



Solid fuel steam generators

«Bent-Iron»

is the fastest and safest way to get steam

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ADVANTAGES OF STEAM GENERATORS «BENT-IRON»



✓ SAFETY OF USE

The heat exchanger is made in the form of a coil. This is a solid pipe with a diameter of up to 80 mm, which has one inlet and one outlet. There are no large pressure vessels in the boiler, except for the pipe itself. Boilers up to 4 tons of steam per hour are allowed to be installed near production lines.



✓ SPEED

There are no large inert components in the design of the steam generator. Thanks to the small volume of the furnace and a clear dosage of fuel, air, and feed water, the boiler instantly responds to changes in steam consumption by the company's technology.



✓ AUTONOMY

The concept of developing a solid fuel steam generator «BENT-IRON» is based on the principle of maximum autonomous operation. Operation of the boiler does not require the constant presence of personnel servicing the equipment.



✓ ECONOMY

High efficiency of 86%, the ability to quickly modulate the operating mode, a retort vortex combustion furnace, which burns 100% of fuel - all this provides savings of up to 30% compared to analogs on the market.



✓ ENVIRONMENTAL FRIENDLINESS

Air is supplied to four separate zones of the furnace, the amount of which is clearly controlled by the boiler automation. A cone furnace, vortex combustion, and an additional stirrer - all this ensures full combustion and low NOx values. Emissions comply with the current standards of Ukraine.



✓ RELIABILITY

Each boiler unit is assembled and fully factory tested, which ensures reliable operation and the possibility of quick installation in a few days on site.

THE PERFECT SOLUTION FOR:



