



JSC "Sumy Frunze NPO"

**EQUIPMENT
FOR CHEMICAL
PRODUCTION WORKS**



catalog
of products



JSC "Sumy Frunze Machine-Building Science and Production Association", founded in 1896, is one of the largest European enterprises, manufacturing equipment for chemical, oil and gas industries.

During more than its 100-years history the company has accumulated great experience in developing and manufacturing both special items for equipping chemical production lines and complete process lines for chemical, oil, gas, food, medical and other branches of industry of CIS countries and foreign countries – Cuba, Egypt, Pakistan, India, Turkey, China, Sweden, Japan, Bulgaria, Hungary, Romania, Czechia, Germany, Vietnam, Iran, etc.

We are proud to say that practically all chemical plants in CIS countries are equipped with equipment manufactured at JSC "Sumy Frunze NPO".

During last 50 years the Company has supplied efficient equipment to all soda production plants on the territory of CIS and the Council for Mutual Economic Aid (CMEA) countries.

They are Beresniki, Lisichansk, Sterlitamak, Crimea, Kungrad soda production plants, as well as Devnya soda production plant in Bulgaria, soda ash production plants of "Sovlay" (Italy), "Soda Sanayi" (Turkey) companies.

Chemical equipment for production of ammonia and nitrogen fertilizers is successfully operated at all Production Associations "Azot" of former USSR (Dneprodzerzhinsk, Cherkassy, Severodonetsk, Nevinnomyssk, Kujbyshev, Rossosh, Mary, Tolyatti, Chirchik, Kirovochepetsk, Novomoskovsk, etc.). In general all about 100 process lines were supplied.

Chemical equipment as a component of complete process lines for ethylene, propylene and helium production was supplied to enterprises of petrochemical complex (Sumgait, Omsk, Ufa, Salavat, Kasan, Angarsk, Lisichansk, Shevchenko, Orenburg, Uzen, Abovian, Kstovo). In general 30 process lines were supplied.



The equipment with the trade mark of JSC "Sumy Frunze NPO" was supplied to:

- Coke-chemical plants of former USSR (Avdeevsk, Alchevsk, Bagleysk, Gorlovka, Dnepropetrovsk, Zaporozhye, Krivoy Rog, Makeevka, Mariupol, Stakhanovsk), as well as metallurgical works in Kuznetsk, Magnitogorsk, Karaganda;

- Enterprises of chemical, biological, petroleum refining, food and other industries of CIS countries (Sumykhimprom, Bereznikiazot, Tambovsk Production Association "Pigment", Sterlitamak Production Association "Soda", Ufa petroleum refining works, Volgograd Production Association "Khimprom", Novo-Neftekamsk iodine-bromine plant, Novosibirsk tin-zinc works, Achinsk alumina plant, Arkhangelsk pulp and paper mill, Kotlas pulp and paper mill, etc.);

- Sewage facilities for purification of sewage water in large towns and at the enterprises, blood transfusion stations, meat processing plants, fish fleet (sewage facilities in Moscow, St-Petersburg, Ivanovo, Sochi, sewage facilities of Soligorsk potassium works, Berezniki potassium plants, etc.).

The Company has accumulated great experience in manufacture of the equipment designed to carry out the reconstruction and renewal of many chemical enterprises: JSC "Naftan" and JSC "Polimir" (Belarus), JSC "Minudobrenia", JSC "Surgutneftegaz" and "Kirishynefteorgsintez", Ltd (Russia), JSC "Concern Stirol" and "Crimea soda production plant" (Ukraine), Production Association "Maryazot" and Turkmenabad chemical works (Turkmenistan), and so on.

The wide range of manufactured production and existence of high efficient construction facilities as integral part of the Company have stipulated change-over from delivery of individual items of equipment to complete deliveries of equipment and commissioning of industrial facilities on turnkey basis.

Our Company delivers process equipment on turnkey basis for the following chemical productions of:

- Soda ash with the capacity from 50 to 200,000 t/year;
- weak nitric acid;
- helium concentrate;
- ethylene and propylene;
- fuels and lubricants;
- distillate (100 dal – 6,000 dal per day).

JSC “Sumy Frunze NPO” is a machine-building enterprise with a complete process cycle – from generation of ideas to turnkey supply and further technical servicing of finished products.

Engineering of the Company is carried out by two Specialized Design Divisions, equipped with advanced automatic design systems and up-to-date experimental testing benches, as well as, by three Production Process Departments, elaborating progressive production processes for manufacturing parts and assemblies from metal melting to mounting and testing the manufactured products.

