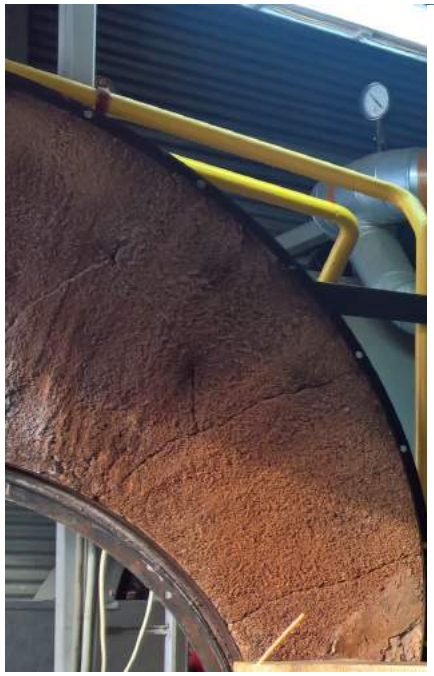
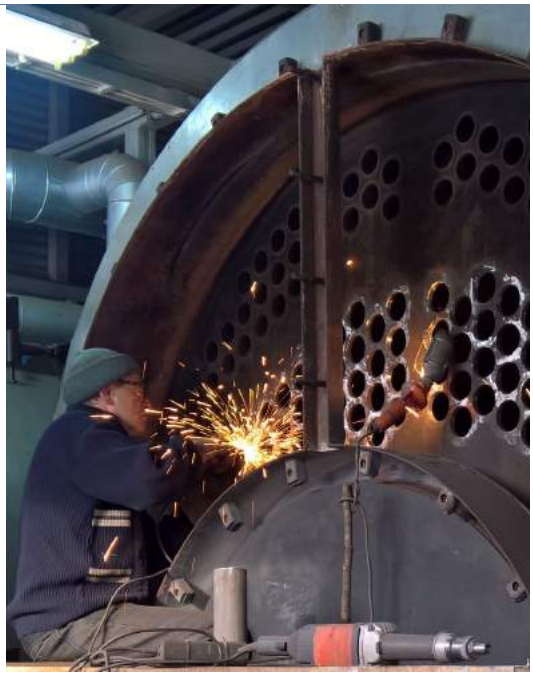

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Expert in steam systems and boiler equipment










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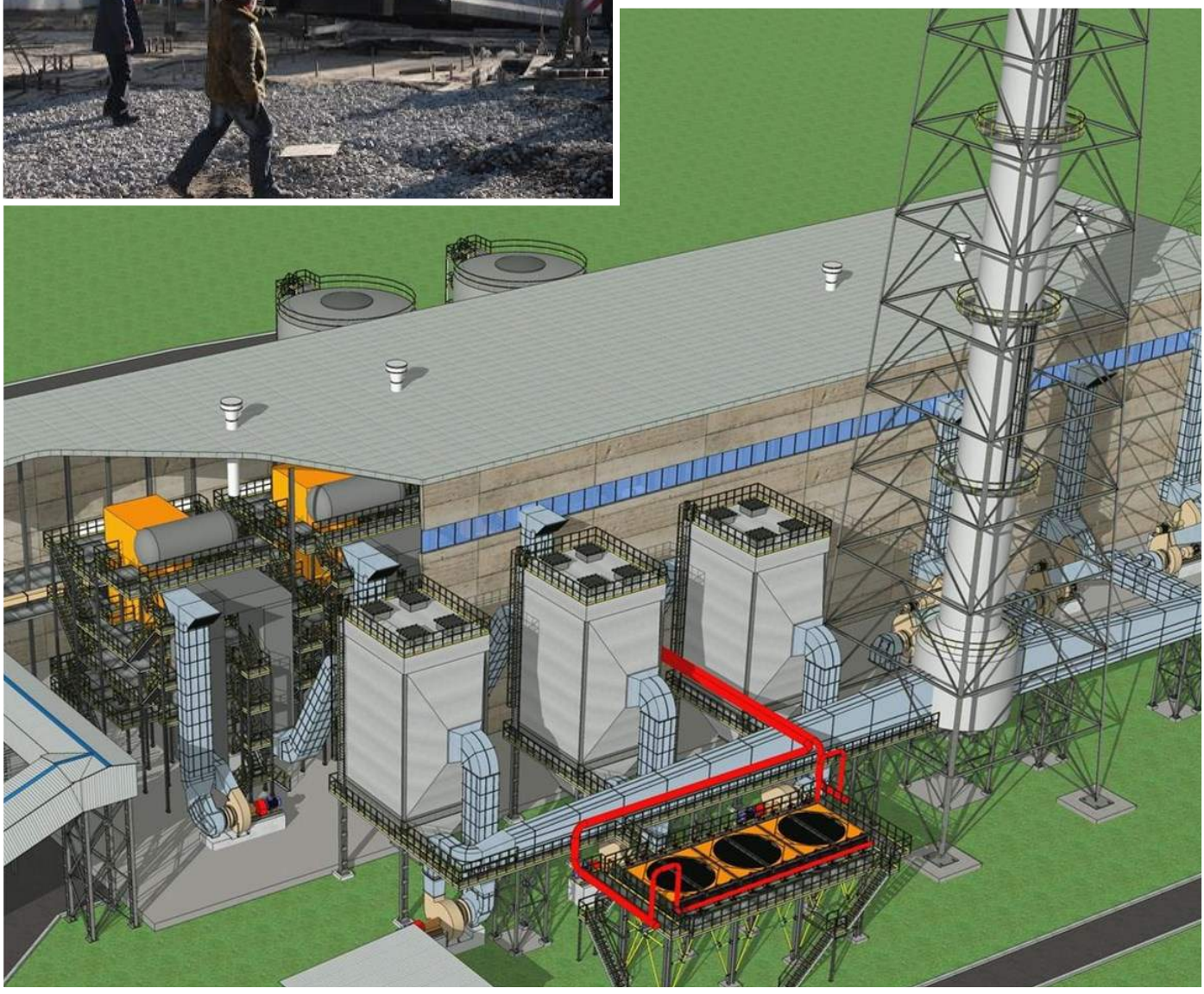
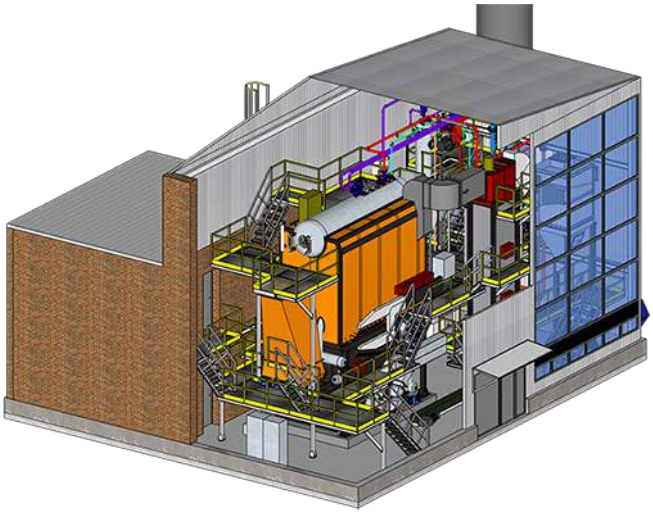


