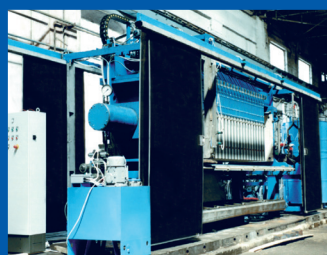




«PROGRESS»

Equipment catalogue



BMBP “Progress” is an industrial engineering company that combines the experience and capabilities of its partners: JSC Berdichiv Machine-Building Plant “Progress” and its plant of environmentally friendly equipment and metal structures, RPE Dneproenergostal, LLC “KB Energomashproekt”.

To sell products and services on the international market, BMBP “Progress” has a number of representative offices.

JSC “Berdichev Machine-Building Plant “Progress” has over 140 years of experience in producing of the filtering, drying and capacitance equipment. Equipment of “Progress” trade mark is widely used in the ecological, chemical, mining, coal, metallurgy and other industries.

Tower, horizontal belt filter presses, disc and belt vacuum filters, cartridge type and leaf filters, furnaces with rotating drums and drum coolers, baghouse filters and electrostatic precipitators manufactured by our plant are operated at facilities in more than 35 countries around the world, and proved themselves as a reliable, high-performance and quality equipment. «Progress» has a strong industrial and technological base and highly qualified scientific, engineering and technical personnel.

At present, the enterprise has launched the production of environmental equipment for the cleaning of exhaust gases (bag filters and electrostatic precipitators) with a capacity of 600 to 1,100,000 m³/h and the absorption of sulfur oxides.

Effective certified quality management system that meets the highest requirements of the International Standard ISO 9001: 2015 (DSTU ISO 9001: 2015), is the guarantee of product quality.

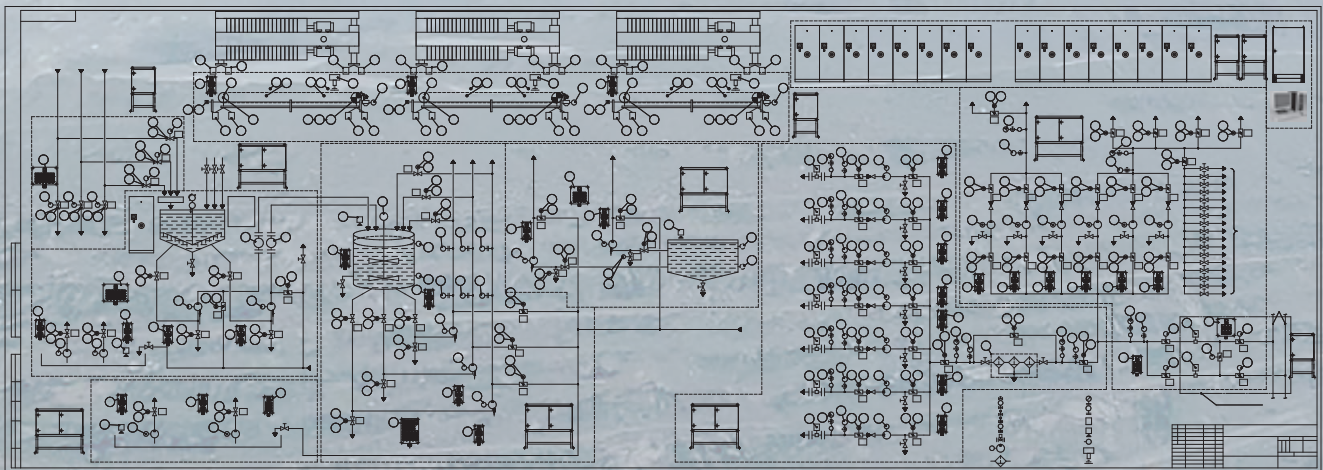
RPE Dneproenergostal for over 45 years incorporates highly skilled professionals, successfully working in the field of gas cleaning equipment and dust catching technology. The range of services covers many practical problems arising in the field of dedusting and gas cleaning - from the development of design documentation to performing a complex of construction and installation, pre-commissioning and commissioning of gas cleaning plants in operation.

LLC “KB Energomashproekt” - is a company focusing on performing complex works in the field of industrial energy and energy- saving technologies from design to commissioning of boiler and power equipment using solid fuels of organic origin.



Stages of project implementation:

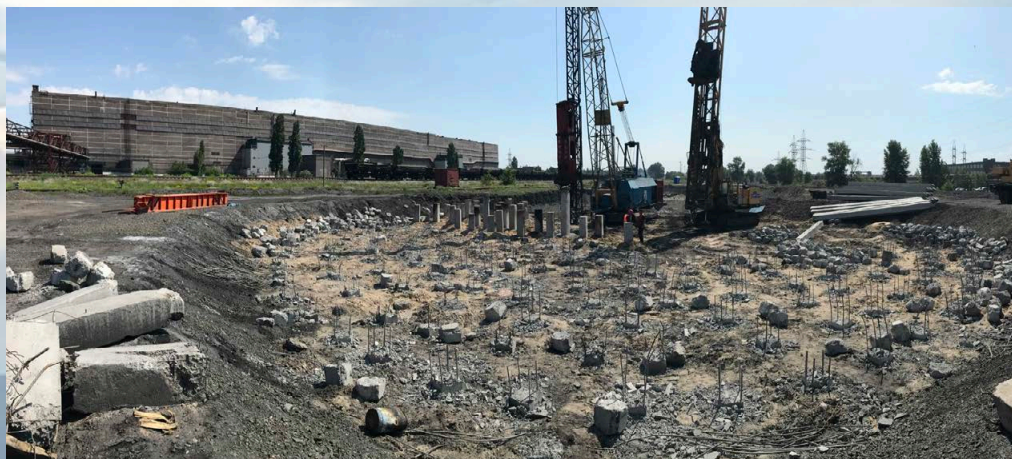
- *Creation of a working group with the involvement of the customer*
- *Preparation of a design assignment*
- *Key technical solutions*
- *Feasibility study*
- *Implementation of stage P*
- *Preparation of working documentation*
- *Support of the project implementation process – designer supervision and other works*



Design Sections

- **Stage «Project»**
*Architectural planning calculation
 Process solutions, process lines, conditioning,
 Electric equipment, electric lighting, electric power supply, sanitary protection,
 software, general layout, architectural & civil engineering solutions, heat and
 ventilation, water supply and sewage, safety block, construction management
 plan, environmental impact assessment, fire alarm, utility equipment, civil safety,
 engineering equipment*
- **Stage «Working documentation»**
*Process solutions, process lines, conditioning
 Electric equipment, process flow automation, electric lighting, electric power supply,
 sanitary protection,
 general layout, architectural section, metal structures, concrete structures, heat and
 ventilation, water supply and sewage*
- **Development of functional and technological schemes**
- **Design of the process control system for a workshop (site)**

Mining and metallurgical industry. EPC contract.



Construction stages

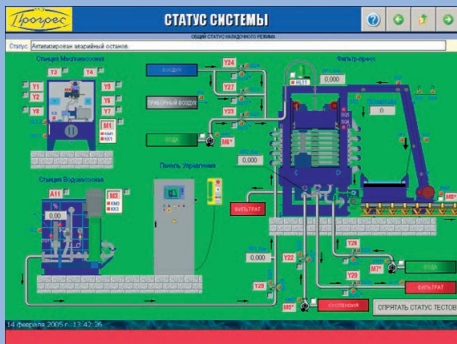
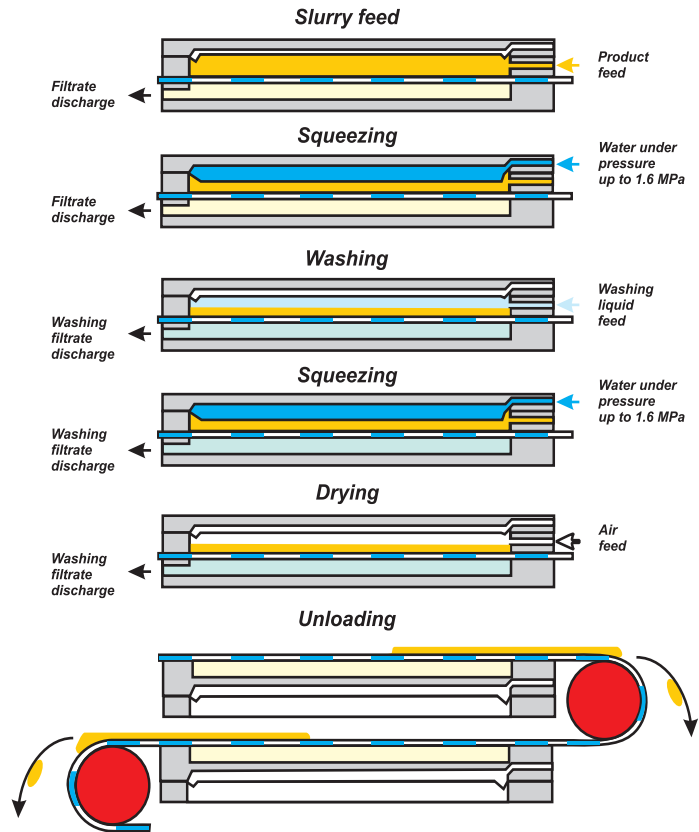
- *Earthwork operations*
- *Construction of foundations*
- *Reinforced concrete works*
- *Fabrication and installation of metal structures*
- *Supply and installation of technological equipment*
- *Installation of conveyor equipment and pipelines*
- *Installation of technological equipment*
- *Laying electrical cables*
- *Completion of installation of buildings and structures*
- *Installation of sandwich panels and roof*
- *Installation supervision*
- *Starting equipment under load*



Unique design of the tower filter presses with horizontal positioning of filtering partitions provides performing of the filtering process in the most optimal conditions, therefore reducing the duration of auxiliary operations and accordingly increasing the filter-press capacity in comparison with other filter types.

Benefits of the automatic tower filter presses “PROGRESS”:

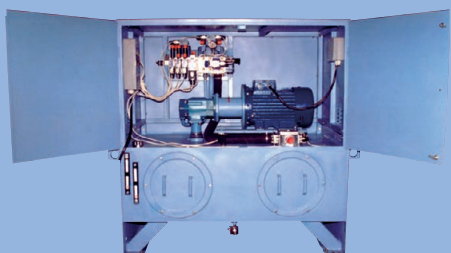
- Complete automation of the operation process and no need of service personnel participation.
- Possibility to adjust wide range of cake moisture and thickness.
- Optimal conditions for cloth regeneration during the filter-press operation process.
- Cloth unloading and regeneration are combined in one operation.
- Low power consumption, minimal operating and maintenance costs.
- Complete cake discharge.
- Short-time auxiliary operations.



Automatic tower filter presses “PROGRESS” are equipped with automatic control systems, based on microprocessors of the world leading companies, such as Siemens, Allen Bradley, ABB, Bernecker & Reiner and others. PLC system allows to control filtering process automatically according to preset process cyclogram as well as to change the cyclogram in operation process.

Water pumping station is used to supply pressurized water onto the squeezing membranes in order to lower cake moisture.

Water pumping station is equipped with vertical centrifugal pump and control devices.

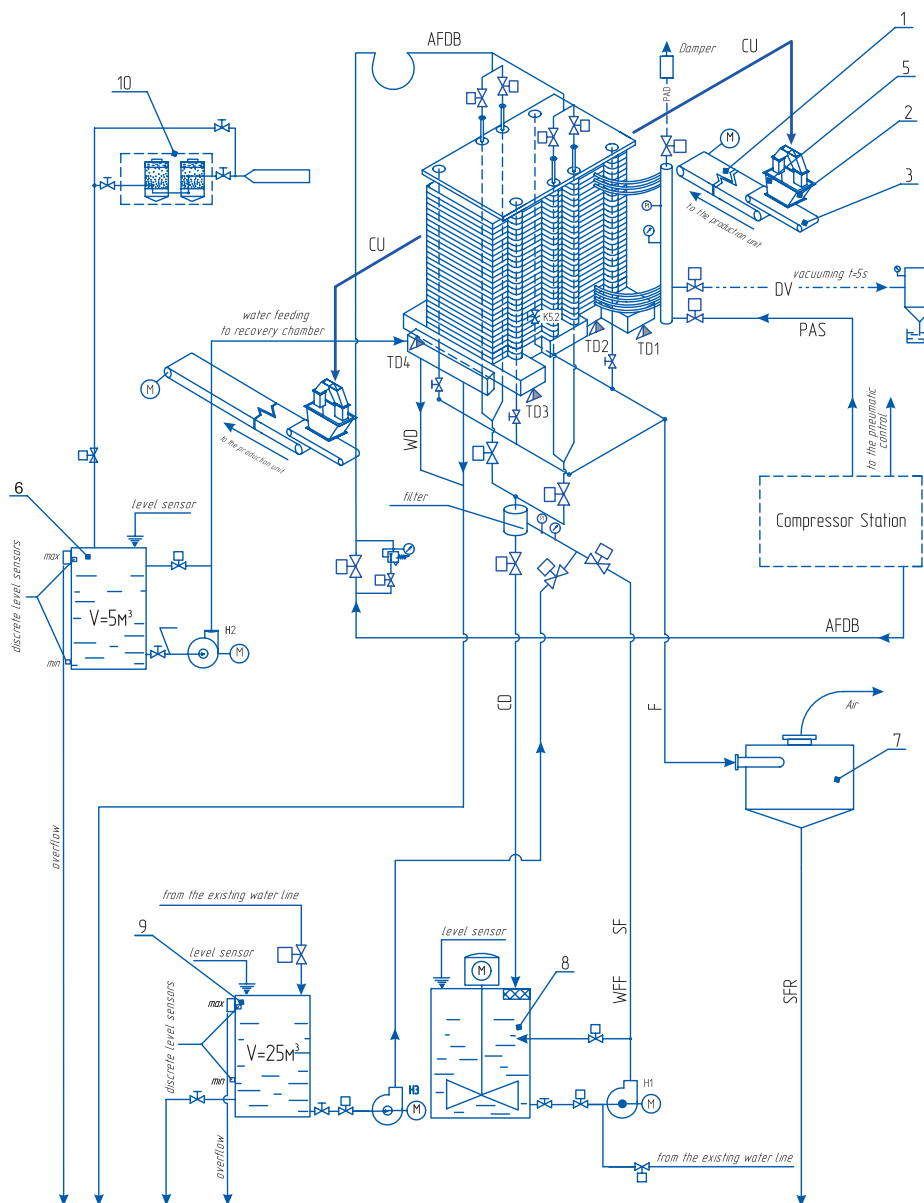


Hydraulic power pack provides operation of clamping mechanism, mechanical cake discharging and tensioning of filter cloth.

Component parts of leading world manufactures such as Rexroth Bosch Group, Hydac as well as of manufactures of CIS countries are used to equip hydraulic power pack.

Automatic tower filter presses “PROGRESS”

Typical process piping of automatic tower filter presses



- 1 Belt conveyor at a workshop
- 2 Storage hopper
- 3 Belt feeder
- 5 Isotope moisture control sensor
- 6 Cloth regeneration station
- 7 Filtrate vessel
- 8 Surge vessel
- 9 Washing filtrate vessel
- 10 Hardness removal station
- H1 Slurry and washing filtrate pump
- H2 Regeneration water pump
- H3 Flushing water pump
- TD1, TD2, TD3, TD4 weight measuring sensors

- F Filtrate
- DA Drying Air
- CD Concentrate Discharge
- WD Water Discharge from regeneration chamber
- SF Slurry Feed
- SD Slurry Drain
- SAF Squeezing Air Feed
- SAD Squeezing Air Discharge
- DV Diaphragms Vacuuming
- DBAF Drying and Blowing Air Feed
- WF Washing Filtrate
- WFF Washing Filtrate Feed
- SFD Sludgy Filtrate Drain

Automatic tower filter presses “PROGRES” are equipped with up-to-date wear-resistant valves which are installed on slurry feed and discharge manifolds, feed of washing water and drying air.



Specialized tower filter presses KMPm are designed for filtering of easy and not very difficult to filter slurries containing from 50 up to 1200 kg/m³ of suspended particles and with solid phase density up to 5000 kg/m³.

Cake thickness can be within the range of 10-40 mm. Slurry temperature: 5-80°C. The most effective usage of filters KMPm is to obtain cake of low moisture.

The unique design of the filter allows achieving the minimum cake moisture (6-9%) when dewatering slurries, formed in the process of

**Tower filter presses KMPm with filtering area
up to 196 m²**



benefication of nonferrous metal ores such as copper, zinc, lead, etc.

Filter presses KMPm are equipped with additional actuators to move the filter cloth during cake discharge and reduce the load on the filter cloth.

Filter parts contacting with product can be made of carbon steel, stainless steel, and titanium; the choice of material depends on product's properties.



Automatic tower filter presses

Progress-KMPm



The main parameters and dimensions of the filter press KMPm-196:

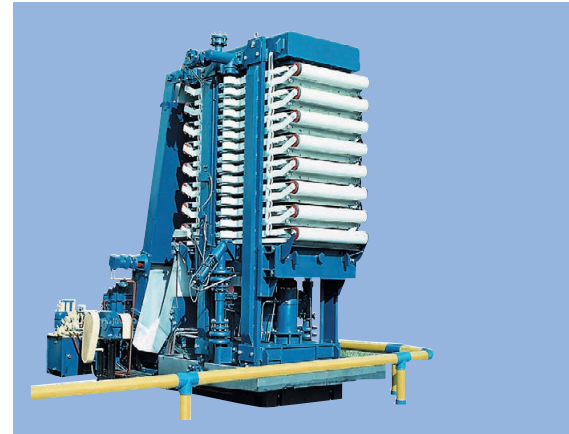
Filtration area, m ²	196
Chamber cavity volume, m ³	8,82
Filter-press operating pressure (Not exceeding), MPa (kgf/cm ²):	
- filtration	0,8 (8)
- drying	0,8 (8)
Slurry squeezing system air pressure (Not exceeding), MPa (kgf/cm ²):	1,2 (12)
Hydraulic system operating pressure, MPa (kgf/cm ²):	
- plates shifting	8,0 (80) - 10 (100)
- plates fitting	3,0 (30) - 8,0 (80)
- hydraulic drives	8,0 (80) - 14 (140)
Washing unit water pressure (Not exceeding), MPa (kgf/cm ²):	7,5 (75)
Operating medium	suspension
Operating medium condition	liquid
The particle size of the solid phase, mm	not exceeding 3
Operating medium temperature, °C	
- maximum	80
- minimum	5
Estimated number of filter plates, pcs.	28
Filtration chamber depth, mm	43
Recommended dimensions of the filter cloth, mm:	
- length	161000
- width	1900
- depth	1,5...2,0
Installed capacity, kW, not more:	130
motors:	
- oil pump station	99,7
- water pump station	30
control circuit	0,4
Overall dimensions of the filter press with the service platforms, mm:	
- length	12150
- width	6420
- height	7935
Weight of the filter press in the scope of supply with the automation system, kg	155550



KMP automatic tower filter-presses are used for separation into liquid and solid phase of not very difficult- and difficult-to- filtrate slurries, containing from 50 up to 500 kg/m³ of suspended particles and forming cakes with high hydraulic resistance.

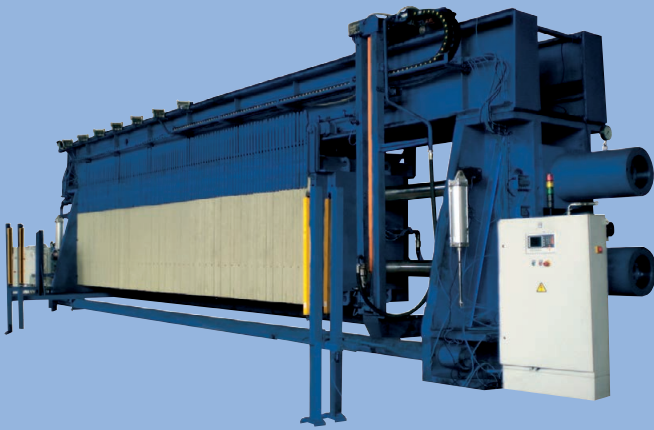
They allow to optimize the operation duty by changing the cake thickness within the range from 5 up to 32 mm.

Standard sizes range of tower filter presses KMP with filtering area - from 2,5 m² up to 32 m².



Technical characteristics

	KMP 2,5	KMP 5	KMP 10	KMP 12,5	KMP 22	KMP 25	KMP 32	KMPm 38
Filtering area, m ²	2,5	5	10	12,5	22	25	32	38
Pressure , Mpa :								
- operating (suspension, washing liquid, air, water, while squeezing with membrane), not more than					1,6			
- washing liquid for cloth recovery, not more than					0,3		1,6	
- oil in hydraulic control system					2		10	
- oil in hydraulic clamping system, not more than					15		25	
Temperature of working medium, °C					5 - 80			
Filtration plate chamber depth, mm	35	35	40	35	40	35	35	45
Max. admissible load by wet cake, kg/m ² •h	110	110	400	110	400	110	110	650
Installed power of filter-press, kW, not more				6,3			9,3 19,2	
Installed power of water pumping station, kW, not more					30			
Power supply from mains with deady grounded neutral:								
- frequency, Hz					3~50			
- voltage ,V					380			
Overall dimensions, mm:								
- length	3150	3150	3976	3976	3976	3976	3840	4430
- width	2215	2215	2895	2845	2895	2845	2845	4600
- height	2860	3605	3515	3515	4635	4635	5320	5260
Weight, kg	6490	7745	12340	12740	16440	16770	19060	26500



The horizontal chamber filter presses FKM with upper suspension plates are designed for filtering suspensions (separation of solid and liquid phase) at a pressure in various industries.

The filter press consists of a set of filter polypropylene plates suspended from the upper beam, a stationary plate and cross-resistant, flexible pressure plate, clamping mechanism, the mechanism of movement of plates, block headers. The automation system of the filter press is based on industrial controllers the world's leading manufacturers. The automation

Standard sizes range of chamber filter presses FKM with filtering area - up to 1300 m².

system controls all the actuators, valves and fittings and accessories. Upon request, the filter press can be equipped with an automatic device to restore the filtering properties of tissues (regenerating system), safety curtains, curtain railings and lighting, ensuring safe handling of the filter press.

The main process steps: a clip package of plates; filtering; extraction of sediment; washing of the precipitate; drying the precipitate; purge the collector supply; profiteer package of plates; discharge of sediment.

Filter presses can be equipped with FCM chamber, chamber membrane and membrane packages of plates. The presence of membrane plates in the package allows you to perform the operation «Spin sludge», which allows you to further reduce the moisture content of sediment.

Filter presses are made based on the filter plates in the following sizes: 1000x1000mm, 1200x1200mm, 1500x1500mm, 1500x2000mm, 2000x2000mm, 2440x2440mm filtration surface area from 35 to 1300m² and the depth of the chamber from 15 to 50mm.

Most filter press plates are with central feed of slurry; though plates with angle feed hole or up/down placed, or external top feed hole can be used. By the way of filtrate discharge there are filter presses with open and close discharge.

Discharge of sediment from the filter press is carried out through the mechanism of transfer plates, which can be implemented as follows:

- Reciprocating movement of the carriage with one plate;
- Reciprocating movement of the carriage on some boards (particle-batch discharge);
- One-way traffic with the movement of carriages on one plate;
- Batch upload all plates with movable cross-arm and pressure plate.

Filter press' parts contacting with product can be manufactured of the following materials: carbon steel, titanium alloy, stainless steel, and polypropylene.



Horizontal chamber filter presses FKM with side suspension of plates are designed for filtering of slurries under pressure (liquid-solid-separation) and applied in various industries.

Chamber filter presses FKM with side suspension of plates filtering surface area up to 1300 m²

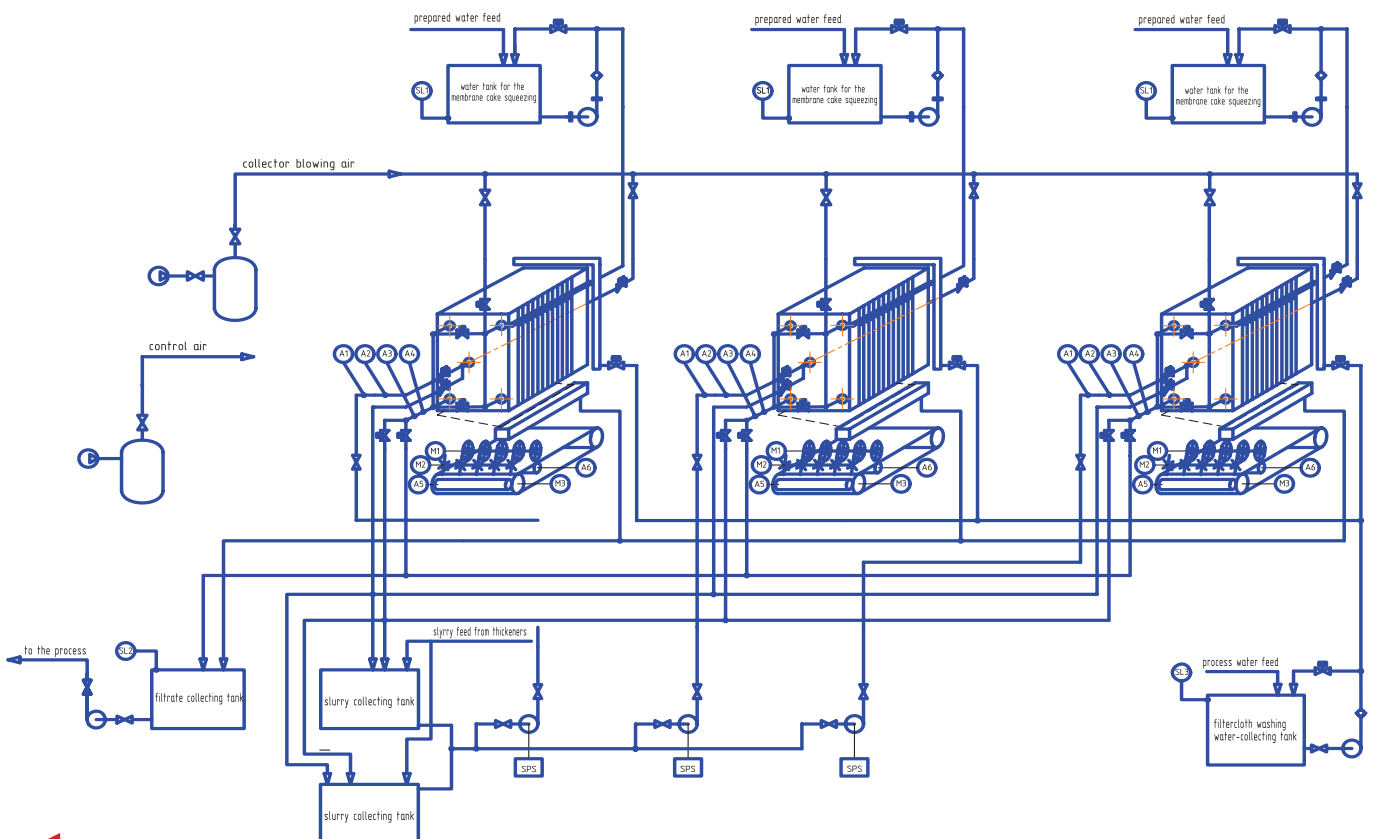


Filter presses with side plate suspensions can be equipped with plates of the following standard sizes: 800x800mm, 1000x1000mm, 1200x1200mm, 1500x1500mm, 1500x2000mm, 2000x2000mm, 2440x2440mm; chamber depth is from 15 up to 50mm; with hydraulic clamping of plate pack.