JSC “Sumy Frunze NPO” designs and manufactures basic and auxiliary equipment taking into consideration customers’ requirements, including technical and economic parameters, climatic and seismic conditions at the operation site.

High technical level of designed equipment is achieved due to high qualification of engineering personnel, usage of the latest achievements in science and technology, as well as, to many years close co-operation with scientists from more than 20 academic and research institutes such as: JSC “GIAP”, JSC “VNIINEFTEMASH” (Moscow); “UKRGIAP” (Dneprodzerzhinsk); JSC “Ukrkhimproekt” (Sumy); “Ukrniikhimmash”, GI-Prokoks, NIOKHIM (Kharkov); GNIPI “Khimtehnologia” (Severodonetsk), etc.

The Company has the powerful metallurgical division equipped with automated complexes for continuous casting and vacuum-oxygen decarburization of steel, which produce high-alloy steels in castings weighing up to 18 tons.

Blanking division is equipped with the facilities, carrying out the following operations:

- cutting of carbon and low-alloyed steels rolled products with thickness to 300 mm;
- forge-rolling of metal with thickness to 120 mm;
- cold and hot forming of parts with thickness from 0.1 mm to 80 mm;
- bending of tubes with diameter to 530 mm and wall thickness to 50 mm;
- bending of tube coil with diameter 20–90 mm, radius to 1600 mm, and pitch to 6°.

There is a workshop manufacturing cold-rolled, electric welded and bimetallic pipes as well as finned with the help of spiral arrangement and rotary extrusion pipes.

Specialized sector for manufacturing of elliptic heads with diameter to 4000 mm and wall thickness to 40 mm by flanging was founded at the enterprise. It is equipped with high-efficient press for sphere formation, unique unit for heads flanging, heat-treating furnace with manipulator as well as quench chamber.

Automatic submerged arc, automatic and semi-automatic shielded, argon-arc, resistance spot and seam, electron-beam types of welding as well as various types of slag welding for thick-walled structures and special types of steels are widely applied in welding division of the Company.

For the first time in chemical engineering practice unique procedure of welding of square nozzles to cylindrical casings by eight-electrode welder with consumable tip was applied at the enterprise.

Automatic welding of pipes to heat exchangers tube plates by “Orbita”, “Kometa” and “Agat” types welders were applied.

Universal, adjustable automated welding “Deuma” machines with manipulators of load-lifting capacity from 10 t up to 100 t are widely used at the enterprise. Practically all production divisions are equipped with such machines, that makes possible to carry out automatic submerged arc and shielded, electric slag welding as well as arc deposition by tape electrode.



Equipment for mechanized manufacturing with the help of rolling methods of 5,000 m³, 10,000 m³ and 20,000 m³ tanks has been designed, manufactured and applied at the enterprise.

The procedure of wear-resistant and corrosion-resistant coating application on units and parts surface by deposition and different types of spraying is widely used.

Processes and equipment for powder deposition, plasma powder tape electrode spraying, the whole range of units and parts gas-thermal strengthening have been applied. There is a specialized sector equipped with up-to-date units UN – 115, "Metko", "Kiev – 7", UMP – 6 and the whole range of auxiliary equipment including large vacuum furnace.

Welding robotization has been performing for last years. "IGM" and "Kreger" robot-technical plants are installed in the workshops of the Company.

For steel construction stress relief after welding vibration treatment instead of heat treatment is used. Treatment cycle is reduced by 10 – 20 times.

Assembling division is equipped with mechanized plants for assembling of shells and casings longitudinal and ring-shaped joints, benches for heat exchangers and frame parts assembling, assembly rigs, set of pneumatic and hydraulic tools.

The procedure of pipes fixing in tube plates (expanding) with the help of units with torque, electrohydraulic impulse method and explosive energy has been applied.

The method of columns marking-out by quantum-mechanical oscillator (laser beam) has been applied.

The Company is in possession of huge fleet of modern metal-working equipment in the amount of more than 3,500 units, including unique equipment of the world leading machine-tool manufacturers Waldrich Siegen, Dörries, Forest, Innse, Mecof, etc.