MILK AND CHEESE
FACTORIES



BREWERIES



CONSTRUCTION INDUSTRY



OIL AND FAT PLANTS



CONFECTIONERY
FACTORIES



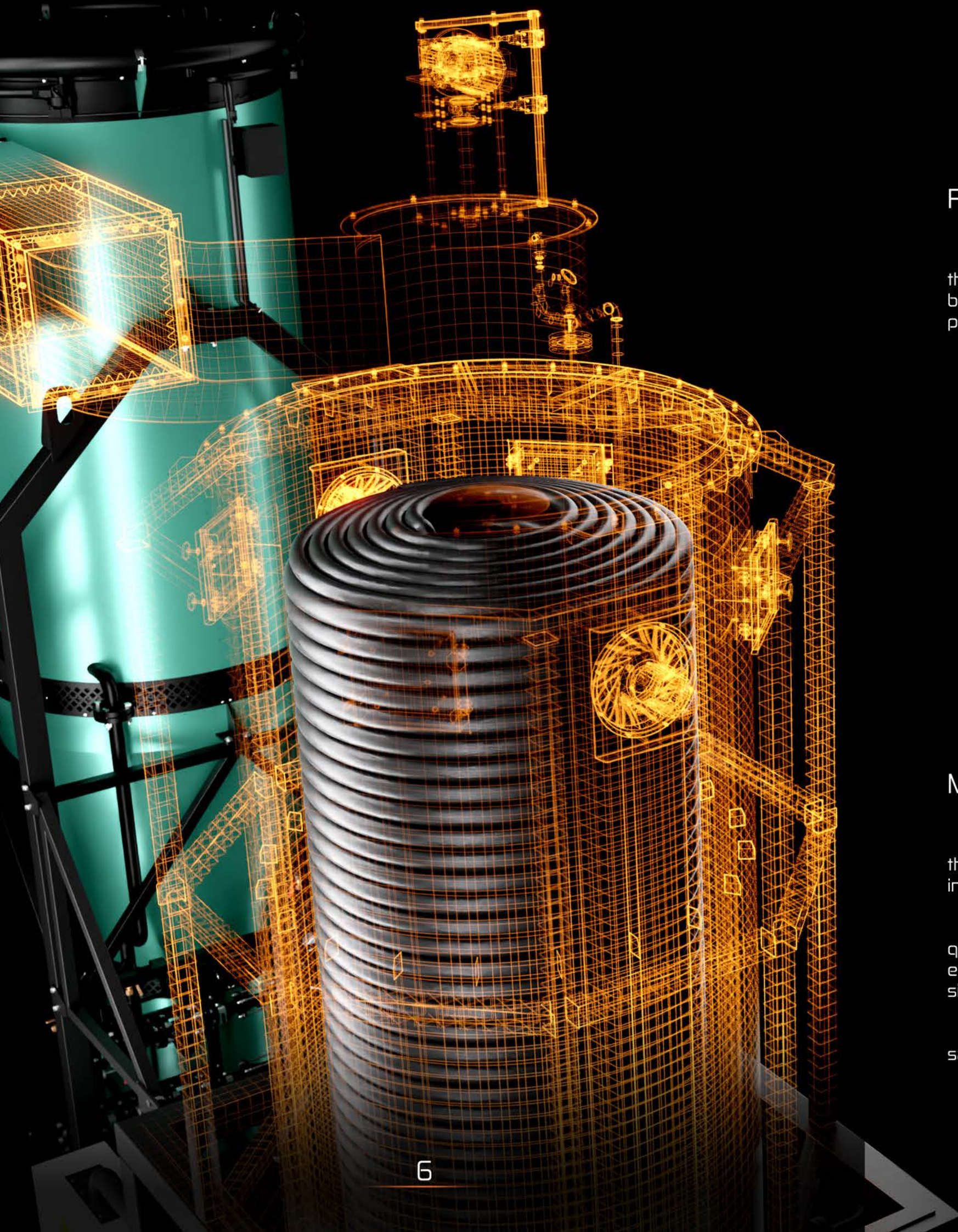
TEXTILE INDUSTRY



WOODWORKING INDUSTRY



AGRO-INDUSTRY



VAPORIZATION IN THE COIL

FEATURES OF VAPORIZATION IN THE COIL

Unlike classic drum boilers, with large pressure vessels, in which vaporization occurs on the principle of evaporation of water from the surface, the idea of direct-flow boilers is based on the principle of counterflow of feed water in the flow of exhaust gases, which provides:



many times faster
vaporization



safety - there are no
pressure vessels, which
ensures absolute explosion
safety



compact dimensions of the
boiler, thanks to the large
area of the heat
exchanger, in the form of a
coil.

MORE THAN 100 YEARS OF WORLD EXPERIENCE

The principle of steam formation in coil B (spiral heat exchanger) was invented more than 100 years ago. For the first time, such boilers were installed on ships of the US Navy in the 30s of the 20th century.

The main reasons for the growing popularity of direct-flow steam boilers: compactness, quick start and almost instant access to the mode, safety, efficient purging of the heat exchanger in the opposite direction, which made it possible to work in emergency situations, even on seawater.

Today, steam generators are used in all industries. Technological processes that require saturated or superheated steam.

TYPES OF FUEL FOR STEAM BOILERS «BENT-IRON»



WOOD PELLETS

Diameter*	8±2mm
Length*	30±10mm
Water content	≤ 10%
Dust content	≤ 1%
Ash content	≤ 0.8%
Heat of combustion	≥ 16,5min MJ/kg
Classification	A1 / A2

*Dimensions are within the permissible range according to ISO 17225-2:2021



TECHNOLOGICAL
WOOD CHIPS

Maximum cross-sectional area	≤ 2 cm ²
Length*	25±15mm
Fine particle content less than 3.15 mm	≤ 15%
Coarse particle content greater than 31.5 mm	≤ 6%
Water content	≤ 20%
Ash content	≤ 1%
Heat of combustion	≥ 15min MJ/kg