On special request we can manufacture filter presses with manual clamping of plates sized 315x315mm, 470x470mm, 630x630mm and electromechanical clamping of plates sized up to 1000x1000mm.

Filter presses with side and top suspension of plates have equal process parameters and automation systems; they are identical in process steps and component parts. Filter presses with side plate suspensions are easy and convenient to operate. This type of suspension allows quickly replacement of plates and easy filter press maintenance. Filter presses with top suspension of plates facilitates operator access to the plates during cake discharge and filter cloth replacement.

Typical filtration unit process diagram of chamber-membrane filter-presses.



Horizontal filter press FKM500 of high unit capacity

The filter press surface area is 500 square meters. The design of the filter press allows quick cake discharge and speed up work of all components, which is extremely necessary to reduce the cycle when dehydrating such easily filtered slurries as ferrous and nonferrous metal ores.



The automation level allows you to program the filter press to obtain the moisture content within the desired range before start of discharge process.

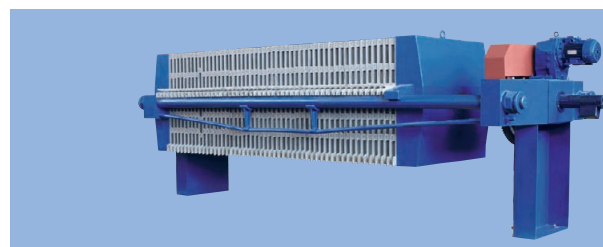
Permanent high precision humidity monitoring of discharged cake and its weighing is used as control function. GSM module, as an option, allows you to monitor the operation of the filter press worldwide.



Plate-and-frame filter-presses ROR, ROM, RZR, RZM

Plate-and-frame filter-presses ROR, ROM, RZR, RZM are designed for filtering neutral, alkaline and acidic slurries with the content of solid phase up to 500 kg/m³.

Cotton, polypropylene, polyethyr, polyamide fabrics are used as filtering partitions.



Technical characteristics

Type of filter press	Dimensions of frames in light, mm	Filtering area, m ²	Frames thickness, mm	Operating pressure, Mpa	Temperature of working medium, °C	Installed power, kW	Overall dimensions, mm:			Weight, kg
							length	width	height	
ROR RZR	315x315	2	45	1	up to +45	-	1750	1000	645	620
		2,8	25				1730			680
		4	45				2400			940
		5,6	25				2360			1020
ROM, RZM	630x630	16,0	45	0,8	up to +45	3,0	3450	1270	1340	3905
		22,4	25				3450			4395
		25	45				4300			5375
		35,5	25				4300			6180
ROM, RZM	820x820	40	45	0,6	up to +45	3,0	4120	1470	1500	7350
		50	45				4720			9020
		56	25				4120			8640
		63	45				5270			10520
		80	25				5170			11565
ROM, RZM	1000x1000	80	45	0,4	up to +45	3,0	4920	1700	1600	9820
		100	45				5520			11770
		112	25				4920			10910
		140	25				5520			12870

Developed filtering area, high dewatering level, perfect safety system, operation and service safety, reliable maintenance guarantee optimal operation of plate-and-frame filter-presses ROR, ROM, RZR, RZM and make them indispensable in many branches of industry.



Continuous-running belt filter-presses are used for dehydration of organic and fine-mineral suspensions of the food-, pulp-and-paper production plants, petrochemical, metallurgical, coal and other plants.

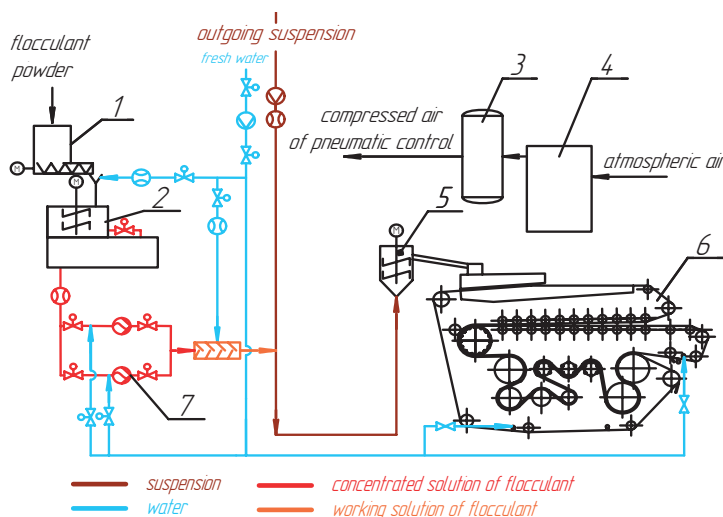
Dehydration of sludge is carried out by flocculation of the initial suspension, followed by drainage of free water and the mechanical squeezing of sludge between the two grids.

Filter press is equipped with automatic belt tensioning system and belt misalignment prevention system, scrapers for belt cleaning from the cake, automatic belts washing system, automatic system for squeezing pressure maintaining in case of load parameters changes.

Filter presses LMN are produced with the filter belts of the width: 500, 700, 1000, 1500, 2500, 3200 mm.

Alongside with belt filter press delivery we can provide customer design piping and accessory equipment (flocculants treatment and dosage station, unit for dilution of concentrated flocculants, flocculants) and additional automation system.

Typical process piping diagram of the filter-press



1. dispenser for the flocculant powder
2. flocculant supply station
3. receiver
4. compressor
5. reactor (flocculator)
6. belt filter press
7. cavity pump-dispenser

— suspension
— water
— concentrated solution of flocculant
— working solution of flocculant

Technical characteristics

	LMN 2	LMN 10	LMN 15	LMN 16	LMN 17	LMN 20
Belt width, m	1,0	1,5	1,5	2,0	2,0	2,5
The belt motion speed, m/second	0,6-6	0,01-0,1	0,025-0,25	0,013-0,04	0,045-0,3	0,01-0,1
Material of parts contacting with the product	1*	1*	2*	1*	2*	1*
Installed power, kW	1,5	3	4,2	1,5	8	8,5
Overall dimensions, mm:						
- length	2500	5900	5650	5040	9300	6500
- width	1900	2945	3150	2570	2600	4400
- height	1100	2265	3310	2985	3000	3360
Weight, kg	1375	5602	10360	6500	7000	17895
1* - Steel, GOST 08X18H10T + rubber coating		2* - Steel GOST Cr3nc2 +rubber coating				

Vacuum Belt Filters are designed for the separation of aggressive and nonaggressive fast sedimenting suspensions with inhomogeneous solid phase.

Belt vacuum filters LON are successfully used for dewatering of quartz sand, rough ilmenite and zirconium concentrates, as well as similar crystalline products.

Belt vacuum filters LON are characterized by high reliability, structural simplicity and ease of maintenance.

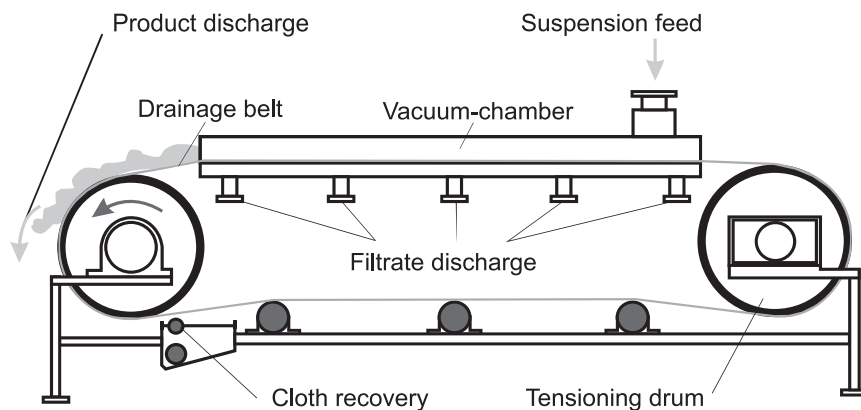
In contrast to other types of filters, there is no need to supply compressed air to LON filters. Filters of this type can use cloths without high strength properties, since the cloth is not tensioned and all loads are carried by reinforced rubber belt.



Filtration is carried out through a filter cloth fixed on the outer surface of the rubber-fabric drainage belt.

An optimal dewatering is achieved by adjusting the rotation speed of the belt using an AC frequency converters.

Optionally the filter can be equipped with a device for measuring the sediment volume, which allows to determine the current and the total capacity on the bone dry weight with sufficient precision.



Technical characteristics

	LON 1,8	LON 4,5	LON 7,5	LON 10	LON 12
The actual surface area of the filter, m ²	1,8	4,5	7,5	11,8	14,1
Operating Pressure Drop (vacuum), MPa, not more than:	0,084				
The length of the vacuum chamber, operating, m	3,6	9,0	7,5	9,3	11,3
The width of the filter tape, operating, mm	500	500	1250	1250	1250
Operating temperature, °C	+ 10 ... + 60				
Characteristics of power line	3~50 Hz 380 V				
Drive power, kW, not more*:	4	5,7	11	12,5	15
Overall dimensions, mm, not more than:					
- length	5230	11720	8960	13500	14600
- width	2170	2130	3150	3240	3240
- height	1435	1600	2100	2800	2590
Weight, kg (depending on the execution)	1800-2470	4093-4413	8340	9730-9820	10475

* Drive power is determined by the specific weight of the product and process speeds.



Vacuum belt filters are designed for separation of aggressive, not aggressive and quick settling slurries with inhomogeneous solid phase.

These filters are used in chemical industry (for floatation of potassic wastes and other chemical slurries filtration); in coal industry (for coal concentrate filtration); in mining industry; in food industry and other branches of industry.

The scope of delivery includes: a filter with a drive, a control system, a drainage belt and filter cloth. Accessories are available on request: a vacuum pump, an air trap and receiver trap.

To ensure the efficiency of the filtration process, uniform sludge moisture content and stable performance, a level gauge is installed in the sludge drying or unloading zone, which controls the supply of the slurry to maintain a stable

sludge height, regardless of fluctuations in the density of the slurry. The sediment level gauge also regulates the supply of the initial suspension to the filter by reducing or increasing the speed of the pump drive, or by positioning the position of the stop valves on the supply of the suspension (depending on the type of filter).

For easy replacement of sealing belts, the vacuum filters are equipped with a system of lowering of a vacuum chamber.

Depending on the width of the vacuum filter drain belt, an air-cushioned drain belt support system or roller supports can be used. This system will significantly reduce the frictional force on the rubber band, ensuring a long service life with continuous operation of the filter.

To reduce downtime of equipment associated with the occurrence of emergency stops and reduce their consequences, it is possible to install additional sensors (pressure sensor in the receiver, vacuum sensor on the receiver traps, rotation sensor on pump drives, etc.). They provide control of the state of the main and auxiliary equipment with visualization on the screen of the control panel, as well as correct stop in emergency situations.

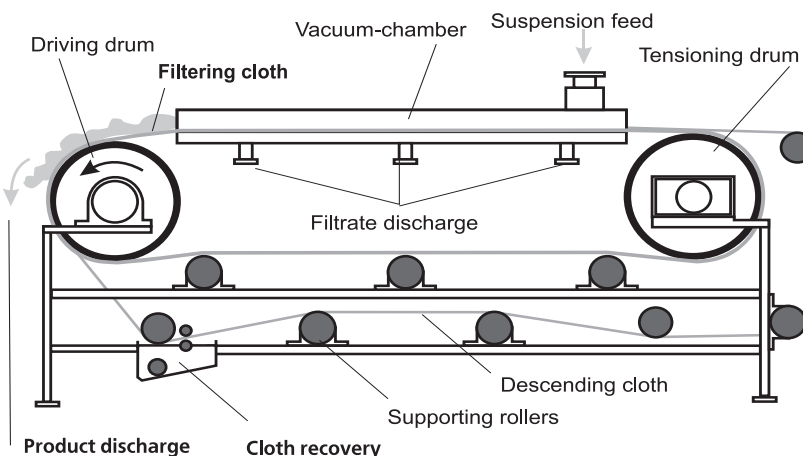
On belt vacuum filters it is possible to wash the sediment using a single-stage washing. Multi-stage washing makes it possible to obtain a sediment with a minimum content of soluble impurities. It is also possible to use multi-stage countercurrent washing on these filters, which can significantly reduce the consumption of water.

To ensure uninterrupted operation of the filter and its operations (filtering, washing, drying, sludge discharge), the filter can be equipped with elements of a vacuum system, depending on the technological requirements (removal of a portion of turbid filtrate, separate removal of washing liquids, dampening of vaporization) according to the attached standard technological binding scheme.

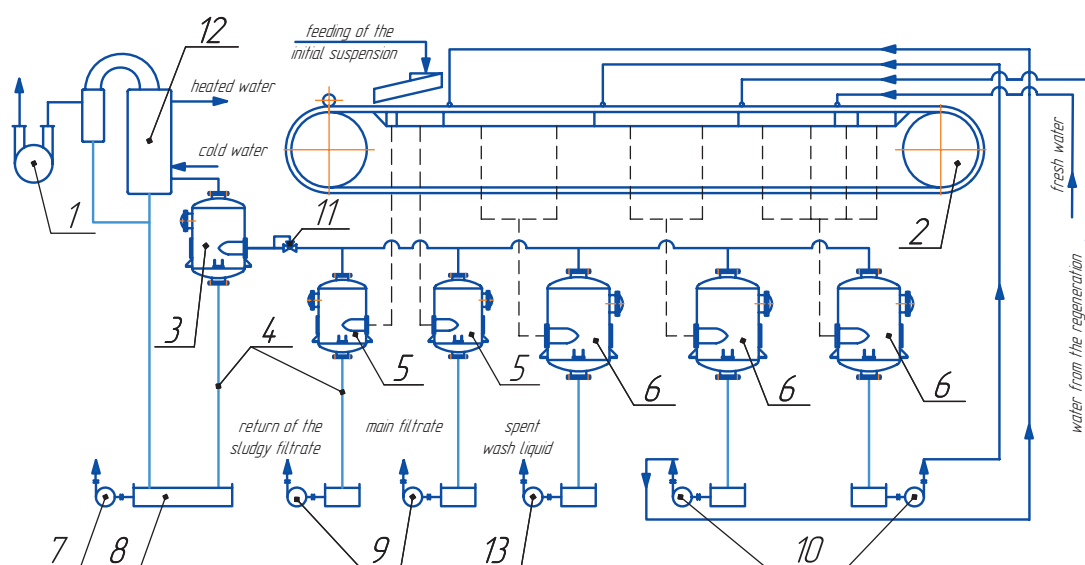
In addition to the basic functions of centering and adjusting the speed of the filter cloth, it is possible to automate the entire filtration process.

Filters manufactured by the Progress plant are developed taking into account many years of experience in the production and operation of belt vacuum filters at enterprises in various industries, as well as analysis of designs and operating experience of filters from leading world manufacturers. This ensures reliability and durability of operation, which is confirmed by many years of operation of this type filters.





Typical process piping diagram



- | | |
|---|---|
| 1 Vacuum pump | 8 Seal water tank |
| 2 Belt vacuum filter | 9 Pump outlet and the main filtrate turbidity |
| 3 Receiver-trap (drip tray) | 10 Feed pump circulating wash liquid |
| 4 Barometric post | 11 Vacuum gate valve |
| 5 Receiver-trap drain muddy ground filtrate | 12 Capacitor |
| 6 Receiver-washing liquid drain trap | 13 The pump discharge the spent wash liquid |
| 7 Pump liquid discharge eliminator | |

Technical characteristics

Filtering surface area, m ²	1,8	4,5	10	15	20	25	30	40	61	64	70	110
Operating pressure (vacuum), MPa	0,05...0,084											
Operating temperature, °C	10-80											
Installed power, kW*	1,2	8	11	15	18,5	22	22	30	30	30	55	75
Overall dimensions, mm:												
- length	6080	12500	13594	12725	16580	19210	17050	15226	22250	27650	25050	33400
- width	2115	2115	2818	3410	5450	5450	6227	3065	8195	6000	7345	8195
- height	1724	1724	3015	2542	3258	3120	3121	2121	4800	3125	4845	4800
Weight, kg	2214	2214	10050	11000	30000	33000	35000	39950	48000	49000	58000	90000

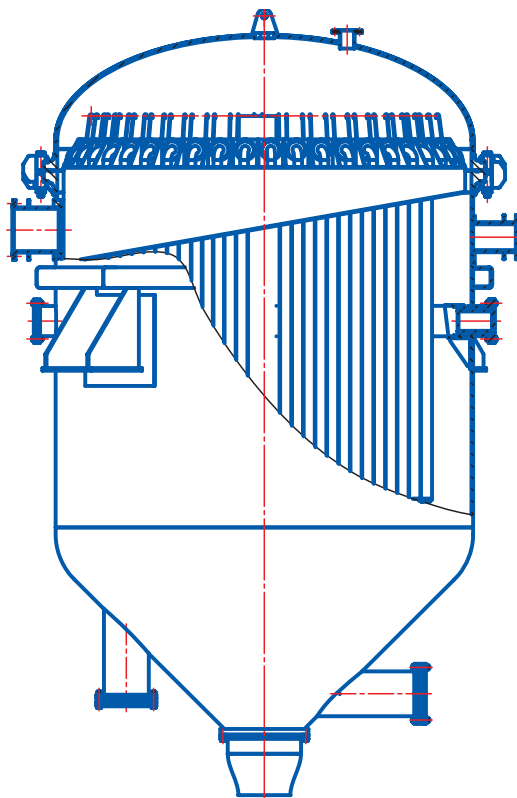
* Drive power is determined by the proportion of product and process speeds.

Leaf vertical filters MVR, MVK, MVV, MVJ are designed for filtering fine-disperse, highly viscous, easily evaporating, oxidizing, toxic suspensions.

Filter elements can be manufactured for operation with precoat and without it. Cake is removed with the help of vibrator or hydraulic wash-out pipe.

Filtering leaves with drainage mesh, equipped with filtering mesh or cloth are used as filtering elements.

Filters are operated in automatic and semi-automatic modes



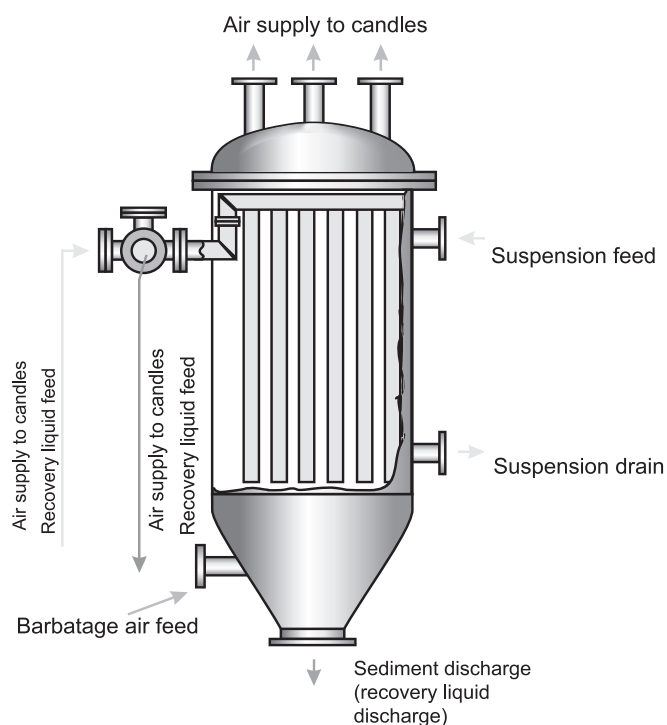
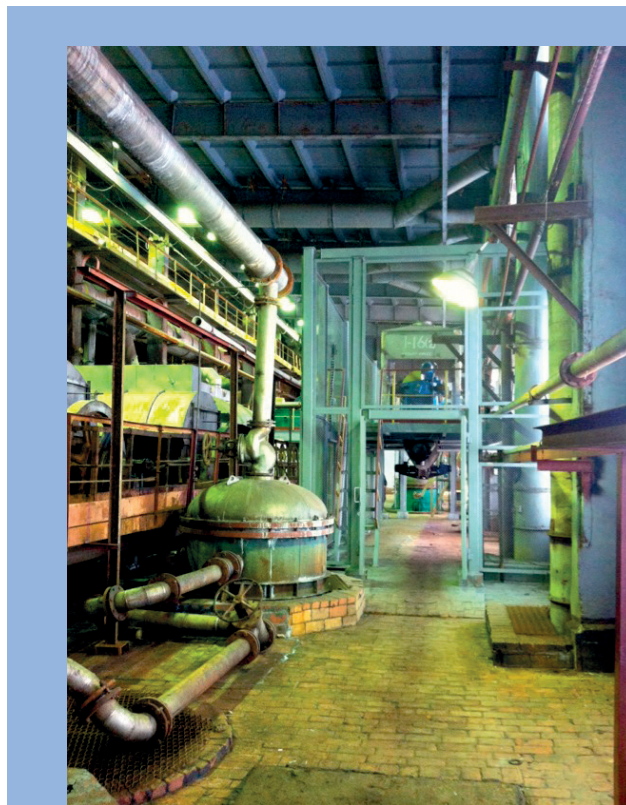
Technical characteristics

	MVR 3,5	MVV 20	MVK 25	MVZh 125	MVZh 250
Filtering area, m ²	3,5	20	25	125	250
Body volume, m ³	0,008	2,0	2,02	12,5	25
Body pressure, MPa	0,6	0,4	0,4	0,4	0,4
Temperature of working medium, °C	85	100	90	90	100
Installed power, kW	-	-	0,25	0,75	0,75
Overall dimensions, mm:					
- length	600	1945	2000	4160	4800
- width	600	1945	1850	3100	4500
- height	1450	2695	3385	5740	6815
Weight, kg	196	2567	2015	9170	18840

Ceramic Candle Filters PKJ, PKO and Pressure Candle Filters PMJ, PTJ, PTV, PTK

Ceramic candle filters PKJ, PKO and pressure candle filters PMJ, PTJ, PTV, PTK are designed for thickening and decolouring filtration of slurries under pressure.

Filtering surface area from 2,5 to 80 m²



Filter is operated in automatic and semi-automatic modes.

Filters have developed filtering area and provide high filtrate purity. Low maintenance cost, high efficiency guarantee optimal use of candle filters and make them indispensable in many branches of industry.

Technical characteristics

	PMJ 2,5	PMJ 10	PTJ 5	PTJ 20	PTJ 80	PTK 80	PTV 5	PTV 20
Filtering area, m ²	2,5	10	5	20	80	80	5	20
Body volume, m ³	0,225	0,63	0,63	2,25	11,0	11,0	0,63	2,25
Pressure inside the body, MPa	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3
Temperature of working medium, °C	40	40	60	90	90	90	60	90
Installed power, kW	-	-	-	-	-	5,5	2,2	2,2
Overall dimensions, mm:								
• length	850	1255	1280	2240	3300	3600	1660	2050
• width	810	1210	920	1990	3270	3300	1360	1990
• height	1545	1950	1970	2970	5560	4870	2220	3390
Weight, kg	280	830	500	2770	9110	8060	515	2870

Weight is indicated without automatic control system and set of spares, tools, accessories.
All the data are given for filters made of corrosion-resistant steel.

Technical characteristics

	PKJ 1	PKJ 5	PKJ 10	PKJ 20	PKJ 40	PKO 40	PKO 80
Filtering area, m ²	1	5	10	20	40	40	80
Body volume, m ³	0,16	0,55	1,35	3,7	6,3	6,0	11,4
Pressure inside the body, MPa	0,6	0,6	0,6	0,6	0,6	0,6	0,6
Temperature of working medium, °C	80	100	80	80	80	80	80
Overall dimensions, mm:							
• length	700	1200	1530	1870	2480	2540	3055
• width	670	820	1250	1650	2080	1730	2630
• height	1350	2220	2900	3800	4220	4760	5685
Weight, kg	165	430	890	1820	2900	3272	6030

All data are indicated for filters made of Titanium.

Apparatuses design allows to perform additional technological operations for cake drying with air (if required).

Leaf horizontal filter MGV

Leaf horizontal air-tight with heating and vibrational cake removal filters MGV are designed for purification of remelted Sulphur in Sulphuric acid production, and also for decolouring filtration of solutions and remelted substances.

Filters can be manufactured for operation with precoat and without it. Cake is removed with the help of vibration shaking.

Filtering leaves with drainage mesh equipped with filtering mesh are used as filtering elements. Filters are operated in automatic and semi-automatic operation duties.

Upon the requirements of the customer we can manufacture filters out of low-carbon, highly corrosion-resistant steels.



Technical characteristics

	MGV 20	MGV 60	MGV 130
Filtering area, m ²	20	60	130
Body volume, m ³	2,5	5,0	19
Pressure inside the body, MPa	0,4	0,4	0,4
Temperature of working medium, °C	150	150	150
Capacity w/w remelted Sulphur, m ³ /h	10	30	40-60
Installed power, kW	4,75	6,74	11
Overall dimensions, mm:			
• length	4950	6275	10370
• width	1950	2250	2000
• height	2240	2420	3160
Weight, kg	3158	5950	9520

Is possible to manufacture filters with filtration surface area up to 200 m²

Pressure Disc Filters DPR

Filters are designed for filtering Copper sulphate, Nickel sulphate and other electrolytes.

Filters provide high quality of electrolyte, its heat-resistance up to 60 °C, high capacity and time savings.

