44	900
GEN 100/80-01	100	70	4	4	-30+50	44	900
GEN 50/250	50	250	3	4	-30+50	65	1300
GEN 50/250-01	50	270	3	4	-30+50	65	1300
GEN 50/250-02	50	300	3	4	-30+50	65	1300
GEN 100/500	100	500	3	4	20	305	3200
GEN 50/125-01	50	125	3	4	50	44	1100
GEN 90/100-01	100	100	3	4	50	44	1100
GEN 130/60-01	130	60	4	4	50	44	1100
GEN 170/190-01	170	200	4	4	50	120	4170
GEN 170/190-03	170	140	4	4	50	120	4170
GEN 50/50	50	50	3	2,5	50	22	620
GEN 25/80	25	80	3	2,5	50	22	620
GEN 50/50-01	50	50	3	2,5	350	22	1000
GEN 25/80-01	25	80	3	2,5	350	22	1000
GEN 10/40	12	45	2	2,5	90	5	170
GEN 500/105	500	105	5,5	3,3	-50+30	165	1000
GEN 300/135	300	135	7	3	50	305	170

SHUT-OFF AND CONTROL VALVES

SHUT-OFF AND CONTROL VALVES PRODUCED BY ARAKO (CZECH REPUBLIC)

Pipe valves produced by the Czech company Arako are designed for use in thermal, nuclear power and oil&gas industries. The valves are produced in accordance with SN, DIN, EN, and ANSI standards and can be made of carbon, alloy and stainless steel. The company's product range includes gate valves, shutoff, globe and swing check valves, bellows and quick valves, bleed and blow-down valves, swing check valves, ball valves, filters.

Supply References

- E-ON, Germany
- Skoda, Czech Republic
- AREVA, France
- Slovenske Elektrarne, Slovenia
- Maeikiu Nafta, Latvia
- Siemens AG, Germany
- EZ a.s., Czech Republic
- ALSTOM, France
- ENEL, Italy
- Thyssen Krupp, Germany



Swing check valves



Swing check gates





Filters



Gate valves



Shut-off and control valves

Characteristics of manufactured valves for power, chemical, oil and gas industries

	High-pressure gate valves	Low-pressure gate valves	Shut-off and globe valves and bellows valves	High-pressure shut-off valves
DN	50—350	40—500	15—200	10—150
PN	160—500	10(6)—100	10—40	63—630
Minimum operating temperature, °C	-50	-105	(–196) –50	-196
Maximum operating temperature, °C	600	540	400	650
Application	Gas, water, etc.	Gas, steam, water, oil, oil products, aggressive and non-aggressive liquids, etc.	Gas, steam, water, oil, oil products, aggressive and non-aggressive liquids, etc.	Gas, steam, water, oil, oil products, aggressive and non-aggressive liquids, etc.

	Bleed and blow-down valves	Swing check valves	Swing check gates	Ball valves	Filters
DN	10—50	10—200	50—400	10—150	10—150
PN	63—500	10—630	10—630		10—160
Minimum operating temperature, °C	(–196) –10	-196	-105	-196	-196
Maximum operating temperature, °C	580	600	540	200	550
Application	Steam, waste water	Gas, steam, water, oil, oil products, aggressive and non-aggressive liquids, etc.	Gas, steam, water, oil, oil products, aggressive and non-aggressive liquids, etc.	Gas, water, oil, oil products, aggressive and non-aggressive liquids, etc.	Gas, steam, water, oil, oil products, aggressive and non-aggressive liquids, etc.

SHUT-OFF AND CONTROL VALVES PRODUCED IN RUSSIAN FEDERATION

Atommash, a branch of AEM-technology in Volgodonsk, is experienced in serial production of large shut-off and control valves. Today, this area has been developed in a new project. The project is aimed at the establishment of the production of gate valves for trunk oil pipelines, axial check valves, axial control valves for gas industry

	Axial check valves	Gate valves	Axial control valves
Nominal size, mm	DN 100 1400	DN 300 1200	DN 1501200
Nominal pressure, MPa	PN 1,6 16,0	PN 1,6 12,5	PN 4,0 25,0
Valve type			Globe, cut-off,blow-off
Operating fluid	non-aggressive natural gas	commercial oil, petroleum products	non-aggressive natural gas
Operating fluid temperature, °C	from -40 to +180	from -40 to +80	from -40 to +180
Design service life, years	30	30	30



WATER TREATMENT AND PURIFICATION

AEM has a whole range of unique modern technologies

of water treatment, purification and desalination for thermal power, gas and petrochemical and other industries.