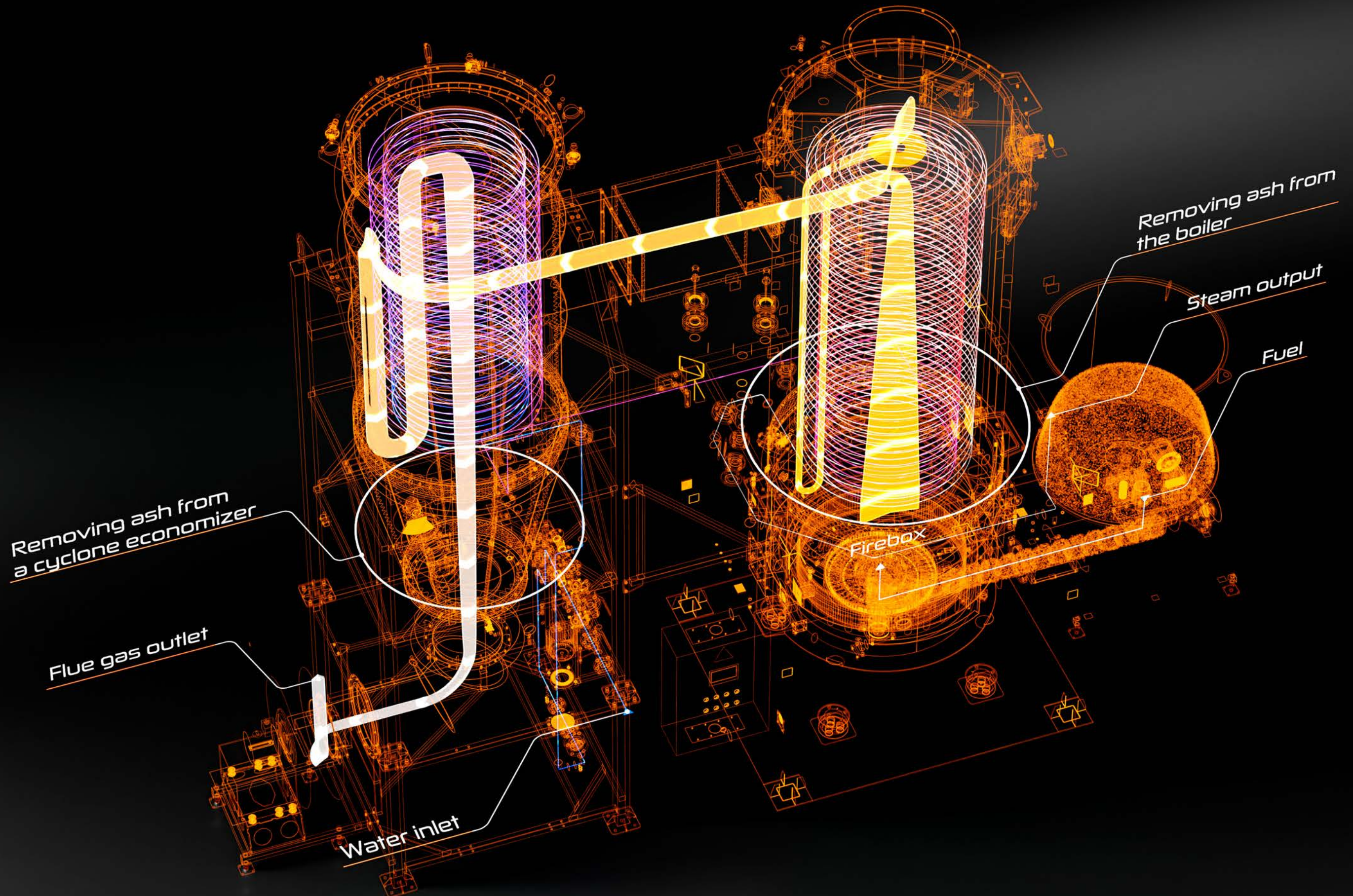
*Dimensions for wood chips of fraction G30