Time can be saved due to the design of filtering package, envisaging its quick replacement, and small dimensions of the filter, which makes it possible to move it fast to the required bath.

Technical characteristics

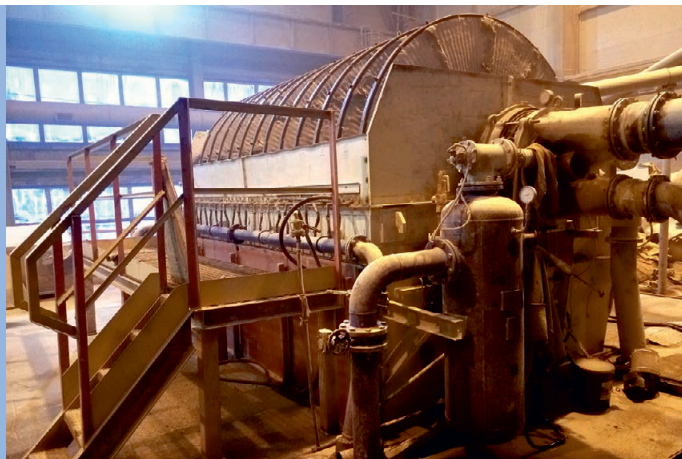
	DPR 2,5	DPR 3,2
Filtering area, m ²	2,5	3,2
Body volume, m ³	0,055	0,074
Pressure inside the body, MPa	0,2	0,2
Installed power, kW	3,0	3,0
Number of filter tanks, pcs.	1	2
Overall dimensions, mm:		
• length	860	1150
• width	540	560
• height	875	900
Weight, kg	142	192



Disk vacuum filters DOO are designed for separation of suspensions with the up to 70% content of solid phase with up to 5000 kg/m³ of solid phase density and for suspensions which are forming crack-free deposit and deposit which does not require flushing.

The unique design of disc vacuum filters DOO consists in a large filter surface, at comparatively less required space. It provides filters DOO with the highest performance.

Moisture of produced cake, depending on the properties of the suspension (particle size), and provided by appropriate addition of reactants can reach 8,7-9,0% performance from 400 to 2000 kg/m² filter area. This the filters can be used for filtration of iron concentrate after wet magnetic separation, mineral concentrates obtained by flotation and gravity separation.



The temperature of the slurry for the filter made of carbon steel - 2-60°C, of stainless steel - 2-95°C.

Disk sectors can be made from the following materials: steel, galvanized steel and stainless steel, titanium and plastic.

It is possible to supply auxiliary equipment, including: receiver traps, diaphragm valves, liquid ring vacuum pumps, blowers, filter bags, valves, instrumentation, weight meters, etc.

To organize steam drying of the sludge, the filters can be equipped with a hipped roof (steam hood).

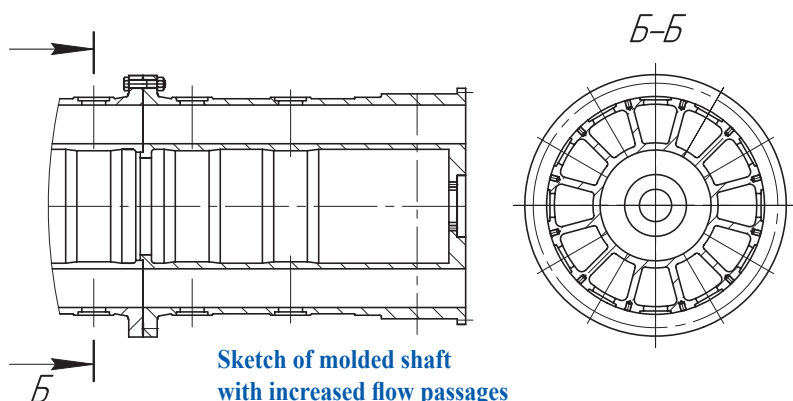
Technical characteristics

	DOO 16	DOO 32	DOO 50	DOO 63	DOO 80 "Ukraina"	DOO 100	DOO 160	DOO 160 «Донбас»	DOO 200	DOO 250
Filtering area, m ²	16	32	50	63	80	100	160	160	195	250
Discs diameter, m	2,5	2,5	2,5	2,5	2,7	2,5	3,2	3,75	3,72	3,75
Installed power no more than, kW	1,49	3,46	5,3	6,9	3,9	8,0	13,0	11,0	11,0	13,0
Operating pressure, MPa (kgf/cm ²)	0,085	0,085	0,085	0,085	0,085	0,085	0,085	0,085	0,085	0,085
Overall dimensions, mm:										
• length	2800	3600	4400	5500	6640	7400	7400	7200	7910	9500
• width	3200	3200	3200	3200	3230	4000	4400	4300	4320	4400
• height	3300	3300	3300	3300	2950	4100	4500	4100	4550	4600
Weight (without actuators), kg	4540	6300	8500	10100	10710	15180	24000	24890	27900	32500

New disc vacuum filters “DOO” with the casted iron shaft with increased cross-section.

Our specialists have designed a new disc vacuum filter with a tubular shaft and cast iron shaft with enlarged cross-section (this characteristic is specified in the designation of the filter at the end, numbers “04”), filtration surface area of 200 m².

Increased cross-section of these shafts, as well as the distribution heads, washers, cellular and distribution gaskets and sector neck can significantly reduce the resistance on the filtrate discharge path, improve hydro- and aerodynamic characteristics of the filter, provide the optimal conditions for filtrate discharge and effective drying of the cake.



The basis for this development were the technical and technological research results of disc vacuum filters under operating conditions, as well as many years of experience in the production of disc vacuum filters DOO100 / DOO63.

Also is possible to produce disc vacuum filters DOO in the budgetary version - with a tubular shaft. This option is in addition to the relatively smaller re-source of the shaft and is characterized by the low cost of its repair.

Main advantages of the filters with the casted iron shaft with increased cross-section are as follows:

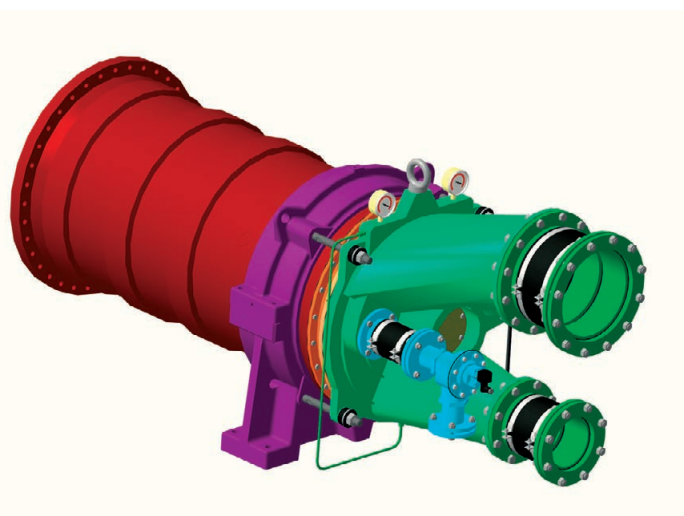
- increased performance at a lower filter cake moisture;
- increased endurance of the distribution heads;
- long interrepair time.

Ergonomics of the design solutions utilized in this new development guarantees convenient access of the operation personnel to the working zone of cake removal, to driving mechanisms, lubrication units and control and measuring instruments.

Description of main units of “DOO” filters modernization:

- Casted **cell shaft** with the increased flow section allows larger diameter, which significantly increase the flow capacity. The filters with this type of shaft have the highest specific performance and maximum service life.

- **Straight distributive head** (can be with increased or with standard cross-section) is a single-piece cast construction with abrasion resistant coating. Performance of distribution heads with propulsive filtrate discharge improves the aerodynamic characteristics of the filtrate discharge (increases the capacity of water mixture through the internal channels) that based on operating experience, can decrease the humidity by 0.5%. Application of this design (eliminates turbulence inside the head) and head material (material of manufacturing - cast iron with abrasion resistant coating) can increase their service life.



- **Filter bath** - to prolong the lifetime is covered by abrasion resistant coating
- **Sliding bearings** - cast block housings with additional installation of anti-friction inner liners made of plastics.
- **Rotary mixer** of improved design with an improved seal bearing units and automatic control.
- **Automatic centralized lubrication system** of the rubbing surfaces.
- **Sediment removal system** - adjustable in length and the number of pulses (up to 3 times) the system of pulse stripping.

The main advantages of the sludge instantaneous pulse stripping:

Comparison table of the cross sections in the shafts of disc vacuum filters from different manufacturers:

Producer	Name of equipment	Cross sectional area in the shaft, cm ²	Specific area of the shaft pass, cm ² /m ²	Note
BMBP Progress JSC	DOO-100-2,5-5U-02	96	23	Standard shaft
	DOO-100-2,5-5U-04	115	27	Tubular shaft
	DOO-100-2,5-5U-04(M)	174	41	Casted shaft with an incr. passage section
“UGMK Rudgormash”, S.A.C.	DOO-100-2,5-1U	122	29	Tubular shaft
“Uralkhimmash”, S.A.S.	DTVO-100 “Master”	122	29	Tubular shaft



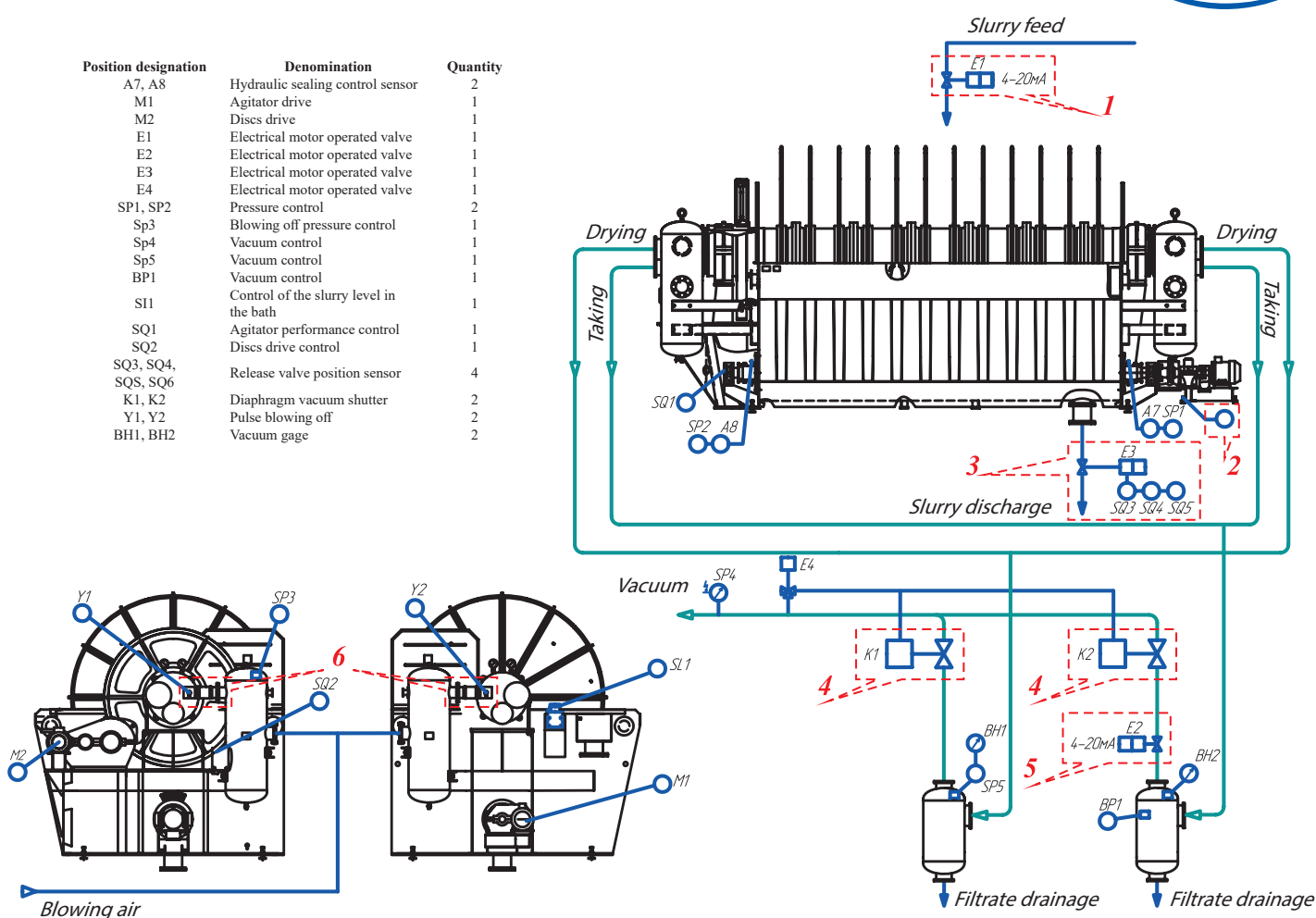
- Gentle effect on the filter cloth.
- Reduction of air stripping.
- Ease settings changing (quantity and duration).
- Reduction of water concentrate (moisture, which, when the filter is removed through the inner cavity of the shaft and is in it during the short cycles of stripping does not have time to go back through the cavity of the sectors in the sediment).
- Removal of sediment from the surface of the sector up to 99% (which affects the specific performance of the vacuum filter.)
- Regeneration of the filtering properties of the filter cloth (covers on the sectors)

In recent time industrial companies are paying attention to process technology and final quality of the produced products. Therefore the companies are modernizing their production facilities and installing centralized control system of operating process with the option of equipment remote control. The technological characteristics are recorded and displayed on common control panel which

allows to timely diagnose and correct deviations from the assigned parameters.

For this purpose our company has developed and successfully implementing new automation system of disc vacuum filters.

Position designation	Denomination	Quantity
A7, A8	Hydraulic sealing control sensor	2
M1	Agitator drive	1
M2	Discs drive	1
E1	Electrical motor operated valve	1
E2	Electrical motor operated valve	1
E3	Electrical motor operated valve	1
E4	Electrical motor operated valve	1
SP1, SP2	Pressure control	2
Sp3	Blowing off pressure control	1
Sp4	Vacuum control	1
Sp5	Vacuum control	1
BP1	Vacuum control	1
SI1	Control of the slurry level in the bath	1
SQ1	Agitator performance control	1
SQ2	Discs drive control	1
SQ3, SQ4, SQ5, SQ6	Release valve position sensor	4
K1, K2	Diaphragm vacuum shutter	2
Y1, Y2	Pulse blowing off	2
BH1, BH2	Vacuum gage	2



For today the control system can perform the following functions:

- 1) Automatic starting and stopping with automatic switching on and off of the vacuum and power supply / shutoff.
- 2) Automatic optimization of filtration, including: maintaining the level of suspension in the bath by adjusting the speed of rotation of the discs, depending on the amount of supply (in case of emergency); adjusting the amount of power supply to the filter; connection of the filter vacuum to the heads only at a given level of suspension in the bath; lock and alarm system: based on pressure and flow of water on the hydro seal, on the stop the conveyor, by the presence of the vacuum, along the lower level of the pulp in the bath, on the stop of the agitator drive, by the presence of stripping, on rotation of the disk.
- 3) Flexible adjustment by the operator of agitation mode of fabric covers (with adjustable time of stripping operations 0,08-3 seconds and the number of pulses 1-3 times) for adjustable instantaneous of stripping cake with automatic synchronization with the rotational speed of the cell shaft (increases performance and energy-efficiency of the filter).
- 4) Adjustment of the suspension volume
- 5) Double stage opening of slurry discharge valve from the bath.
- 6) Maintaining the temperature by local heating in the control cabinet.
- 7) Audible alarm at start-up of the filter and emergency situations.
- 8) Application of selfregenerating filters for sealing water cleaning (up to 50 mkm).
- 9) Purification of hydro seal water (up to 50 microns) of self-recovering filters.

Our lately developed automatic control system can be used for new disc vacuum filters as well as for modernization of already operated disc vacuum filters. Upon customer request automatic control system can be developed on the basis of world leading manufacturers of PLC, such a Siemens, Mitsubishi, etc. We can supply it with uninterruptible power supply 220 V, AC.

Process tasking of new automation system:

- Optimization of slurry intake – cake thickness adjustment.
- Prevention of emergencies at vacuum filter operation.
- Reduction of service operation on a vacuum filter.
- Ability to connect to upper level of automation.
- Ability to control the filter capacity.
- Ability to control moisture content of obtained concentrate.

The modernized automation system allows achieving the following:

- Increasing productivity of vacuum filter.
- Reduced moisture content of obtained cake.
- Long service life of filter cloth.
- Reduced energy consumption.
- Reducing of service time.
- Ability of commutation with shop automation of upper level.

Slurry density control (SDC) system



One of the recent developments of Berdichev Machine-Building Plant “Progress” is slurry density control (SDC) system in the filter bath. SDC system was implemented and tested at one of the iron-mining plants. The test results showed, in addition to the SDC system operability, the importance of adjusting the density of the slurry in the bath, as an important technological parameter having a significant effect on the moisture content of the concentrate. Based on the SDC system, modern filters are equipped with a patented SDS density control system that performs the slurry thinning to the operator-specified density.

The presence of the SDC system offers a new level of filtering process control (in real time with the setting of optimal values) to the technological staff of the ore-processing plants.

Another development is the patented FCC filter cloth monitoring system. This system allows to determine the presence of damage to the filter covers, prevents prolonged ingress of the solid phase into the internal cavities of the filter and prevents wear of parts and clogging of components with the solid phase.

Drying facilities on the basis of the rotating drum dryers BN

Rotary drum dryer BN (max. diameter 4.5 m) is a device of continuous operation.

It is designed for moisture removal (drying) of non-explosive, non-flammable and non-toxic granular materials.



Technical characteristics

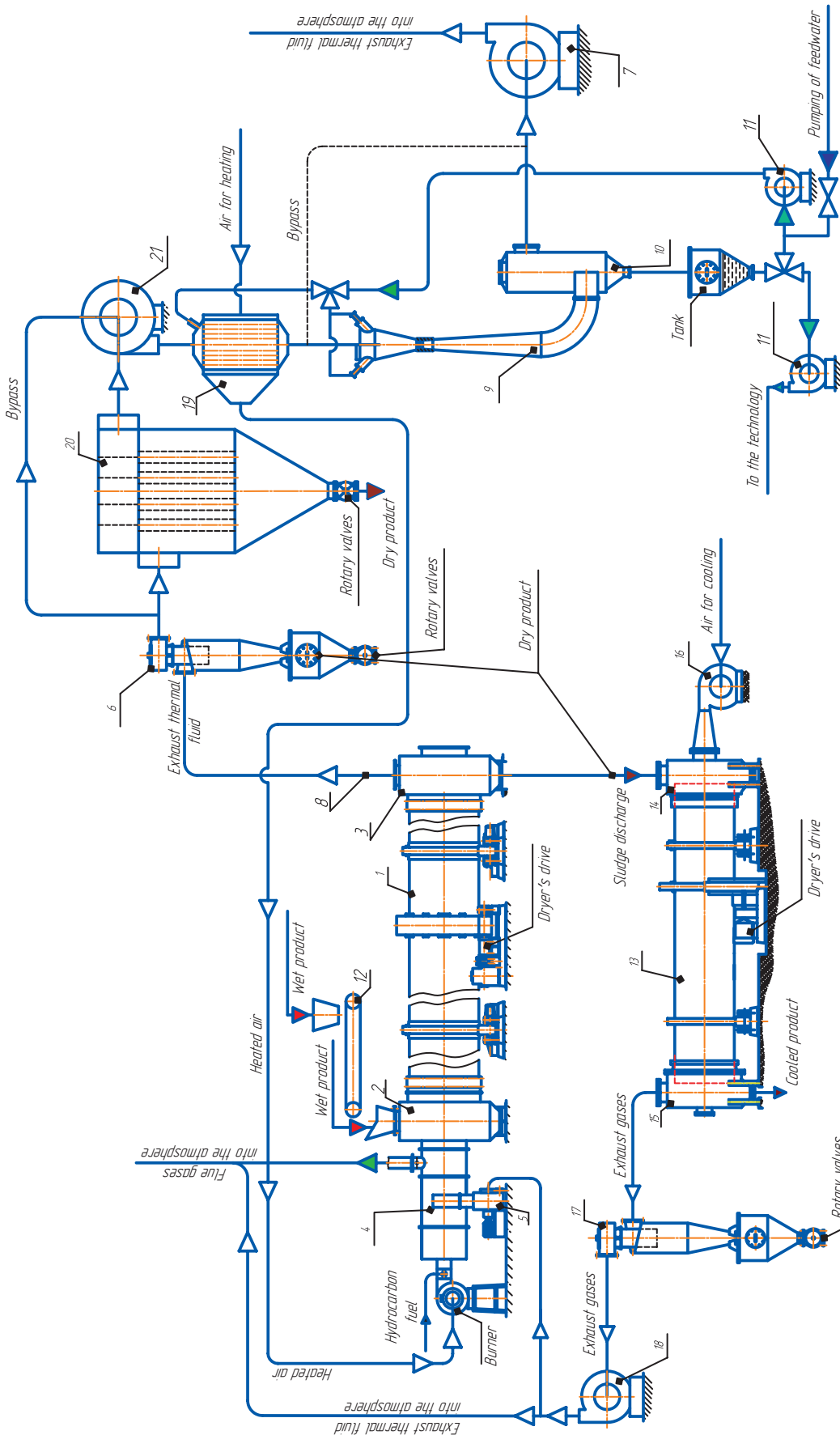
	Drum diameter, m	Drum length, m	Installed power, kW	Overall dimensions, mm			Weight, kg
				length	width	height	
BN 1,0	1,0	4	4	5300	2280	2150	4960
	1,0	6	4	7300	2280	2150	5430
	1,2	6	7,5	7350	2550	2350	7070
BN 1,2	1,2	8	7,5	9350	2550	2350	7660
	1,2	10	7,5	11400	2550	2350	8230
BN 1,6	1,6	8	15,0	9700	3300	2900	13450
	1,6	10	15,0	11700	3300	2900	14330
	1,6	12	30,0	13700	3300	2900	16360
BN 2,0	2,0	8	30,0	9900	3850	3600	21920
	2,0	10	30,0	11950	3850	3600	23542
	2,2	10	30,0	12100	3950	3750	27410
BN 2,2	2,2	12	30,0	14100	3950	3750	29410
	2,2	14	30,0	16150	3950	3750	31410
	2,2	16	30,0	18150	3950	3750	33230
BN 2,5	2,5	14	55,0	14100	5100	4250	67100
	2,5	18	75,0	18000	5100	4250	88850
	2,5	20	75,0	20000	5100	4250	94000
BN 2,8	2,8	14	55,0	14100	5570	5000	79349
	2,8	16	55,0	16100	5570	5000	84594
	2,8	20	75,0	22760	5570	5000	100000
BN 3,0	3,0	18	132,0	18100	5870	5160	129520
	3,0	20	132,0	20100	5870	5160	129860
BN 3,2	3,2	18	160,0	18100	6250	5450	145650
	3,2	22	160,0	22100	6250	5450	159860
	3,5	18	200,0	18100	6650	5900	165040
BN 3,5	3,5	22	200,0	22100	6650	5900	194120
	3,5	27	315,0	31000	6650	5900	215520
	4,5	16	315,0	21500	8100	7400	224310
BN 4,5	4,5	18	400,0	23500	8100	7400	244830
	4,5	22	450,0	27500	8100	7400	258320
	4,5	27	450,0	32500	8100	7400	310250
	4,5	32	500,0	37500	8100	7400	335820



Drying complexes include: dryer drum, heat generator, dust and gas cleaning system.

The delivery set includes an automatic process control system that allows maintaining the humidity and temperature of the dried product in a given tolerance. As an additional option, a waste gas heat recovery (collection) system can be supplied for its further use.

Drying facilities on the basis of the rotating drum dryers BN



- 1-Drum dryer
- 2-Loading chamber
- 3-Lift Chamber
- 4-Heat generator
- 5 Fans in the mixing chamber
- 6-cyclone with unloading hopper and floodgates
- 7-exhaust fan
- 8-Air line
- 9 Venturi pipe with a collector
- 10-venturi scrubbers (eliminator)
- 11-circulating pump for pumping slurry
- 12- Belt Feeder
- 13-fridge-reel
- 14-loading chamber refrigerator
- 15-unloading chamber refrigerator
- 16 blower
- 17-cyclone with rotary valves
- 18-exhauster
- 19-heat exchanger
- 20-bag filter
- 21-exhauster interim

Heat generators for drying and rotary kiln system

Drying units are equipped with the heat generators, **power from 0,12 up to 34,42 mW**. Heat-conveying medium is generated in heat generator in result of fuel burning (natural gas and liquid fuel) after that it is mixed with the atmospheric air (prepared according to requirements) up to required temperature. Prepared heat conveying medium of required temperature is fed to the drying drum.



Heat generator TG is comprised of:

1. Diffuse - stabilization burner with combined mixer of hot air and fume gases, it is operated at low and medium gas pressure of gas system;

2. Automatic control unit - controls operation

of burning start up according to preset operation algorithm, industrial safety standards, operation temperature settings, maintained with the help of PID control of burner heat capacity.

Automatic control board has four additional contact-inputs to provide connection of emergency stop sensors controlling certain process parameters, and it has standard interface RS 485 to enable connection to the common workshop (plant) control network by Modbus and Profibus DP protocols.

Heat generator is equipped with burner gas transmission pipeline comprised of electromagnetic valves system, electro-controlled throttle gas-valve, pressure sensors & temperature sensors.

3. Forcing fan for burning maintenance & for heat-carrying agent preparation (drying agent).

4. Heat generator (air and gas heat carrier box) the material of manufactory - heat-resistant steel thus lining inside of it is not needed;

5. Heat generator is equipped with special spark-extinguishing device, providing safe operation.

Heat generator TG has the following advantages:

light weight, reliability, perfect engineering-and- economical performance (fast heating up of the drying drum, short time to reach technological operating mode, fuel saving, even drum heating).

The heat generators can be equipped with gas burners (different gases can be used, i.e.: natural gas, blast-furnace gas, coke gas, ferroalloy gas, liquid gas, etc; as well as with liquid fuel burners (diesel oil, fuel oil, heating oil) or combined burners of leading world manufacturers.

Mixing furnace chamber of liquid fuel generators power is ranging from 1.5 mW, it is made of heat-resistant steel with NOCO reactor to provide complete burning and to minimize CO and NO_x effluences.

Mentioned heat exchanges can be operated at the temperature from 50 up to 1 000 °C.