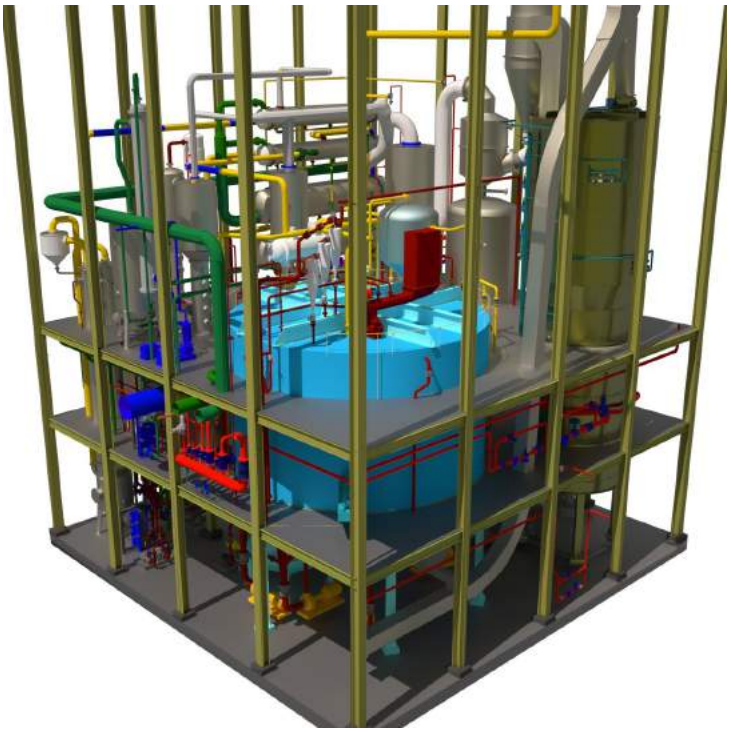


ENGINEERING

Our main trend is industrial heat engineering, the power units, heating and production boilers systems construction, the heat and power plants, steam and condensate systems, technological pipelines, and non-standard equipment designs development. All documentation is developed using the latest versions of CAD software, from 2D drawings to full-size 3D models.
The engineering potential of our team has many years of experience in implementing large projects in Ukraine and neighboring countries in the construction of energy supply facilities using both traditional and alternative fuels.
Integrated design of the object, from the concept development at the initial stages: feasibility study, preliminary assembling solutions to the development of stages P and working drawings of stage P. All design work can be supported by calculations, and the graphic part of the works is supplemented by 3D visualization and by video-realistic photos and video presentations.

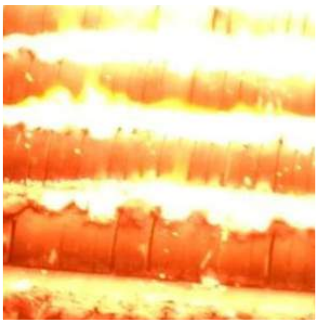
Our specialization is the engineering services provision

- The solid fuels boiler rooms
- The boiler rooms with superheated water, steam and high-temperature organic coolant
- Cogeneration systems: steam turbine and steam-gas turbine cycles, gas piston systems
- Steam condensate systems of industrial enterprises
- Heating and ventilation systems

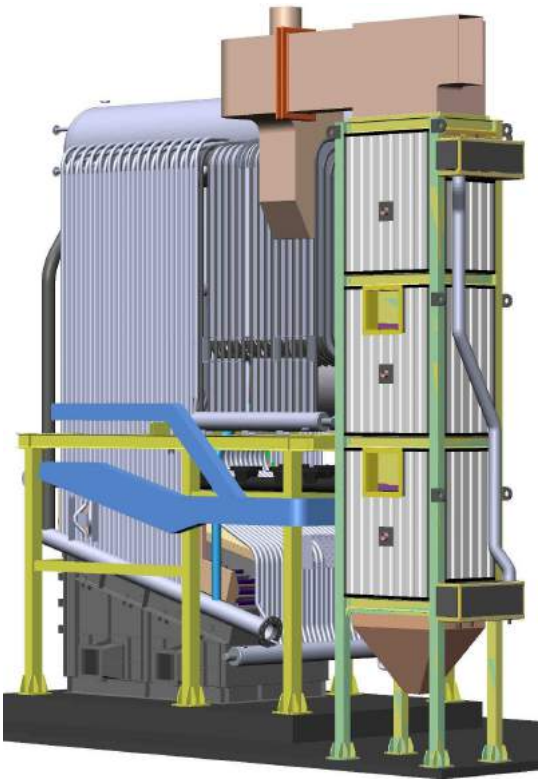


Disadvantages of boilers with non-cooled furnaces when burning dry fuels

When burning even such types of fuel as wood pellets, ash is sintered on the walls of the combustion chamber, forming a layer of fused ash in the form of glassing. Integral coating disrupts the heating joints of the fire bars and leads to failure of refractory materials and necessity of frequent repairs.



