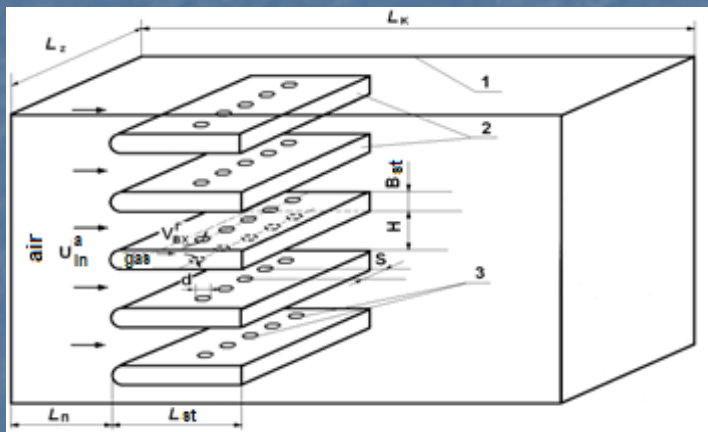


EQUIPMENT

TECHNOLOGIES OF MICROJET BURNING OF FUEL IN THE SYSTEM OF FLAME STABILIZERS

Purpose: to increase the heat and environmental efficiency of fuel combustion in the burners of fire-fighting equipment for various purposes such as boilers, furnaces, dryers, etc.



Scheme of flame stabilizers in burner device

Advantages:

- improving the reliability of the ignition of the torch and ensuring the possibility of effective operation of the burner devices (BD) in a wide range of changes in operating parameters;
- increase the durability of BD by 1.5-2 times by self-cooling of this BD with natural gas before it enters the gas distribution system;
- reduction of aerodynamic resistance along the paths of the oxidizer and combustion products;
- the possibility of smooth control of power BD and ensure a favorable temperature regime of combustion products in the combustion space;
- modularity that allows you to compile the BD of the required power.

Efficiency

- natural gas savings of 4%;
- energy savings of 10%
- 12% reduction in emissions
- increase in the life of the equipment of fire installations in 1.3-1.5.

Patents

№49938 from 05.11.2010 Burner

№82967 from 08.27.2013 Gas burner

№83358 from 09.10. 2013 Gas burner



Burner device of stabilizer type to the boiler PTVM-50

MODULE GAS BOILER WITH UTILIZER OF HEATING KVMU-1,25GN



Areas of Application:

heating and hot water supply of residential and industrial and administrative facilities in closed heating systems.

Advantages:

- relatively low production cost;
- payback period up to 12 months;
- support of the maximum possible efficiency (98%) in the whole range of loads of the boiler;
- Modular boiler design allows
- use of each module separately;
- in addition to the production of heat energy, the boiler is able to receive electric energy.

Basic specifications

Nominal heat output, MW	1,25
Fuel consumption (natural gas), m ³ / h	116
Type of burner	ГБГМ-1,4 НД
Working pressure of the coolant, MPa	0,6
Temperature adjustment range, %	10...110
Heat carrier costs, m ³ / h	5...16,5
Hydraulic resistance of the boiler, not more than, kPa	50
Estimated service life, year	25

Efficiency:

gas savings up to 40% compared to obsolete boilers;
reduction of NO_x emissions by 40% and total absence of CO emissions.

Patents of Ukraine: № 102363.

Ukraine, Kiev., Zhelyabova Street, 2a, tel. (044) 453-28-68; e-mail: vptt@i.ua

BOILER FOR SOLID FUEL UNIFIED CVU-0,5T



Basic specifications

Nominal heat Output, MW	0,5
Efficiency,%	93
Fuel type	Wood chips, wood pellets, combined pellets
Fuel costs per 1 Gcal:	340
Wood chips, kg / h	
wood pellets, kg / h	290
combined pellets, kg / h	260
Minimum temperature of exhaust gases, ° C	<140
Temperature adjustment range,%	40...100
Estimated service life, year	>15

Areas of Application:

heating and hot water supply of residential and industrial and administrative facilities in closed heating systems

Advantages:

- combustion of various types of solid biofuels;
- application of burners according to different principles of action;
- payback period up to 18 months;
- support of the maximum possible efficiency (not less than 90%);
- The design allows you to quickly replace the main elements of the boiler during operation

Efficiency:

- replacement of natural gas using solid fuel;
- emission reductions of NO_x up to 300 mg / m³ and CO emissions up to 50 mg / m³.

Patents of Ukraine: № 95495

THE HEATING AND COOKING FURNACE «RECORD»



Areas of Application: heating and cooking of residential and ancillary facilities by area from 20 to 40m².

Advantages: maintaining the desired temperature with minimal fuel consumption; additional equipment of the furnace allows to generate electricity by power 100W under voltage 12V; support the highest possible efficiency; long fuel combustion (at least 6 hours per one fuel charging); provided nearly 95% of fuel combustion; significantly reduced the temperature of the exhaust gases, emissions of NO_x and CO emissions.

Basic specifications

Nominal heat output, kw	2...4
Fuel type	Firewood, brown coal, peat, briquettes, pellets, cereals, straw, chips
Maximum amount of loaded fuel, dm ³	20
Heating area, m ²	20...40
Efficiency,%	75...80
Temperature of exhaust gases, ° C	200
Emissions of pollutants, CO/NO _x , mg/ m ³	1300/50
Weight kg	50

Efficiency: almost 95% of fuel combustion is provided; the amount of NO_x emissions and CO emissions reduces.

Patents of Ukraine: №111623

BOILERS



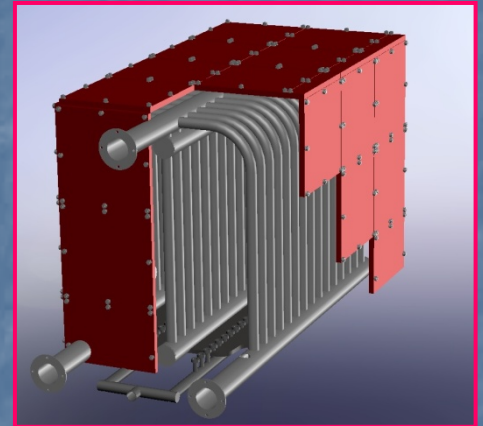
KVVD-0,63 Gn Boiler

Heating hot water fire-and-water-tube boiler of 0.63 MW capacity. Implementation of the boiler enables to replace the outdated “Minsk- 1”, “NIISTU-5”, “Universal”, “Energy” etc. boilers, to increase twice heating capacity of a boiler-house without changing its building, to increase substantially the efficiency and reliability of heat supply sources.



KVV-2,0 Gn Boiler

Heating hot water water-tube boiler of 2.0 MW capacity. Implementation of the boiler enables to increase heating capacity of a boiler-house 2-3 times without changing its building.

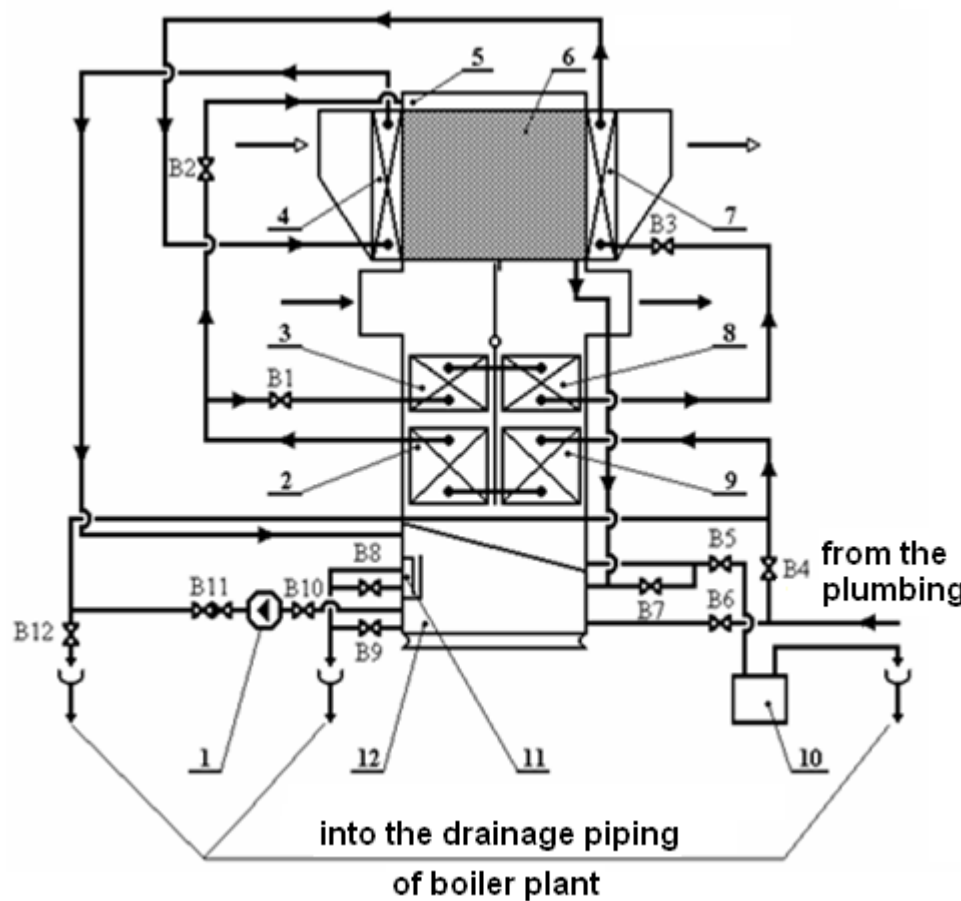


Reconstruction of “NIISTU-5” boiler

Reconstruction of “NIISTU-5” boiler with installation of the double-side water-tube screen, additional convection surface and light heat insulation. The reconstruction will increase boiler efficiency by 10 ... 12% and reduce natural gas consumption by 40 thousand. m³ / year.