For each process and operating conditions special heat generator design is developed.





A complex for drying mineral fertilizers developed on the basis of a drum dryer BN, with a solid fuel heat generator, the heat carrier of which is flue gases formed during the combustion of solid fuel.



Solid fuel heat generator

Wood pellets, wood chips, sunflower pellets, small-size stone coal, peat, etc. are used as solid fuel for heat generator.
Generator thermal rating is 0,7 mW.

Aero Vibration dryers (fluidized bed dryers)

Aero vibration dryers are designed only for drying of bulk products, which do not stick together during drying. Feature of this dryers is that the product is in suspension and is blown by hot coolant. At small dimensions has comparable high performance.



Filtering and drying systems for dewatering of aluminum silicate microspheres

JSC “Berdichev Machine-Building Plant “Progress” has designed filtering and drying complexes for cenospheres dehydration.

Aluminosilicate hollow microspheres (cenospheres) are a product formed during high-temperature flame combustion of coal. They are the most valuable components of ash wastes of thermal power plants. Cenospheres are hollow, nearly of perfect shape silicate beads with a smooth surface and average diameter about 100 μm (diameter varies from 10 μm up to several hundred).

Technological scheme of dehydration include:

- belt vacuum filter together with a vacuum system - for reducing the amount of moisture in the starting material, which can significantly reduce energy consumption in the drying process;
- an interim storage bin with a feeder (optional);
- heat source - for the preparation of a drying agent, working on different types of fuel: natural gas, LPG, diesel, fuel oil, solid fuel;
- rotary drum dryer;
- dust cleaning system - for cleaning of the exhaust drying agent from the entrained dust from the dryer, gas treatment efficiency - 99.99%, dust content of the heat carrier - not more than 10mg/m³;
- exhaust fan;
- automatic control system.

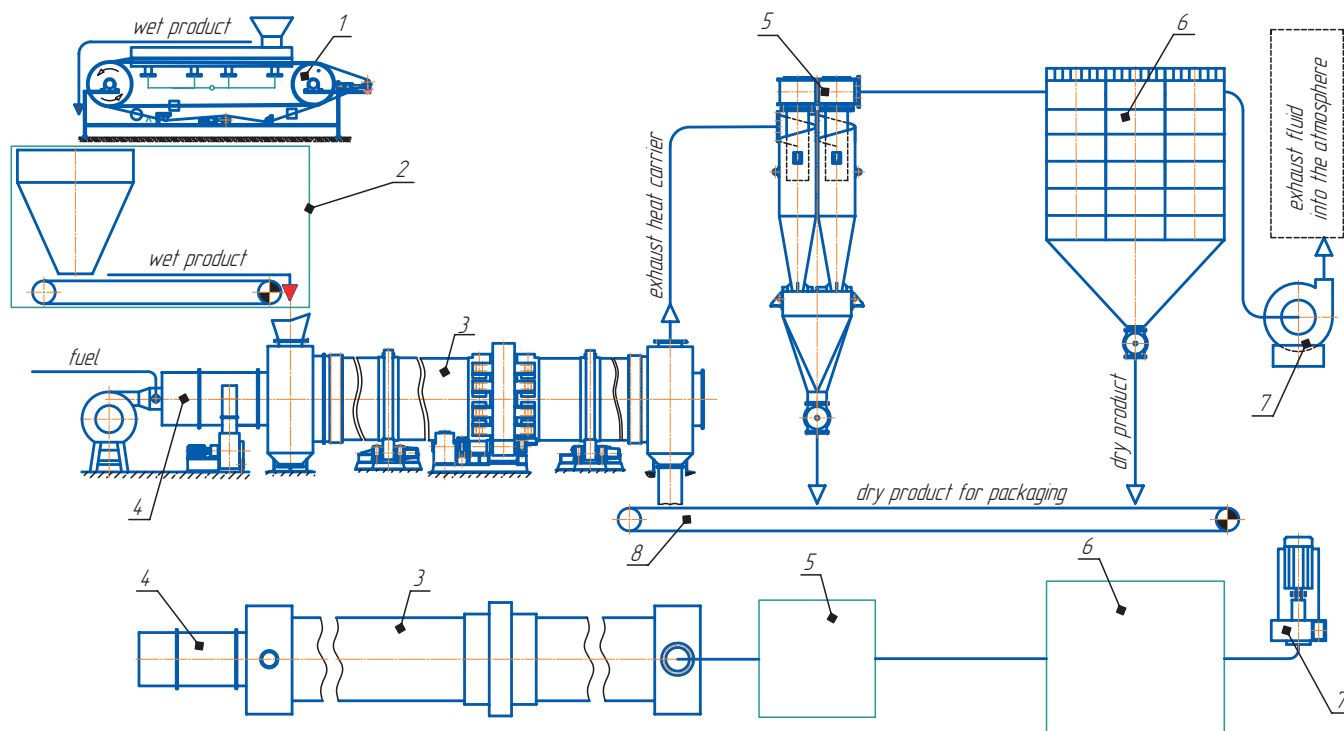
When using heavy types of fuel (oil, coal, pellets) to prevent clogging of the microspheres by combustion products we can supply drum dryer of indirect heating.

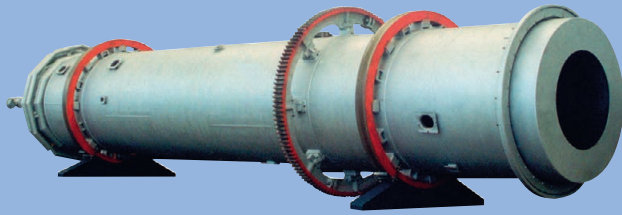
Optionally we can supply sieving and packing line.

Apparatus-technological scheme of the complex

1. Belt vacuum filter together with a vacuum system;
2. Intermediate storage hopper with the feeder;
3. Drum dryer;
4. Heat source (a complete set of block type burner, combustion chamber of mixing type, dilution fan);

5. Gang cyclone with the storage hopper and rotary valve;
6. Bag filter with the rotary valve (dust content after the bag filter – up to 10 mg/m³);
7. ID-fan (exhaust fan);
8. Conveyor of dry product.





Furnaces with rotating drums V (diameter up to 4,5m) are continuous operating apparatuses and are designed for thermal treatment of non-explosive, non-flammable, non-toxic granular materials.

Technical characteristics

	Drum diameter, m	Drum length, m	Installed power, kW	Overall dimensions, mm			Weight, kg*
				length	width	height	
V-1,0	1,0	8	2,2	9350	2235	1960	6130
	1,0	12	2,2	13350	2235	1960	7010
	1,0	16	2,2	17350	2235	1960	7890
V-1,2	1,2	12	2,2	13400	2550	2220	10550
	1,2	16	2,2	17400	2550	2220	11090
V-1,6	1,6	12	3,0	13700	3350	2980	16600
	1,6	16	3,0	17700	3350	2980	18600
	1,6	20	3,0	21700	3350	2980	20430
V-2,2	2,2	18	7,5	20150	3950	3600	35220
	2,2	22	7,5	24150	3950	3600	38860
	2,2	25	18,5	34000	5500	6700	86000
	2,2	35	30	41000	5500	6700	135000
V-2,5	2,5	20	30	22100	5500	5000	90000
	2,5	30	37	32100	5500	5000	106000
	2,5	40	55	43600	5500	5700	165000
V-2,8	2,8	40	75	45000	6300	6500	195000
	2,8	45	90	48500	6300	6500	210000
	2,8	55	110	60000	6300	6500	230000
V-3,0	3,0	45	110	48600	6500	6500	220000
	3,0	60	160	65000	6500	6500	270000
V-3,2	3,2	50	160	54000	6800	6800	280000
	3,2	60	160	64000	6800	6800	335000
V-3,5	3,5	60	200	69000	8800	8000	540000
	3,5	70	200	80000	9400	8100	580000

* - The lining in the scope of delivery is not included and not included in the weight of the oven.

Furnaces are manufactured in direct-current and counter-current versions with air- or water-cooling.

The drive is equipped with a furnace control system based on the frequency converter. Furnace burners can complete with different fuels: natural gas, diesel fuel, fuel oil, coal- dust mixture.

In addition to furnaces deliver gas treatment system, control system and, if necessary, the heat recovery.

Drum dryers and indirect-heating furnaces.

Drum dryers and indirect-heating furnaces are designed for drying and thermal treatment of materials without direct contact of heater (flue gas) with product.

Such furnaces and dryers are used for treatment of reactive and harmful products that must not contact with the flue gases and have high dust-forming properties.

Technical characteristics furnaces

	Drum diameter, m	Drum length, m	Installed power, kW	Overall dimensions, mm			Weight, kg*
				length	width	height	
V 1,6-12*	1,6	12	7,5	16200	3300	3000	25500
V 2,2-16*	2,2	16	15,0	22000	4000	3800	38000
SBK 1,2-4**	1,2	4	7,5	5200	2300	2300	9000
SBK 1,4-8**	1,4	8	15,0	10000	3000	3000	15000
SBK 1,6-8**	1,6	8	18,5	11000	3500	3400	23500

* Internal retort is made of stainless steel. External retort is lined with refractory materials.

Refractory materials in the scope of supply are not included in the weight of indirect-heating furnaces

** Material production - St3ps steel or stainless steel.

Axial screw charger retort and made of stainless steel.

Drum coolers B

Drum coolers B (diameter up to 4,5 m) are continuous operating apparatuses designed for cooling of non-harmful, non-explosive materials.



Technical characteristics furnaces

	Drum diameter, m	Drum length, m	Installed power, kW	Overall dimensions, mm			Weight, kg*
				length	width	height	
B-1,0	1,0	8	7,5	9300	2300	2200	7600 (6700)
	1,0	12	7,5	13400	2300	2200	9000 (7500)
B-1,2	1,2	12	7,5	13400	2550	2400	12500 (10600)
	1,2	16	7,5	17450	2550	2400	14400 (12000)
B-1,6	1,6	14	25,0	15750	3350	3100	23200 (20400)
	1,6	16	25,0	17800	3350	3100	25000 (21700)
	2,2	16	37,0	18150	3950	3750	43500 (39000)
B-2,2	2,2	20	37,0	22200	3950	3750	50000 (44100)
	2,2	25	37,0	28000	4800	3800	81000 (75000)
	2,5	20	75,0	23700	5100	420	87000 (80900)
B-2,5	2,5	25	75,0	28500	5100	4280	105450 (97350)
	2,5	30	75,0	33500	5100	4500	114000 (107970)
	2,8	25	100,0	30000	5600	5300	116650 (108000)
B-2,8	2,8	30	100,0	35000	5600	5300	128400 (116800)
	2,8	35	100,0	40000	5600	5300	145000 (135000)
	3,0	30	150,0	34500	5920	5500	152500 (141000)
B-3,0	3,0	35	150,0	40000	5920	5500	175750 (162800)
	3,0	40	150,0	44700	5920	5500	206800 (191780)
B-3,2	3,2	50	250,0	55000	6500	5600	279600 (255200)

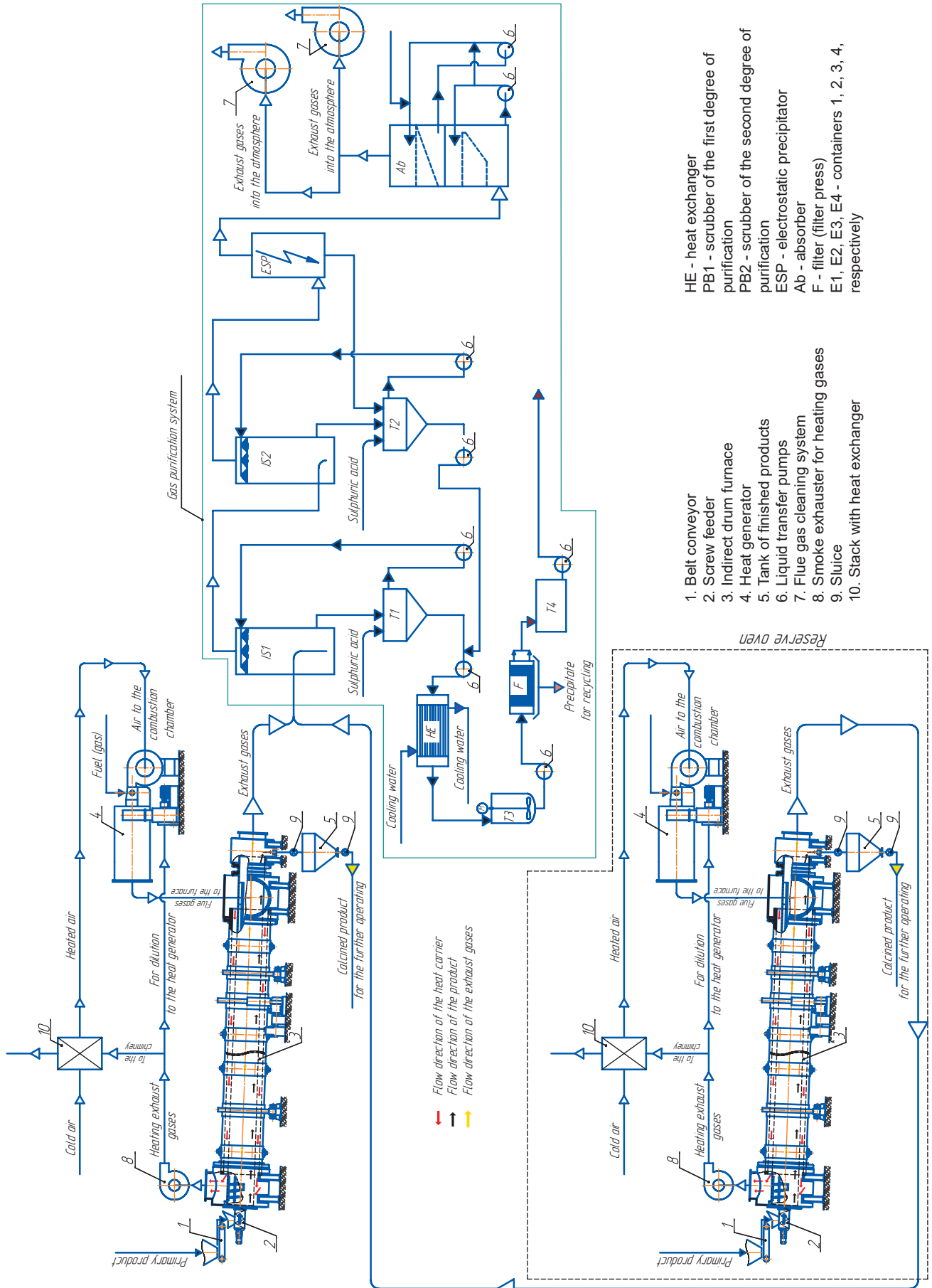
*- The lining is not included in the scope of delivery and not included in the weight of the kiln.

Coolers are equipped with blade-type and screw-type mixing devices.

The actuator is equipped with a cooler control system based on the frequency converter.

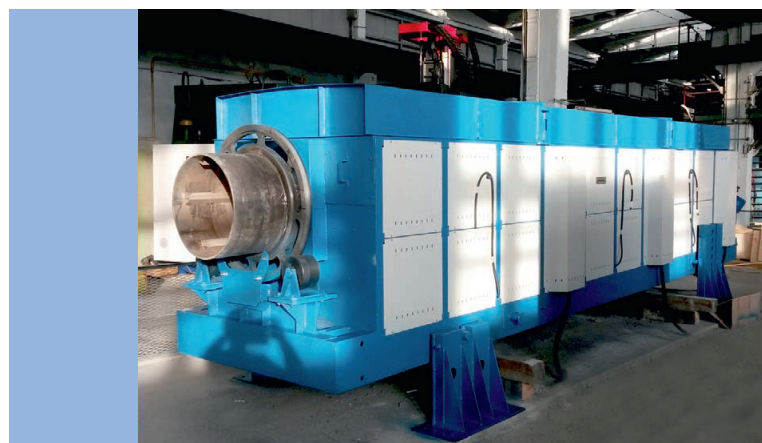
Material of parts in contact with product - St3ps steel or stainless steel. In addition with the a coolers supply intake and exhaust fans, coolant purification system from dust and process control systems.

Instrumental-technological scheme of the drying and sintering complex of indirect heating



Dryers and kilns with electric external heating with rotating drums SBOA

These devices are equipment with indirect heating. Drying of the product is carried out by heat, which is transferred from electric heating elements through the body of the rotating drum. The thermal output of the heating casing is regulated by changing the power supply voltage and turning off / on the heating sections of the casing. The standard size range varies from 500 to 1000 mm in diameter and from 200 to 8000 mm in length of the heating zone. Temperature mode of operation from 100 to 500 °C. When using high-quality heat-resistant steels, the operating temperature can be increased.



Technical characteristics

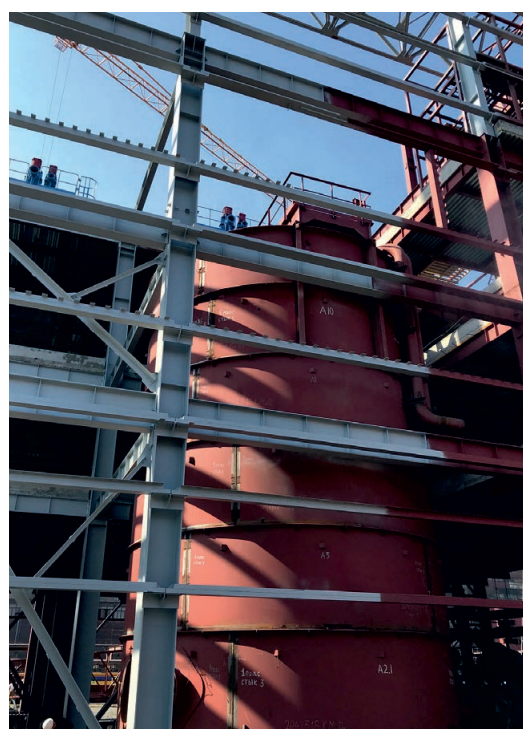
	Drum diameter, m	Heating zone length, mm	Overall dimensions, mm			Heater power, not less than, kW	Weight, kg
			length	width	height		
CBOA-070/4	700	4000	8400	2450	2200	300	7100
CBOA-076/5	760	5000	9300	2450	2200	400	8700
CBOA-100/6	1000	6000	9600	3200	2600	500	11500
CBOA-100/8	1000	8000	11300	3200	2600	500	16000

Contact tank

A contact tank is a container equipment designed for mixing slurry with reagents before the flotation process, preparing working compositions of reagents, and can also be used as an active sump to maintain solids in suspension at concentrating plants in the metallurgical, chemical and other industries.

The mixer drive is equipped with a frequency converter to adjust the rotation speed.

The mixer itself is lined with a material resistant to abrasive and corrosive wear. The walls of the body are equipped with bumpers to improve the process of averaging the slurry.



Designers of JSC “ANA-TEMS” have developed a dimension range of repulpators which are produced in collaboration with technical specialists of Berdichev Machine Building Plant “Progress”.

Repulpator is designed for: removing inclusions from ore concentrate and preparation of slurry suitable for further processing; for washing (disintegration) of clay and separation of coarse inclusions.



Technical characteristics

	IOCS*	KS**
Feed capacity, m ³ /h	1250	33
Bulk mass, t/m ³	2,8-2,9	1,6-1,7
Specific weight, up to, t/m ³	4,6	2,8
Initial moisture content, up to, %	12	11
Service fluid	Technical water	
Weight percent of solids in the slurry, %	35-40	28-35
Inside diameter of wash column, mm	2000	1640
Holes in trommel screen, mm	7	4,5
Drum rotations, rpm	14-25	11-25
Drive power, kW	2 x 55	45
Overall dimensions, mm:		
• length	9845	6200
• width	3100	3900
• height	4204	2800
Weight, kg	24500	12000

* IOCS - Iron-ore concentrate slurry

** KS - Kaolinic slurry

Deslimmer

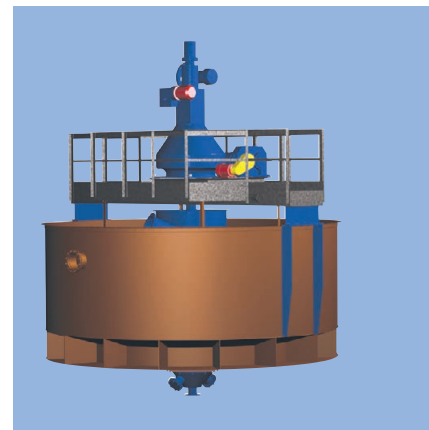
Magnetic dirt separator designed for desliming, thickening and classification of strongly magnetic ores of size 1-0 mm. when the content in the diet of solid 10-28%.

Main advantages:

- High specific productivity;
- Low specific energy consumption;
- Low specific weight.

Technical characteristics

Capacity on the initial solid, m/h, not less	60	100
The inner diameter of the tank, mm	5000±30	9000±30
Motor power drive mechanism of the rake, kW	3,0	4,0
Overall dimensions, mm, not more than		
• length	5400	9440
• width	5300	9220
• height	5250	7925
Weight, kg, not more than	10500	32000
Rake lifting height, mm	250±40	400±40
Rakes rotational frequency, sec-1 (rpm)	0,024(1,46)±5%	0,013 (0,78)±5%
Magnetic field strength, kA/m, not less than	55	55



Coagulating drums KB-1, KB-2, KB-8 designed for cleaning of sewage, blowing and return waters from metal ions, organic substances and other impurities.

Galvanic coagulators can be applied at different concentrations of harmful impurities in treated water and at any pH from 0 to 14. They provide chrome recovery from hexavalent to trivalent.

The choice of dimension-type of coagulating drum is to be performed by a specialized organization developing a purification system.

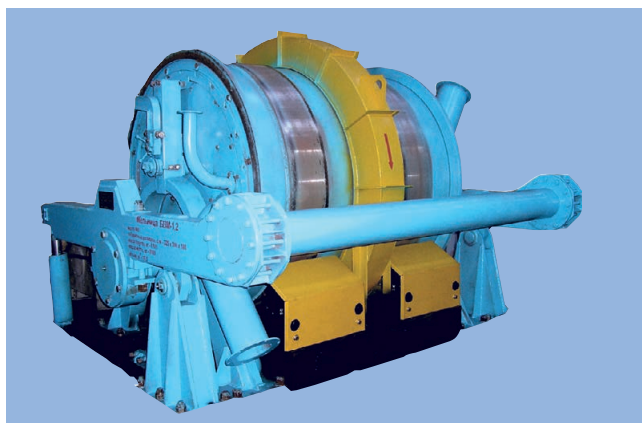


Technical characteristics

	KB-1	KB-2	KB-8
Operation volume, m ³	0,45	6,5	1,6
Capacity at cleaning from impurities, m ³ /h	4	40	12,5
Capacity of chromates recovery, m ³ /h	25	100	40
Level of chromates recovery, %	99	99	99
Overall dimensions, mm:			
• length	3170	9220	6830
• width	1540	3770	1821
• height	1642	3486	1922
Weight, kg	1452	20560	4295
Parts in contact with product are produced of stainless steel: 08X18H10T, 12X18H10T.			

Mill of type BVM 1,2

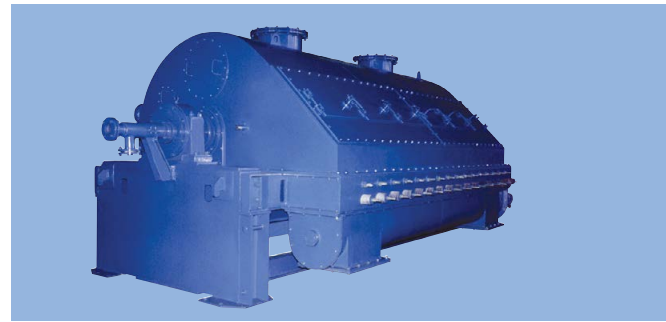
Mill BVM 1,2 is designed for grinding and processing into a powder brittle and soft materials with compressive strength up to 100 MPa: chalk, gypsum, limestone, crushed bricks, crystals, caliches, borax, glass, slag and so on.



Technical characteristics

Design capacity, m ³ /h, (t/h)	5±0,5 (5...8)
Drum working surface diameter, mm	1160
Rolls working surface diameter, mm	470
Max. size of piece of feed material, mm	60
Specific surface of ready product, cm ² /g	1800 - 5000
Grinding fineness 0.09 mm, sieve residue, %	15 - 30
Drum speed, rpm	92
Power of motor of rotary drum drive, kW, not less than	55
Overall dimensions, mm:	
• length	3900
• width	2250
• height	1880
Weight, (without hydraulic station and electric cabinet), kg	5895

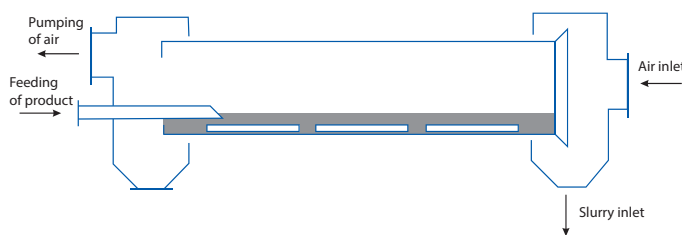
Rolling crystallizer is designed for crystallization of organic and nonorganic melts of chemical processes.



Technical characteristics

	KVUR-68	KVK-7,8
Crystallization surface area, m ²	68	8
Capacity, kg/h, not less	3000	2500
Working pressure, MPa (kgs/cm ²):		
- of heat carrying agent in the jacket and in the level sensor	0,25; 0,6 (2,5; 6,0)	1,4 (14)
- of coolant inside the roller	atmospheric	Pouring in
Working temperature, °C:		
- of heat carrying agent in the jacket and in the level sensor	+90...+100	+170
- of coolant inside the roller	+28...+30	+15
- of melts in a bath	+80...+90	+160
- of crystals	+34...+40	+50
Working fluid	Melt of naphthalenic cut	Melt of diphenyl propane
Rotation frequency, rpm.:		
- of roller	0,3	7
- of feeder	0,75	-
Overall dimensions, mm:		
- length	8336	6080
- width	2840	1720
- height	2540	W2173
Weight, kg	18330	7150

Drum Crystallizers BJ, BV



Continuous operating drum crystallizers with liquid and air cooling are intended to crystallize harmless, non-explosive, fire-safe substance from aqueous solution.