**Data according to ISO 17225-2:2021, ISO 17225-4:2021

SCHEMATIC DIAGRAM

STEAM GENERATOR OPERATION

Principle of operation of a solid fuel steam generator "BENT-IRON" on YouTube



MODEL RANGE

	BS (S) 1.0	BS (S) 2.0	BS (S) 4.0
Fuel types and their average calorific value, kcal / t	Granulated wood fuel - 4100 Cod - 2600 Sawdust - 2000 Granulated fuel from sunflower husk - 4320 Husk - 4100		
Design feed water pressure	0,05-0,3 MPA	0,05-0,3 MPA	0,05-0,3 MPA
Calculated temperature of deaerated feed water, °C	95±5	95±5	95±5
Design steam pressure	1,6 MPA	1,6 MPA	1,6 MPA
Estimated steam capacity, kg / h	1200	2500	5000
Performance adjustment range, %	30-100	30-100	30-100
Internal water volume of the heat exchanger, L	341	870	2280
Calculated saturated steam temperature, °C	201	201	201
Estimated heat output, kW	900	2000	4050
Average natural fuel consumption per 1 ton of steam (granulated wood fuel)	140±20	140±20	140±20
Average natural fuel consumption per 1 ton of steam (process wood chips 10-20 mm, humidity up to 25%)	190±20	190±20	190±20
Average natural fuel consumption per 1 ton of steam (granulated fuel from sunflower husk)	150±20	150±20	150±20
Total maximum set value of electricity consumption, kW	15	25	40
Noise level, dB	75	80	85
Boiler unit weight, t	7,5	12,7	17,9
Design load on foundations, kg / m²	900	820	920
Connecting feed water	DN32	DN40	DN50
Connecting the steam output	DN50	DN65	DN80
Flue gas outlet	DN300	DN450	DN500
Recommendations for the chimney	Diameter ≥300 mm Tap angle - 45	Diameter ≥450 mm Tap angle - 45	Diameter ≥500 mm Tap angle - 45
Average flue gas values at the point of release into the atmosphere (depending on the type and quality of fuel)	Exhaust gas temperature, t Nitrogen oxides NO _x Sulfur anhydride SO ₂ Carbon oxide CO Solid particles that are undifferentiated in composition		
Safety valves*	DN50 2 pieces	DN65 2 pieces	DN80 2 pieces