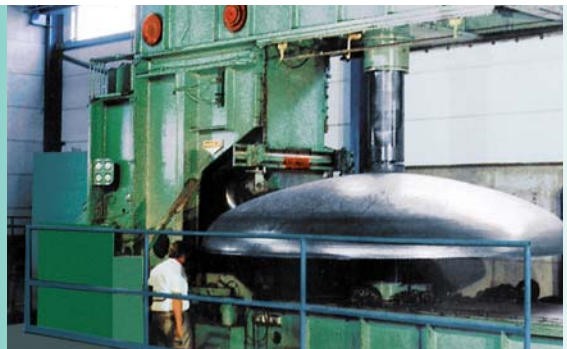
In 1997 the certification body Bureau Veritas Quality International (BVQI) granted to the Joint Stock Company "Sumy Frunze Machine-Building Science and Production Association" (JSC "Sumy Frunze NPO") the certificate, confirming correspondence of quality system valid in JSC "Sumy Frunze NPO" to the international standard ISO 9001.

The Company products correspond to the International Standards API, ASME, the Standards of Ukraine and CIS countries. Licenses of appropriate national and international bodies are available for design and production of all kinds of JSC "Sumy Frunze NPO" products.

Effective functioning of quality system is one of the major competitiveness indices in the world market for products, manufactured by JSC "Sumy Frunze NPO".

All these components facilitate the Company to gain acknowledgement and respect of Customers, and to win at international tenders for equipment supply.

Consumers in more than 40 countries worldwide know JSC "Sumy Frunze NPO" as a responsible business partner.



Pressure vessels are used for receiving, storage, processing and distribution of aggressive, toxic and non-toxic, explosive and non-explosive products in chemical, petrochemical, food and other branches of industry.

JSC "Sumy Frunze NPO" manufactures different types of pressure vessels with working pressure up to 25 MPa (250 kgf/cm²), temperature from -210°C up to +700°C and volume up to 1000 m³, namely:

- pressure vessels without internals;
- pressure vessels with internals;
- pressure vessels with mixing devices;
- pressure vessels with internal/external heating/cooling;
- cyclones;
- rotating drying - and - cooling drums;

● special pressure vessels according to functional purpose:

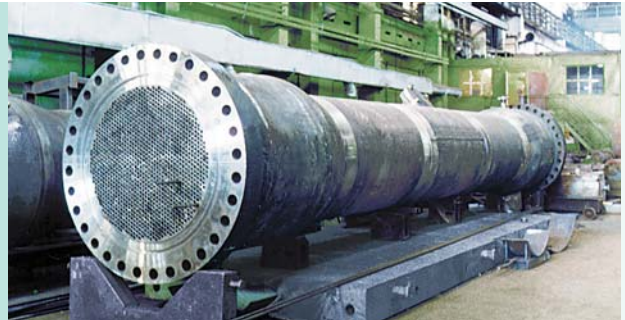
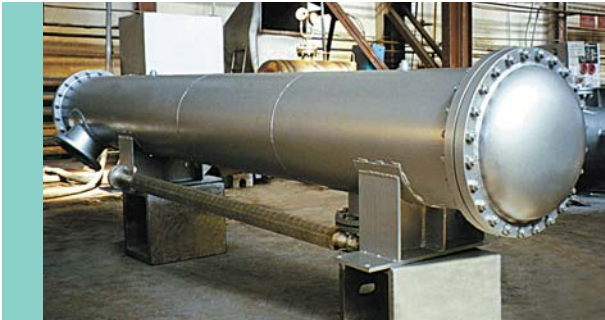
- absorbers;
- adsorbers;
- desorbers;
- washers;
- regenerators;
- extractors;
- contact equipment;
- combustors;
- mixers;
- afterneutralizers;
- stills;
- oxidants;
- reactors;
- separators;
- chlorinators.



The equipment is being worked out for individual projects and can be made of carbon, corrosion-resistant steels, titanium alloys and nickel-base alloys (Hastelloy "C" type).

The main advantages of the equipment are low material consumption, usage of unified parts and assemblies, reliability.

To order pressure vessels it is necessary to submit technical project or questionnaire with detail information for the development of technical documentation.



Heat exchangers are used for thermal process realization such as heating, cooling, evaporation, condensation and boiling in all branches of industry and agriculture.