2a, Zhelyabov str., Kyiv, Ukraine
tel.: (044) 456-92-62, 453-28-63; e-mail: office@engecology.com

HEAT-RECOVERY EQUIPMENT FOR GAS-FIRED BOILER PLANTS HEATER & HUMIDIFIER OF COMBUSTION AIR



1 - pump; 2,3,9 - water heaters; 4 - air heater; 5 - water distributor; 6 - contact camera; 7 - air heater; 8 - gas heater; 10 - neutralizer; 12 - water collector

Patent of Ukraine: № 56591

Purpose:

for heating and humidifying the combustion air through the use of heat from the boiler exhaust-gases with a heating capacity of 0.63 MW

Advantages:

- autonomy from external heat consumers and heat suppliers;
- compactness;
- improving the reliability of the gas and air ducts

Efficiency:

- increase of coefficient the use heat of fuel of boiler by 10-12%;
- ensuring the environmental effect: reduction of CO₂ by 10-12%, NO_x up to 50%

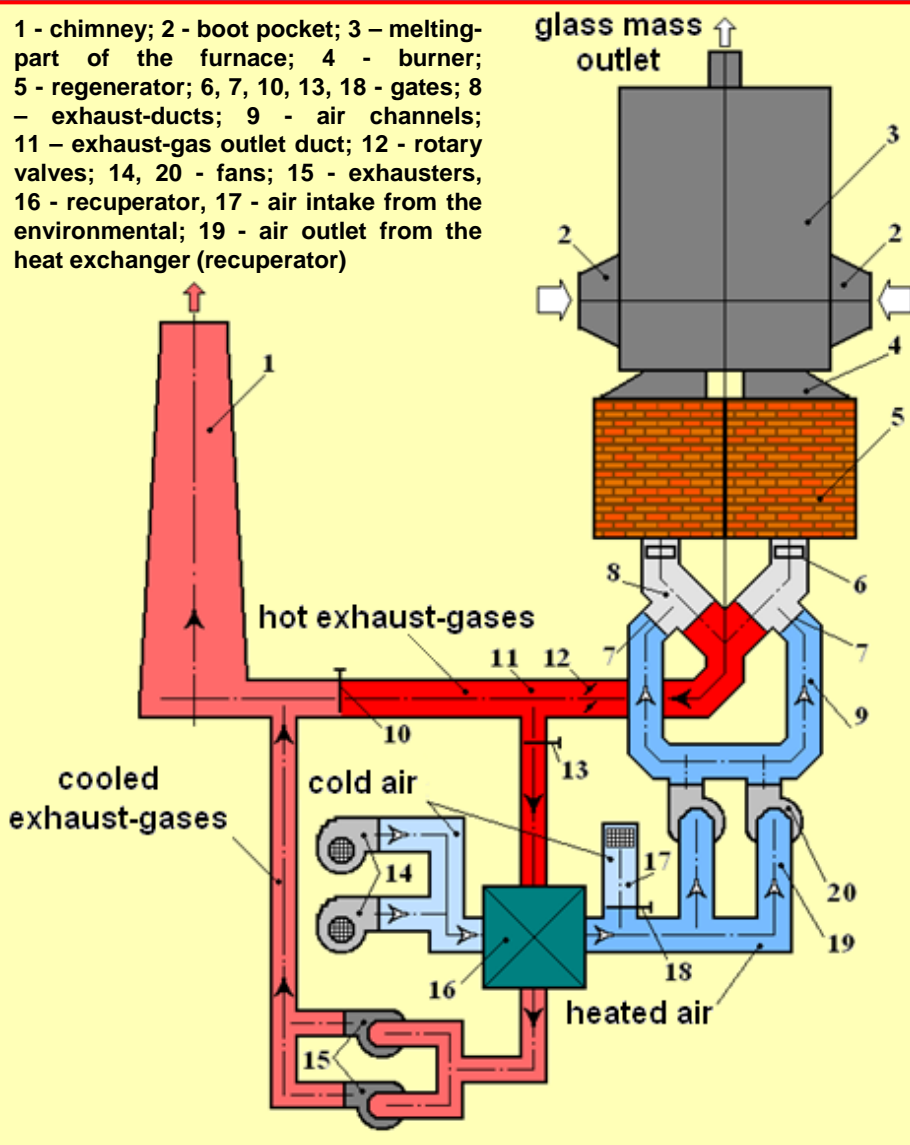
Main technical specifications

Heat power, kW	80
Exhaust-gas consumption, m ³ /h	1500
Air heating temperature, ° C	60
Aerodynamic resistance from the gas side, Pa	500
Aerodynamic resistance from the air side, Pa	500

HEAT-RECOVERY EQUIPMENT FOR GLASS MELTING FURNACES

ENDING HEAT-EXCHANGER

1 - chimney; 2 - boot pocket; 3 - melting-part of the furnace; 4 - burner; 5 - regenerator; 6, 7, 10, 13, 18 - gates; 8 - exhaust-ducts; 9 - air channels; 11 - exhaust-gas outlet duct; 12 - rotary valves; 14, 20 - fans; 15 - exhausters, 16 - recuperator, 17 - air intake from the environmental; 19 - air outlet from the heat exchanger (recuperator)



Purpose:

to preheat cold air before it enters into the furnace regenerators by utilizing the heat of exhaust-gases

Advantages:

- compactness;
- ease of installation and operation;
- possibility of cleaning working surfaces from dust deposits

Efficiency:

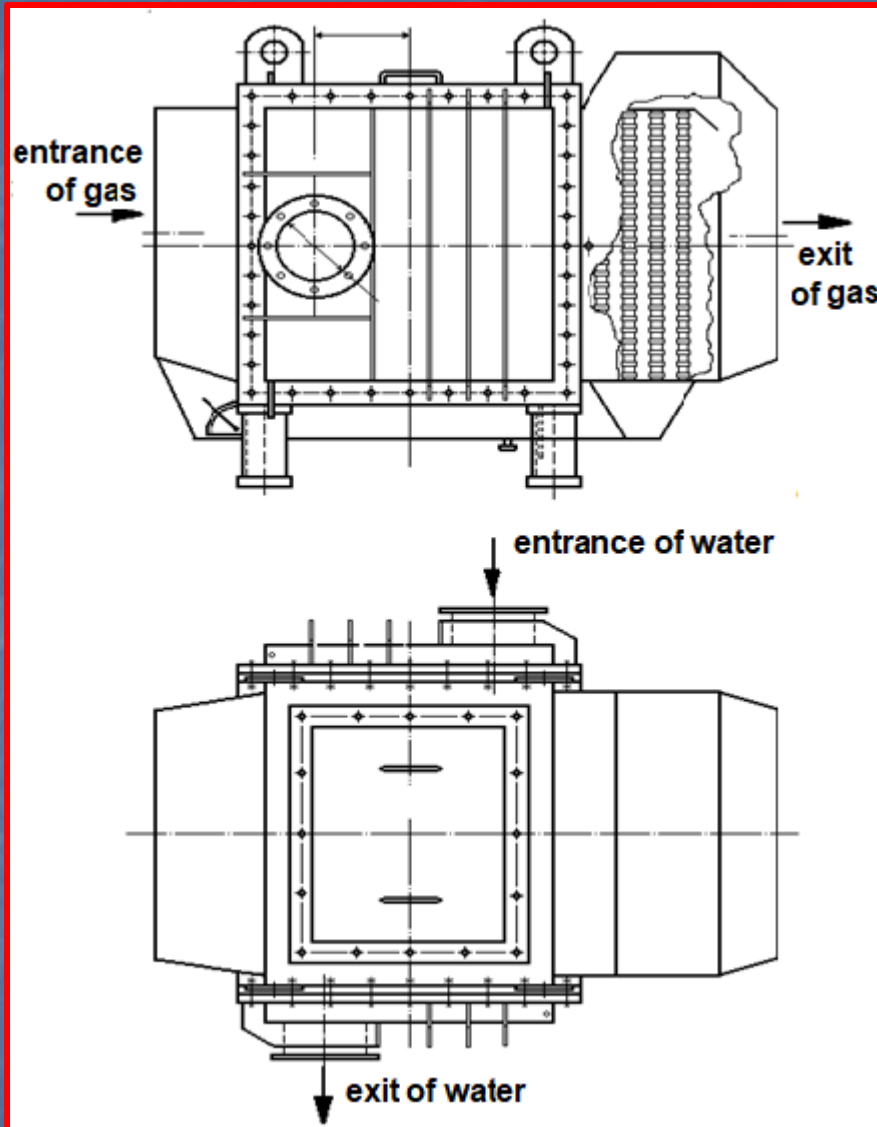
- an increase in the heat utilization rate of the furnace fuel by 5-8%;
- reduction of harmful emissions into the environment by 5-8%