Automatic control system enables flexible control of technological process

Technical characteristics

Ttype	Drum length, m	Crystallization surface area, m ²	Installed power, kW	Overall dimensions, mm			Weight, kg
				length	width	height	
BJ 0,6	6	10	3,0	7265	1254	1163	3240
BJ 0,8	8	16	4,0	9275	1425	1335	4135
BJ 1,0	10	25	7,5	11455	2090	1960	7805
BJ 1,2	12	40	7,5	13465	2330	2215	11620
BJ 1,6	18	80	15,0	19460	3305	2951	23665
BV 1,0	20	62	7,5	20730	2024	1960	9185

* The above values are for carbon steel crystallizers.

Crystallizers can be manufactured with air or water cooling. Working pressure is atmospheric.

Solution temperature is from 0°C up to +150°C. Upon request, we can deliver crystallizers with feed and discharge chambers or without them.

Mechanical filtration is the most effective way to capture the fine dust from the exhaust gas emissions and aspiration of various technological processes and equipment.

Fabric with different characteristics is used as the filter material. Fabric filters are widely used in the different industries:

The enterprise produced as serial devices, and installation of individual projects.

Specialists of BMBP “Progress” are constantly working to improve the efficiency and reliability of devices using the following methods:

- Improving the design
- Modernizing the individual elements.
- Using the new filtering materials with high capacity Dust resistant to high temperatures and corrosive environments.

The proposed gas cleaning devices are not inferior to foreign analogues, and according to some characteristics are superior to them, having at the same time lower costs.

At present, many enterprises operate bag filters of the type FRI, SMTs, FRKN, FRKDI, and others, which are developments of the 50s - 60s. Samples of recent deliveries of equipment of this type indicate that they have not undergone significant design changes.

We offer effective and economical solutions to such a problem. The specialists of our company, depending on the characteristics of the main technological equipment, develop and implement projects for the modernization of dust treatment facilities.



Dust-trapping unit modernization

We can provide the following projects:

- I - major maintenance;
- II - partial modernization;
- III - combined modernization.

I - major maintenance

The filtration area is increased up to 1,5 time, the design changes are made in the bag filter housing and in the filter elements (frames, filter bags).

The systems of regeneration and dust crushing are modernized, is installed automation control system for bag filter technological operation.

As a result of this type of reconstruction, the capacity of the filter was increased by 50% at required residual dust content 20 mg/m³.

II - partial reconstruction

The filter body is changed slightly, only «clean» gas chamber, system of regeneration, sleeve boards, sleeves and frameworks are subjected to changes. Such kind of reconstruction allows to save original capacity. This variant is preferable for the conditions when filter is operated continuously.

This solution allows to considerably reduce compressed air consumption (up to 60%), to save electric

power (up to 70%) and to decrease electric power consumption of recovery system (number of blowing valves is decreased in three times) while the residual dust is not more than 20 mg/m³.

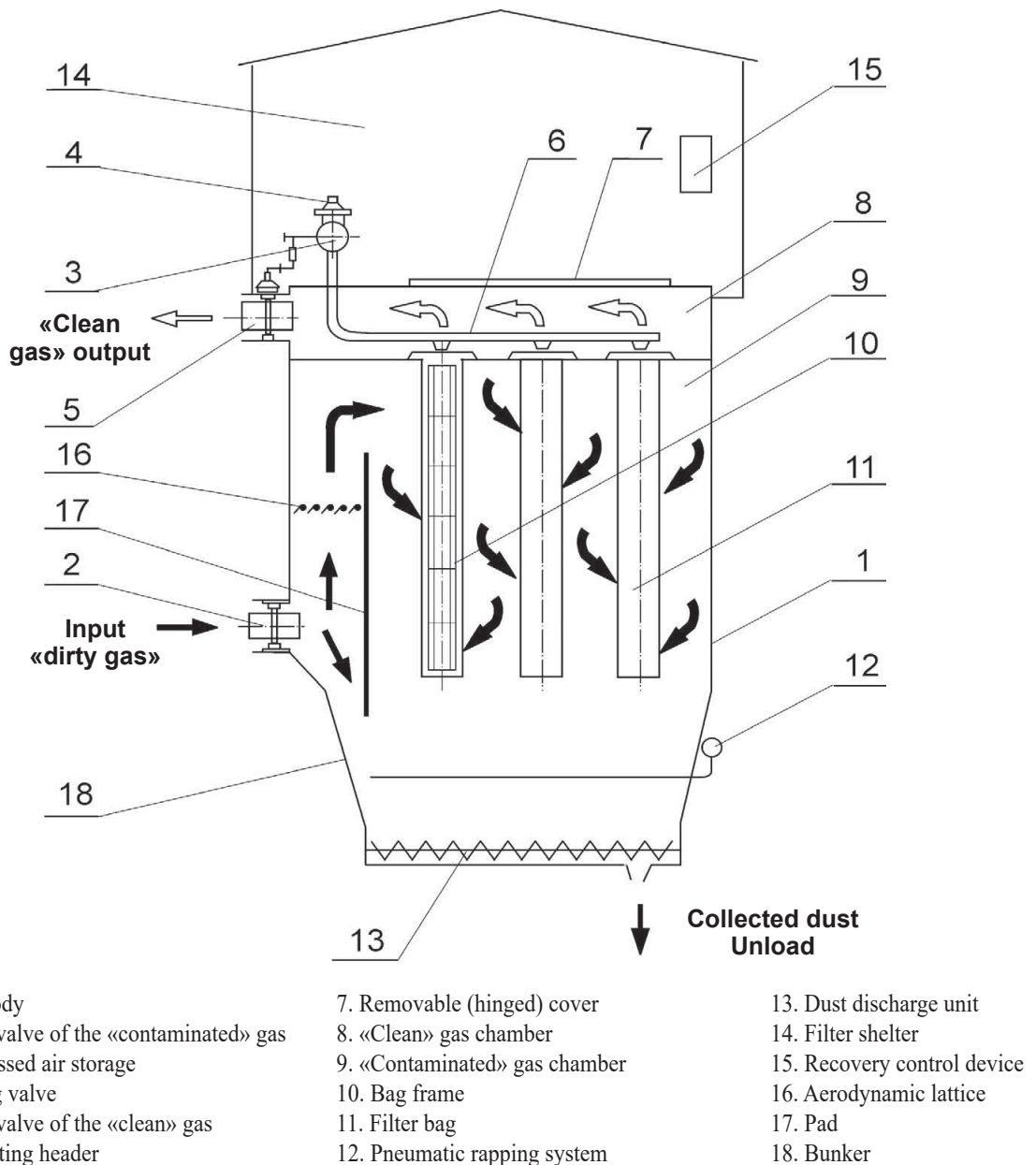
II - combined reconstruction

If partial stoppage of technological equipment is acceptable, we can propose the most cost efficient solution for existing bag house filter modernization with application of all up-to-date constructive solutions, applicable for FRIR bag house filter-presses. But herein, the filter capacity will be decreased by 20%-30%.

The certain advantage of all represented variants of bag house filters modernization is the using of

- Existing waste gas system;
- Metal structures of the existing equipment;
- Existing dedusting system;
- Draft and blowing equipment.

Operational scheme of FRIR bag house filter



Technical characteristics

Filter name	Productivity on gas, m ³ /h	Hydraulic resistance of the filter, Pa	Filtration area, m ²	Number of filter bags, pcs.	Length of filtr bag, mm
FRIR-18	up to 1 620	up to 2 000	19,5	42	1 100
FRIR-25	up to 2 200	up to 2 000	24,9	42	1 400
FRIR-36	up to 3 200	up to 2 000	37,4	42	2 100
FRIR-54	up to 4 800	up to 2 000	55,2	42	3 100
FRIR-54x2	up to 9 720	up to 2 000	110,4	84	3 100
FRIR-70	up to 6 300	up to 2 000	73,6	56	3 100
FRIR-100	up to 9 000	up to 2 000	97,3	56	4 100
FRIR-110	up to 9 900	up to 2 000	110,4	84	3 100
FRIR-160	up to 15 600	up to 2 000	174,4	196	2 100
FRIR-250	up to 23 000	up to 2 000	257,5	196	3 100
FRIR-250x2	up to 46 000	up to 2 000	515	392	3 100
FRIR-340	up to 30 000	up to 2 000	344,8	196	4 150
FRIR-340x2	up to 62 000	up to 2 000	689,6	392	4 150
FRIR-400	up to 38 000	up to 2 500	429	196	5 160
FRIR-800x2	up to 155 500	up to 2 000	1728,10	784	5 200
FRIR-950x2	up to 177 750	up to 2 000	1975	896	5 200
FRIR-1000	up to 88 800	up to 2 000	987,5	448	5 200
FRIR-1200	up to 114 000	up to 2 000	1269,60	576	5 200
FRIR-2700	up to 243 000	up to 2 500	2700	1 008	6 300
FRIR-3800	up to 355 500	up to 2 500	3950	1 792	5 200
FRIR-4600	up to 360 000	up to 3 000	4050	2 304	4 150
FRIR-5700	up to 533 250	up to 2 500	5925,10	2 688	5 200
FRIR-7000	up to 657 000	up to 2 500	7358	3 024	5 740
FRIR-9000	up to 791 100	up to 3 000	8790	3 456	6 300
FRIR-12000	up to 1 080 000	up to 2 000	12000	4 608	6 280

Electrostatic Precipitators

Designed and produced by “Progress” Electrostatic precipitators are used in many industries and provide a guaranteed dedusting of gases in accordance with technical requirements less than 50mg/nm³.

The specialists of BMBP «Progress» perform calculations and selection of electrostatic precipitators by today’s procedures, basing on many years of experience in the development and operation of «Progress» electrostatic precipitators at industrial plants.

The Electrostatic precipitators implementation concept is based on application of most suitable size of electrostatic precipitator in view of technical

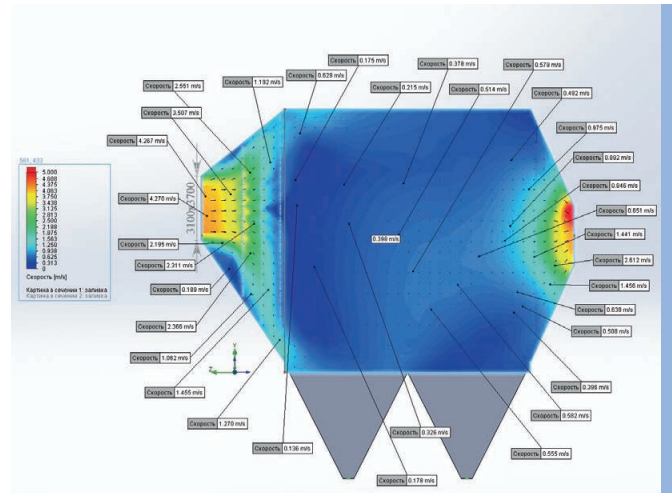


requirements and site sizing to achieve maximum efficiency under the given conditions.

To ensure the effective operation of electrostatic precipitators, in order to select and install gas distribution systems, Progress specialists carry out design simulation of the gas flow and perform flow adjustment within the framework of supervision during the projects implementation.

Benefits of Electrostatic Precipitators “Progress”:

- Application of wide-profile collecting electrodes with active height up to 18m;
- Stable and efficient catching of the particles smaller than 1 micron;
- Usage of bug-free programs for electrostatic precipitator operation in various conditions and modes;
- High reliability and long life time of electrostatic precipitator units;
- Minimum power consumption and low maintenance costs;



- Easy maintenance during the stoppage of the main process equipment.

BMBP “Progress” by its own facilities manufactures internal mechanical equipment for horizontal and vertical electrostatic precipitators, including precipitating and corona electrodes, rapping systems, gas distribution systems, etc.

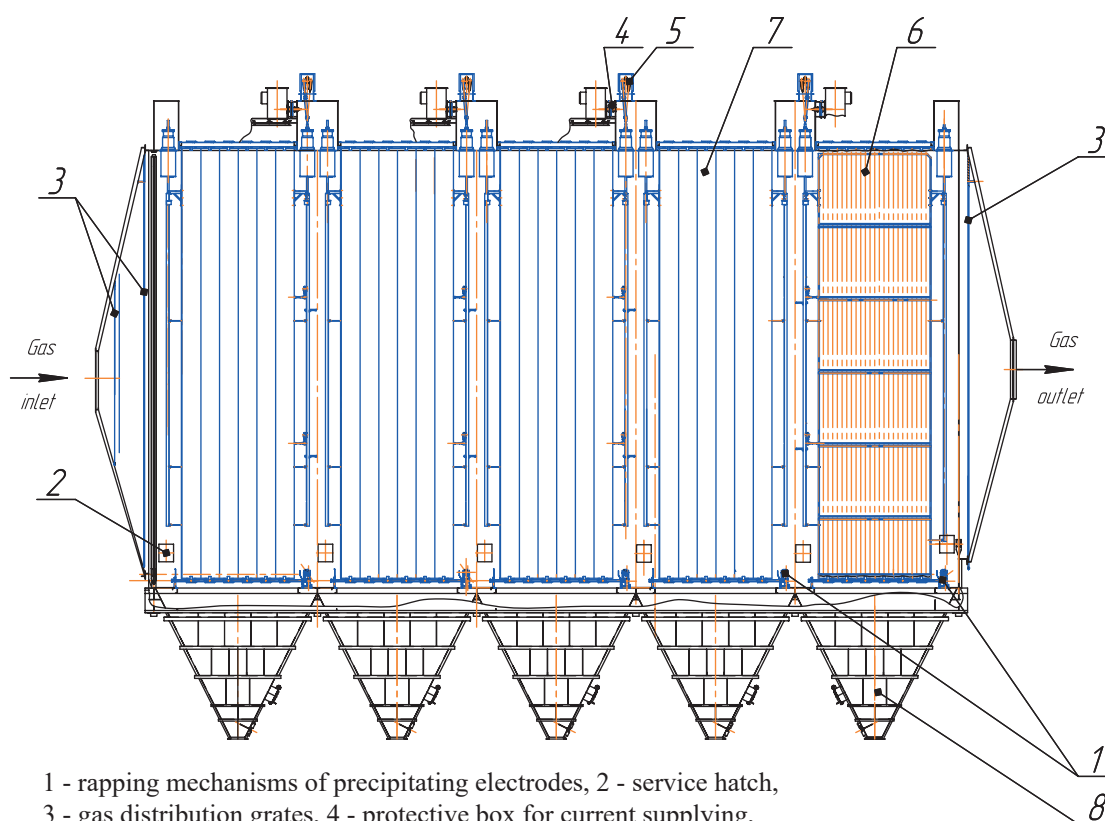
«Progress» electrostatic precipitators are equipped with modern geared motors for rapping mechanisms of precipitating and corona electrodes, power-supply units, and automatic monitoring and control system for the electrostatic precipitator.

The features of «Progress» electrostatic precipitators include:

- the use of mechanically elastic seats of needle corona electrodes with a low ignition voltage of the corona, as well as optimal height and spacing of the needles;
- “semi-rigid” elastic tape and needle elements securing in electrodes, that provides increased current density of corona and rapping degree;
- the use of wide plate precipitating elements (such as «ETI-640» or «S-350») with a minimum closed and maximum open electrodeposition areas, optimally selected density and non-uniformity of corona electrostatic field;
- «alternately-shifted» configuration scheme of corona electrodes arrangement over the precipitation ones with keeping of equal discharge gaps, which will provide almost double expansion of the area of maximum field strength in the direction of the gas path in each individual gas passage and, accordingly, a significant increase in the drift velocity of fine-dispersed particles.



Scheme of EGU



1 - rapping mechanisms of precipitating electrodes, 2 - service hatch,
3 - gas distribution grates, 4 - protective box for current supplying,
5 - rapping mechanisms of corona electrodes, 6 - corona electrode,
7 - precipitating electrode, 8 - housing.

Wet-type electrostatic precipitator MEF

MEF-type electrostatic precipitators (wet-type electric precipitator) are designed for fine cleaning of exhaust gases from dust, mists, tarry and oily substances.

Wet-type electrostatic precipitators are used for cleaning blast-furnace gas, cleaning gases from soot and tar, precipitation of the sulfuric acid mist in metallurgical, chemical, oil refining and other industries.

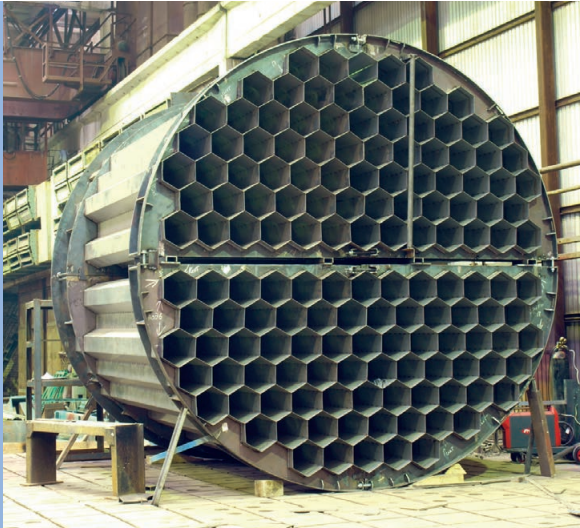
Wet-type electric precipitators are vertical tube plants with precipitation and corona electrodes located in a cylindrical body.

The system of precipitation electrodes - coaxial cylinders. Corona electrodes are made of strip or wire elements.

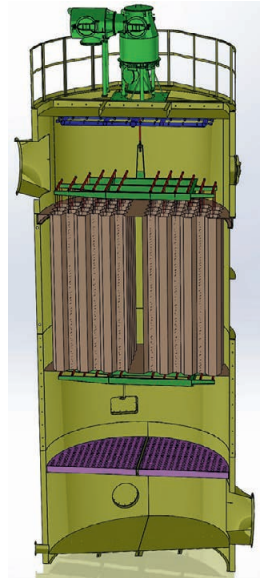
In wet-type electrostatic precipitators manufactured by «Progress», the edge effect of precipitation electrodes is reduced and the electric strength of the discharge gaps is increased, the ignition voltage of the corona discharge is reduced, and the parameters of the electrode system as a whole are optimized.

A gas cleaning efficiency rising is achieved due to improved electrical characteristics of the internal

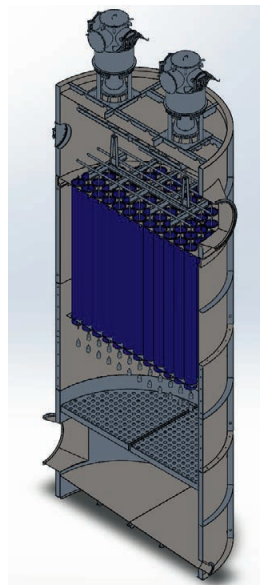




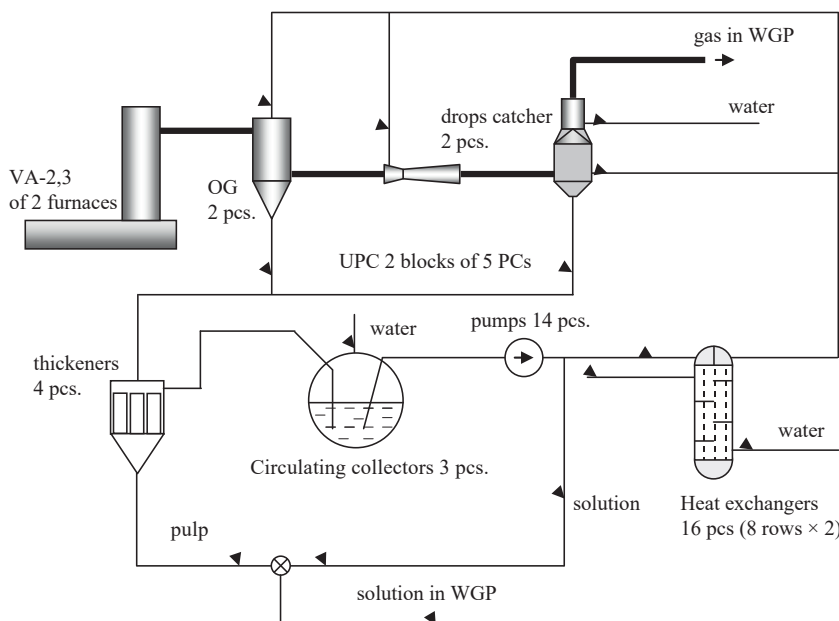
equipment design of an electrostatic precipitator, speed decrease in the active section, specific collection area increase, and gas distribution system improvement. The main feature of the wet-type precipitator is the design and mutual bracing of the precipitating and corona electrodes, which «work» in pairs, providing the maximum voltage of the precipitator fields at limiting currents. Precipitating electrodes are one of the main structural elements of the wet-type precipitators, on its surface the dust particles, mists, tarry substances and etc. are deposited. The precipitated product in the form of a liquid phase flows by gravity into the receiving hopper of the wet-type precipitator and then is sent to the sludge removal system.



In wet-type electrostatic precipitators by «Progress» two types of precipitating electrodes systems are used: tube and honeycomb structures. The applied honeycomb design of the precipitating electrodes assumes the maximum use of the wet-type precipitator effective volume. Corona electrodes are helical wire elements and are arranged in parallel rows in frames. Corona elements tension in frames is carried out due to elastic stretching of the KE-helix. Wire straight or twisted corona elements are used, as well as needle corona electrodes made of strip. The electrostatic precipitator is provided with a gas distribution device, consisting of gas distribution grates that ensure uniform gases distribution over the plant section. The plant is equipped with a system of periodic washing of precipitating and corona electrodes.



Technological scheme of gas cleaning from sulfuric acid mist of melting units



Gas cleaning of Vanyukov furnaces (VF) is carried out according to the following scheme. Preliminary cleaning of gases VF-2, VF-3 is carried out in washers - a gas cooler (GC), a unit of coagulation pipes (UCP) and a drip collector, located in the melting workshop in the immediate vicinity of the furnaces. Aftertreatment plants are located in the wet-gas purification area (WGP). After preliminary purification, gas is sent to the WGP wet-type electrostatic precipitators for cleaning from aerosol impurities (sulfuric acid mist, condensed moisture) and fine dust.

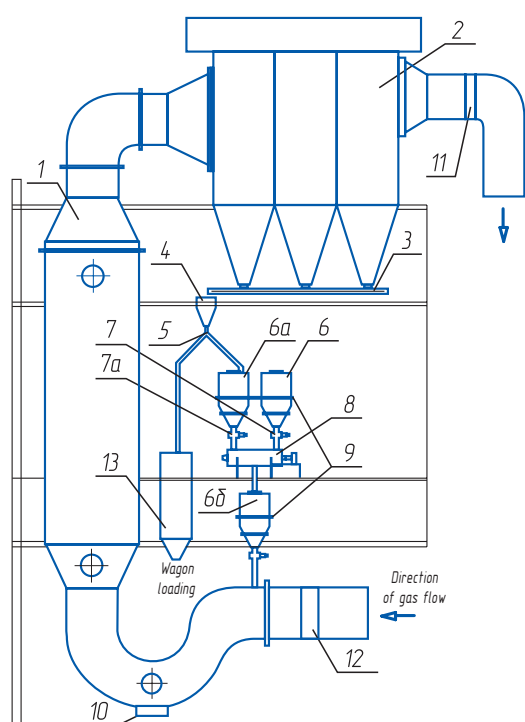
Purification of dusty flue gases from sulfur dioxide (SO₂)

In modern industrial processes of dry dust collection in industrial, waste/exhaust gases are used bag fabric filters, which are capable of ensuring efficiency of > 99.9%, to meet environmental requirements. Moreover, their introduction involves less capital costs and smaller production mounting areas.

Sulfur oxides (SO₂, and in smaller quantities SO₃) is one of the largest and most difficult-to-clean air pollutants, and formed by their combination with water vapor acid (H₂SO₃ and H₂SO₄) cause the destruction of metal structures and building materials.

The greatest current interest is the use of technologies of gas desulphurization of dust air flow, which is capable of ensuring the effective (> 90%) binding of sulfur dioxide. The relevance of SO₂ emission reduction is defined as the expansion of electricity generation using pulverized fuel and an increase in the share of coal in the balance of metallurgical industries.

One of the most effective methods is a method of semi-dry desulphurization, created and implemented based on the use of technological schemes and equipment manufactured by “BMBP “Progress”.



Technological scheme of the reactor-adsorber with the reagent preparation and feeding system

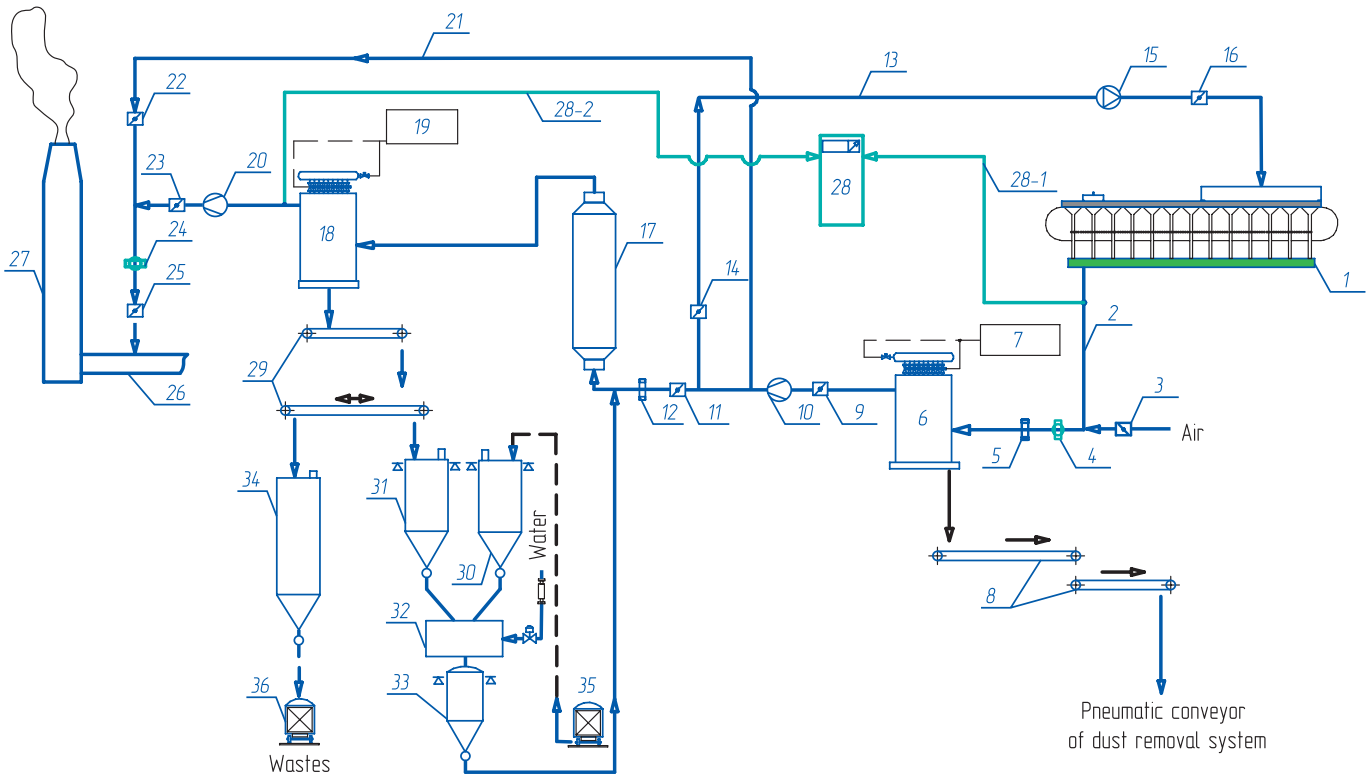
- 1 - adsorbing reactor;
- 2 - bag filter;
- 3 - belt conveyor of dust transportation and dust circulation;
- 4 - secondary product hopper with the gate;
- 5 - stream transportation direction switch;
- 6, 6a – constant weight hoppers of Ca(OH)₂ fresh reagent and of secondary product-reagent;
- 6b - a feeding hopper with a humidified reagent;
- 7, 7a - rotary valves;
- 8 - mixer-dosing device- humidifier;
- 9 - strain gauges of hoppers;
- 10 - rotary valve;
- 11 - gas duct section for continuous analysis of dust (mg/m³) and the gas concentration control in the «on-line» mode O₂, CO, CO₂, SO₂, NO_x (ppm/vpm; vol.%; mg/m³);
- 12 - gas duct section for continuous monitoring of gas flow velocity (m/s) and/ r volume flow (m³/h);
- 13 - waste silo.