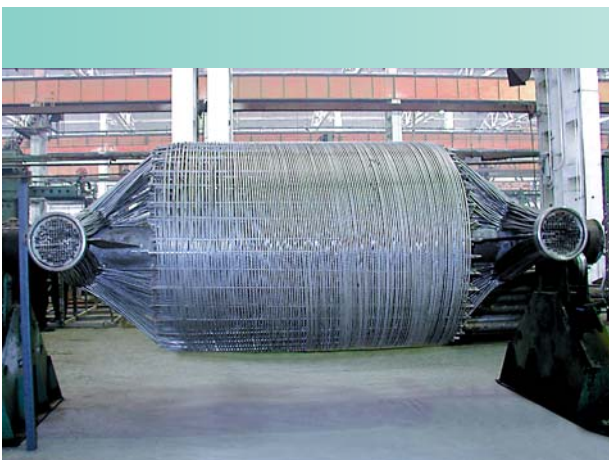
JSC "Sumy Frunze NPO" manufactures heat exchangers of different types with a working pressure up to 25 MPa (250 kgf/cm²), temperature from -210°C to +700°C, namely:

- "H" - with stationary tube walls;
- "P" - with floating head;
- "K" - with temperature compensator on shell;
- "U" - with U-tubes;
- "PK" - with floating head and compensator on it;
- heat exchangers with coiled tubes;
- spiral heat exchangers;
- evaporation apparatus;
- special apparatus.

The equipment is being worked out for individual projects and can be made of carbon, corrosion-resistant steels, titanium alloys and nickel-base alloys (Hastelloy "C" type).

The main advantages of the equipment are construction simplicity, compactness, high heat transfer coefficient, possibility of heat-exchange surface treatment from impurities, resistance to pressure fluctuation, vibration, impact loads, easy to assemble and dismantle.

To order heat exchangers it is necessary to submit technical project or questionnaire with detail information for the development of technical documentation.





Column equipment is designed for rectifying and absorbing processes in chemical and other branches of industry. The equipment is being worked out for individual projects and can be made of carbon, corrosion-resistant steels, titanium nickel-base alloys (Hastelloy "C" type).

The main advantages are high separating capability at great vapour and fluid loads; little pressure losses; easy to assemble and dismantle and operation reliability.

To order column equipment it is necessary to submit technical project or questionnaire with detail information for the development of technical documentation.

PERFORATED, BUBBLE-CAP, VALVE AND LOUVER PLATES COLUMN APPARATUS

Diameter, mm	Pitch between plates, mm	Material	Parameters	
			Temperature, °C	Pressure, MPa
400...4000	170...1200	Steel 3	From - 20 up to 425	No less than 5 mm Hg No more than 10 MPa
		Steel 20K	From - 20 up to 475	
		Steel 09G2S	From - 70 up to 475	
		10H14G14N4T	From - 196 up to 500	
		08H22N6T	From - 40 up to 300	
		08H18N10T	From - 253 up to 610	
		12H18N10T		
		02H18N11	From - 253 up to 450	
		03H18N11		
		10H17N13M2T	From - 253 up to 600	
		10H17N13M3T		
		Alloy VT 1-0	From - 50 up to 300	

PACKED COLUMN APPARATUS

Diameter, mm	Material	Parameters		Packing	
		Temperature, °C	Pressure, MPa	Pall rings, mm	Rashig rings, mm
400...4000	Steel 3	From - 20 up to 425	No less than 5 mm Hg No more than 16 MPa	50 x 50	50 x 50
	Steel 20K	From - 20 up to 475		35 x 35	35 x 35
	Steel 09G2S	From - 70 up to 475		25 x 25	
	10H14G14N4T	From - 196 up to 500			
	08H22N6T	From - 40 up to 300			
	08H18N10T	From - 253 up to 610			
	12H18N10T				
	02H18N11	From - 253 up to 450			
	03H18N11				
	10H17N13M2T	From - 253 up to 600			
	10H17N13M3T				
	Alloy VT 1-0	From - 50 up to 300		No less than 5 mm Hg No more than 10 MPa	

PACKAGED COLUMN APPARATUS

Diameter, mm	Plates	Packing	Heat exchangers	Material	Parameters	
					Temperature, °C	Pressure, MPa
400...4000	Valve bubble-cap perforated	Rashig rings Pall rings	Spiral shell-and- tube	Steel 09G2S	From - 70 up to 475	From 5 mm Hg up to 16 MPa
				10H14G14N4T	From - 196 up to 500	
				12H18N10T	From - 253 up to 610	

COMPLETE PROCESS LINE FOR WEAK NITRIC ACID PRODUCTION

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Designed for production of nitric acid from liquid ammonia and air.

Production process is divided into four main stages:

- ammonia conversion;
- nitrous gases cooling;
- nitrogen absorption;
- exhaust gases catalytic purification.