Main technical characteristics for various operating modes of the furnace

Parameter name	value		
Heat power, MW	1,7	1,6	1,5
Inlet gas temperature, ° C	450		
Temperature of the gases at the outlet of the heat-exchanger, ° C	229	241	253
Air inlet temperature, ° C	-30	0	30
Outlet air temperature, ° C	151	170	190
Aerodynamic resistance from the gas side, Pa	460		
Aerodynamic resistance from the air side, Pa	440	470	510

HEAT-RECOVERY EQUIPMENT FOR GAS-FIRED BOILER INSTALLATIONS

PACKAGES CONVENTIVE PC



Purpose:

for heating the return water of the heat supply system through the use of heat from the exhaust-gases of boilers running on natural gas

Advantages:

- low hydraulic resistance;
- compactness and ease of installation;
- ease of maintenance;
- prevention of condensate formation in the exhaust ducts

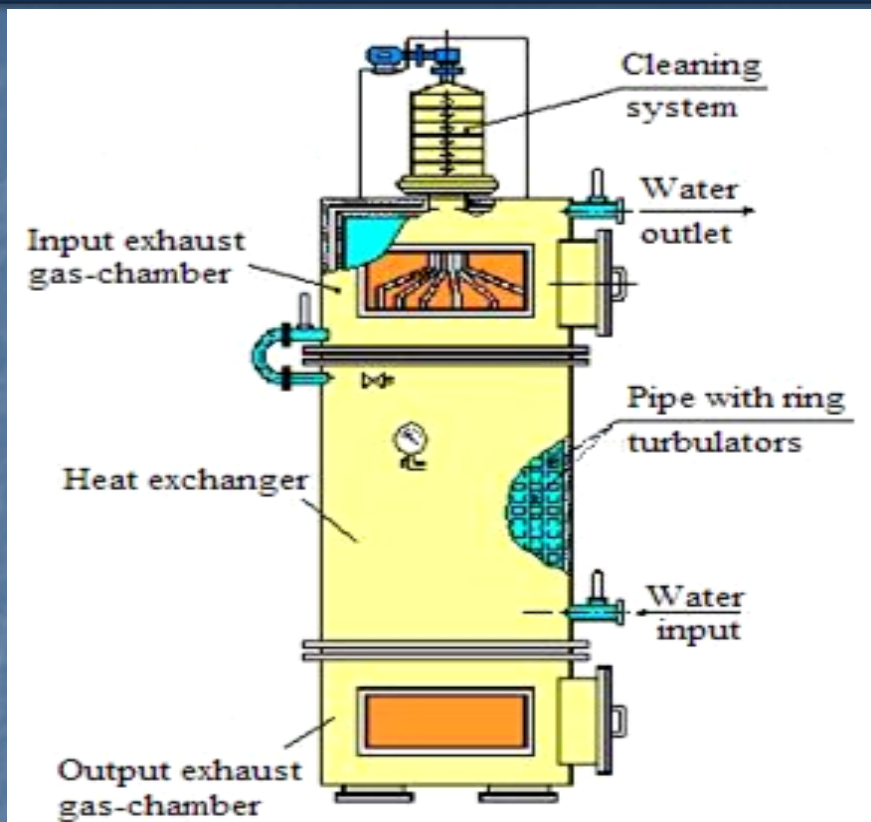
Efficiency:

- increasing boiler efficiency by 4-6%;
- reduction of harmful emissions into the environment by 4-6%;
- payback period of capital costs up to 1.5 years

Main technical specifications

Parameter name	Value
Heat power, kW	240-460
Exhaust-gas consumption, m ³ /h	4300-13800
Water consumption, t/h	40-106
Aerodynamic resistance, Pa	65-240
Hydraulic resistance, kPa	1,5-3,2
Dimensions, mm:	
length	1442-2356
width	560-1240
growth	700-1034
Mass, kg	672-1262

HEAT-RECOVERY EXCHANGERS OF EXHAUST-GAS FOR INDUSTRIAL FURNACES



Purpose:

for heating water of heating systems by using the heat of clean and dusty exhaust-gases of industrial furnaces for various purposes

Advantages:

- intensification of heat-exchange through the use of pipes with ring turbulators, which allows to reduce the metal consumption and dimensions of heat-exchange equipment by 1.5-2 times;
- automatic cleaning of working surfaces from deposits of process dust

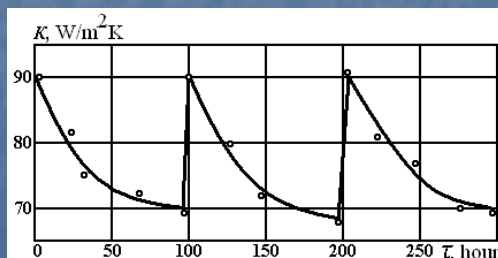
Efficiency:

- natural gas saving by 10-20%;
- payback period up to 1 year

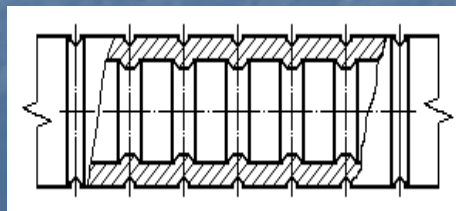
Main technical specifications

Heat power, MW	0,3-1,2
Inlet water temperature, °C	70
Outlet water temperature, °C	95
Inlet exhaust-gas temperature, °C	450
Exhaust-gas outlet temperature, °C	130-200
Exhaust-gas consumption, kg/s	1,0-3,5
Aerodynamic resistance, Pa	450-600
Hydraulic resistance, kPa	5

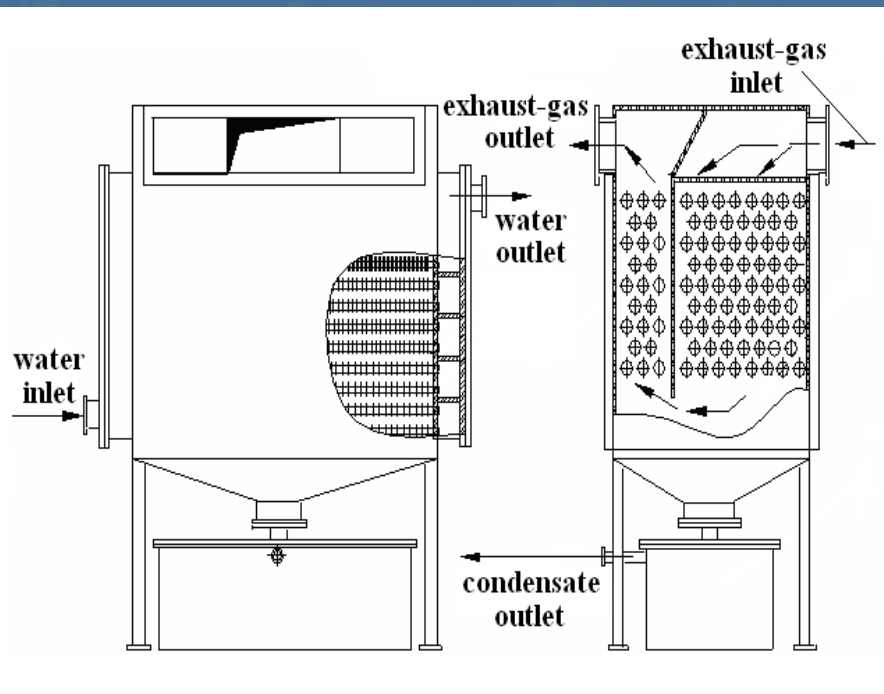
Dynamics of heat transfer coefficient between cleanings



Tube with ring turbulators



CONDENSING SURFACE HEAT-EXCHANGERS



Purpose:

heating water heating and hot water supply using the heat of exhaust-gases of gas-fired boilers

Advantages:

- use of latent heat of condensation formation;
- insignificant dimensions and cost due to the use of finned chipped bimetal tubes;
- protection of exhaust-gas ducts;
- ease of maintenance

Efficiency:

- increase of coefficient the use heat of fuel or efficiency of boilers by 7-10%;
- reduction of harmful emissions by 7-10%;
- payback period up to 2 years