The essential advantage of this dust-cleaning and desulphurization method are the following:

- low capital cost and easy installation;
- light maintenance and repair, if necessary;
- no waste water;
- high reliability;
- possibility of implementing of automatic process control;
- low power consumption;
- the end product: a mixture of calcium salts and agglomerate dust or boiler external ash.

In the process of developing a set of processing equipment, performed a complex modeling of aerodynamic parameters of dust and gas flows in the adsorbing reactor; determination of the residence time of reagent in different geometrical variations, dimensions and shapes under conditions of changing flow volume and flow

Dust cleaning apparatus- technological scheme for sintering machine



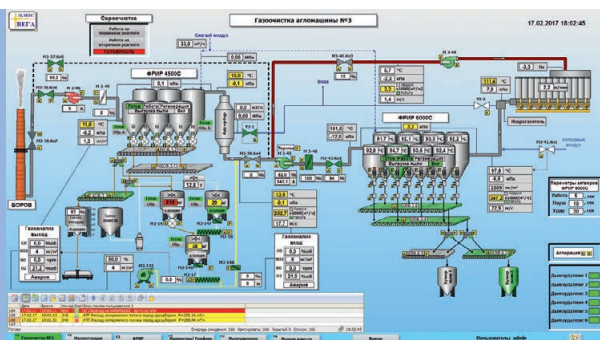
1- modular vacuum collector of sintering machine; 2- dust-gas air stream to be cleaned; 3- adjustable automatic valve for the suction of ambient air and controlling of the flow temperature ($<150^{\circ}\text{C}$); 4-Flowmeter of continuous control of velocity (m/s), and/or volume flow (m^3/h) of stream to be cleansed; 5- continuous operational dust meter (mg/m^3); 6-bag filter (BF) №1; 7- regenerating system of BF No.1; 8- belt conveyors for the collected sinter dust; 9- adjustable automatic valve; 10- exhauster; 11 - adjustable automatic valve; 12- continuous operation flow meter to control the speed (m/s) and/or the flow rate (m^3/h) of gases; 13- gas recirculation line; 14- adjustable valve; 15- axial fan of recirculation line; 16- adjustable valve; 17- adsorbing reactor; 18- bag filter (BF) №2; 19- regenerating system of BF No.2; 20-ID-fan; 21 - emergency bypass line for dust- gas air-flow discharge; 22- adjustable valve; 23- adjustable valve; 24- continuous operation dust meter (mg/m^3); 25- adjustable valve; 26- assembly breeching for flue gas; 27- chimney; 28- stationary extractive multicomponent (O_2 , CO , CO_2 , SO_2 , NO_x) system of continuous gas analysis; 28.1- heated line for transportation of gas samples №1; 28.2- heated line for transportation of gas samples №2; 29- belt conveyors of secondary reagent; 30- $\text{Ca}(\text{OH})_2$ fresh reagent hopper; 31 - hopper of secondary reagent; 32- dispenser-humidifier-mixer; 33- a feeding hopper for the mixture of humidified reactants; 34- silo-bunker of wastes; 35- fresh reagent delivery line; 36- wastes disposal line.

velocity profiles on the basis of the following criteria: availability of adsorbent, compliance with the emission limit values of CO_2 concentrations in waste gases, possible ways of utilization of desulphurization products, as well as the prediction of design and installation investments.

The introduction of environmentally friendly technologies for processing of iron ore requires solving important problems: disposal of sinter dust with the purpose of its usage in the production cycle to obtain the agglomerate and limitation of harmful emissions in atmosphere.



Automated control system of technological process of dust-gas cleaning after sintering machine (APSC)



The system is divided into two levels and is an integrated system under the hierarchical principle.

Lower level:

- process parameters control subsystem;
- technological equipment control subsystem;
- electric drives control manual buttons.

Upper level:

- the level of operational management of technological process, providing operational displaying and registration of information for creating an optimal connection interface between controller / operator and the system to allow a reliable assessment of the process.

APCS (top-level) is based on advanced software and hardware technologies for the collection, processing, transmission, archiving and visualization of operational data and functioning 365 days a year.

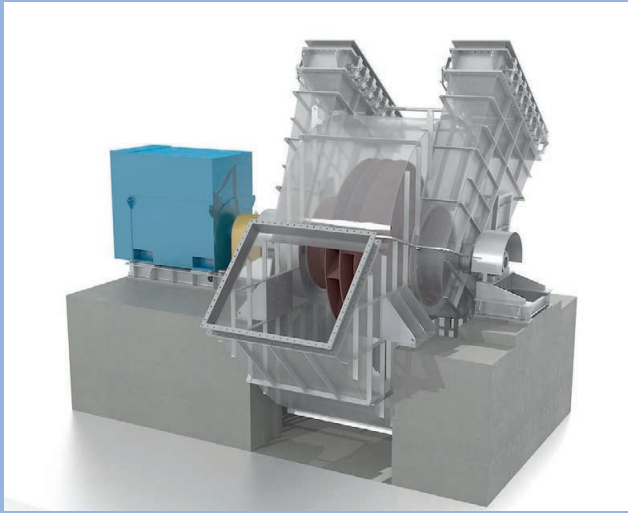


APCS (top-level) functions are implemented on Siemens S7 series controller and include two working automated workplaces on which is possible to register current process data. Operator workstation Software (SW) is built on the basis of the Siemens WinCC software. The system operation algorithm provides the following:



- starting of dust cleaning equipment;
- stopping of dust cleaning equipment;
- emergency stopping of dust cleaning equipment;
- reagent dosing to ensure the effective implementation of the desulfurization process;
- exhaustion control in the shelter of the sintering machine;
- temperature control over the path before the bag filter №1 - temperature control in the adsorber;
- providing of control valves operation.





REITZ Company is:

- More than 70 years of experience in the manufacture of reliable high-quality centrifugal fans with a power of up to 10,000 kW and a capacity of up to 1,890 thousand m³/h.
- More than 250,000 fans delivered since 1958 in various industries, in more than 100 countries worldwide.
- High performance and low power consumption due to optimal node design.
- Individual calculation of the fan for specific operating conditions in any industry.
- High installation availability thanks to the modular design of the units.

BMBP Progress LLC is the official representative of Reitz in Ukraine, providing engineering and maintenance services for fan and auxiliary equipment.

Special arrangements:

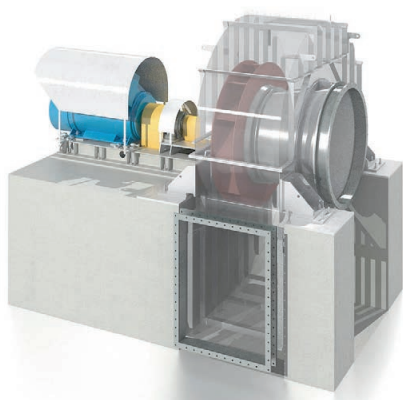
- Wear protection (lining, hardfacing, duplex steel, continuous jerky cleaning from build-up, innovative impeller geometry)
- Corrosion protection (stainless steel, electroplated, ECTFE fluoropolymer coating)
- Heat-resistant version (-50°C... +600°C)
- Sound and heat insulation of the body.
- Explosion-proof and spark-proof design
- Gas tight design (High pressure fans)

Additional equipment:

- Gate valves
- Expansion joints
- Adapters
- Vibration bases
- Stop brake
- Oil-pumping station



Basic designs



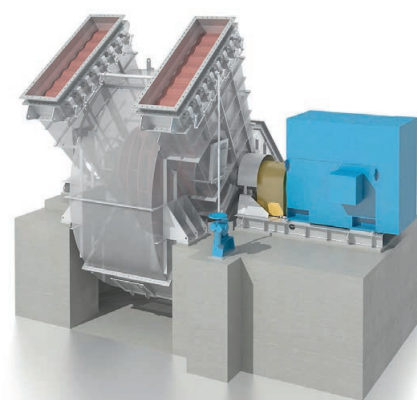
KBA, KXA arrangement

- Single suction
- Impeller with double sided bearing support
- With suction box
- With louver guide suction device.
- On concrete foundation (KBA) or steel frame (KXA)



KBE, KXE arrangement

- Single suction
- Console location of the impeller
- With built-in axial guide slinging apparatus
- On concrete foundation (KBE) or steel frame (KXE)



KBZ arrangement

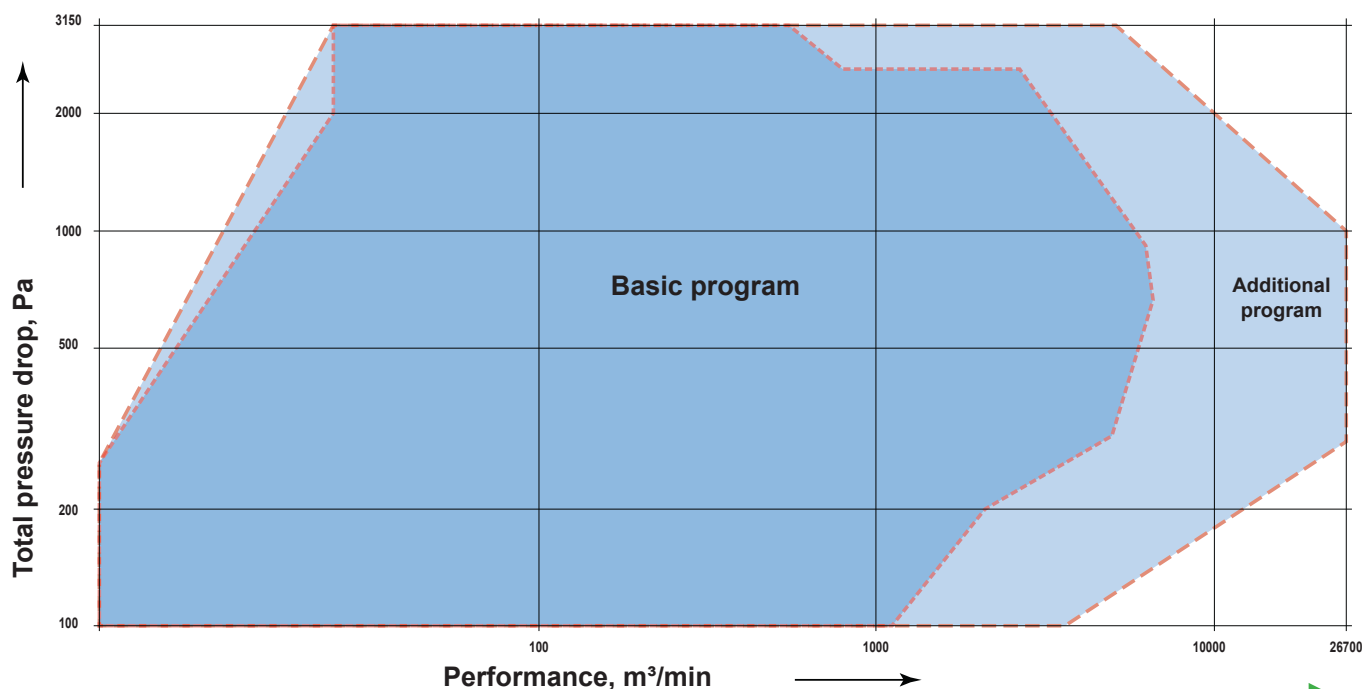
- Double suction
- Impeller with double sided bearing support
- With 2 suction boxes
- With louvered suction guide vanes

Technical characteristics

Total pressure drop, Pa	1 000...35 500
Performance, m ³ /h	300...1 890 000
Drive capacity, kW	1,1...10 000
Environment temperature, °C	-50...+60
Working environment temperature, °C	-50...+600

Technical specifications refer to:
 Medium temperature 20°C
 Density 1.205
 Air pressure 101.325

Summary aerodynamic characteristic of REITZ fans

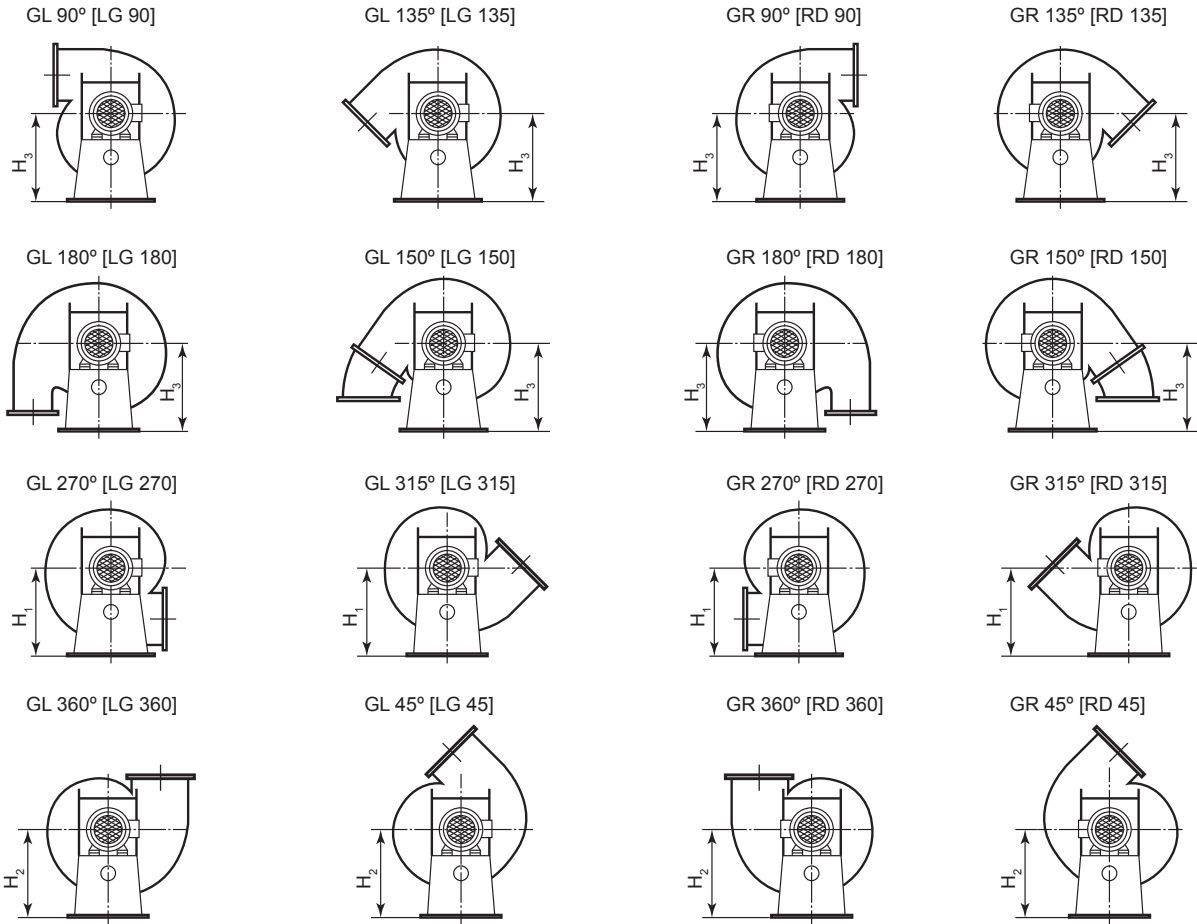


Diagrams of reversal of housing and suction boxes of REITZ fans

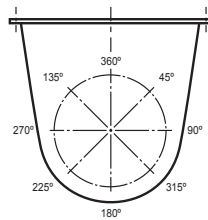
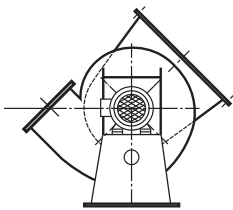
View from the motor side

Left rotation (GL)
counterclockwise

Right rotation (GR)
clockwise



Reversals of the suction box



AK 360
AK 90
AK 180
AK 270

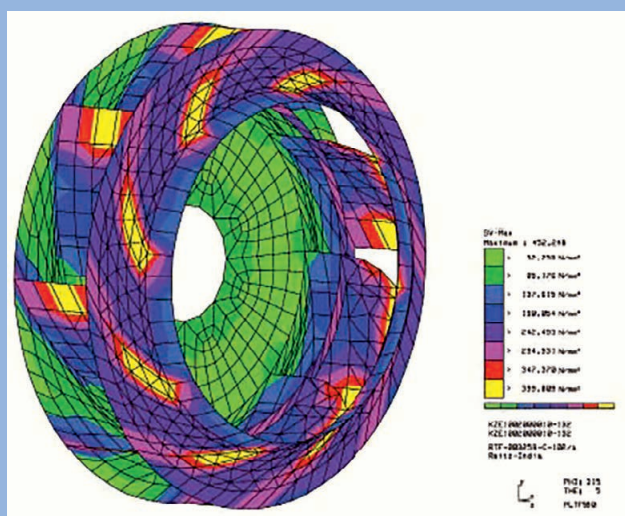
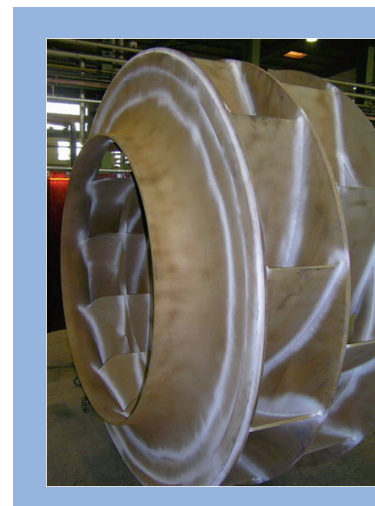
AK 45
AK 135
AK 225
AK 315



Quality control

Fans must guarantee the operation of entire industrial installations, which is why REITZ tests each fan according to a quality assurance plan before delivery:

- ISO 9001-2015 Quality Management System
- Quality control from certified suppliers.
- Vibration analysis, rotor balancing in 2 planes, machine-dynamic coordination of the complete fan (motor, frequency converter) to minimize vibration.

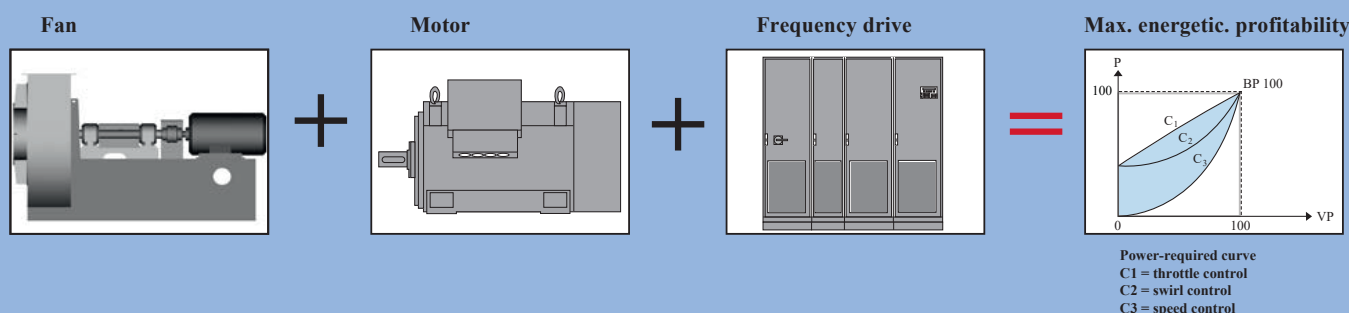


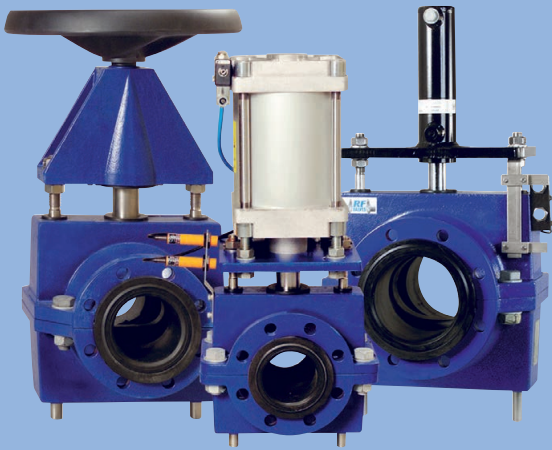
- Control assembly and running-in at the factory.
- Test bench measurements (aerodynamic, sound, vibration measurements)
- Preliminary strength calculations by the finite element method (Finite-Elemente-Methode - FEM).
- Non-destructive flaw detection and much more.

Maximum energy efficiency thanks to frequency control

- Up to 30% energy savings compared to conventional control methods without compromising efficiency.
- Electricity consumption is 100% matched to the needs.
- Uniform acceleration characteristics and smooth mechanical running.
- Payback of the system within an average of 2 years.

With traditional mechanical regulation of the fan parameters by throttle bodies, the engine speed remains constant. If the engine is running at 100%, and in reality only 50% power is needed, then most of the energy is wasted. Motor speed control is a method in which the aerodynamic characteristic of the fan is precisely adapted to the characteristic of the power, which allows significant savings in energy consumption.





Designed for use in abrasive, corrosive slurries, liquids and powders.

Pressure-cast elastomeric tube has longer service life than other more expensive materials such as: stain-less steel, satellite and other alloys in ball, cone, mem-brane and standard pinch valves when processing abrasive, cor-rosive and scale-forming materials.

Complete interchangeability with most sizes as per ASME and DIN standards enables usage of pinch valves instead of ball, cone and membrane valves that is essential for modernization and improvement of enterprise.

Installed in each tube SMART Valve™ sensor automat-ically gives a signal of need to replace the tube that saves the costs to be spent on sudden breakdowns of valve. Elastomeric tube is the only part which is in contact with working fluid. It can be replaced without any special tools or skills; that by 70% reduces maintenance costs.

Patented folded tube: non-stretching design offering large choice of elastomeric materials and reinforcing fibers, complying with the re-quirements for the most complicated operating conditions.

KEVLAR reinforcing cords enables operation at heavy loads, and elastomeric materials like VITON and others stand in the most chemi-cally aggressive and corrosion-risky media.

Special opening devices allow the tube to be stable under chang-ing pressure in the pipeline and to ensure reliable operation even in a low-pressure pipeline, or under vacuum conditions.

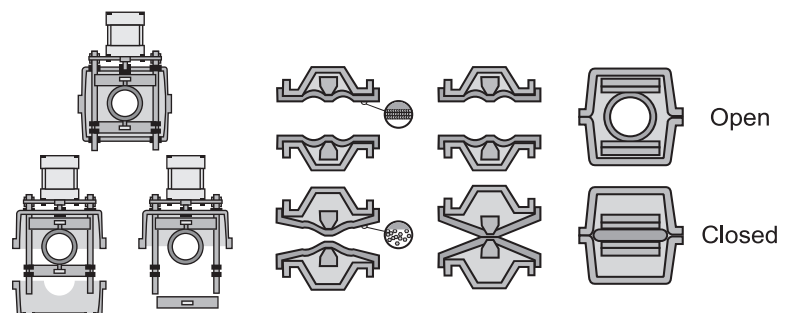
The tube is bent, not stretched at closing; that optimizes elastomeric resistance in difficult conditions, provides long service life and larg-er number of cycles as compared to metallic or standard elastomeric valves.

The standard design with complete opening provides unrestricted two-way flow, low resistance and precise linear flow, zero leakage.

Flexible self-cleaning property of elastomeric tube reduces the ability to scale storage and eliminate clogging. The body is made of cast iron or carbon steel.

RF valves actuators: manual, pneumatic, hydraulic and electromechanical are adapted to conditions of any company.

Sealed body and seamless “flange-to-flange” design eliminates the risk of valve clogging and possible leakage.