The content of nitrogen oxides after catalytic purification corresponds to sanitary standards.

During the production process the output of industrial steam, which can be used for technological purpose, occurs.

The process control is fully automated that has allowed to reduce up to the minimum an amount of serving staff to provide the optimum conditions of equipment operation. The start-up and shutdown of the line are made from the operator's desk.



Complete process line, containing about 40 items of main chemical equipment, was delivered for 29 Companies of former USSR, as well as Companies of Hungary and Bulgaria.

High effectiveness and reliability of the apparatus allow to operate them for over 25 years.

Great experience in manufacturing of the equipment for nitric acid production makes it possible to carry out the selection and production of apparatus for process lines, manufacturing on different designs and at different time. It also allows to carry out the modernization of available process lines and individual apparatus during overhaul.

SPECIFICATIONS

Capacity, t/year	To 360000
Acid concentration, %	60
Cubical content of nitrogen oxides in exhaust gases, %	0.004 – 0.006

EQUIPMENT FOR COMPLETING THE PROCESS LINES FOR SODA PRODUCTION



The equipment is designed for completing the process lines for soda production. The following equipment is manufactured:

- absorption column;
- distillation heat exchanger;
- carbonation column;
- distillation column;
- calciner;
- crystallizer;
- valves;
- pipelines and shaped parts.

The absorption column incorporates six sections, each of which performs the specific functions: storage of weak active liquid and ammoniated brine; brine absorption of ammonia and carbonic acid; distillation gas cooling.

If any section fails, it is possible its individual replacement.

The distillation heat exchanger serves for carbonic acid topping from distillation condenser liquid with the help of vapor and gas mixture.

SPECIFICATIONS

Equipment designation	Components	Service	Overall dimensions, mm		Weight, kg
			Diameter	Height	
Absorption column	Tank I (R - I)	For storage of weak active liquid the ammoniated brine		7168	23437
	Tank II (R - II)	For storage of weak active liquid and ammoniated brine	2800	6715	20760
	The second absorber (AB - II)	For brine absorption of ammonia and carbonic acid		12333	82950
	The first absorber (AB - I)	For brine absorption of ammonia and carbonic acid, not absorbed in the second absorber		8340	45100
	The second column gas washer (PGKII)	For brine absorption of ammonia and carbonic acid, supplied with gas from the first gas carbonation washer		10103	54110
	Distillation gas cooler (HGDS)	For distillation gas cooling		1245	5612
	Total absorption column				52000
Distillation heat exchanger		For carbonic acid topping from distillation condenser liquid with the help of steam and gas mixture	3200	15950	65845

PROCESS EQUIPMENT FOR DISTILLATE PRODUCTION

The equipment is designed to construct high-profitable, compact, low power-consuming, waste-free and ecologically safety works for distillate production with high level of mechanization and automation.

Cereals, root vegetables, containing starch, reed raw material as well as other agricultural products, containing sugar and starch serve as raw material for distillate production.

The experts of the Company have mastered the production of the whole range of plants with capacity of 100, 250, 500, 1000, 1500, 2000, 3000, 6000 dal/day.

The works with the capacity of 100 and 250 dal/day operate as to cycling flow diagram, the works of over capacity operate as to continuous flow diagram.

The delivery scope comprises the following items:

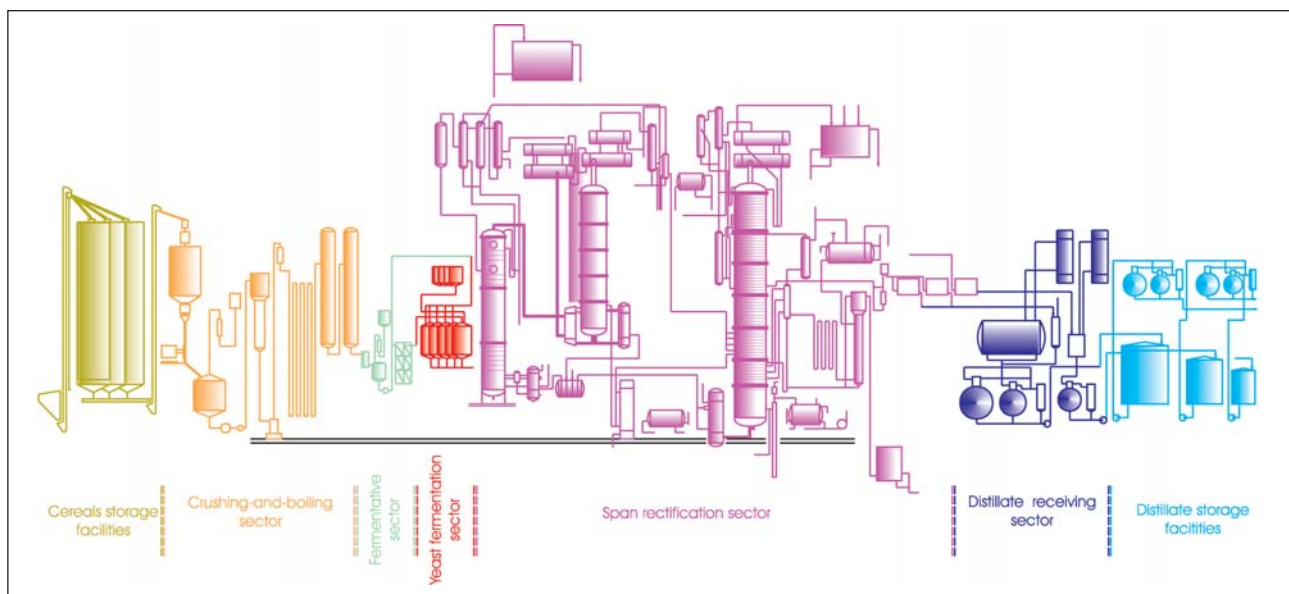
- different pressure vessels equipment, heat exchangers and column apparatus;
- liquid-packed vacuum and chemical pumps of different capacity;
- pipeline valves;
- instruments, automation facilities and others.

Software is also in the delivery scope.

The main advantages are: waste-free and ecologically safety works, possibility of location at agricultural and processing fabrications, accompanying production of high-calorific feed with protein, yeast components and microelements higher content for cattle, possibility of industrial alcohol for explosion engine production.



PROCESS FLOW DIAGRAM OF WORKS FOR DISTILLATE PRODUCTION





PRELIMINARY TECHNOLOGICAL INDICES OF WORKS FOR DISTILLATE PRODUCTION

Indices of daily capacity	BK-100	BK-250	BK-500	BK-1000	BK-1500	BK-2000
Consumption of raw material, materials, power suppliers						
Raw material						
cereals (50% of starch), t	3.1	7.75	15.5	31.0	46.5	62.0
Antiseptics						
sulphuric acid (100%), kg	2.3	5.75	11.5	23.0	34.5	46.0
chlorinated lime, kg	2.5	6.25	12.5	25.0	37.5	50.0
Nutrients						
carbamide, kg	0.6	1.5	3.0	6.0	9.0	12.0
ortho-phosphoric acid, kg	0.2	0.5	1.0	2.0	6.0	4.0
Ferment materials						
thermamil, l	0.31	0.78	1.55	3.1	4.65	6.2
San-Super, l	1.53	3.83	7.65	15.3	23.0	30.6
Water						
cooling, m ³	126	315	630	1260	1890	2520
portable, m ³	15	38	75	150	225	300
Power suppliers						
steam (6 atma),t	12	30	60	120	180	240
electric power, kW/h	190	475	950	1900	2850	3800
Equipment						
quantity, pcs	90	122	134	142	150	185
weight, t	32	69	97	148	198	400
Production area						
factory building, m ²	300	300	400	820	980	1150
Shift operating personnel						
workers, people engineering and technical personnel, people	16	20	20	24	24	28
	1	2	3	5	6	8
Products, by-products						
Products						
ethyl rectified alcohol of fine refinement, dal	95.9	239.75	479.5	959.0	1438.5	1918.0
By-Products						
head fraction of ethyl alcohol, dal	3.0	7.5	15.0	30	45	60
fusel oil, dal	0.3	0.75	1.5	3.0	4.5	6.0
grains, m ³	12.0	30.0	60.0	120.0	180.0	240.0

Centrifugal atomizers are designed for fine atomization of fluid materials (solutions, emulsions, suspensions) in drying chambers of spray dryers with upper and lower supply of heat carrier having a temperature up to 873°K (600°C).