HEAT-RECOVERY SYSTEM WITH HEAT-EXCHANGER FOR BOILER TYPE DE-16-14GM

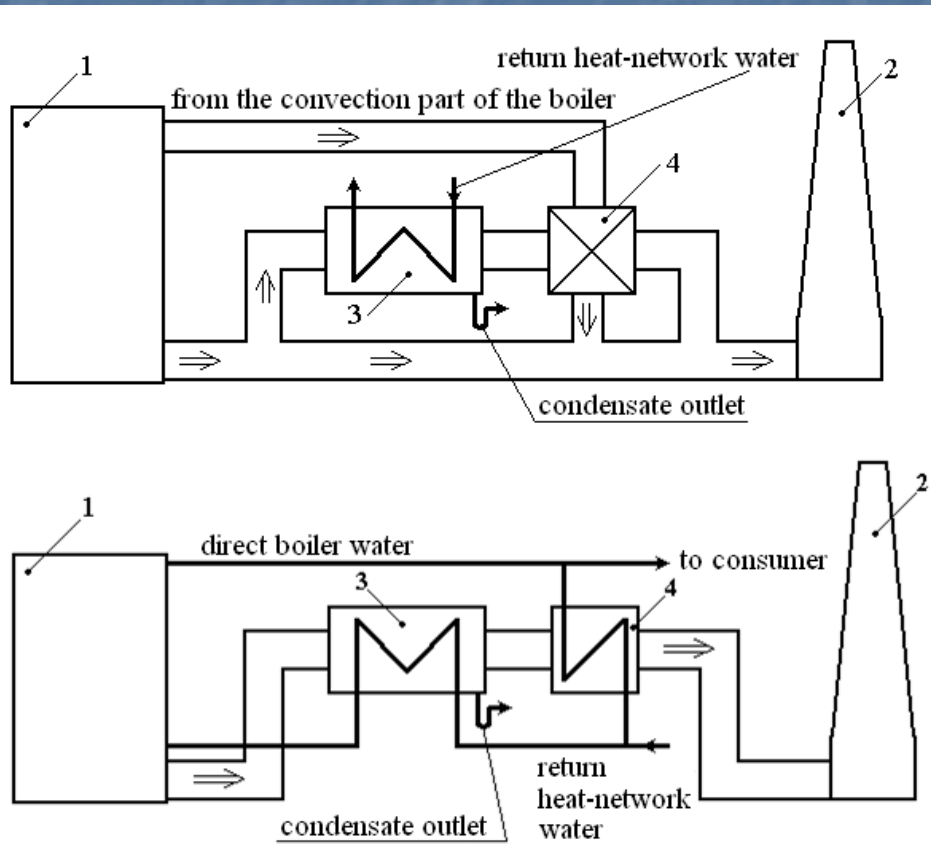


Main technical specifications

Heat power of boiler, kW	3,15-0,25
Heat power of heat-recovery exchanger, kW	130-8
Inlet exhaust-gas temperature, °C	240-160
Exhaust-gas outlet temperature, °C	87-81
Inlet water temperature, °C	70
Outlet water temperature, °C	71,4-74,5

TECHNOLOGY AND EQUIPMENT FOR LENGTHENING OF RESOURCES OF EXHAUST-GAS CHIMNEY

Schematic circuits of boiler plants with protection of exhaust-gas ducts



1 – boiler; 2 – chimney; 3 – heat-recovery exchanger; 4 – gas and hot water exhaust-gas heater

Purpose:

Improve the durability and longevity of chimneys. The technology involves the application of thermal methods for protecting exhaust-gas ducts from condensation by using modern heat-recovery technologies for boiler units and process plants of different industries (gas-fired glass furnaces, kilns, etc.). In the technology, the following thermal methods of condensation prevention are used: bypassing part of the exhaust-gases of the boiler (or technological unit) past the heat-recovery exchanger, predrying the cooled exhaust-gases after the heat-recovery exchanger in the surface heat-exchanger (exhaust-gas heater), heat insulation of the chimney body, and installing in the chimneys of the internal gas-driven trunk.

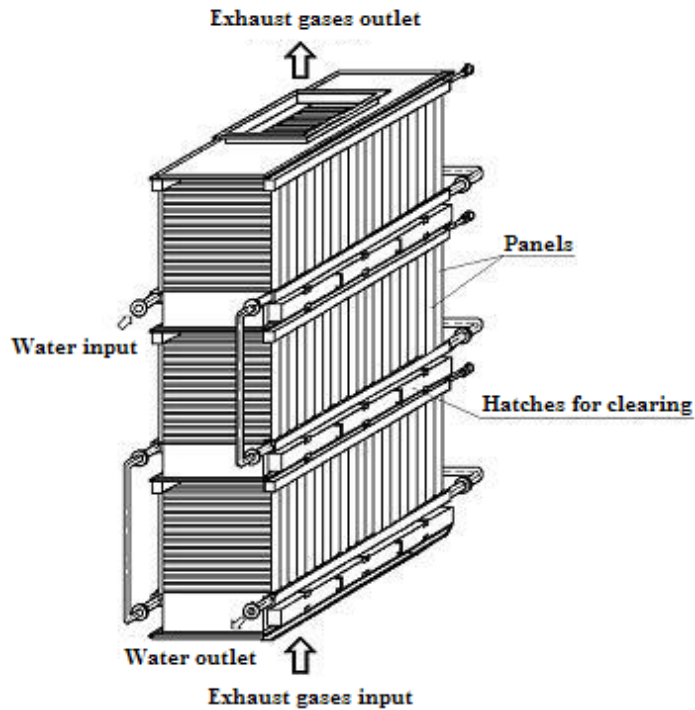
Advantages:

- lengthening the life of the chimneys 2-3 times

Efficiency:

- increasing the efficiency of the boiler by 7-10%, or the coefficient the use heat of fuel of technological plant by 10-30%;
- the payback period of the implementation costs does not exceed 2 years

MODULAR PANEL HEAT-RECOVERY EXCHANGERS



Main technical specifications

Heat power, MW	0,15-3,5
Inlet water temperature, °C	70
Outlet water temperature, °C	95
Inlet exhaust-gas temperature, °C	300-500
Exhaust-gas outlet temperature, °C	150-250
Exhaust-gas consumption, kg/sec	1,0-3,5
Aerodynamic resistance, Pa	300-600
Hydraulic resistance, kPa	5-30

Purpose:

heating the water of heat-supply systems by using the heat of dusty exhaust-gases of industrial furnaces

Advantages:

- the configuration of heat-exchange surfaces (panels) contributes to reducing the deposits of dust;
- the possibility of cleaning the working surfaces from the dust deposits

Efficiency:

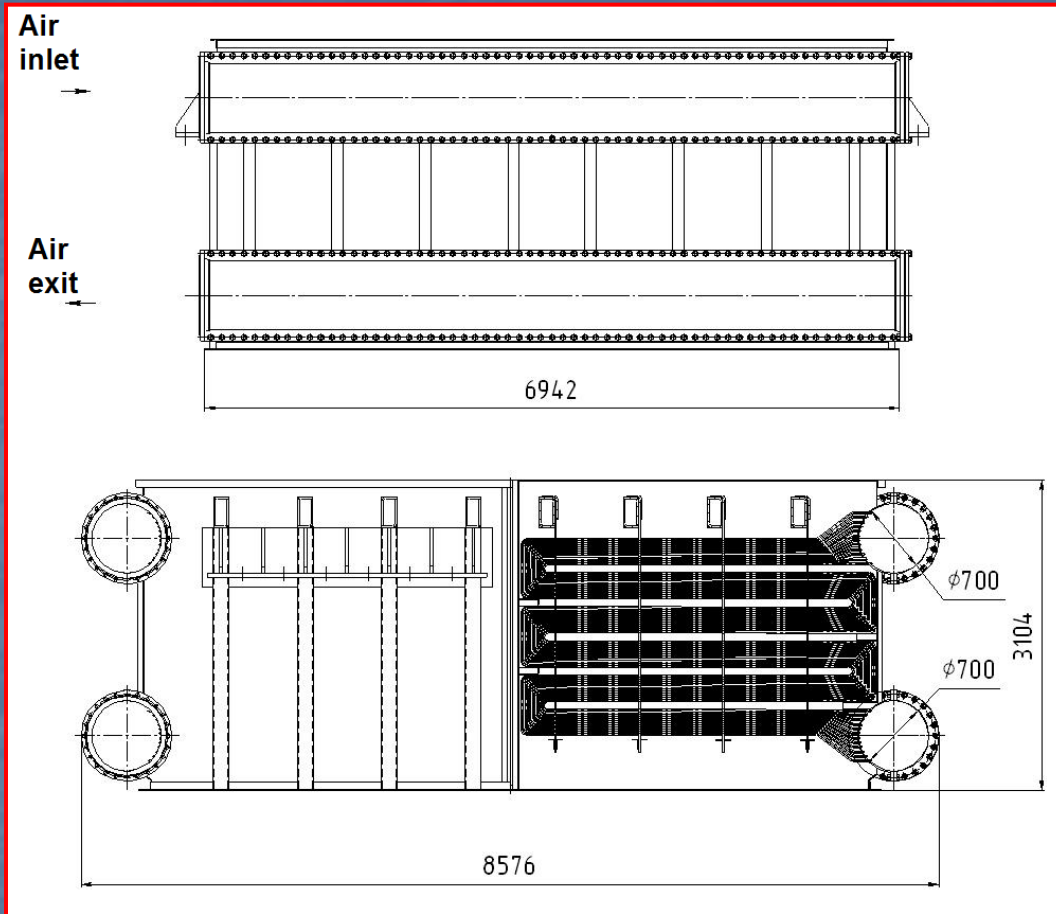
- increasing the coefficient the use heat of fuel of the furnace by 10-30%;
- the payback period is 3-6 months



HEAT-RECOVERY SYSTEM FOR GLASS FURNACE

2a, Maria Kapnist (Zhelyabova) str., Kyiv, Ukraine,
tel.: (044) 456-91-71; e-mail: nmfialko@ukr.net

GENERAL VIEW OF THE WORK HEAT REGENERATOR



Regenerator is one of biggest components of gas turbine plant

Annual economy due to renovation of a single Gas Turbine Pump with new gas turbine engine is 20 thousand m^3 of the fuel natural gas. This can be compared with approximate cost of the proposed Gas Turbine Pump.