In our boilers, when burning dry fuels, a narrow type of fire bars is used; this allows for efficient distribution of the primary air flow for cooling the fire bars field and the fuel layer, which reduces the risks of sintering the layer. Efficient air cooling of the fire bars extends their service life.



DBW STEAM BOILER

Double-drum water-tube steam boiler with layered fuel combustion technology.

Productivity of steam is from 4,0 to 10,0 t/hour

The boiler is designed to generate saturated steam of 13 bar pressure.

Boiler efficiency is not less than - 85%

Boilers provide a fully automated mode of operation without the need for the constant staff presence.

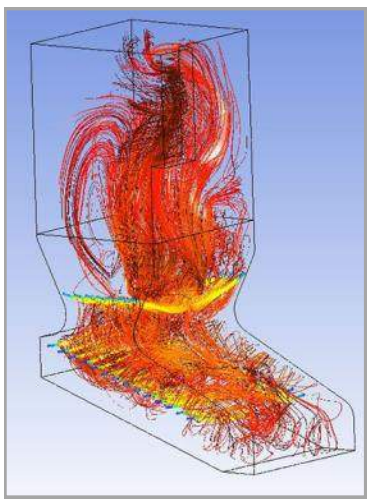
We use sloping-over grating grid in our boiler plants. The firebox surface is formed by alternating rows of moving and non-moving rows of grates and is divided into several combustion zones. Adjustment of the speed of movement and the incidence of grates, as well as the supply of primary air under the grate, is adjusted individually for each combustion zone. Grate bars are driven by a hydraulic system.

The design of the boiler of the KE series developed for burning traditional solid fuels (coal, peat) with the completion of the flue space specifically for burning biomass with configuration features of the furnace and supplying primary and secondary air was adopted as the basic design.

Distinctive features of our boiler unit:

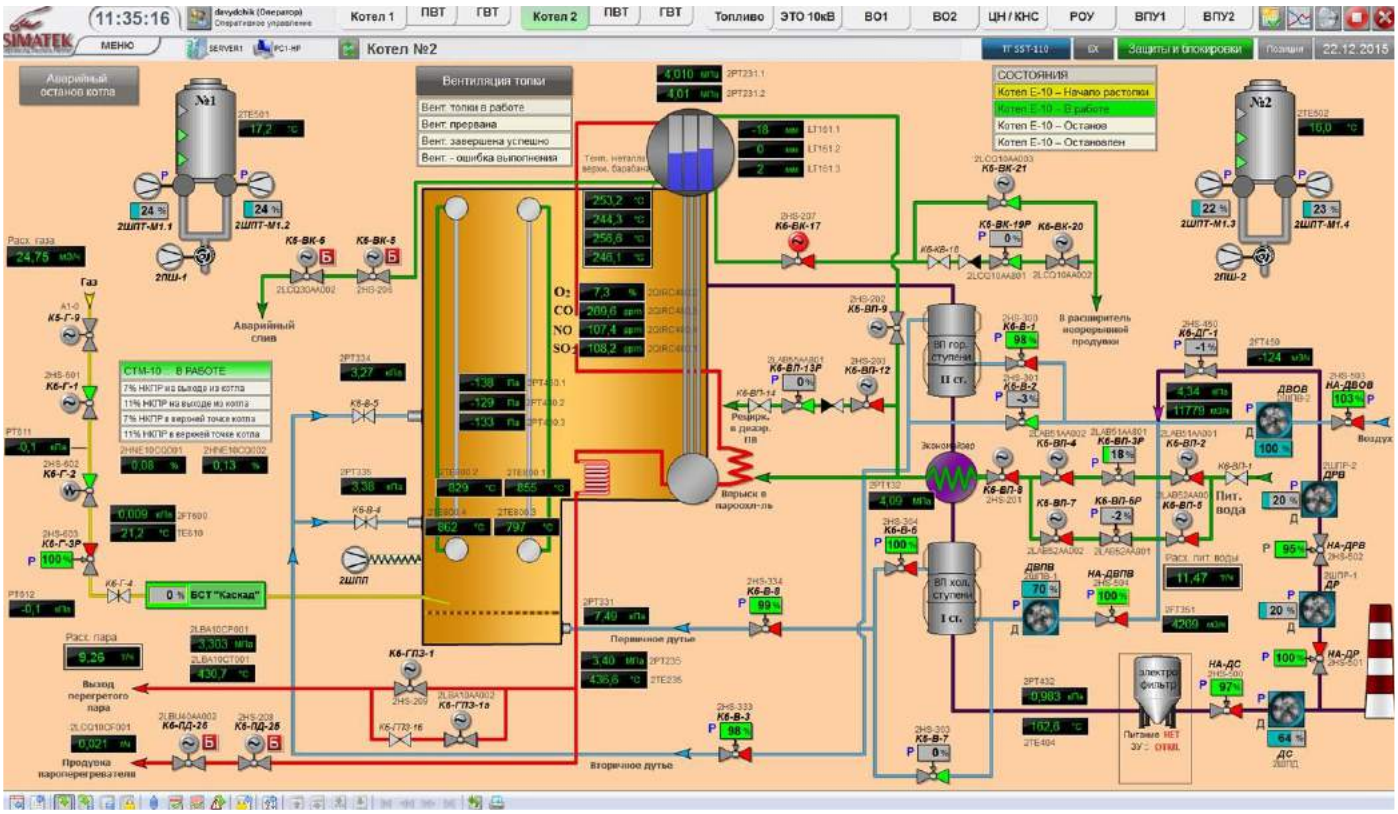
- Variable width and length of the combustion device at the rate of the optimal combustion mirror on the moving grate
- front and rear screens are added,
- side screens are changed, which ensures maximum shielding of the furnace volume,
- secondary blast zones are organized and countercurrent combustion is provided