SPECIFICATIONS

Atomizer type	Capacity, t/h	Weight at operation position, kg, no more
CEL22-25-5K-01-U3	3	628
CES22-22-7K-01-U3	4	628
CEL30-25-5K-01-U3	4.5	638
CES30-22-7K-01-U3	5	638
CEL22-25-5K-02-U3	3	628
CES22-22-7K-02-U3	4	628
CEL30-25-5K-02-U3	4.5	638
CES30-22-7K-02-U3	5	638
CEL55-27-5K-01-U3	12	1061
CEL55-28-6K-01-U3	11	1058
CES55-25-7K-01-U3	14	1062
CEL75-27-5K-01-U3	18	1184
CEL75-28-6K-01-U3	17	1182
CES75-25-7K-01-U3	21	1186
CEL90-27-5K-01-U3	23	1215
CEL90-28-6K-01-U3	21	1212
CES90-25-7K-01-U3	24	1216
CEL55-27-5K-02-U3	12	1061
CEL55-28-6K-02-U3	11	1058
CES55-25-7K-02-U3	14	1062
CEL75-27-5K-02-U3	18	1184
CEL75-28-6K-02-U3	17	1182
CES75-25-7K-02-U3	21	1186
CEL90-27-5K-02-U3	23	1215
CEL90-28-6K-02-U3	21	1212
CES90-25-7K-02-U3	24	1216
CES110-25-7K-01-U3	27	1586
CES110-25-6K-01-U3	27	1586
CES132-25-7K-01-U3	32	1636
CES132-25-6K-01-U3	32	1636
CES160-25-7K-01-U3*	40	1860
CES160-25-6K-01-U3*	40	1860
CES200-25-7K-01-U3*	50	1984
CES200-25-6K-01-U3*	50	1984
CES110-25-7K-02-U3	27	1586
CES110-25-6K-02-U3	27	1586
CES132-25-7K-02-U3	32	1636
CES132-25-6K-02-U3	32	1636
CES160-25-7K-02-U3*	40	1860
CES160-25-6K-02-U3*	40	1860
CES200-25-7K-02-U3*	50	1984
CES200-25-6K-02-U3*	50	1984
CES160-30-7K-01-U3	28	1900
CES160-30-7K-02-U3	28	1900
CES200-30-7K-01-U3	40	2024
CES200-30-7K-02-U3	40	2024



Disk rotational speed is 8000 and 10000 rpm.

The main advantages are remote control, stable operation under hard service conditions, availability of labyrinth seal system, which prevents ingress of treated product vapour into internal atomizer cavity.

Notes:

Atomizer type:

C - centrifugal atomizer; E - with electric motor; L and S - disk type (L - blade, S - nozzle).

The first group of digits - the installed power of drive, kW.

The second group of digits - the disk diameter, cm.

Digits (5; 6; 7) - the disk protection types: 5 - unprotected; 6 - disk with silicon carbide protection S-2, 7 - disk with boron- and -siliconised graphite protection BSG-60.

K - materials, contacting with the product, are corrosion-resistant.

Group of digits: 01 - scope of delivery with automatics; 02 - scope of delivery without automatics.

U3 - climatic version type.

* Atomizers are supplied for initial products with density more than 1.5 t/m³.

To order the atomizer it is necessary to indicate the following: atomizer type, drier capacity, product description, product abrasive and corroding properties (acidity, alkalinity).



The drum vacuum filters are designed for filtration of difficult to filtrate suspensions in titanium dioxide production (BBM45-3.14-1G), of sodium bicarbonate suspension in soda ash production (BB-5.4 and BYaN-180) as well as in other chemical productions.

Design features:

The filter **BBM45-3.14-1G** comprises the horizontal rotating on the hollow shaft cell-free perforated drum with the lower part immersed in the tray with suspension being filtered. The discharge pipe with the nozzle with the help of which filtrate is removed from the drum inner cavity to a vacuum line, is located along the drum axle. To remove sediment from the filtering surface the filter BBM45-3.14-1G is equipped with the cutter having micrometer feed. To prevent filtering suspensions precipitation the mixer is mounted in the tray. The main material: stainless steel or titanium.

The filter **BYaN-180** comprises the horizontal rotating on the hollow shaft cell drum with the lower part immersed in the tray with suspension being filtered. The distributing head, with the help of which filtrate is removed from the drum inner cavity to a vacuum line, is located along the drum axle. To remove sediment from

the filtering surface the filter BYaN-180 is equipped with the cutter. To prevent filtering suspensions precipitation the mixer is mounted in the tray. The main material: stainless steel.