The regenerator weight with proposed types of heat transfer surfaces is 20% less of the regenerator with smooth tubes

2-a, Zhelyabov str., 03057, Kyiv, Ukraine.

Phone (044) 456-60-91; e-mail: admin@ittf.kiev.ua; kovalenko@vortex.org.ua

HEAT PUMP DRYERS

Technical characteristics

- Drying temperature 40 - 55 °C
- Amount of water evaporated from product up to 2 kg/h
- Amount of product dried up to 40 kg/day
- Installed electrical power 1,0 kW
- Electrical energy consumption for evaporation 0,3...0,7 kWh/kg
- Net weight 80 kg
- Dimensions 900x650x1850 mm



2, Bulakhovskogo str., Kyiv, Ukraine,
tel. (044) 456-62-82, 424-15-26,
e-mail: ittf_ntps@ukr.net

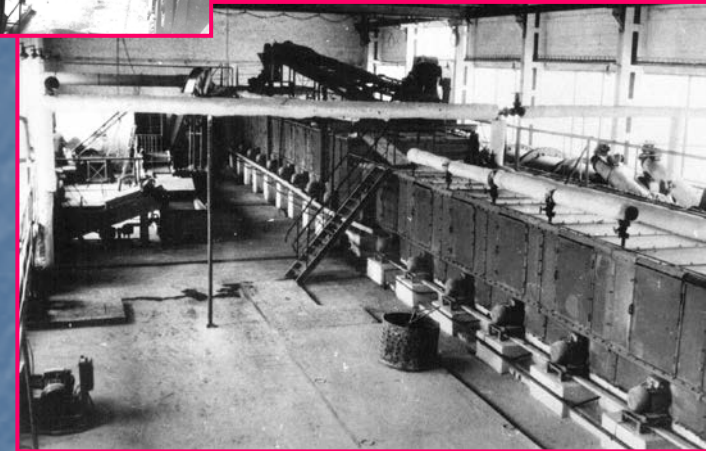
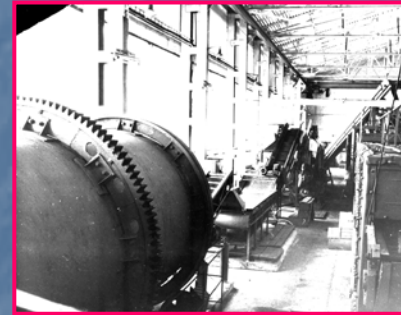
THE TECHNOLOGICAL LINES WITH TUNNEL AND CONVEYOR DRYERS

Productivity on raw material 10...1000 kg/h. Possible heating sources of the heat are carrier with the help of pair, liquid fuel, natural gas or biomass.

Tunnel dryers



Conveyor dryers



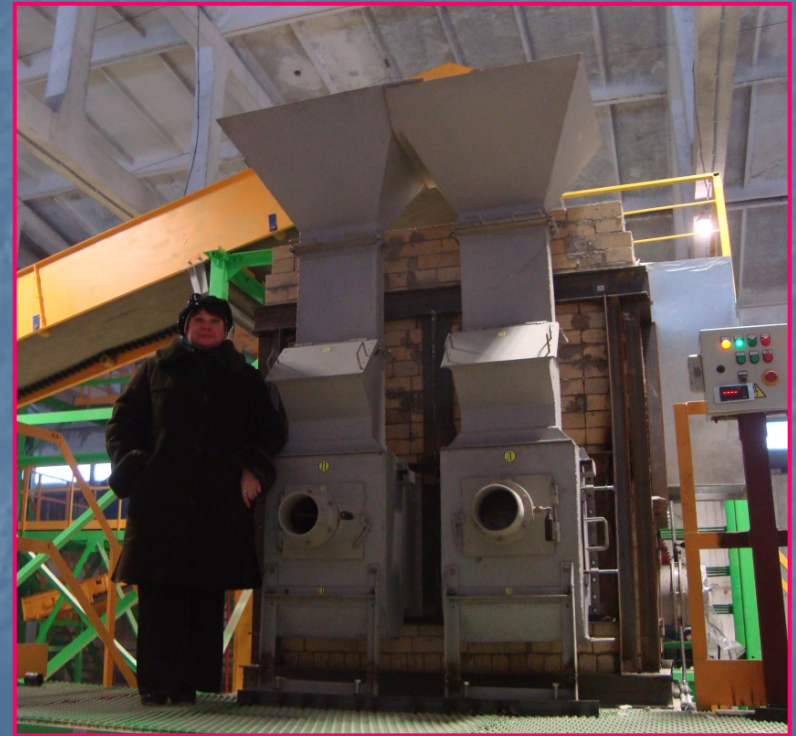
The cost of heat for **1 kg** of evaporated moisture drying units are designed **800 ... 900 kcal**, design dryers protected more than 20 patents of Ukraine.

THE HEAT GENERATORS ON FUEL OF VEGETABLE ORIGIN

The heat generators on fuel of vegetable origin with capacity of 0.7 MW, was established in subsection TMC. The heat generator runs on vegetable fuel - chips and granules and is able to use large lump fuel - wood and others. The heat generator made of three blocks: post-combustion and mixing (fireplace) and two primary furnace heat output of 350 kW each.

The primary furnace, due to the peculiarities of their work, including in its composition: bunker for small fraction of fuel - wood chips and granules (pellets), small storage fractional fuel, feeder large lump fuel and burning devices of restrained over the layer.

The heat generator embedded in the process of drying mineral fertilizers drum dryer as the source of the drying agent, the company LLC "Oriy" (Ukraine. Berezan, 2013).



2a, Zhelyabov str., Kyiv, Ukraine,
tel.: (044) 453-28-65, e-mail: chmel.valerii@gmail.com

THE DRUM DRYER FOR DRY FERTILIZERS

The drum dryer for dry fertilizers was introduction of the company LLC "Oriy" (Ukraine, Berezan,2013). The subsection TMC Institute of Engineering Thermo physics NAS of Ukraine fulfilled calculation process of drying mineral fertilizers in the dryer drum, defined thermal power sources and the technical characters of drying agent and established flow sheet drying process.

According to the flow sheet chosen equipment - drum drying system and removal of the drying agent and made overall layout equipped. As a source of drying agent used the heat generator, that runs on wood fuel. Performance dryer for raw materials (pellets from sunflower husk ash) 5000 kg / h.



2a, Zhelyabov str., Kyiv, Ukraine,
tel.: (044) 453-28-65, e-mail: chmel.valerii@gmail.com

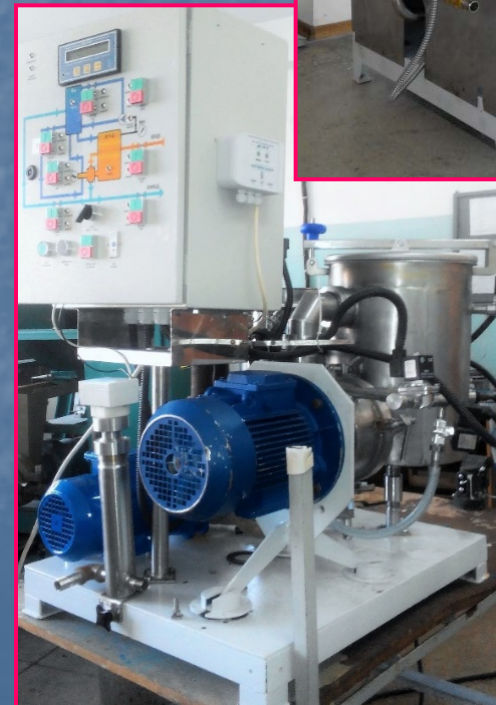
SETTING FOR NEUTRALIZATION OF SOUR RUNBACK OF SMOKE GASES BY THE NONCHEMICAL METHOD

The device is intended for use with boilers with total capacity of 10 MW.