The main advantages of the boiler compared with designs of other boilers:



The result of process modelling in the boiler

- low calorific combustion mirror (650kVt / m3) and a fully water cooled furnace chamber enclosing surfaces allow qualitatively burning biomass of plant origin with a low ash melting point temperature and humidity levels below 15% and not slag furnace.
- the increased volume of the combustion chamber and the secondary air supply system are designed for high volatile biomass burning elements.
- Fully gastight version of the furnace screens and side screens of the convective beam provide minimal air suction and compensate for the cost of heavy brickwork and insulation.
- the increased screening of the combustion chamber and the afterburner chamber formed between the firebox screen and the first row of the convective beam make it possible to keep flue gas inlet into the convective beam below the temperature of the beginning of ash.
- increased area of a convective beam with installed gas-tight partitions across the course of gases provide effective heat removal by these heating surfaces grate with a field of narrowed specially developed fire bare
- the fire bares grate with a field of narrowed grates specially designed for burning
- biomass with a moisture content of 10-15%
- the block coil economizer with a systematic cleaning of heating surfaces



Steam boiler with low-temperature fluidized bed furnace

Productivity: from 10,0 to 30,0 t/hour

Operating pressure: from 14.0 to 39.0 bar

Overheating temperature: up to 440oC

Efficiency: 88%

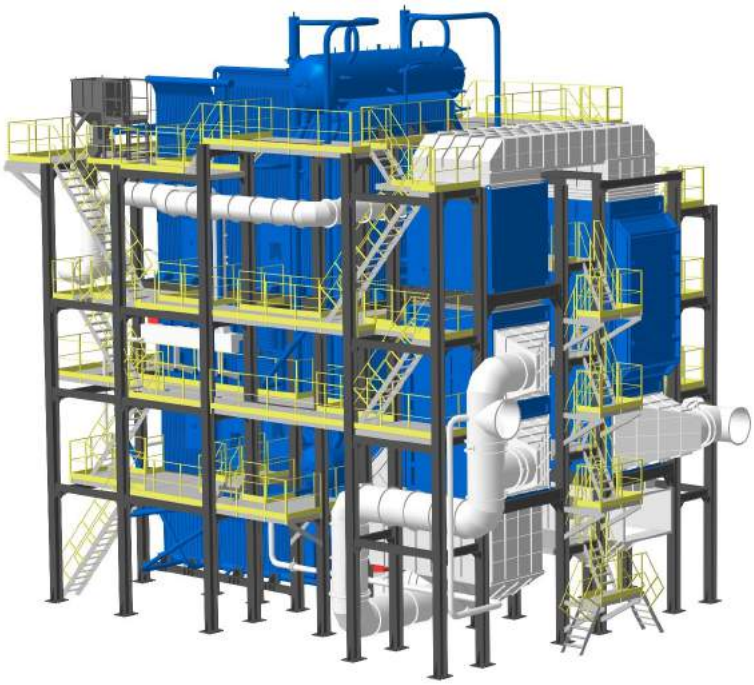
Types of fuel:

- wood chips
- sawdust
- milled peat
- pellets (peat, wood, straw, husk, etc.)
- lignin
- husk of cereal plants
- Sludge from treatment facilities
- Chicken droppings

Melting fuel: gas/diesel fuel

Advantages:

- Gas-tight execution of the furnace, convection unit and the remaining components of the boiler
- Low atmospheric emissions 50 (30) mg/nm3
- The possibility of burning fuels with moisture content up to 65%, without the need for pre-drying of fuel
- The possibility of burning a mixture of various fuels
- Efficient burning of various low-grade fuels
- Lack of mechanical knots in the furnace device



MECHANIZED FURNACES

The moving fire bars grate is made of alternating moving and fixed rows of fire bars.

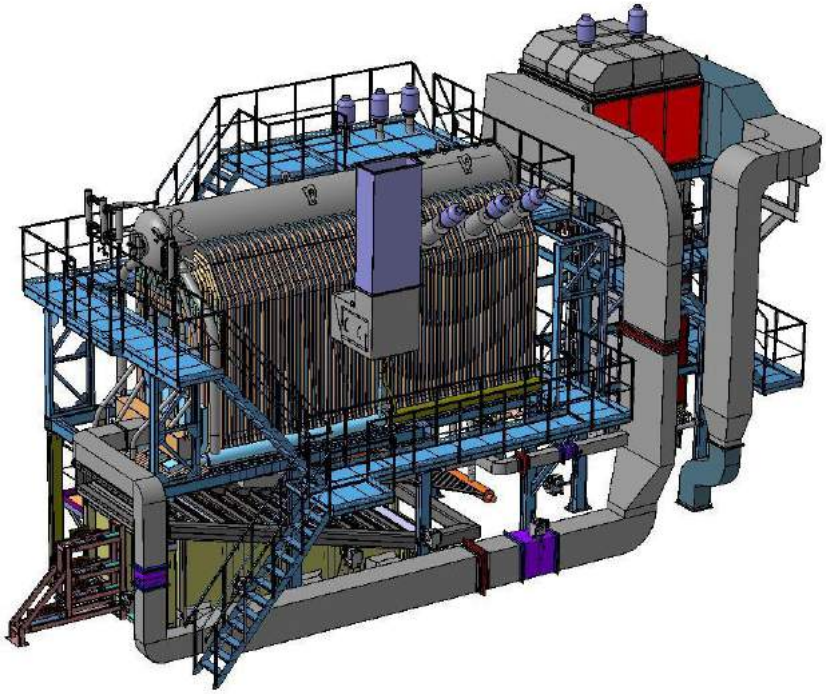
The movement of moving fire bars is regulated by hydraulic cylinders. The cycle of grates steps is adjustable in time. The primary air flow is regulated by a frequency converter. The grate consists of separate zones: drying, heating, ignition and full burnout of fuel. The stroke length of the moving grate for each zone is individually adjustable. The assembled ash trough for ash removal system is installed. At the end of the grate, which includes a flasher with an adjustable counter-weight. The temperature of combustion is 900 - 950 ° C, which is below the melting point of the ash and eliminates the formation of deposits on the heating surfaces.