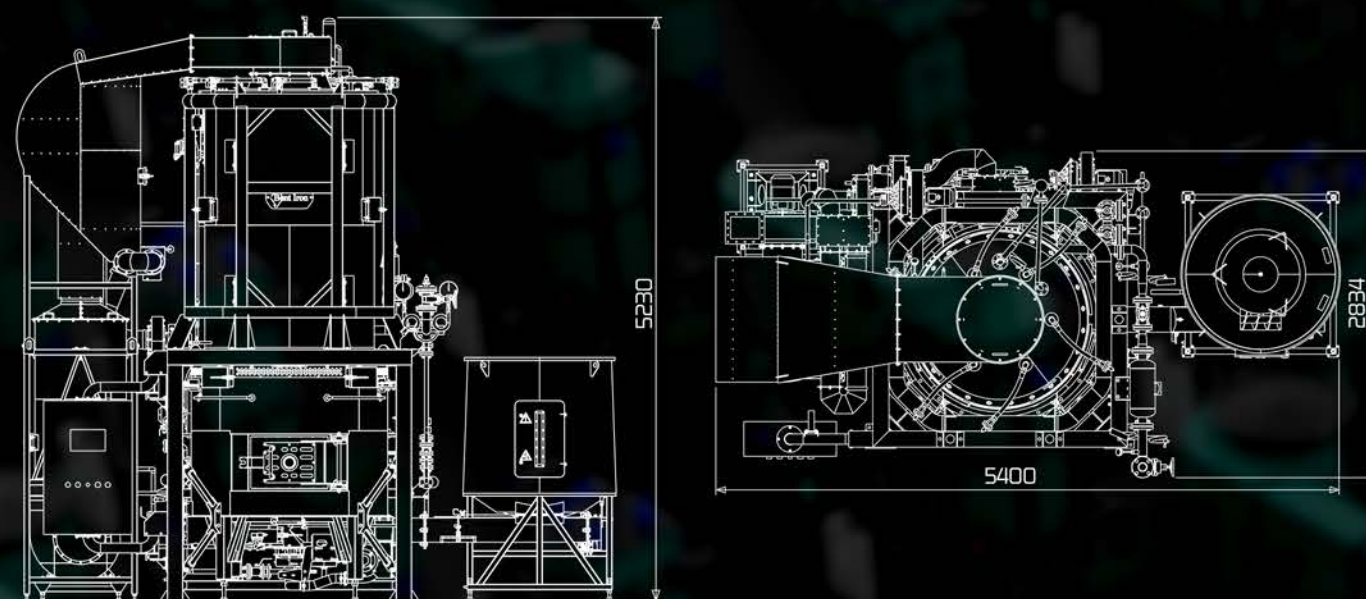
*according to the terms of reference

OF STEAM GENERATORS «BENT-IRON»

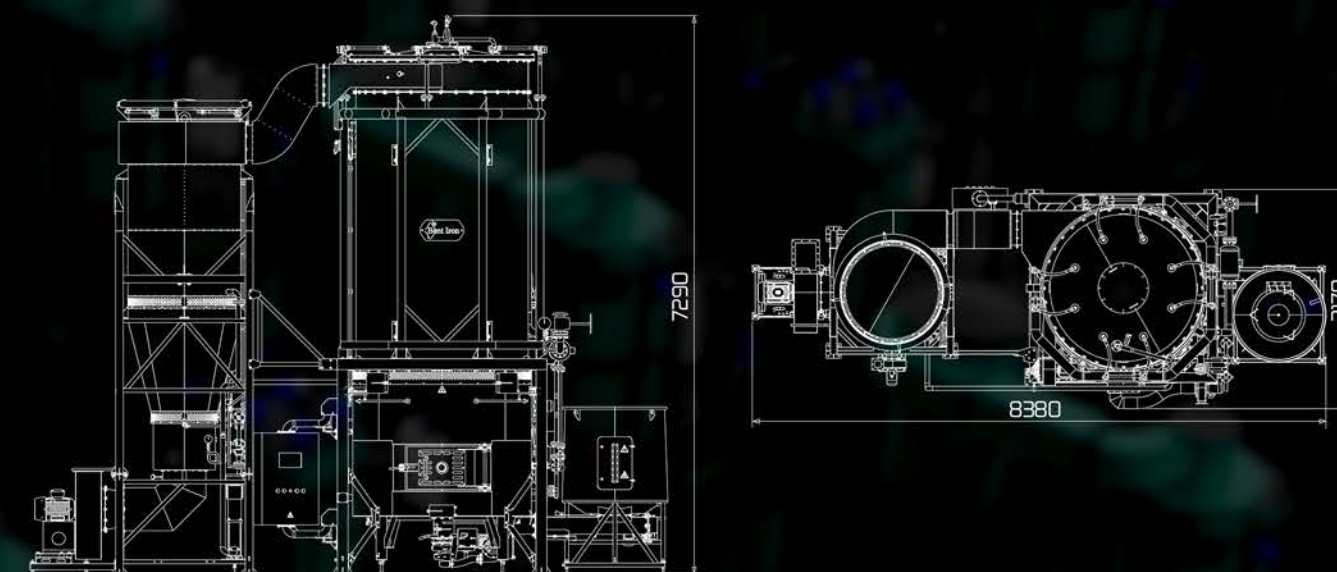
	Additional communication connections		
Condensate drain*	DN25	DN25	DN25
Purge/start-up crane*	DN25	DN40	DN40
Compressed air*	DN15	DN15	DN15
Ash removal*		D=160mm	D=160mm
Power supply*	Copper cable 5*3 Grounding TN-S	Copper cable 5*4 Grounding TN-S	Copper cable 5*10 Grounding TN-S
Boiler dimensions (HxWxL), mm ± 20	5230x2834x5400	direct placement: 6200x2927(3210*)x8166(7000*) corner placement: 6200x4220x6230(5270*) *the exhaust gas extractor is rotated by 90°	direct placement: 7290x3170(3670*)x8380(7200*) corner placement: 7290x4410(5460*)x6820(5620*) *the exhaust gas extractor is rotated by 90°
Boiler fuel supply system	automatic, modulated		
Ash removal system	From the boiler and Cyclone economizer-pneumatic-mechanical From the furnace - manually It is recommended to install a cyclone of the CN type 15-450/500/550 to the Aspiration System		
Dispatching capability	yes		
Feed water requirements	General view pH at 25°C Total stiffness (Ca + Mg) Iron (Fe) Copper (Cu) Dissolved oxygen (O ₂) Conditional salinity (in terms of NaCl) Specific conductivity at 25 °C Content of petroleum products		
Description of routine maintenance,	Inspection, cleaning and preventive maintenance: Removing contaminants from internal components (filters, fans, grates, blower chambers, heat exchanger) to ensure efficiency and extend equipment life. Technical inspection and replacement of parts: Inspecting and replacing the necessary components (bearings, seals and drive elements) and lubricating them. Ensuring the safety of the hydraulic system: Inspecting the hydraulic system and performing a pressure test. Ensuring the safety of connections: Check and tighten terminal connections on motors and other controls to ensure reliability and safety. Diagnostics and parameter adjustment: Measuring physical and chemical characteristics, analyzing operating parameters and adapting equipment to current operating conditions as needed.		