Implementation installation will improve the environment by reducing the amount of waste water (polluted chemically neutralized condensate and waste water softener units) and the rational use of water resources (reuse neutralized condensate).

Productivity, t/h	to 1,2
Specific electricity consumption for 1t , kWh	3,2
Sizes, mm	750x800x1100
Mass, kg	to 300
Estimated boiler thermal power , MW	to 10

2, Bulakhovskoho str., Kyiv, Ukraine
tel.: (044) 424-14-96, 424-13-06, e-mail: ittf_tds@ukr.net



THE INDIVIDUAL HEAT POINT WITH A HYDRAULIC ARROW

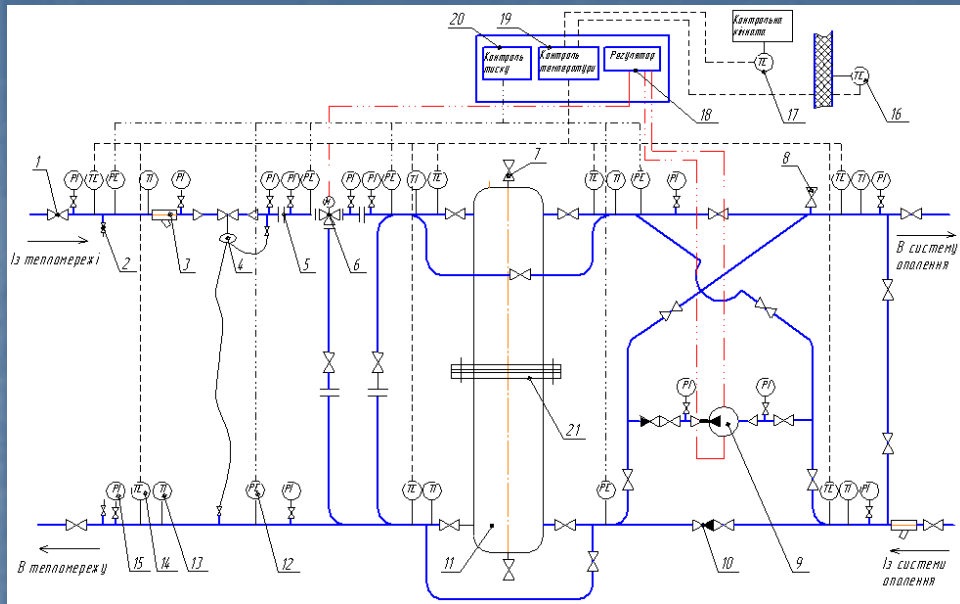


Fig. 1 - Schematic diagram of IHP

Legend: 1 – a ball valve; 2 – a drain valve; 3 – a filter sediment; 4 – a differential pressure regulator; 5 – a washer; 6 – a three-way valve; 7 – a venting valve; 8 – a safety-valve fault; 9 – a circulation pump; 10 – a return valve; 11 – a hydraulic arrow; 12 – a pressure sensor; 13 – a thermometer; 14 – a temperature sensor; 15 – a pressure gauge; 16 – an outdoor temperature sensor; 17 – a temperature sensor in the room; 18 – a regulator; 19 – a temperature control; 20 – a control pressure; 21 – a check valve.

Feature of the development of IETH of NAS of Ukraine from *typical* IHP is combined in one IHP three heat meters, three-way (two-way) valves, hydraulic arrow, hydraulic mixing unit for membrane that allows to implement various variants of the hydraulic circuit IHP and its effective modes of operation

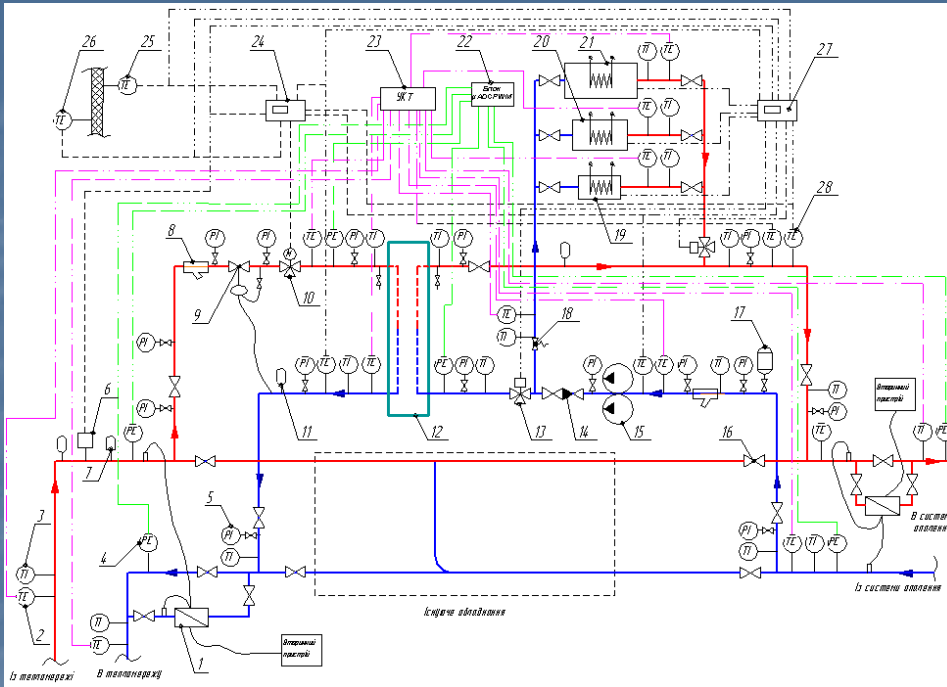


The real average cost savings of heat energy for the heating period is up to 15%.

Pat. 70590 Ukraine, IPC (2012.01), F24D 15/00, F24D 3/02 (2006.01). Individual heating unit / applicant and the owner is the In-t of Engineering Thermophysics of NAS of Ukraine. - № U 201109780; appl. 08.08.2011; publ. 25.06.2012, Bull. № 12.-3 p.

2,, Bulakhovskogo str., Kyiv, Ukraine
tel.: (044) 456-92-72, 424-25-27,
e-mail: basok@ittf.kiev.ua

THE INDIVIDUAL HEAT POINT WITH ELECTRIC BOILERS



Legend: 1 – a heat meter; 2 – a temperature sensors; 3 – a thermometer; 4 – a pressure sensor; 5 - a pressure gauge; 6 – a sensor of dry run; 7 – a pressure switch; 8 – a mesh filter; 9 – a regulator of pressure drop AVP; 10 – a 2-way regulating valve; 11 – a safety air valve; 12 – a plate heat exchanger; 13 – a stop-valve 2-way Drive; 14 – a return valve; 15 – a pump; 16 – a shut-off valve; 17 – an expansion tank; 18 – a safety valve; 19 – an electro heater "Eco"; 20 – an electric heater "Pioneer"; 21 – an electric boiler "Titan"; 22 - block ADCPWM; 23 - UCT; 24 – an electronic controller ECL-300 with the card management C66; 25 – a room temperature sensor ESM 10; 26 – an outdoor temperature sensor ESMT; 27 – an electronic controller ECL-300 with card management C75; 28 - temperature sensor ESMU.

The patent for useful model № 38541 Ukraine. Individual heating point for heating and hot water systems. / Publ.12.01.2009, Bull. №1.

The special difference of the development of IETH of NAS of Ukraine from a typical IHP: is the presence of electric boilers of various capacities, which allows not only regulate, but also independently of the heat distribution networks to generate heat, for example, during a night failure of electricity.

The Principle scheme of IHP



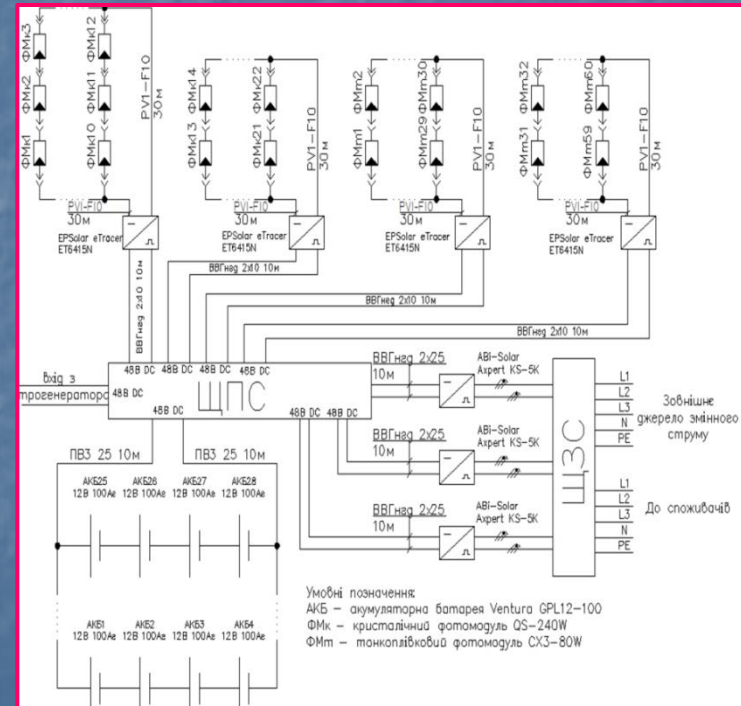
2, Bulakhovskogo str., Kyiv, Ukraine,
tel.: (044) 456-92-72, 424-25-27,
e-mail: basok@ittf.kiev.ua

The system of electric power supply for passive house of "0 energy" type

The system of electric power supply of the passive house "0 energy" is based on the use of renewable energy sources: solar energy and wind. Key elements of the system - Fortis Montana wind turbine, rated power of 5 kW; 22 monocrystalline photovoltaic panels QSolar QS-240W, total power of 5.3 kW and 60 polycrystalline panels Calyxo CX3 80W, total power of 4.8 kW. The total rated power of the system is 10 kW, output power not less than 600 kWh/(month).