The fire boxes are made of heat-resistant cast iron CR28 with 28% chromium content - this guarantees a long life cycle of the fire bars

The standard unit of the furnaces device includes:

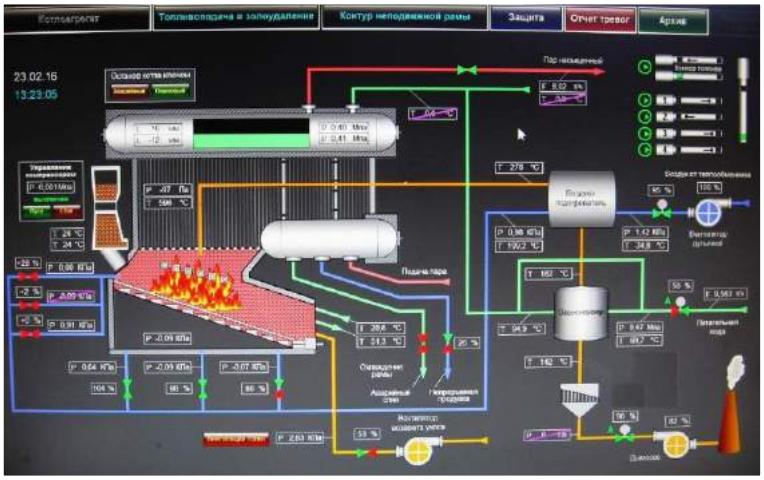
- block of the furnace device;
- fire bars set;
- oil station with central hydraulic pump, bypass valves and fittings;
- set of hydraulic cylinders with proximity sensors;
- a set of hydraulic hoses and fittings;
- hydraulic oil.

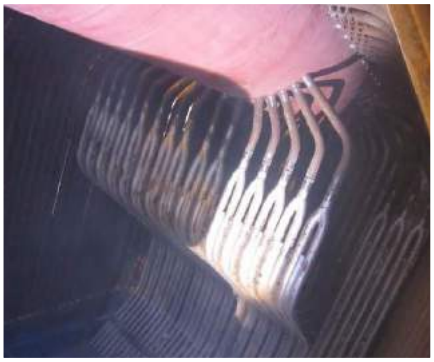
STEAM BOILER E-10-1,4DR FOR WET FUEL TYPES BURNING



The boiler with inclined-pushing grill assigned to generate 10 t/h of saturated steam pressure of 1.3 MPa (13 bar) and 194ºC, when burning various types of solid fuels (wood chips, milled peat, crushed peat briquette), as well as mixtures of these fuels, including with the addition of lignite and hard coal

Name of the indicator	Value
Steam capacity	10 t/hour
Power	6,6 MW
Operating pressure	13 Bar
Efficiency	84 – 86%
Boiler mass	67 t
Putting the boiler into operation	2013
Replacement of natural gas from the beginning of operating	7,5 mln. m3
	8600 t



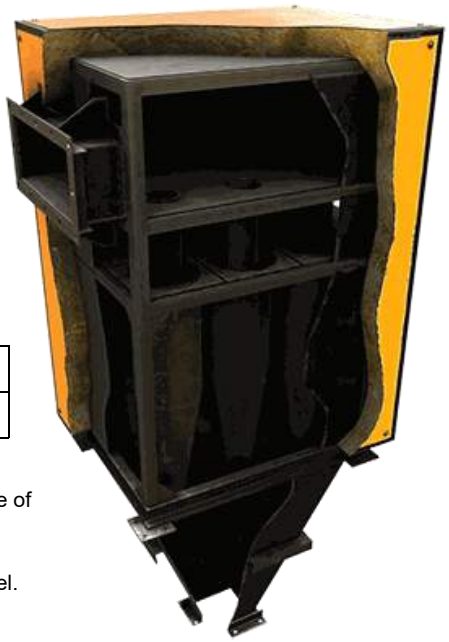


Tail surfaces of steam boiler heating

Production of block steel water economizers and blocks of air heaters
Development and production of non-standard pieces of equipment for individual requirements of the Customer, including the condensation mode of operation of the boiler unit.

Multicyclone

Multicyclones are used to trap ash from the flue gases of boilers operating on solid fuels, as well as to trap dust from the exhaust gases of dryers and sintering devices.
The multicyclone is designed to operate under vacuum and is installed in front of the exhauster; in the case of using a two-stage gas cleaning system, the multicyclone is installed as the first stage.



Fractional Purification Values

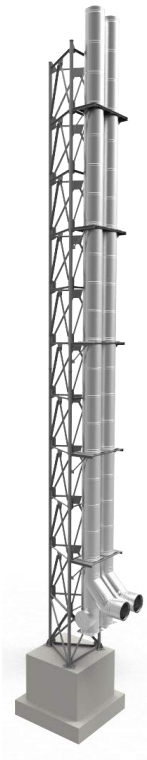
Particle size, mkm	0...5	5...10	10...15	15...20	20...30	30 and more
Efficiency, %	50...80	75...89	90...98	93...96	97...99	98...99,4

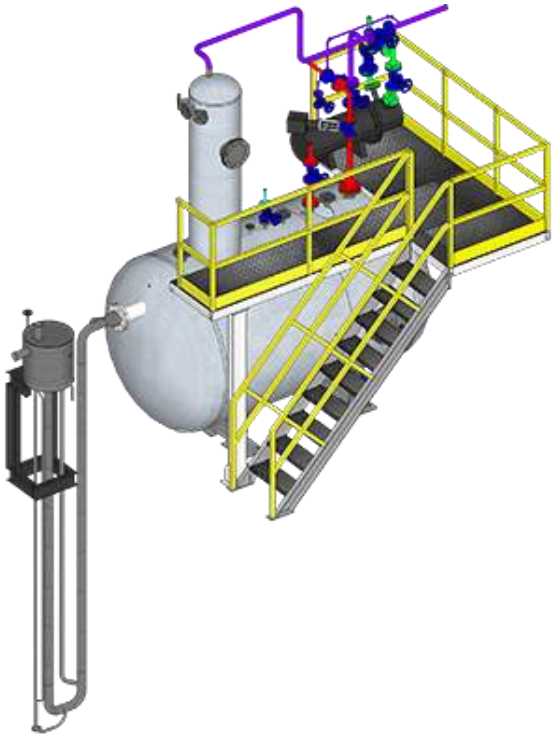
The front rows are broshured by sheet to extand the product life.