*according to the terms of reference

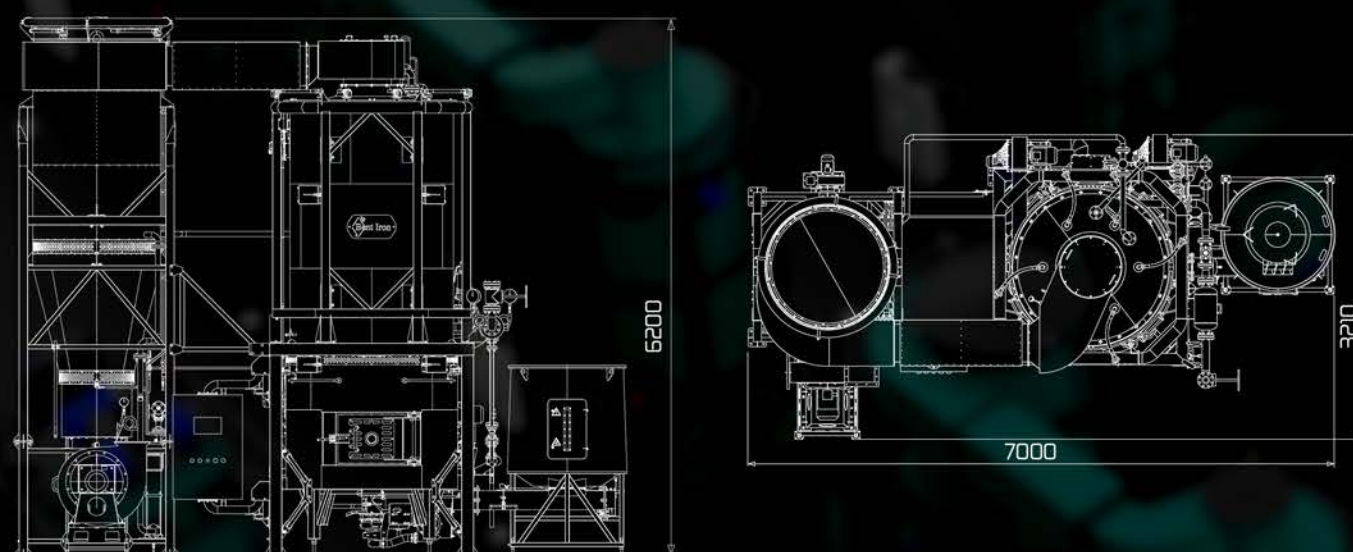
TYPICAL PLACEMENT SCHEMES AND OVERALL SIZE DIAGRAM BS (S) 1.0



TYPICAL PLACEMENT SCHEMES AND OVERALL SIZE DIAGRAM BS (S) 4.0



TYPICAL PLACEMENT SCHEMES AND OVERALL SIZE DIAGRAM BS (S) 2.0



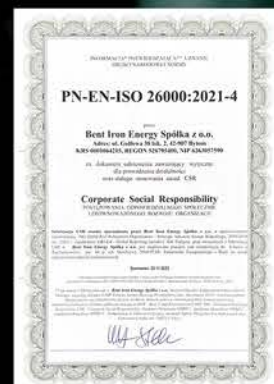
ADDITIONAL PLACEMENT SCHEMES BS (S) 2.0 BS (S) 4.0



EUROPEAN CERTIFICATION AND COMPLIANCE WITH STANDARDS

Our products meet the highest international quality standards:

- Full compliance with the international quality management standard ISO 9001
 - Compliance with European machine safety standards (EN 60204-1:2018, EN 61310-1:2008) and electromagnetic compatibility (EN IEC 61000-6-2:2019, EN IEC 61000-6-4:2019)
 - Certification in accordance with EU Directive 2014/68/EU on pressure equipment
 - CE marking - compliance with EU standards for health, safety and environmental protection.
- All necessary certificates of conformity are available upon request.



TECHNICAL QUALITY CONTROL

To ensure high product quality and compliance of each product with all applicable requirements, standards and EN, multi-stage quality control of each stage of the design stage has been introduced, and production facilities.



CONTROL OF COMPLIANCE WITH TECHNICAL DOCUMENTATION

Each unit and element of the equipment is thoroughly checked. Technical documentation is analyzed for compliance:

- Technical specifications
- Current European norms and standards
- Requirements of the EU Pressure Equipment Directive (PED 2014/68/EU).

This ensures the accuracy and reliability of each component from the beginning of the design.



INCOMING INSPECTION

All materials, equipment and components are subject to strict incoming inspection:

- Quality and specification checks
- Checking the completeness of the delivery
- Assessment of packaging and labeling condition
- Verification of quality certificates for materials.

Pressure vessels are manufactured exclusively from PED-certified materials, which guarantees compliance with European safety standards.



OPERATIONAL CONTROL

Continuous control is carried out at every stage of production:

- Monitoring of each technological operation
- Checking compliance with technical parameters and PED requirements
- Quality control after completion of each stage
- Continuous verification of the use of certified materials.

This ensures that possible deviations are detected and eliminated at an early stage, ensuring full compliance with European standards.



ACCEPTANCE CONTROL

Final product inspection includes:

- Testing individual components and the product as a whole
- Verifying compliance with technical specifications and PED requirements
- Evaluating functionality and performance
- Ensuring conformity with the PED 2014/68/EU directive

We provide informational support during the acceptance of the boiler by technical supervision bodies such as UDT in Poland and similar organizations in other EU countries. This approach ensures that our products meet European safety and quality standards.

OUR

CLIENTS



HAISYN MILK PLANT



Capacity - 2500 kg of steam per hour
Operating steam pressure - 8-10 bar
Fuel - wood pellets
Project type - Modernization
Savings - up to 30% vs. drum boilers

UMANPIVO

УМАНЬПИВО
1878

Capacity - 5000 kg of steam per hour
Operating steam pressure - 8 bar
Fuel - sunflower husk pellets
Project type - Modernization
Savings - up to 50% vs. gas

STEFAINO



Capacity - 1200 kg of steam per hour
Operating steam pressure - 6 bar
Fuel - wood pellets
Project type - Modernization
Savings - 40% vs. gaz