Specialization in water treatment technologies

Thermal technologies

- evaporators
- vaporizing apparatus
- distillation desalination units

Membrane technology

- reverse osmosis
- nanofiltration
- ultrafiltration
- electrodeionization

Products & Technologies

- treatment of associated reservoir water ($\leq 1.0 \ \mu\text{S} \ / \ \text{cm}$)
- production of demineralized water for energy enterprises in the oil and gas industry ($\leq 0.2 \ \mu$ S / cm)
- desalination systems, including drinking water supply (SanPin)
- removal of radioactive elements

lon-exchange technology

• counter-current and parallel-current ionization of water in filters



LLC ZapSibNeftekhim. Salt-containing effluent evaporation unit with capacity of 150 m³/h



Salt plant in Kaliningrad. Two vacuum evaporation units with a total capacity of 200 t/h in the initial salting liquid and 50 t/h in sodium salt



Sibur-Himprom JSC. Water treatment for water desalination with capacity of 700 m³/h, $\leq 0.2~\mu S$



PJSC Nizhnekamskneftekhim. Petroleum condensate cleaning systems with capacity of 800 m³/h, TOC \leq 200 µg/dm³



PJSC Tatneft. Petrochemical plants of Taneco JSC. Water treatment for deep water desalination with capacity of 1000 m³/h



In 1989, the first domestic industrial reverse-osmosis unit UOO-50 with capacity of 50 m³/h was designed for Zuevskaya TPP

CRITICAL EQUIPMENT FOR LNG PRODUCTION

Atomenergomash has become one of the key participants to implement the Russian Government roadmap for the development of domestic LNG technologies. The holding companies were the first in the country to launch the production of coil-wound heat exchangers and mid-capacity cryogenic pumps. In 2019, the first domestic equipment was delivered to the fourth train of Yamal LNG project.

Our plans are to expand and localize the production of a wide range of equipment for large-scale LNG production projects, LNG icebreakers and LNG.



PUMPS



The range of submersible cryogenic pumps

Built-in motor capacity	5 to 1700 kW
Flow rate	up to 2500 m³/h
Head	up to 2100 m
Pumped fluid	liquefied gases (methane, propane, butane, ethylene, nitrogen)
Pumped fluid temperature	up to -195 °C





TESTING FACILITIES

The test bench on liquid nitrogen (-196 $^{\circ}$ C) was established for testing pumps, with the first tests carried out in 2019.

Successful tests of the first domestic LNG pumps confirmed:

- the compliance with requirements to head, flow rate and cavitation characteristics;
- the operation in a cryogenic fluid;
- the equipment certification.



Liquid nitrogen test bench

Currently, Rosatom State Corporation is the construction operator of the first in Europe and the fourth in the world test bench for medium- and large-scale LNG production. The bench will allow testing the full range of pumps, expanders and BOG compressors required for the implementation of domestic LNG projects.



PRODUCTION OF COIL-WOUND HEAT EXCHANGERS

ZiO-Podolsk established the design and production of coil-wound heat exchangers, the critical equipment of natural gas liquefaction facilities. In 2019, six CWHEs were produced and delivered for Train 4 of Yamal LNG project.







Uzbekistan JSC MAXAM-CHIRCHIQ PJSC Orsknefteorgsintez

Orsk Refinery

Kirovo-Chepetsk

JSC Kirov-Chepetsk

Chemical Plant

Omsk, Russia

Omsk Refinery

PJSC Gazprom Neft

Kirov Region, Russia

Yaroslavnefteorgsintez

TAIF Group of Companies

PJSC Slavneft

Kazan, Russia

Kazanorgsintez

Samara, Russia Kuibyshev Refinery

PJSC Rosneft

Heat-exchange and pumping equipment for LNG projects

Sabetta, YANAO, Russia Yamal LNG **PJSC NOVATEK**

O • Ufa

• • Omsk

• Tobolsk

Canned motor pumps

Kstovo, Nizhny Novgorod region, Russia Lukoil-Nizhegorodnefteorgsintez PJSC Lukoil

Ufa, Russia Ufaneftekhim PJSC Bashneft

Kazan, Russia PJSC Tatneft

Nizhnekamsk Republic of Tatarstan PJSC Nizhnekamskneftekhim Water treatment and purification

Geroysk, Kaliningrad Region, Russia Kaliningrad Salt Plant "VARNITSA"

Tobolsk, Tyumen region, Russia ZapSibNeftekhim-2 PJSC SIBUR

Omsk, Russia Omsk Refinery PJSC Gazprom Neft

Moscow, Russia SUE Mosekostroy i Pipe valves

Ufa, Russia LLC Gazprom transgaz Ufa

Nadym, YANAO, Russia LLC Gazprom dobycha Nadym LLC Gazprom dobycha Yamburg

Czech Republic CHEMCOMEX, a.s.