The multicyclone is made of cyclone elements D 250 with an axial entrance made of 6 mm sheet steel.

Chimneys

We produce: self-supporting single-barrel and multi-barrel chimneys, chimney masts





Atmospheric type deaerator

Atmospheric pressure deaerators are designed to remove corrosive-agressive gases (oxygen and free carbon dioxide) from the feedwater of steam boilers and feedwater from heat supply systems.

Three-stage degassing scheme is used in the deaerators: two stages are placed in the deaeration column: a jet and a bubbling column. The third, additional stage, in the form of a submerged bubbling device is located in the deaerating tank.

Specifications:
Working pressure: 0,02 MPa
Deaerated water temperature: 104oC
Residual oxygen fraction: 10…30 mcg/l

Deaerator delivery set:
- Deaerating tank
- Deaerating column
- Water lock
- Evaporator cooler
- Control and stop valves within the installation.
- Leveling column
- Reinforcing rod
- Set of instrumentation automatic control
- Automatic control system

Automatic control system

Automation set for monitoring the atmospheric deaerator, automatic control and protection of the deaerator against emergency situations, and provides:
- control and regulation of the level in the deaerator;
- control and regulation of pressure in the deaerator;
- temperature control in the deaerator; steam pressure control;
- control of inlet water pressure and temperature

Possible combinations of control panels:

Name	Controllers	Controllers and Panel
Power supply	DR-120-24	DR-120-24
Controllers	ТРМ210-Щ2.УР	
Controller`s panel		ПЛК154-220.А-М
Operator panel		СП 307-Р
Level indicator	ВКК 1-220	ВКК 1-220
Alarm	DUET C-03C-24	DUET C-03C-24

Consists:
- switchboard
- sensors and indicating devices
- actuators

Modifications of the control panel:

SHUD-X

SCD - Shield control deaerator;

X - control type (Р - regulators, К - controller with a sensor panel)

Condensate collection and return station

The condensate collection and return station is made of sheet metal with an anti-corrosive coating. It is a block product that includes: a group of condensate pumps, a control panel, a level column with electrodes and water-indicating glass, instrumentation and automation devices and shut-off valves.

As standard the station uses an open condensate return circuit. The station can be made on request for a closed condensate return circuit.

Steam reduction (cooling) unit

Steam reduction (reduction and cooling) installation is made on the instructions of the Customer and is supplied as a block product assembled on the support frame.

Required data:

installation performance range: minimum/maximum,
steam inlet / outlet pressure
steam inlet / outlet temperature.

Fuel oil filtr

The fuel oil filter is designed for fine or coarse cleaning of fuel oil from solid residue of petroleum fractions and mechanical impurities

Specifications:

- **Pr**oductivity - 30 t/hour
- Working pressure - 25 Bar
- Working temperature - 60...200oC
- Filtration area– 0,315 m2
- Number of holes -- 240 (65) pcs./cm2
- Clean Filter Resistance 0,15 (0,1) Bar

(*) - data for coarse filter

Steam separator

The centrifugal separator is used to remove condensate from steam lines and compressed air systems. On the drain pipe must be installed trap. The maximum effect of steam drainage is achieved at speeds from 20 to 40 m/s. It is made of carbon steel.
Accession: Flanges in accordance with DIN.
Installation: Strictly horizontal, the direction of flow must coincide with the direction of the arrow on the body.

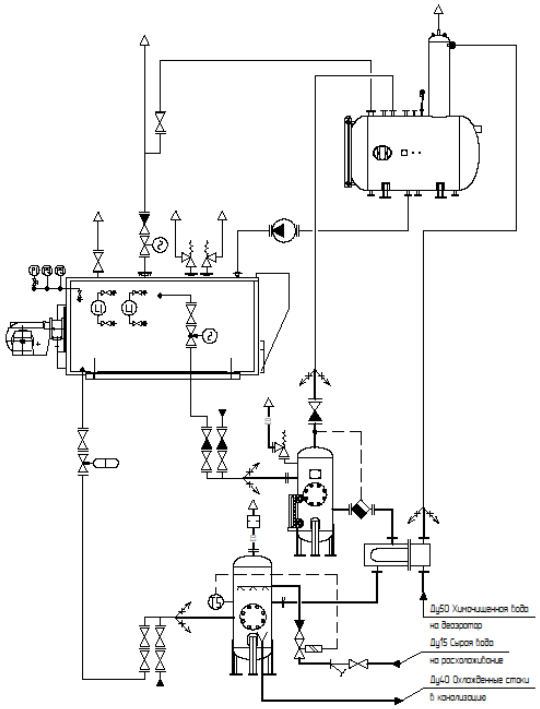
Specifications:
Operating pressure 1.6 MPa
Maximum allowable temperature 300 ° C
Minimum steam speed 15 m/s

Separator of the upper steam boiler purge

The purge separator is intended for use as a tank for the discharge of boiler water from the systems of lower and upper manual boiler purges, as well as systems of upper automatic boiler blowdowns salt content. Steam from the overhead separator is directed to the vapor volume of the deaerator, the lower part of the separator is connected to the expander of periodic blows through the float condensate trap. The cooling system is installed on the dilator to
Discharge water into the sewer (temperature controller of direct action).