Technical characteristics

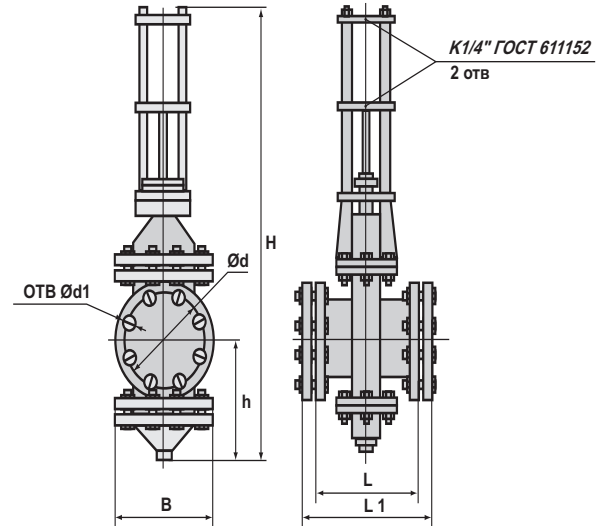
Valve type	Conditional passage, D _y , mm	Pressure, MPa (kgf/cm ²), not more		Working environment temperature, °C		Overall dimensions, mm, not more			Weight, kg, not more
		Conditional, P _u	Working, P _p	Min	Max	Construction length	Width	Height	
KPR	50	1,0 (10)	1,0 (10)	-15	120	185	242	460	23
	50	1,0 (10)	1,0 (10)	-15	120	185	242	495	30
	80	1,0 (10)	1,0 (10)	-15	120	202	285	545	41
	100	1,0 (10)	1,0 (10)	-15	120	230	316	700	56
	150	1,0 (10)	1,0 (10)	-15	120	263	400	968	90
	200	1,0 (10)	1,0 (10)	-15	120	294	516	1160	155
	250	0,6 (6)	0,6 (6)	10	90	544	550	1324	221
KPP	50	1,0 (10)	1,0 (10)	-15	120	181	242	860	43
	80	1,0 (10)	1,0 (10)	-15	120	202	282	620	62
	100	1,0 (10)	1,0 (10)	-15	120	230	316	720	80
	150	1,0 (10)	1,0 (10)	-15	120	263	400	930	200
	200	1,0 (10)	1,0 (10)	-15	120	294	516	1080	270
KPE	80	1,0 (10)	1,0 (10)	-15	120	202	282	870	53
	100	1,0 (10)	1,0 (10)	-15	120	230	316	980	70
	125	1,0 (10)	1,0 (10)	-15	120	319	342	1025	91,5
	150	1,0 (10)	1,0 (10)	-15	120	263	400	1025	130
	200	0,6 (6)	0,6 (6)	-15	120	294	516	1140	175

Selection of elastomer quality

Properties	Natural NR rubber	Styrene, Butadiene rubber SBR	Butyl rubber IIR	Nitrile rubber NBR	Chloroprene rubber CR	Fluorine rubber FPM (Viton)	Chlorosulfone ethene rubber CSM	Ethene propene rubber EPDM EPM
Application temperature:								
Max, °C	+78	+121*	+138	+121	+121	+248**	+171	+121
Min, °C	-53	-45	-51	-40	-40	-20	-40	-51
Elasticity	5	5	2	3...4	3...4	2	3	3
Resistance:								
- weather and ozone	1...2	1...2	3...4	1...3	4	5	5	5
- acids	2...3	2...3	4	3	3	3...4	4	3...4
- alkalis	2...3	2...3	4	2...3	3	1...3	4	3...4
- oils, grease	1	1	1	4	2...3	4	2...3	1
- aromatic	1	1	1	3	1	4	1	1
- water	5	3...4	3...4	5	3	4	3...4	5
- wear	4...5	4	2...3	3...4	3...4	3	3	3
- fire	1	1	1	1...2	3...4	4	3	1
Gas permeability	3	3	5	3	3...4	4	4	2...3
Electrical resistance	4	4	4...5	1...2	3	3	3...4	4



Designed to use as cut-off valves in process lines with aggressive and neutral free-flowing non-cementing media.

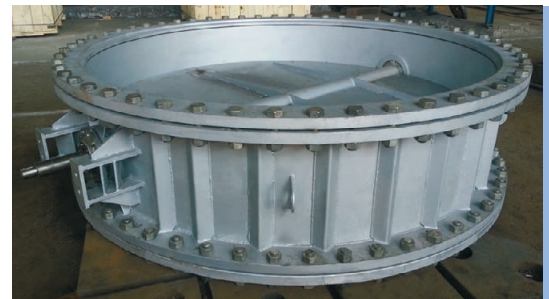


Technical characteristics

Dy	Pressure operating, MPa	Dimensions, mm							Number of holes d1	Weight, kg
		B	H	L1	L	h	d	d1		
50	1,0	200	674	220	180	167	145	18	4	36
100	1,0	250	960	318	230	238	200	18	8	72
150	1,0	315	1296	362	270	332	280	23	8	112
200	1,0	370	1470	410	330	384	295	23	8	154
300	0,6	486	2126	420	340	568	445	23	12	300

Orifice valve

Orifice valves are designed to adjust waste gas flow blockage.



Technical characteristics

Port area, Dy, mm	1500	2000	2100	2150	2300
Breathing, %	0,37-0,45				
Waste gas characteristics:					
- Temperature, °C, max	up to +270				
- Negative pressure, kPa	up to 15				
External temperature, °C					
• min	+ 5				
• max	+ 40				
Actuating unit	HQ – 060	HQ – 080	HQ – 080	HQ – 080	HQ – 080
• power, kW	0,184	0,312	0,312	0,312	0,312
• nominal torque on the shaft, Nm	600	800	800	800	800
• time of opening, closing, sec	31	37	37	37	37
Set position	Horizontal, vertical				
Feed direction	Any				
Gate travel	Revolution through 90°				

Specialists of LLC “ KB Energomashproekt” and BMZ “Progress” have organized designing, production and implementation of new sources of heat and electric power generation, development of new ways, methods of saving energy and resources, application of new technologies for burn-ing various types of fuel.

On the basis of the accumulated experience, a fundamentally new generation of steam boilers is created: they use biomass as fuel, including technological waste from the production of various processing and agro-industrial complexes, depending on the location of productive capacities.

The entire production chain for the use of biomass is designed in full compliance with the EN standards on amount of emissions of harmful substances in flue gases.

In boiler designs, various technologies for burning solid fuels are used:

- layer burning;
- vortex combustion;
- combustion in the boiling expanded layer;
- burning in a circulating fluidized bed.

These technologies enable usage of degraded solid fuel (according to content of ash and moisture):

- food and processing industry waste;
- different types of biomass;
- other fuel types.

For the combustion of various types of solid fuels in boiler units, various types of grates are used:

- tilting grate bars;
- reciprocating grate;
- chain gratings of various types;
- vibrating grates, etc.

The dimension range of boilers meets the following parameters:

- capacity: 12, 16, 25 t/h;
- pressure: 1,3; 1,8; 4,0 MPa;
- temperature: 1-95, 250, 360, 440 °C.



Technical characteristics

	E-12-1,8-250D, E-12-1,4-225D	E-16-1,4D E-16-2,4-250D	E-16-3,9-360D	E-25-3,9-440D	E-50-3,9-380D
Productivity	12 t/h	16 t/h	16 t/h	25 t/h	50 t/h
Pressure at outlet	1,4 - 1,8 MPa	1,4 - 1,8 MPa	3,9 MPa	3,9 MPa	3,9 MPa
Steam temperature	225 - 250°C	195 - 250°C	360°C	440°C	380°C
Dimensions:					
• width in axes of columns	5,7 m	6,80 m	9,8 m	9,8 m	7,6 m
Depth in the axes of columns					
• including outside economizer	13,2 m	15 m	17,1 m	19 m	25 m
Mark at the boiler top	11,7 m	14,1 m	17.15 m	20 m	23,5 m
Main type of fuel	Husks of sunflower seeds, wood chips, coal of various grades, MSW pellets				
Boiler overall efficiency	86 %				

Steam boiler E-12-1,4-225D, E-12-1,8-250D



Double-drum, with natural-circulation, has a Z-shaped closed arrangement of heating surfaces. The boiler is gastight, with balanced draft. The walls of the combustion chamber and the downtake convective flue duct are formed by gastight panels of pipes, between which a strip is welded.

A steam superheater and economizer are arranged in series along the fuel gas flow.

Flare-layered combustion method with stepped air supply allows to burn biomass with minimal formation of pollutants according to the EN requirements.

The processes of boiler feed, combustion and control of steam superheat are fully automated.

Steam boiler E-16-1,4D , E-16-2,4-250D

Double-drum, with natural-circulation, has a Z-shaped closed arrangement of heating surfaces. The boiler is gastight, with balanced draft. The walls of the combustion chamber and the downtake convective flue duct are formed by gastight panels of pipes, between which a strip is welded.

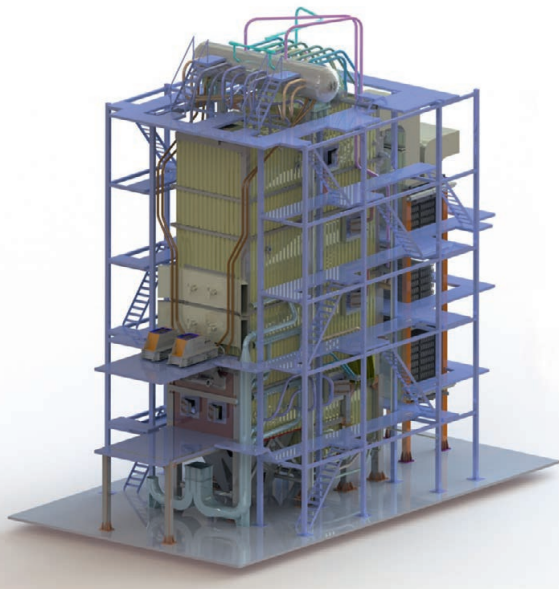
A steam superheater and economizer are arranged in series along the fuel gas flow.

Flare-layered combustion method with stepped air supply allows to burn biomass with minimal formation of pollutants according to the EN requirements.

The processes of boiler feed, combustion and control of steam superheat are fully automated.



Steam boiler E-16-3,9-360D



Single-drum, with natural-circulation, has a Z-shaped closed arrangement of heating surfaces. The boiler is gastight, with balanced draft. The walls of the combustion chamber and the downtake convective flue duct are formed by gastight panels of pipes, between which a strip is welded.

A steam superheater and economizer are arranged in series along the fuel gas flow.

Flare-layered combustion method with stepped air supply allows to burn biomass with minimal formation of pollutants according to the EN requirements.

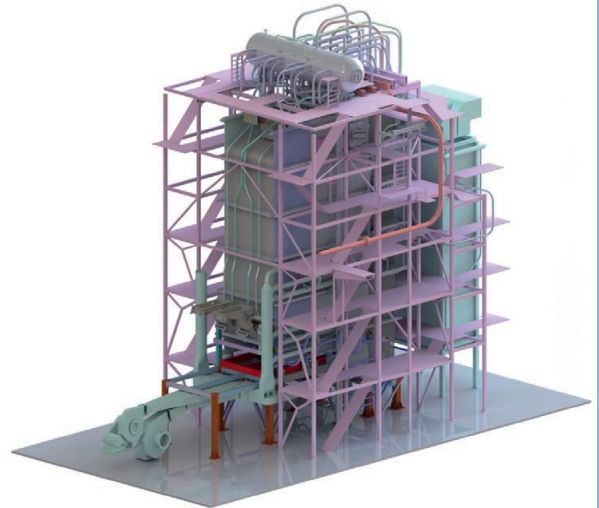
The processes of boiler feed, combustion and control of steam superheat are fully automated.

Single-drum, with natural-circulation, has a Z-shaped closed arrangement of heating surfaces. The boiler is gas-tight, with balanced draft. The walls of the combustion chamber and the down-take convective flue duct are formed by gastight panels of pipes, between which a strip is welded.

A steam superheater and economizer are arranged in series along the fuel gas flow.

Flare-layered combustion method with stepped air supply allows to burn biomass with minimal formation of pollutants according to the EN requirements.

The processes of boiler feed, combustion and control of steam superheat are fully automated.



Lignin heat generator

Designed to create a flow of lignin combustion products in the amount of 12000-22000 nm³/h with a temperature of 800-850 °C.

Structurally, it consists of a combustion chamber, an afterburning chamber and downcomer gas ducts. The principle of combustion is cyclone.

Natural gas is used as starting and reserve fuel. Power when working on natural gas 2 MW.

The heat generator also includes an ash and slag removal conveyor with a water seal, a kindling gas duct with a valve for switching operating modes, explosive safety valves, sharp blast air ducts, a heat generator operation control system and a set of instrumentation.



Fuel supply is carried out by a screw feeder and a fuel supply fan, secondary blast fans, controlled and shut-off valves along the natural gas path.

The control system includes a cabinet for controlling and monitoring the operation of a heat generator, a power cabinet, flame control sensors, gas pressure sensors, and temperature control sensors.

The design of the heat generator provides two flue gas outlets for connecting fuel drying systems.

Specialists of “KB Energomashproekt” for many years have been active in the introduction of modern technologies of treatment of feed-water for industrial and power boilers. They perform the whole package of works:

- technological schemes development for water treatment of various sources of water supply;
- implement projects of water treatment stations with advanced equipment.



Developed and introduced in the production of industrial boiler the latest technologies of water-chemical mode of boilers operation, which completely exclude corrosion of the steam-and -condensate channel and heat-consuming equipment.

Rational operation of boiler house with water treatment allows obtaining of significant saving firstly by prolonging of trouble-free operation of heat exchange equipment and steam-and -condensate channel, and secondly, by lowering expenses for purification of recycled condensate from iron oxides.

Besides, absence of buildup on the heat exchange equipment reduces coolant rate for process needs of the enterprise.

At present, with an acute shortage of fresh water, water-saving technologies for water treatment for energy industry have become of high priority.

When solving tasks to reduce discharges from water treatment equipment, our specialists are actively working to develop methods and technologies for cleaning process effluents and to return of desalted water to the cycle of heat-and-power station (HPS) or boiler house.



The water treatment projects for thermal desalting and chemical softening in vortex reactors have been already implemented; the project of effluents desalting with application of electro dialysis demineralizer is designed and being implemented at the moment.

In order to reduce the amount of highly concentrated effluent after chemical cleaning of boilers, we have developed schemes for cleaning and passivation of heating surfaces using water-soluble high-molecular amines, which significantly reduces water consumption.



Designing of HPS (heat-and-power station)

We offer services and knowledge in the field of modernization of old boiler houses, their con-version to alternate fuels, reorganization of boiler houses to HPS and the possibility of expanding the HPS by adding of both boiler units and steam turbines. Our specialists have performed the whole construction phase of HPS and boilers from scratch. With our knowledge and many years experience we can start designing and perform multistage construction of HPS, so-called construction phases (when they install the equipment, put it into operation, then they install the following equipment).



Experienced supervisors constantly carry out erection supervision, communicate directly between designers and installers, keep a clear line of installation with meeting all norms, rules of implementation, timing and, accordingly, compliance with design documentation.



Apparatuses with mixing devices

Apparatuses with mixing devices, including non-standard designs, are designed to carry out the processes of homogenization, suspension, emulsification, dispersion and heat transfer.



- | | |
|------------|--|
| Design: | |
| - housings | with product cooling or heating (with liner), without product cooling or heating (without liner) |
| - covers | flat, elliptical |
| - liners | removable, welded |
| - bottoms | flat, elliptical, conical |
| - mixers | bladed, three-bladed, six-bladed, screw, turbine (open and closed), cage, auger, anchor, frame, belt (with and without scrapers) |

Technical characteristics

Inner housing diameter, mm	1000; 1400; 1600; 1800; 2200; 2400; 2800
Nominal volume (capacity), m ³	1; 2; 3,2; 4; 5; 6,3; 10; 12,5; 16; 25; 32
Working pressure, MPa:	
• in housing	up to 1,6
• in liner	up to 0,7
Residual suspension pressure, Pa, not less than	1,34
Operating temperature in the housing and liner, °C	от -15 до +240
Mixer speed, min ⁻¹	45 - 250
Drive power, kW	1,5 - 22

The devices are made of carbon and corrosion-resistant steels, as well as titanium alloys. The working environment in the device is not regulated.



Belt mixers are designed to mix bulk materials as well as bulk materials with small quantity of liquid components.

Batch mixer LN is a horizontal body fixed on a frame or a foundation. Inside the body there is a rotor with two rows of spiral belts.

In the course of operation, outer belts move the material towards body central part, inner belts – towards side walls of the body. Material is fed through an inlet fitting and discharged through an unloader valve with pneumatic actuator. Rotor with belt spiral

blades in a form of skew helicoid is used as operating device.

Continuous mixers ND900 have rotor with belt spiral blades as operating device; mixers of ND650 type have two rotors with helically installed blades.

Automatic control system operates in two modes: local – from control desk, remote – from central control board.

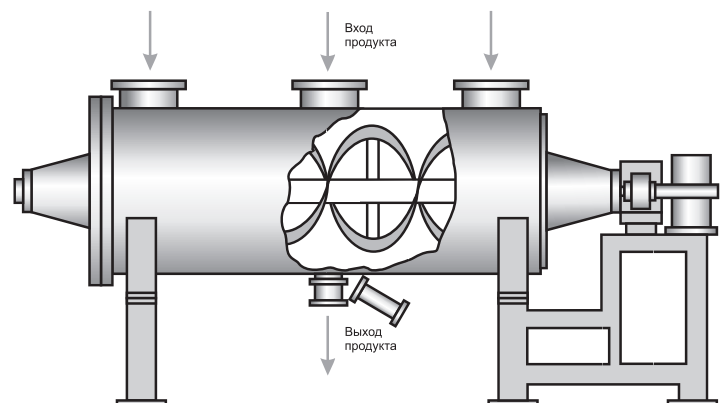
Technical characteristics

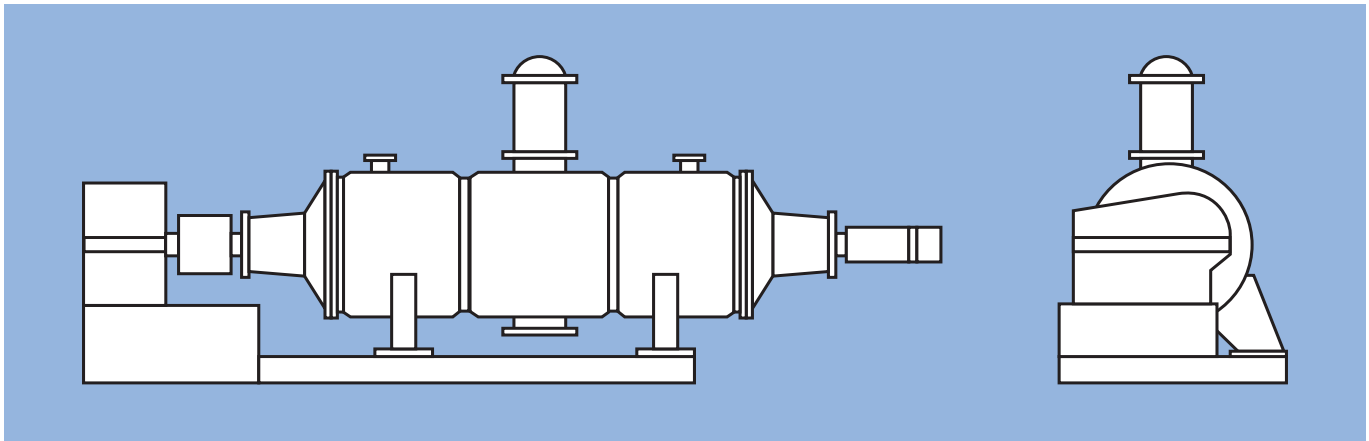
Mixer type	Volume of mixing chamber, m ³	Pressure in mixing chamber, MPa	Operating temperature in mixing chamber, °C	Installed power, kW	Overall dimensions, mm			Weight, kg
					length	width	height	
LN 1,0	1,0	0,02	20...+ 45	5,5	3750	1400	1980	2135
LN 1,6	1,6	0,02	20...+ 45	7,5	3750	1400	2080	2315
LN 3,2	3,2	0,02	- 20...+ 45	11,0	4900	1400	2160	2860
LN 10	10,0	0,02	20...+ 45	40,0	6320	2200	2960	9400
LN 16	16,0	0,02	20...+ 45	45,0	7350	2395	3170	11030
ND 650	2,1	0,02	+ 45	22,0	6485	1595	1840	5690
ND 900	2,5	0,02	+ 45	11,0	5140	1390	2010	3560

The shown data are for mixers of carbon steel.

Helicoid batch mixers LN are produced without cooling or heating of the product (without jacket). Mixers of ND type are manufactured in standard and explosion-proof design, without jacket, made of carbon and stainless steel. Operating temperature for jacketed mixers is +138°C.

On customer request mixers can be made of corrosion-resistant steel or titanium and jacketed.





RV dryer is designed to dry liquid, pasty and granular materials in service vacuum condition, as well as to dry toxic non-explosive products and products with organic solvents content

Batch-operated vacuum-cylindrical dryer is a horizontal cylindrical jacketed unit consisting of the body with two spherical covers on the ends. Brackets with rotor supports are fixed to the covers.

Rotor is a hollow tube to which bars with blades for mixing the product are welded. If additional heating is required, the rotor design provide steam feed and condensate discharge. Rotor rotation is reversive, from individual actuator.

In the top of the body there is a feeder with heating jacket, an unloading gate is at the bottom. A valve of the unloading gate is opened and closed with handwheel by means of worm drive. A sampler, fixed on a spherical cover, provides sampling from operated dryer without vacuum relief. Roller supports are installed to neutralize heat growth.

Technical characteristics

Capacity, m ³	4,5
Pressure of steam in the jacket (liner), MPa	0,5
Residual pressure in the body, mm of mercury	40
Heating steam temperature, °C	158
Heat exchange surface area, m ²	14
Time of spin in one direction, min.	1-10
Mixer rotary velocity, rpm	6
Mixer drive motor:	
• type	AO2-62-6
• power, kW	13
• shaft speed, rpm	1000
Габаритные размеры, мм:	
• length	7180
• width	2030
• height	2670
Weight (without component parts), kg	6770

Remote control of rotor reversing, feeding and discharging.

Control and measuring devices and safety valve are installed on the dryer.

Material of parts in contact with product: body and covers of steel BST.3ps2+12X18H10T; rotor of steel 08X18H10T, 12X18H10T.



The filters are designed for water treatment of relatively low carbonate hardness at power stations, industrial and public boiler plants.

The filter is a single-chamber cylindrical unit with elliptical top and bottom ends. The unit is equipped with hatches that allow the installation and maintenance of all devices inside the body. Depending on the diameter, the filters can be manufactured either with a flange connection or one-piece.

Filling of clarifying filters FOV: quartz sand, marble chips, anthracitic coal.

Filling of ion-exchange filters FIPa and FIPr: sulfonated coal, cation-exchange material Ku-2.

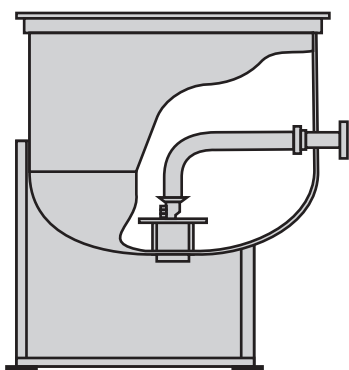
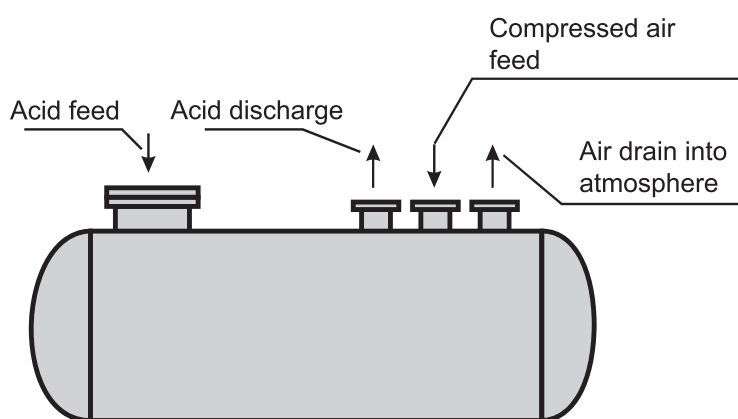
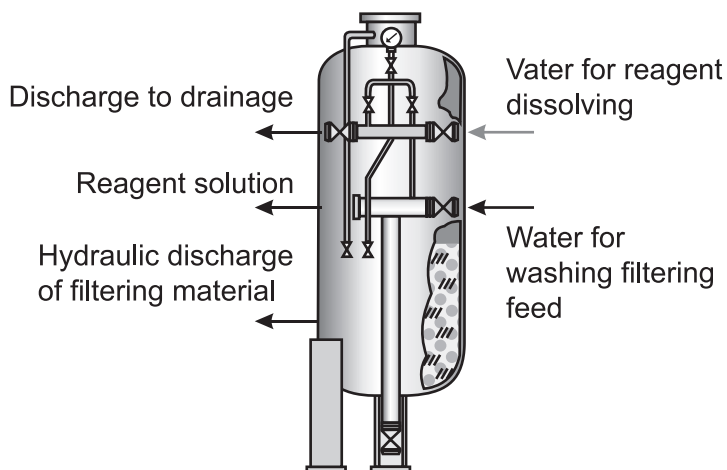
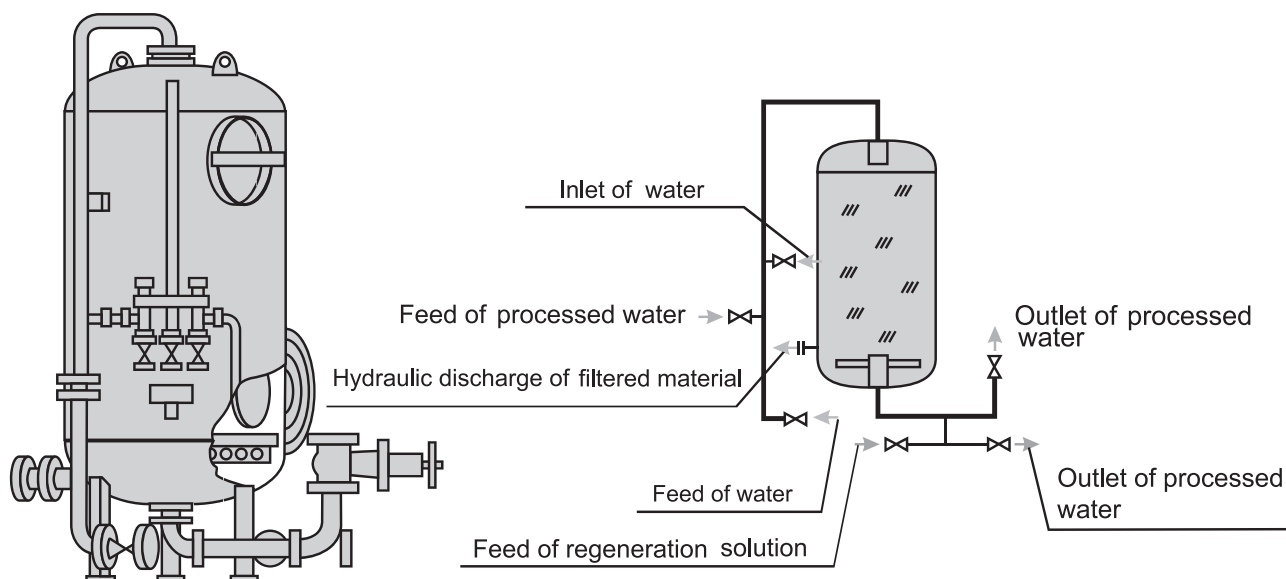
Filling material is not included in the scope of supply.