The block diagram of the electric power supply of the passive house of "0 energy" type



Умовні позначення:
 АКБ - акумуляторна батарея Ventura GPL12-100
 ФМк - кристалічний фотомодуль QS-240W
 ФМп - монокристалічний фотомодуль CX3-80W

For determination of wind potential near passive house of "0 energy" type was conducted mathematical modeling.

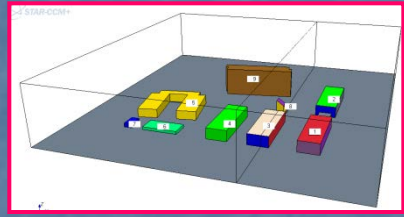
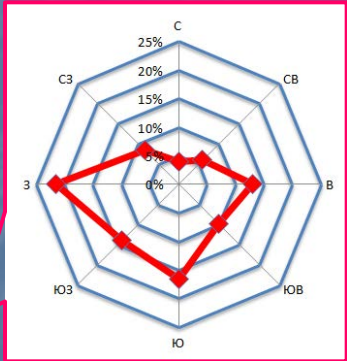


Photo from above

Design scheme

Schematic diagram of electric power supply of the passive house "0 energy"



A diagram of wind

Румб	C	CB	B	ЮВ	Ю	ЮЗ	З	СЗ
Роза вітрів ОП 2007 - 2008	4%	6%	13%	10%	17%	14%	21%	8%
Середня швидкість вітру	3,4	3,9	3,4	3,0	3,4	3,2	5,0	4,7

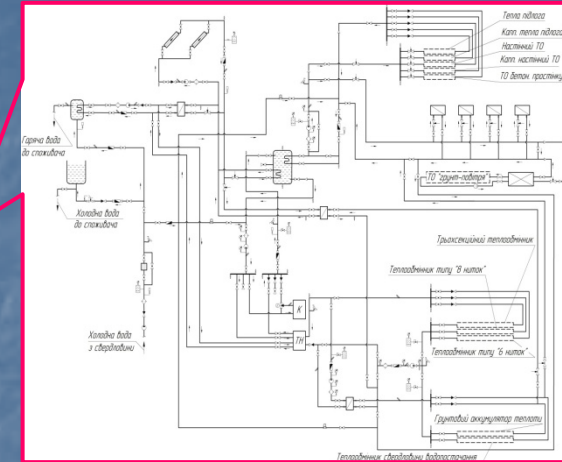
THE COMBINED HEAT PUMP AIR-CONDITIONING SYSTEM OF THE EXPERIMENTAL PASSIVE HOUSE OF "0-ENERGY" TYPE



View of the building

The specific heat losses of the building (total area of 306 m²) are 14.3 kWh-hours/(m² year) when the calculated value of the minimum outdoor temperature during the heating season is -22°C and internal indoor air temperature is 20°C.

Schematic hydraulic diagram of the combined heating system of the pilot passive building of "0-energy" type



The value of thermal power systems:

- heating 2,6 kW;
- hot water supply 3,4 kW;
- supply and exhaust ventilation (with air heating) 5.7 kW.

The source for the heat pump (capacity 6.2 kW) is low-grade heat ground array around the building, which is removed using ground-liquid heat exchangers (mounted from polyethylene pipes of multiloop or U-like forms heat exchangers in 8 groundwater wells of a depth 25 m and 40 m or 3 horizontal and register collectors at a depth of 2.2 m) in combination with heating devices as warm water floors (including capillary) of different stacking geometry and heat exchangers in the spaces between rooms, and liquid-air heat exchangers (wall and floor) for heating and air conditioning in rooms (fan coil units). In the warm season the system provides for seasonal heat accumulation (including passive air conditioning in the rooms), followed by its use in the cold season. Provides compulsory supply and exhaust ventilation with heat recovery with auxiliary heating of air after the heat exchanger into the house, and heating incoming outside air due to its previous passing through ground-air heat exchangers. As a backup heating system provides radiator system based on universal solid fuel boilers, as well as emergency heating system provides passive-convection air heating system. Some rooms also provide electrical cable and thermomembrane underfloor and wall heating. The auxiliary heat sources are: seasonal use tanks heat accumulators, including a heat carrier contains paraffin); operation of solid fuel fireplace with a water lave its surface; organization of thermal curtain of building facades by air that passes through the pre-ground heat accumulators; industrial water intake for technical and household needs from a well depth of 38.5 m in the area of the house. The main heating systems are automated.



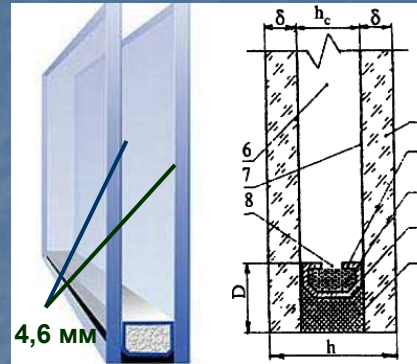
2, Bulakhovskogo str., Kyiv, Ukraine,
tel.: (044) 456-92-72, 424-25-27, e-mail: basok@ittf.kiev.ua

Options for energy efficient windows

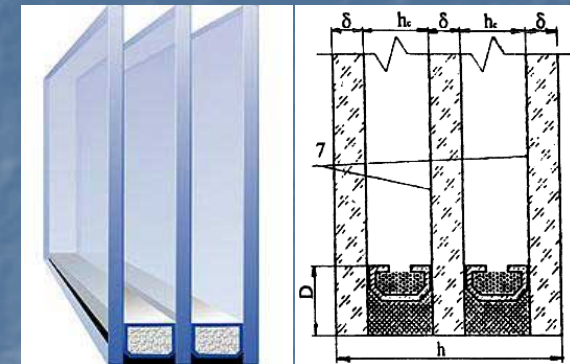
№ п/п	Варіанти скління	Газовий наповнювач	Дистанційна рамка	Профіль рами	Опір теплопередачі склопакета, м² К/Вт
1	4M ₁ -10-4M ₁ -10-4i	Повітря	Алюмінієва	Rehau euro-design 60	0,64
2	4M ₁ -10-4M ₁ -10-4M ₁	Повітря	Алюмінієва	Rehau euro-design 60	0,47
3	4M ₁ -10-4M ₁ -10-4M ₁	Повітря	Алюмінієва	Rehau euro-design 70	0,47
4	4M ₁ -10-4M ₁ -10-4i	Повітря	Алюмінієва	Rehau euro-design 70	0,64
5	6M ₁ -12-6i	Повітря	Алюмінієва	Rehau euro-design 60	--
6	4i-10-4M ₁ -10-4i	Повітря	Алюмінієва	Rehau euro-design 60	0,93
7	4i-10-4M ₁ -10-4i	Повітря	Пластиковая	Rehau euro-design 60	--
8	4M ₁ -12-4M ₁ -8-4i	Повітря	Алюмінієва	Rehau euro-design 60	--
9	4M ₁ -16-4i	Повітря	Duraseal	Rehau euro-design 60	--
10	4M ₁ -10-4M ₁ -10-4i Енергозберігаюча плівка	Повітря	Алюмінієва	Rehau euro-design 70	--
11	4M ₁ -16-4i	Повітря	Алюмінієва	Rehau euro-design 60	0,59
12	4M ₁ -16-4M ₁	Повітря	Алюмінієва	Rehau euro-design 60	0,32
13	4M ₁ -20-4M ₁ -20-4i	Повітря	Алюмінієва	Rehau Geneo 86	--
14	4M ₁ -16-4i	Повітря	Алюмінієва	Rehau euro-design 60	0,59
15	4M ₁ -16-4i	Повітря	Алюмінієва	Rehau euro-design 60	0,59
16	4M ₁ -16-4i	Аргон	Алюмінієва	Rehau euro-design 60	0,66
17	4M ₁ -10-4M ₁ -10-4i	Аргон	Алюмінієва	Rehau euro-design 60	0,71
18	4M ₁ -10-4M ₁ -10-4i	Повітря	Алюмінієва	Rehau euro-design 60	0,71
19 Західн. фасад	4M ₁ -10-4M ₁ -10-4i	Повітря	Алюмінієва	Rehau euro-design 60	0,71
20 Західн. фасад	4M ₁ -10-4M ₁ -10-4M ₁	Повітря	Алюмінієва	Rehau euro-design 60	0,47

Principles of selecting energy saving windows:

1) the number of cameras in the pane; 2) the emission of energy-saving coatings and films on glasses; 3) use of inert gases; 4) focus front of the house; 5) the thickness of the glass; 6) the type of remote framework; 7) the distance between glasses in the pane; 8) configuration profiles frame.