Completeness of the separator unit:

- Gestra condensate trap float flange
- Gestra check valve flanged
- Flanged safety valve
- Level gauge
- Pressure gauge



Purge water utilization scheme

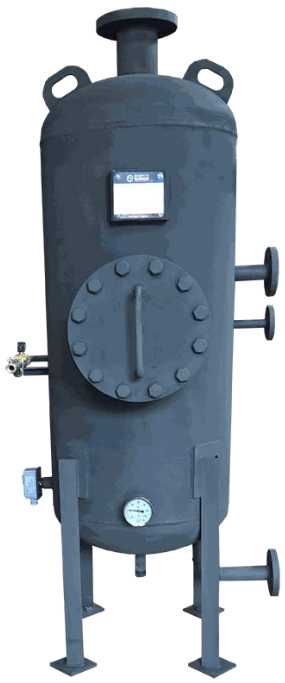
Steam boiler dilator purge

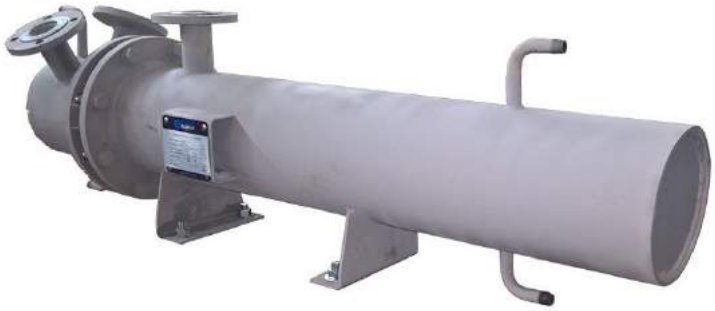
Dilator, the tank for collecting and cooling the purge water before discharge into the sewer. The tank is connected to the atmosphere by the upper breathing tube, the water volume of the tank is divided into hot and cold compartment. Input of wastewater is carried out in the upper zone of the water volume of the hot compartment, cooling water supply is also carried out by a signal from the temperature relay installed in the lower part of the cold compartment. Free drainage into the sewage of cooled water is provided from the lower zone of the cold compartment.

Specifications:

- The mean pressure of the purge water is 1.0 Bar;
- The temperature of the discharged water is 40 ° C;
- Design temperature of the medium - 120 ° C;
- Working pressure capacity - 0.5 Bar;
- Cooling water - 10 ° C, 2 ... 6 Bar;

- El. connection - 230V, 50Hz
- El. consumption 11W





Shell and tube heat exchangers

We produce heat exchangers for your parameters with a floating head and straight pipes.
Productivity: up to 7.6 MW
Operating pressure: up to 16.0 bar,

- One-way and multi-way ones;
- Connection of pipes with tube plates: rolling or/and welding
- Heat exchange surface material: brass or corrosion less steel.

Our company also provides repair services for existing heat exchangers up to 100% recovery.

Evaporator cooler

For the condensation of vapor (gas-vapor mixture), surface-type vapor coolers are used, consisting of a horizontal casing in which a pipe system is placed (the pipe material is brass or corrosion-resistant steel).

Parameter	OBA-1		OBA-2		OBA-8	
	steam	water	steam	water	steam	water
Consumption of the medium, kg/h			30	1600	200	10700
Working pressure, Bar	1,2	5,0	1,2	5,0	1,2	5,0
Hydraulic resistance, mBar				70		830
Number of holes	1	4	1	4	1	4
Volume, l			7	45	24	145
Heat exchange surface	1,0		2,0		8,0	
Working temperature	104		104		104	

Steam-and-water heat exchanger

Steam-and-water heater is a horizontal shell-and-tube heat exchanger. The tube system of the heater consists of two tube plates with straight heat exchanger with two straight heat exchanger tubes rolled in them (tube material is brass or corrosion-less steel). To protect the heat exchange tubes from the action of steam jets opposite the steam supply pipe, a fender shield is installed. In a steam-and-water heater, the heated water moves through the pipes of the pipe system, and the heating steam through the pipe in the upper part of the body enters the annular space. Condensate heating steam flows into the lower part of the body and is discharged from the heat exchanger

Name	ПП2-6-2-II	ПП2-9-7-II	ПП2-17-7-II	ПП1-21-2-II	ПП1-32-7-II	ПП1-32-7-IV	ПП1-53-7-II	ПП1-53-7-IV
Productivity	0,67 MW	1,89 MW	3,46 MW	2,31 MW	6,45 MW	4,51 MW	10,67 MW	7,61 MW
Water temp. T1/T2	70 / 95oC	70/130oC	70 / 130oC	70 / 95oC	70 / 130oC	70 / 150oC	70 / 130oC	70 / 150oC
Heating surface	6,0 sq.m.	9,0 sq.m.	17,2 sq.m.	21,2 sq.m.	32,0 sq.m.	32,0 sq.m.	53,9 sq.m.	53,9 sq.m.
Weigh	465 kg	559 kg	730 kg	1230 kg	1370 kg	1370 kg	1813 kg	1813 kg
Body diameter	325 mm	325 mm	426 mm	530 mm	530 mm	530 mm	626 mm	626 mm
Length	2,6 m	3,6 m	3,6 m	2,8 m	3,8 m	3,8 m	3,9 m	3,9 m