The filters are equipped with on-off valves and connecting piping.

The filters can be manufactured: with lower distributor which is a capped grid (perforated bottom) or in a form of manifold with cut grooves (gap 0.2-0.4mm) imitating the bottom.

Technical characteristics

Filter type	Operating pressure, MPa	Filtering surface area, m ²	Diameter, mm	Volume of filter filling	Capacity with rated filtration speed, m ³ /h	Wight, kg
FOV 1,0-06	0,6	0,8	1000	0,9	10	987
FOV 1,4-06	0,6	1,54	1400	1,6	20	1604
FOV 2,0-06	0,6	3,14	2000	4,34	30	2922
FOV 3,0-06	0,6	7,1	3000	11,0	70	7440
FOV 3,4-06	0,6	9,1	3400	-	-	7595
FIPa I-1,0-06	0,6	0,8	1000	1,6	20	1098
FIPa I-1,4-06	0,6	1,54	1400	30,8	50	1572
FIPa I-2,0-06	0,6	3,14	2000	7,85	80	3400
FIPa II-1,0-06	0,6	0,8	1000	1,2	40	1056
FIPa II-1,4-06	0,6	1,54	1400	2,3	90	1623
FIPa II-2,0-06	0,6	3,14	2000	4,7	150	2970
FIPr 3,0-06	0,6	7,1	3000	26,6	180	8231



Salt dissolvers

Designed to make regenerant solution of salt and ammonium sulphate for cationic reagent solution of water treatment system at power stations, industrial and public boiler plants.

Tanks BSK 16 и BAK 16

Designed to receive, store and distribute concentrated sulfuric (98%) and nitric acid at warehouses of water treatment plants which include ion-exchange filters.

Hydraulic circulation mixers

Designed for preparation and continuous mixing (circulation) of preset concentration fluid prior to its feed to dosing devices.



1. Preparatory and press forging facilities

- 1.1 Dimensioning of flat steel and bar iron.
- 1.2 Cutting of bar iron.
- 1.3 Guillotining of flat steel up to 14 mm thick.
- 1.4 Thermal cutting of flat steel 16 – 100 mm thick with the application of CNC portal or photocopying machines.
- 1.5 Sheet straightening and hydraulic flattening.
- 1.6 Hole perforating in sheet iron up to 1500 mm wide and 3500 mm long; min. hole dia. is 1.5 of thickness.
- 1.7 Bending of flat steel with sheet bending press:
 - thickness up to 6 mm, length 5000 mm;
 - thickness up to 8 mm, length 3500 mm;
 - thickness up to 10 mm, length 2100 mm;
 - thickness up to 12 mm, length 1400 mm.
- 1.8 Stamping of bottoms dia. 90-1200 mm made of carbon and alloy steel 4-25 mm thick.
- 1.9 Cold and hot stamping of blank parts with force up to 630 tnf.
- 1.10 Bending and calibrating of tubular billets dia. 16-426 mm, up to 3000 mm long.
- 1.11 Bending of rings dia. 220-1800 mm out of strip bar, max. section 100 x 140 mm
- 1.12 Bending of segments and semi-rings dia. 1200-3000 mm out of rough forging with section not more than 180 x 225 mm with application of hydraulic press Q 400 tnf.
- 1.13 Making forgings weighing less than 180 kg with

application of air hammer; falling weight 2000 kg.

2. Subassembly welding facilities

- 2.1 Edge planing machining of sheet bars up to 8000 mm long before welding
- 2.2 Rolling of sheet bars dia. 500-3000 mm, up to 2000 mm wide, up to 50 mm thick with plate-bending rolls.
- 2.3 Assembling of metal structures and capacitive equipment of carbon and alloy steel for further welding.
- 2.4 Manual, semiautomatic, automatic welding of metal structures.
- 2.5 TIG welding of Titanium, Aluminum and other nonferrous metal articles.
- 2.6 Hydraulic testing of capacitive equipment with max. pressure up to 160 kgf/cm².
- 2.7 Cleaning operations on removing oxidizing films, corrosion spots and other impurities of carbon and corrosion-resistant articles using wet blasting, shot blasting and pickling treatment. Article dia. is up to 4000 mm.

3. Machining Facilities

- 3.1 Lathe machining of workpieces and units with following dimensions:
 - facing lathe machining, max. dia. 3600 mm and max. length 10550 mm;
 - screw lathe machining: over support max. dia. 1600 mm and max. length 12000 mm, over bed max. dia. 2000 mm.
- 3.2 Vertical boring and turning machining of workpieces with max. dia. 5000 mm and up to 2500 mm high.
- 3.3 Planing machining of workpieces up to: 6500 mm long and 2000 mm wide.
- 3.4 Milling machining of workpieces up to: 6300 mm long, 2000 mm wide and 2000 mm high.
- 3.5 Horizontal boring machining of workpieces and units up to: 4000 mm long, 3000 mm high and max. counterboring depth 1900 mm.
- 3.6 Jig boring machining of workpieces and units up to: 1000 mm long, 630 mm wide and 700 mm high.
- 3.7 Vertical and radial drill machining of workpieces and units with max. drilling dia. 100 mm.
- 3.8 External grinding of parts with max. dia. 400 mm and up to 2800 mm long.
- 3.9 Internal of parts with max. dia. 200 mm and up to 200 mm long.
- 3.10 Planer-type surface grinding of workpieces up to 2000 mm long, 400 mm wide and 500 mm high.
- 3.11 Rotary-type surface grinding of workpieces with max. dia. or circumference 1800 mm and up to 500 mm high.
- 3.12 Deep boring of workpieces with max. boring dia. 400 mm and up to 6000 mm long with application of special boring machines.

3.13 Cylindrical wheel hobbing with max. rifling dia. 5000 mm and up to 2000 mm high using up to 40 mm modules for cast iron and 30 mm for steel.

3.14 Horizontal cylindrical wheel hobbing with max. rifling dia. 500 mm and up to 2500 mm long; module max. 20 mm.

3.15 Straight bevel gear hobbing with max. pitch dia. 1250 mm, cutted teeth length max. 200 mm, module max. 24 mm (standard); 15 mm (helical).

3.16 Skew bevel gear hobbing with max. pitch dia. 450 mm, module max. 10 mm.

3.17 NC turning, max. swing over bed 400 mm; turning of bar, max. dia. 65 mm, max. length 1200 mm.

3.18 NC vertical drill machining, max. drilled dia. 45 mm.

3.19 NC mill machining, workpieces max. 1000 mm long, 400 mm wide, 350 mm high.

3.20 NC horizontal boring mill machining, workpieces and units max. 1250 mm long, 1000 mm high, 710 mm wide (boring depth).

3.21 Profile grinding machining, workpiece max. grinding area 150 x 60 and up to 78 mm high.

3.22 Thread grinding, max. threaded dia. 125 mm, max. pitch 6 mm, max. length 75 mm.

3.23 Other kinds of work:

- benchwork and assembly;
- electrical installation work, manufacturing of control panels and control rooms with relay and microprocessing hardware components;
- shop painting;
- electroplating (chrome-plating, max. plated area 100 square decimeter; zinc plating, max. plated area 15 square decimeter);
- rubber coating, max. article dimensions: length 6000 mm, dia. 2600 mm;
- production of general rubber goods, max. dia. 500 mm;
- packing.

4. Tool-making facilities

4.1 We manufacture:

- punches and molds, casting forms, various form and configuration accessories as per customer's design documentation;
- different pitch lathe jaws $\varnothing 160$, $\varnothing 200$, $\varnothing 250$, $\varnothing 320$, $\varnothing 400$;
- guillotine knives made of steel 5XB2C, 6XB2C, X12M, XBF; max. L=1100 mm;
- punches and dies for sheet bending presses;
- rolls and shafts for rolling mills;
- stamps symbolic and numeric.

4.2 Operations we perform:

- turning, benchwork, milling, grinding and others as per customer's design documentation;
- grinding of guillotine knives, max. L=2000 mm;
- SHF thermal treatment and in heat-treating furnaces;
- annealing and normalizing of large parts;
- abrasive disks impact testing.

5. Testing methods used to calibrate materials and welds

5.1 Chemical analysis of carbon and alloy steel, non-ferrous metal and alloy.

5.2 Metallographic of carbon and alloy steel, non-ferrous metal and alloy.

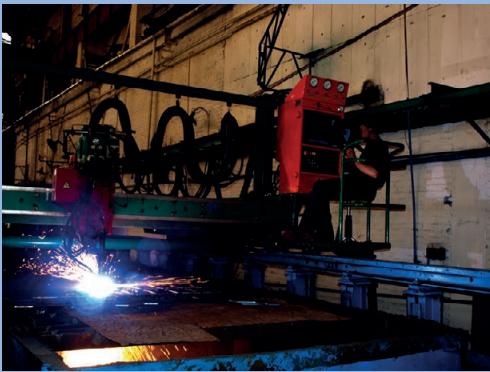
5.3 Corrosion testing of stainless steel.

5.4 Mechanical testing of carbon and alloy steel, titanium alloys.

5.5 Mechanical testing of welds.

5.6 Viscosity and film hardness test, time-of-setting and adhesion test of coating, filler, enamel, paint.





5.7 Viscosity, burning, neutralization tests of industrial oil lubricant, compressor oil, transformer fluid.

5.8 Elongation test, scleroscope hardness test, resistance to attack by corrosive media test of general rubber goods.

5.9 Metal and alloy radiography:

- iron-base alloy, max. thickness 20 mm;
- titanium-base alloy, max. thickness 45 mm;
- aluminum-base alloy, max. thickness 97 mm.

5.10 Ultrasonic inspection:

5.11 Carbon and low-carbon steel thickness range 1 - 5000 mm controlled by crack detector УД-12.

5.12 Visible dye penetrant testing to reveal surface cracks including welds penetration defects.

6. Foundry

6.1 Gray iron castings (СЧ10 - СЧ20 GOST 1412-85) weighing 2 - 3000 kg.

6.2 Special iron castings (ЧХ1, ЧС5, other cast iron grades are dealt singly for each casting) weighing max. 1000 kg.

6.3 Aluminum castings as АК – 7 alloy grade, max. weight 300 kg.

6.4 Bronze castings (grade Бр05Ц5С5, БрАЭЖЗЛ), max. weight 200 kg.

6.5 Carbon steel castings: steel 25Л - 55Л weighing 30 - 800 kg

6.6 High-alloy steel castings as 12Х18Н9ТЛ grade, weighing 30 - 250 kg.

6.7 Custom-tailored approach to each casting order.

6.8 Constructional design of molding tools and manufacturing technology development using up-to-date equipment.

6.9 Wooden and metal mold making for foundry using up-to-date metalworking equipment.

6.10 Heat treatment.

7. Main materials used for pressure equipment manufacturing

Steel:

- Ст3пс2, Ст3пс5 GOST 380, Steel 20 GOST 1050, Steel 09Г2С GOST 5520, GOST 19281
- Steel 12Х18Н10Т GOST 5632
- Steel 08КП GOST 1050, Steel 20К GOST 5520
- Steel 0Х17Н13М2Т, 10Х17Н13М3Т GOST 5632, Steel 06ХН28МДТ GOST 5632
- Alloy BT1-0 GOST 19807-91

Metal structures

Manufacturing plant of ecological equipment and metal structures offers a full-cycle on fabrication and installation of metal structures including constructional design and detailing.

Main activities:

- Industrial and civil construction (all elements of supporting metal frame of a building: columns, frame-works, bars, girt, tie-rods and bearers);
- Unique, complex and special metal structures made of the round and rectangular tubes;
- Road (bridge) metal structures (weighing up to 30 tons);
- Application of a protective anti-corrosion coating;
- Non-standard metal structures according to individual projects;

- Control assembly of manufactured units;
- Installation of metal structures.

We provide tooling manufacturing, shotblasting, high-quality workpieces production, professional assembly and welding of constructions, application of protective anti-corrosion coating. The production is equipped with modern metalworking equipment of leading European companies.

Technological capabilities:

- Overhead travelling cranes with lifting capacity of 10 and 30 tones – 18 pcs; max. load lifting height of travelling crane is 8m.
- Size of workshops gates: 5 m x 4,5 m.
- Production area – 27600 m².
- Certified technology of welding: submerged arc-welding, gas shielded welding, argon arc welding.
- Certified laboratory of non-destructive weld testing methods, X-ray control, and ultrasound control.
- CNC multi-torch gas cutter, thickness of cut metal up to 160mm.
- Coating of products indoors.
- Annealing gas furnaces for stress relief of parts with dimensions: 2 m x 3 m x 6 m.
- Guillotine shears with the capability of cutting up to 25mm;
- Bandsaw machines.
- Plate straighteners, rolling-and-bending machines.
- Horizontal boring machines.
- Friction, electric arc and hydraulic presses with tonnage up to 600 t.
- Vertical and radial drilling equipment to drill diameters up to 85mm.
- Machinery, capable to perform machining of the products with diameter up to 5000 mm.
- Edge-preparing equipment.
- Railway and road access ways.
- Overhead passing to perform check assembly of large-size metal structures.
- Equipment for production and straightening of welded T-sections up to 4 m high.

Production and technological capabilities allow to produce one-piece metal structures up to 20 m long and up to 4 m high within the carrying capacity of the cranes.







НОРИЛЬСКИЙ НИКЕЛЬ





7203

manufactured equipment for enterprise of various industries for the period 1990 -2022

Algeria
Albania
Bulgaria
Brazil

Hungary
Vietnam
Germany
Israel

India
Iran
China
Cuba

Mongolia
Poland
Romania
Slovenia

USA
Turkey
Finland
Czech Republic



	● Tower filter-presses	449
	● Chamber and frame filter-presses	712
	● Tank filters	755
	● Vacuum disc filters	784
	● Belt filters	193
	● Rotary dryers and kilns	347
	● Other equipment	3963

Azerbaijan
Armenia
Belarus
Georgia

Kazakhstan
Kyrgyzstan
Latvia
Lithuania

Moldova
Russia
Tajikistan
Turkmenistan

Uzbekistan
Ukraine



JV "ENERGY PLANT" PU "KYIVTEPLO-ENERGO " is the only operating incineration plant near Kyiv and Ukraine. The plant, which was put into operation in 1988 on the basis of 4 incinerating boilers CHKD "DUKLA" (Czech Republic) utilizes close to 25% of solid domestic waste of Kyiv and transform it into thermal energy for 300 metropolitan superficial buildings.

At the end of 2020, a large-scale project on the technical re-equipment of the flue gas cleaning system was launched at the JV "ENERGY PLANT" of the PU "KYIVTEPLOENERGO". Within the framework of this project, the construction of modern gas cleaning equipment is provided, which will allow to clean the flue gases produced during the burning of domestic waste from harmful substances, in particular from sulfur dioxide (SO₂), hydrogen fluoride (HF), hydrogen chloride (HCl), heavy metals and other pollutants.

The main goal of the project is to ensure the cleaning of flue gases of the plant in accordance with the current regulatory documents of Ukraine and EU Directive 2010/75/EU on industrial pollution.

The project envisages the implementation of a multi-stage gas purification system, which consists of a gas cooler, a chemical purification reactor and a bag filter for dedusting the gas flow.

Each of the 4 boilers will have a separate flue gas cleaning system.

Thanks to the use of modern "semi-dry" cleaning technology, the concentration of various harmful substances in flue gases will be reduced by 5 to 10 times, which will have a positive impact not only on the environment, but also on the health of Kyiv residents.

Purification of flue gases using this technology takes place using completely safe chemical reagents of natural origin - slaked lime and activated carbon. These reagents in the form of powder are sprayed in the gas stream, and after reacting with pollutants, they are completely captured in bag filters and removed.

FZ SOLUTIONS designs and manufactures bag filters of the FRIR type together with "Dniproenergostal".



The modern design of bag filters and the properties of cloth allow them to be used for cleaning gases with a temperature of up to +260°C and an initial dustiness of 100 g/nm³.

Bag filters of production have high cleaning efficiency and allow to achieve the required final dustiness of the gas flow (no more than 10 mg/nm³).

For the spraying of reagents and the flow of chemical reactions, the so-called adsorption, the technology includes special reactors-adsorbers, developed by "FZ SOLUTIONS".

Optimal dimensions and simplicity of design of the "FZ SOLUTIONS" reactor-adsorber ensure its reliable and efficient operation. Design solutions implemented in the reactor allow to achieve the best indicators of desulfurization with minimal capital and operating costs.

According to the project, the gas cleaning system of each boiler also has a cooling column, in which the temperature of flue gases decreases due to water spraying.

The efficient and reliable operation of all gas cleaning equipment is ensured by the automation system. Modern controllers and mechanisms of the automated control system will provide automated dosing of reagents, timely cleaning of bag filters, waste discharge, etc.

One of the most important gas cleaning systems is an environmental monitoring system, which will record not only the residual content of pollutants in the flue gases after their cleaning, but also perform an analysis of the efficiency of the entire gas cleaning equipment.

The entire gas cleaning system is a completely domestic product, since the implementation of the project, the design and manufacture of most of the main equipment, and the construction is carried out by Ukrainian specialists.

The general contractor of the project is FZ SOLUTIONS (formerly BMBP "Progress" LLC). In addition to performing construction and installation works, "FZ SOLUTIONS" is also a developer of gas cleaning technology and a designer of the main gas cleaning equipment.

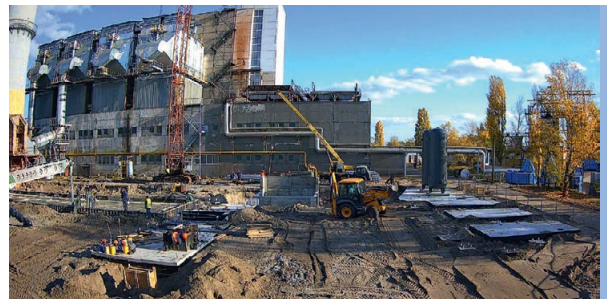
"FZ SOLUTIONS" already has considerable experience in implementing similar projects.

In the period from 2014 to 2018, OJSC "Zaporizhstal" built gas cleaning plants for 6 sintering machines in the conditions of active production. BMBP "Progress" acted as a developer of gas cleaning technology and a reconstruction project, as well as a supplier of the main technological equipment of its own production. The company's specialists also supervised the progress of the construction, commissioned and adjusted the main technological equipment, and staff training was carried out.

The project implements the best global experience of gas cleaning systems installed at modern metallurgical enterprises - these are modern bag filters and adsorber reactors, which are the most effective method of cleaning dust and sulfur dioxide (SO₂).

The basis of the operation of the gas cleaning system is the "semi-dry" method of flue gas cleaning, which involves the use of moistened chemical reagents and also excludes the use of large volumes of water.

Currently, FZ SOLUTIONS, together with its partners, is implementing a similar project at the FERREXPO Poltava Mining. Project documentation has also been developed for a number of enterprises (Central GZK, Southern GZK, Dnirovsky GZK, DTEK Zaporizhia TPP).



Most of the technological equipment for gas cleaning projects is manufactured at the Berdychiv Machine-Building Plant "Progress" (Berdychiv).



The "Progress" plant specializes in the production of technological equipment for dust cleaning systems (cyclones, wet dust collectors, bag filters and electrostatic precipitators), as well as a complex of equipment for chemical cleaning of flue gases from such pollutants as sulfur and nitrogen oxides, chlorine and fluorine compounds, heavy metals.

BMBP "Progress" also manufactures drying and filtering equipment for the chemical, mining, coal, metallurgical and other industries, filtering equipment for industrial and municipal wastewater, as well as boiler equipment.



The guarantee of the quality of the products of the "Progress" brand is a certified quality management system operating at the plant, which meets the high requirements of the International Standard ISO 9001: 2015 (DSTU ISO 9001: 2015).

In addition to domestically produced equipment, some imported equipment is also used in the flue gas cleaning system, in particular automation system equipment (Siemens, Schneider Electric) and environmental monitoring (ABB, Codel).

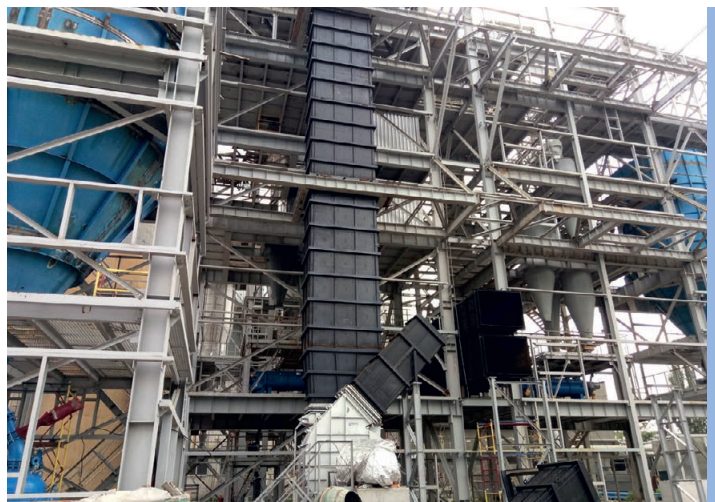


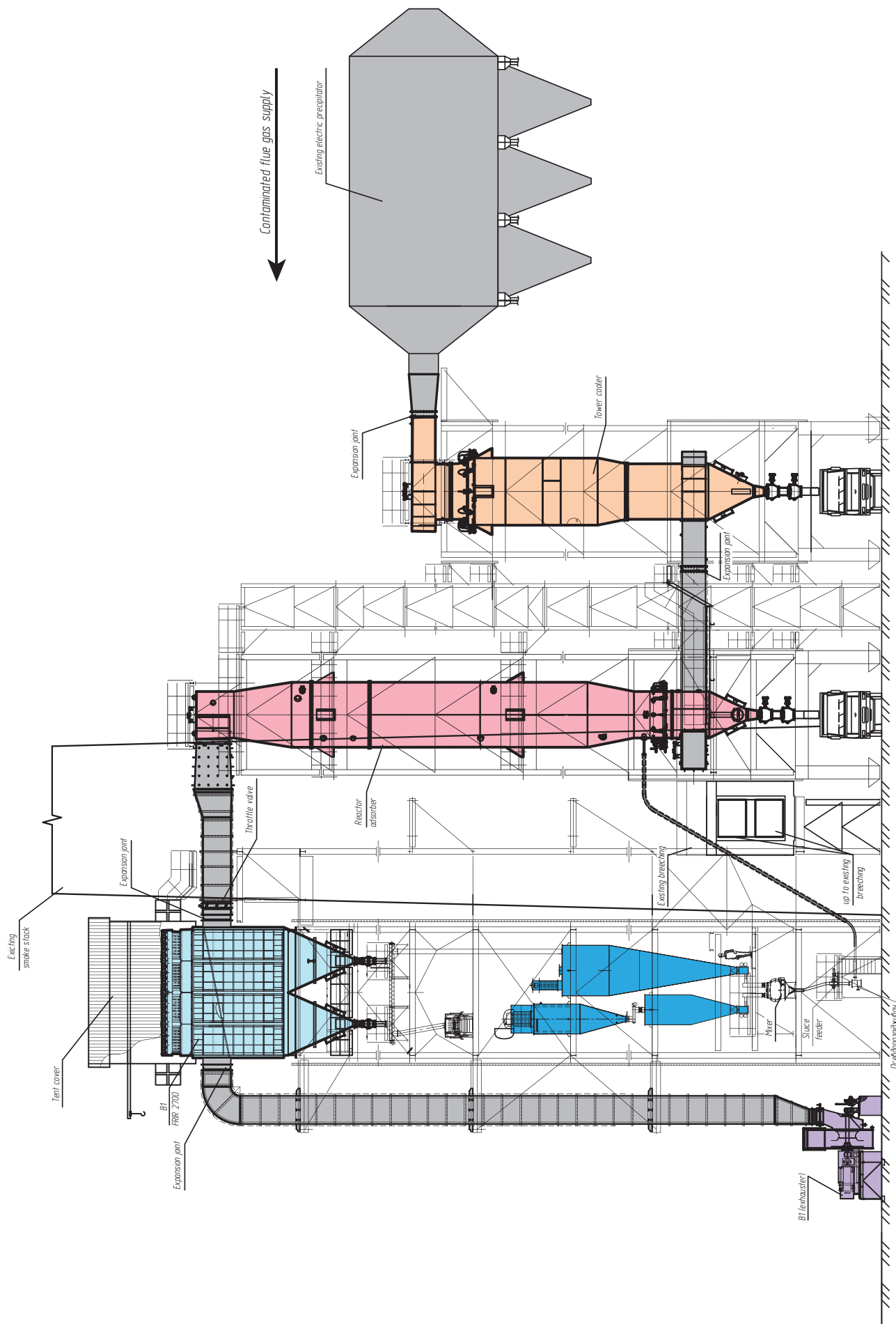
To ensure the reliable operation of not only the flue gas cleaning system, but also the boilers of JV "ENERGY PLANT" PU "KYIVTEPLOENERGO", the project uses reliable exhausters from the company REITZ, which are equipped with electric motors and frequency converters from the company Siemens.

REITZ exhausters are characterized by maximum reliability, high productivity and low energy consumption.

To date, JV "ENERGY PLANT" of PU "KYIVTEPLOENERGO" is actively constructing gas cleaning systems for two of the four boilers. The construction takes place in the conditions of an operating enterprise.

The technological solutions implemented by FZ SOLUTIONS at JV "ENERGY PLANT" of PU "KYIVTEPLOENERGO" are based on the practical experience of European cities. After the reconstruction, the operation of the plant will comply with European environmental directives and will be similar to gas cleaning systems in terms of emissions in cities such as Hamburg, Paris, Vienna, Copenhagen or Barcelona.





A series of horizontal dotted lines spanning the width of the page, intended for taking notes.



**An individual approach
to every project**

BMBP “Progress”

04053, Ukraine, Kyiv

3/5 Kudryavska str.

tel.: +(380 44) 490 3888

fax: +(380 44) 490 3899

e-mail: yu.panchuk@progress.zt.ua

www.progress.ua