A single-chamber glass



A double-glass



Profile of the frame
Rehau Euro-design 60

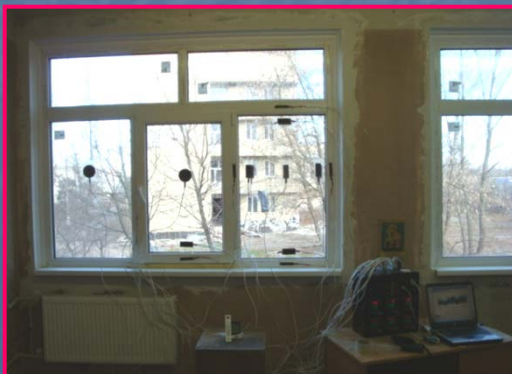


Profile of the frame
Rehau Euro-design 70



Profile of the frame
Rehau Geneo 86

Investigation of heat losses of energy efficient window design in real conditions of exploitation



Variants of heat insulation covers for thermomodernization of building wall constructions by the fastened insulation method

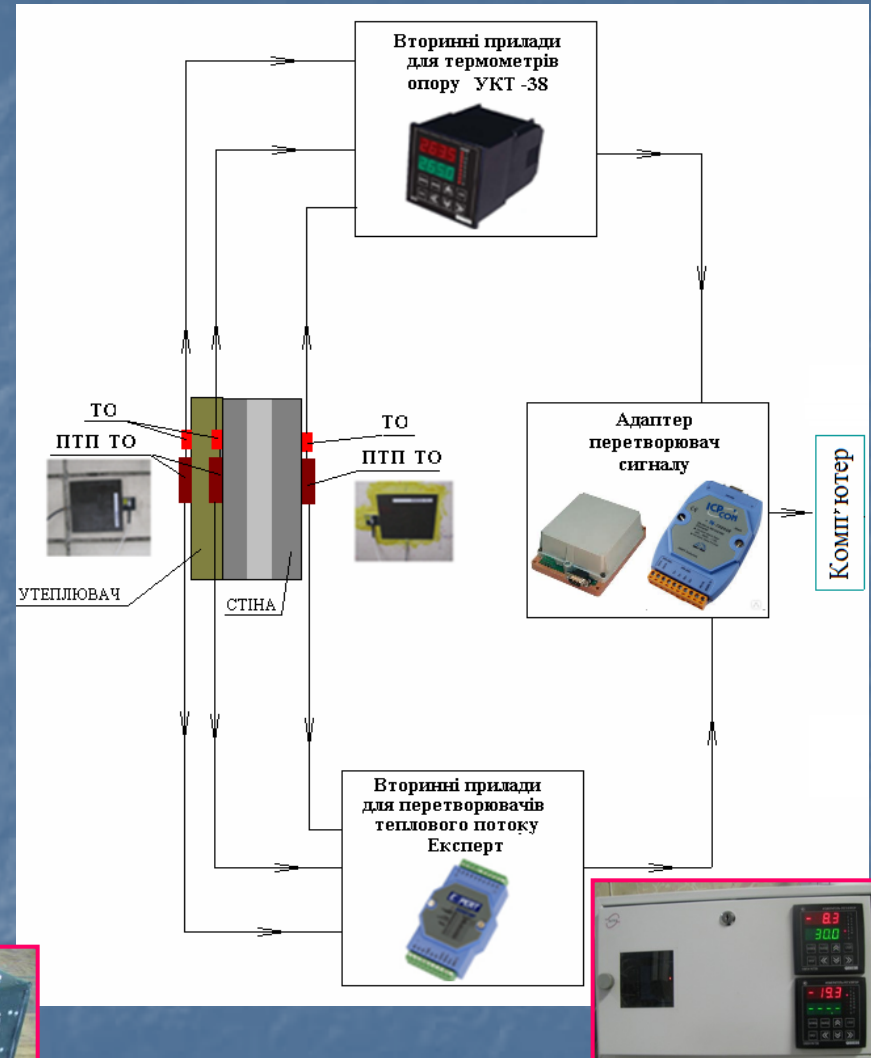
1. Polystyrene foam of density 15, 25, 35 kg / m³;
2. Extruded polystyrene foam;
3. Basalt mineral wool 130 kg / m³;
4. The mineral basalt slab-PMTB 2.140 kg / m³;
5. Vermitokulitoperlitova plaster;
6. Pinohazosklo 160 kg / m³;
7. Spraying polyurethane foam.



The portable unit for investigation of heat losses through walls and translucent constructions



Scheme transmission and recording of data in the study of heat transfer through the wall construction with an additional layer of different variant insulation by the method fastened insulation



2, Bulakhovskogo str., Kyiv, Ukraine,
tel.: (044) 456-92-72, 424-25-27,
e-mail: basok@ittf.kiev.ua

PLANT FOR PRODUCTION LIQUID FEED AND WORT



Operations of

- dispersion;
- mixing;
- dissolving;
- heating;
- hydrolysis **carried out in one device.**

Particle size of the final product is regulated.

Technical characteristics :

Productivity	500 kg per hour
Energy consumption	3 kWh/100 kg
Weight	60 kg
Dimensions	200X1500X700 mm

Raw materials:

Cereal crops, granules, solid and liquid additives, water or distillery slops

Sposib pryhotuvannia ridkykh kormiv dlia molodniaka svynei [A method for preparing a liquid feed for piglets].

Patent Ukraine, no. 80151, 2013.

Sposib pidhotovky krokhmalevmisnoi syrovyny do zbrodzhuvannia [The method of preparation of starch-contained raw material for fermentation]. Patent Ukraine, no. 110074, 2015.

2, Bulahovskogo str., Kyiv, Ukraine

tel.: (044) 424-31-85, 424-96-34, e-mail: tdsittf@ukr.net, itff.kiev.ua

HEAT AND MASS TRANSFER FERMENTATION PLANT



Purpose:

To obtain gas-saturated liquids, even with gases that are difficult to dissolve (oxygen, carbon dioxide).

Use in the technology of cultivation of aerobic microorganisms and in the water treatment to eliminate undesirable impurities (iron, manganese, hydrogen sulfide)

Technical characteristics :

Productivity	7 m ³ per hour
Product productivity	30 - 40 kg per day
Energy consumption per 1 ton	180 kWh
Weight	15 kg
Dimensions	500X250X350 mm

Ustanovka dla kultyvuvannia klityn [Apparatus for cells cultivation]. Patent Ukraine, no. 102394, 2015.

Sposib vyroshchuvannia khlibopekarskykh drizhdzhiv [The method of cultivation of baker's yeast]. Patent Ukraine, no. 102081, 2015.

Sposib aeratsii [Method of aeration]. Patent Ukraine, no. 102393, 2015.

2, Bulahovskogo str., Kyiv, Ukraine

tel.: (044) 424-31-85, 424-96-34, e-mail: tdsittf@ukr.net, itff.kiev.ua

THE DESTINKER VACUUMS FOR MILK

Intended for the roughing-out of suckling raw material with the aim of exception of extraneous smells and aftertaste.

High-efficiency small energykeeping vehicle that provides a deep deodorization and treatment without the losses of raw material.



Productivity, l/h	5000	10000
A temperature of milk is on included in a vehicle, °C	4 ÷ 10	4 ÷ 10
Temperature of heat treatment of milk, °C.	70 ÷ 95	70 ÷ 95
Set power, kW, no more	16,5	27,5
Sizes, mm	1300x1100x1400	1500x1200x1450
Mass, kg, no more	300	450

2, Bulakhovskoho str., Kyiv, Ukraine
tel.: (044) 424-14-96, 424-13-06, e-mail: ittf_tds@ukr.net

NEW GENERATION SHELL & TUBE HEAT EXCHANGERS

Thin-wall flexible corrugated stainless tubes with discrete vortex generators are used as the heat exchange elements.

Heat exchanger ТКГ-350



Heat exchanger ТО-75



Advantages:

- Heat transfer coefficient higher than 1.3-1.5 times;
- Lower metal content;
- Lower production costs;
- Reduction of scale deposits and salts due to the self-cleaning effect.

2, Bulahovskiy Str., Kyiv, Ukraine,
Phone: (044) 424-13-96, 424-98-86,
e-mail: htplab@ukr.net, www.htplab.kiev.ua