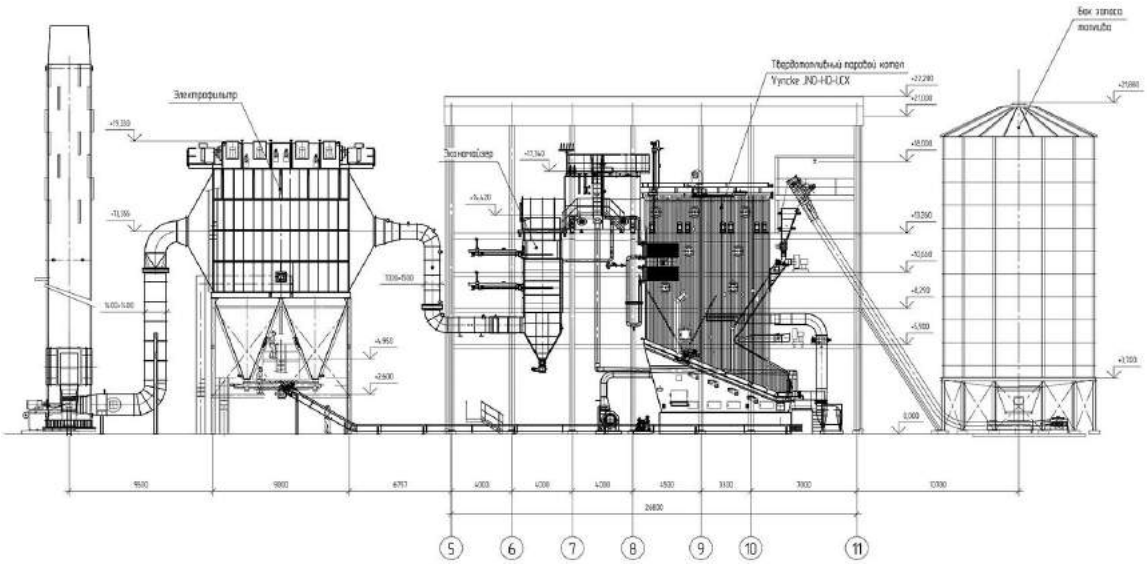
Our experience in project implementation:

2012, “Tekhenergotreyd” LLC, Brovary: Heating boiler of manufactured goods and distribution warehouses in Brovary district of Kiev region.

The working project of a separate hot water boiler house, fuel - natural gas, based on three Viessmann Vitomax100-LW boilers with a unit capacity of 2.9 MW each. The total heat capacity of the boiler is 8.7 MW. The heating system of the logistics center, distribution of heat networks to heat points and the development of a network of heat points of the complex.

2013r., Cargill, Construction of oil extraction plant Novoanninsky, Volgograd region

Development of an enterprise unit at the stage of an investment project. Two Vyncke JNO-HD-LCX boilers, D = 24t / h, P = 28 bar, T = 385 ° C, Siemens SST120 condensing turbine



2013r., 2013, “Company System”, LLC Zaporizhia: The reconstruction of oil press plant into the oil Extraction plant, power plant construction with steam generating capacity 30t/hour

The construction project of the boiler house was developed jointly with the project of reconstruction of the oil press plant with transfer to the oil extraction plant.

The boiler room provides for the installation of a solid fuel steam boiler with a capacity of 12 tons per hour, with a pressure of 14 Bar and overheating point at 205 ° C, as well as two gas three-way boilers of 10 tons per hour each. fuel: gas / diesel

2013, “Creative” PJSC, Kirovograd: Detailed design for the reconstruction of the boiler house of “Protein Production” PJSC with the installation of a 30 t/hour Hurst boiler, fuel: husked sunflower, litter from the fields

The construction project of the boiler house was developed jointly with the project of reconstruction of the oil press plant with the following transfer to the oil extraction plant.

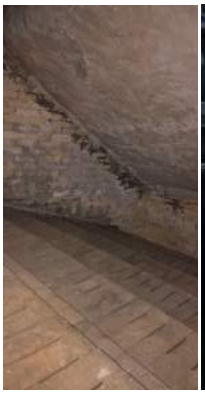
The boiler room provides for the installation of a solid fuel steam boiler with a capacity of 12 tons per hour, with a pressure of 14 bar and overheating point at 205 ° C, as well as two gas three-way boilers of 10 tons per hour: each for fuel\gas

2014, "IZMAILTEPLOKOMUNENERGO", KP Izmaiil

Reconstruction of the boiler house of the South-Western district of Izmail, with the installation of two biomass boilers, unit heat capacity of 8 Gcal/hour, the installed capacity of the boiler house after reconstruction is 16 Gcal/hour. The project had a comprehensive examination and received a positive conclusion.

2015, "MISKTEPLOVODENERGIYA", KP Kamyanets-Podolsky: Reconstruction of the boiler house with re-equipment of boilers ДКВр-10-13 for alternative types of fuel, Zhukova, 2

Transfer of 4 existing boilers ДКВр-10/13 to wood chips with a moisture content of 55% on an inclined-pushing grid. Construction of a mechanized warehouse for receiving and supplying fuel to the boilers.
Within the framework of the project, the project has been developed for transferring the boiler to biomass burning with a change in the geometry of the furnace; Currently one of the reconstructed boilers is in operation, and the launch of the second boiler unit is being prepared. During the start-up process, tests were also performed when the boiler was operating on brown coal. in fact, a mixture of fuels is used on the boilers (chips, corn chop)



2016, DOBRODIYA FUDZ LLC, Chernigov: Construction of a steam boiler-house with a steam output of 6.5 tons per hour as part of the reconstruction of the grain plant

Production and supply of the main and auxiliary equipment of the new boiler house, including the development of a new steam boiler design with a capacity of 4.0 t/hour Pp = 1.3 MPa for burning oat husks and elevator waste on an inclined-pushing.
To ensure emergency backup of the main boiler unit, a backup gas steam boiler with a capacity of 2.5 tons per hour was installed.

2017r., PJSC "BHFZ", Kyiv: Reconstruction of the boiler D`ALESSADRO

Conversion of the existing boiler with a capacity of 3.0 t/hour to the burning of dry biomass:

- reconstruction of the fire bars and replacement of the fire bars
- recalculation and reorganization of the blowing air zones for combustion

- reconstruction of boiler lining

The fallowing result of the work was achieved: sintering effect of the layer was reduced, reduction of harmful emissions into the atmosphere, reduction of the excess air ratio.

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