The filter **BB-5.4** has not cells and distributing device that simplifies its design and allows to collect the filtrate and the washing liquid separately. The filter consists of the hollow drum with perforated lateral surface, inside of which the hollow two-chamber shoe is located. The compressed air for sediment removal and vapour for cloth regeneration are supplied through the shoe. Washing liquid removal from the tray as well as compressed air and vapour supply in the shoe are made through channels, welded to the end of drum hollow axle. To remove sediment from the filtering surface the filter BB-5.4 is equipped with the cutter. Specially designed tray of the filter BB-5.4 allows to feed the pressure suspension into it with speed excluding solid phase precipitation. The main material: stainless steel.

Delivery scope:

Filter, electrical equipment and automatic control system.

SPECIFICATIONS

	BB-5.4	BYaN-180	BBM45-3.14-1G
Capacity, t/day	450	180-200	96
Filtering surface area, m ²	5.4	5.6	45
Drum diameter, m	1.72	1.8	3.14
Drum speed, rpm	6.25 – 31.25	1;1.15;2.3	0.15 – 0.9
Consumed power, kW	5.5	10	11.5
Filter weight, kg, no more than	7000	9250	22900
Overall dimensions, mm	3570 x 2670 x 2475	5050 x 2980 x 2820	8300 x 5600 x 4500

The centrifugal separator is designed for mineral oils and diesel fuels refining from water and mechanical impurities as well as can be applied for clarification and separation explosion-proof, non-aggressive suspensions and emulsions in different branches of industry.

The main operating units of separator are the following:

- bowl with adjusting rings;
- duplex gear-type pump;
- case;
- elastic and centrifugal couplings;
- jack;
- electrical motor with starting devices.

To reduce vibration and noise, it is recommended to arrange the separator on shock absorbers, and pipelines should be connected by flexible connecting pieces.

Block design ensures quick mounting, not requiring any up-dating at the site.

The scope of delivery: assembled separator, spare parts and necessary tools for mounting.



SPECIFICATIONS

Capacity (depending on separated product properties), l/h	1500 – 2000
Suction pressure, kgf/cm ² , no more	0.53
Discharge pressure, kdf/cm ² , no more	4.5
Internal drum diameter, mm	325
Drum rotational speed, rpm	4640
Motor power, kW	4.0
Overall dimensions, mm, no more:	
Length	1020
Width	780
Height	1195
Separator weight, kg, no more	462

Drum type crystallizers are designed for extraction of crystalline products from melts. They are used in processes of chemical industry. The crystallizers can be used during caprolactam, ammonium fluoride-bifluoride production. The crystallizers can be used during caprolactam production.

The main advantages are easy control and maintenance, compactness, small power-consuming.

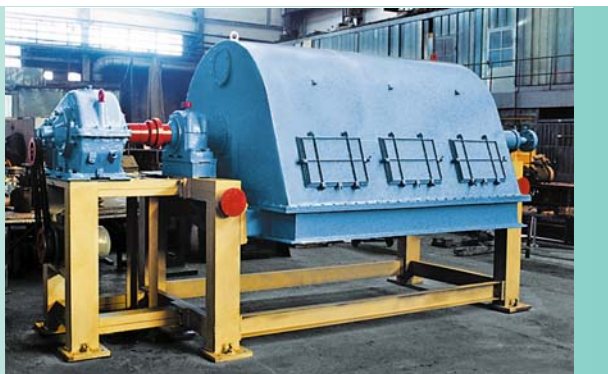
Crystallizer design provides for stepless electronic control of drum rotational speed, that makes easy to select crystallization process at different melts treatment.

The parts, contacting with the product, are made of stainless steel, the other parts are made of carbon steel.

Application of crystallizers makes possible to reduce considerably transportation and storage of final product expenses under minimal additional expenses.

If it is necessary, the crystallizer with another specifications can be manufactured in accordance with specific Customer's requirements.

Sets of spare parts and operating tools are delivered with crystallizer. Accompanying process equipment (conveyers, pumps, intermediate vessels, mixers, etc) can be delivered at Customer's request.



SPECIFICATIONS

	KB 100/150	KB 140/220	KB 100/75
Approximate capacity, t/h	1.5	2.6	0.625
Crystallization surface area, m ²	4.7	9.67	2.35
Crystallization temperature	Up to 140°		
Flow rate of cooling medium, m ³ /h	20	40	10
Drum diameter, mm	1000	1400	1000
Drum length, mm	1500	2200	750
Weight, kg	4180	6300	2240
Overall dimensions, mm	4270 x 1650 x 2090	5540 x 2010 x 2440	3610 x 1700 x 1800



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