Czech Republic Królovopolskó RIA, a.s.

Poland PHZ VIPEX

Germany SCHWIETZKE ARMATUREN GmbH

Finland Konwell

RESEARCH, DEVELOPMENT AND PRODUCTION BASE

Petrozavodskmash (the branch of AEM-technology), Petrozavodsk

One of the largest power engineering enterprises in the north-west of Russia, supplying casing, vessel and other equipment. The enterprise possesses a unique machine park: turning-and-boring, horizontal-milling, boring, gang-drilling, grinding, finishing with CNC, balancing and other machines. PZM production facilities are connected with all European ports via its own pier and the Volga-Baltic Waterway.





ATOMMASH (the branch of AEM-technology), Volgodonsk

The largest heavy engineering enterprise in southern Russia, a key manufacturer of equipment for nuclear power and petrochemicals. The manufacturing capabilities make it possible to produce any heat exchange, case, reactor and vessel equipment, spatial engineering structures, etc. The enterprise has an extensive wide metal-cutting equipment park of metal-cutting, pressing, heat treatment, and welding equipment. The company's advantage is its own special pier allowing to transport oversized equipment by water to anywhere in Russia and in the world.

JSC NPO CNIITMASH, Moscow

The Institute is the main material science center of the nuclear industry. It carries out comprehensive work on the creation of new materials and progressive technological processes for producing new-generation equipment for the energy, metallurgical, chemical and petrochemical industries, transport, gas and mining industries.





JSC Afrikantov OKBM, Nizhny Novgorod

One of the largest design centers in Russia, which has a modern scientific, technical and production base. The company develops marine reactor units, low-power nuclear reactors, and fast-neutron reactors. For the oil and gas industry OKBM Afrikantov produces canned motor pumps designed for pumping explosive and fire hazardous liquids and liquefied gases with temperatures from -50 to +350 °C. Since 2019, the design and production of pumping equipment for LNG projects has been developed, so Afrikantov OKBM has become the world's third producer of pumps for large-scale LNG.



JSC Atomtruboprovodmontazh, Volgodonsk

The company is one of the leading producers and suppliers of high- and low-pressure pipelines for NPPs, TPPs, gas and petrochemical industry enterprises.

ZiO-Podolsk, Podolsk

One of the largest power engineering enterprises in Russia with more than centennial history. While having a unique production complex, the enterprise produces casing, vessel, heat-exchange, boiler reactor equipment for the oil and gas industries, thermal power, and shipbuilding. The enterprise is equipped with its own laboratory and engineering center. The equipment produced by the enterprise operates in over 50 countries.





ARAKO spol. s r.o., Opava

ARAKO is one of the EU largest manufacturers of pipe valves for the energy, chemical and petrochemical industries. The enterprise produces carbon steel, alloy steel and stainless steel valves. The product range includes shut-off and swing check valves, bellows valves, gate valves, swing check gates, filters, ball valves, bleed and blow-down valves. The company's products are represented in 25 countries of four continents.

QUALITY MANAGEMENT SYSTEM

Our enterprises have over 20 various certificates, attestations and other permits issued by international agencies and technical regulation bodies of the customer countries. The certified quality management system of our enterprises is consistent with ISO 9001 requirements. We are qualified by the expert international certification bodies such as Lloyd's Register Quality Assurance, AFNOR Certification, DQS GmbH, TUV Thuringen, Bureau Veritas. All equipment manufactured by our enterprises undergoes strict quality control, including comprehensive examination of documentation, material inspection and testing. The enterprise conduct the following types of control: chemical analysis, metallographic studies, corrosion tests, metal and welded joint mechanical tests, radiographic, ultrasonic, magnetic-particle test, dye penetrant inspection, metal and welded joint leakage monitoring.



OUR ENTERPRISES

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