SLAVUTA BEER



Capacity - 2000 kg of steam per hour
Operating steam pressure - 8 bar
Fuel - wood pellets
Project type - Modernization
Savings - 40% vs. gaz

OBOLON KRASYLIVSKE



Capacity - 2500 kg of steam per hour
Operating steam pressure - 8 bar
Fuel - wood pellets
Project type - Modernization
Savings - 50% vs. gas

DMYTRUK



Capacity - 2500 kg of steam per hour
Operating steam pressure - 6-8 bar
Fuel - wood pellets
Project type - Modernization
Savings - up to 50% vs. gas

ORGANIC MILK



Capacity - 1200 kg of steam per hour
Operating steam pressure - 6 bar
Fuel - wood pellets
Project type - Modernization
Savings - 50% vs. electricity

BTU-CENTER



Capacity - a total 9000 kg of steam per hour
Operating steam pressure - 8 bar
Fuel - sunflower husk pellets
Project type - New construction
Savings - up to 30% vs. drum boilers

GRONO-TEX



Capacity - 2500 kg of steam per hour
Operating steam pressure - 8 bar
Fuel - sunflower husk pellets
Project type - Modernization
Savings - up to 45% vs. gas

TEXWOSH GONSER



Capacity - 2500 kg of steam per hour
Operating steam pressure - 6-7 bar
Fuel - wood pellets
Project type - Modernization
Savings - 45% vs. gaz

SHPOLA FOOD GOODS PLANT



Capacity - 1200 kg of steam per hour
Operating steam pressure - 6 bar
Fuel - sunflower husk pellets
Project type - Modernization
Savings - 40% vs. gaz

NATUREGREEN



Capacity - 1200 kg of steam per hour
Operating steam pressure - 3 bar
Fuel - wood pellets
Project type - New construction
Savings - up to 30% vs. drum boilers

SHIK GALICHINA



Capacity - 4000 kg of steam per hour
Operating steam pressure - 5 bar
Fuel - technological wood chips
Project type - Modernization
Savings - 30% vs. drum boilers

SALTIVSKY MEAT PROCESSING PLANT



Capacity - a total 3700 kg of steam per hour
Operating steam pressure - 8 bar
Fuel - wood pellets
Project type - New construction
Savings - up to 30% vs. drum boilers

ZHYTOMYR MILK PLANT



Capacity - a total 3700 kg of steam per hour
Operating steam pressure - 9 bar
Fuel - wood pellets
Project type - Modernization
Savings - 30% vs. drum boilers

SYROROB



Capacity - a total 10000 kg of steam per hour
Operating steam pressure - 8 bar
Fuel - wood pellets
Project type - Modernization
Savings - 50% vs. furnace fuel

OUR

CLIENTS



MHP



Capacity - in total 5000 kg of steam per hour
Operating steam pressure - 8 bar
Fuel - sunflower husk pellets
Project type - New construction
Savings - up to 30% vs. drum boilers

ICO IF



Capacity - 2500 kg of steam per hour
Operating steam pressure - 6 bar
Fuel - sunflower husk pellets/technol. wood chips
Project type - Modernization
Savings - up to 30% vs. drum boilers

LEVONA



Capacity - 2500 kg of steam per hour
Operating steam pressure - 8 bar
Fuel - sunflower husk pellets
Project type - Modernization
Savings - 40% vs. gas

HIGHBERRY



Capacity - 1200 kg of steam per hour
Operating steam pressure - 7 bar
Fuel - wood pellets
Project type - Modernization
Savings - 40% vs. gas

TERNOPIL MEAT FACTORY



Capacity - 5000 kg of steam per hour
Operating steam pressure - 8 bar
Fuel - wood pellets
Project type - Modernization
Savings - up to 30% vs. drum boilers

EKOMOLPRODUKT



Capacity - 2500 kg of steam per hour
Operating steam pressure - 8 bar
Fuel - wood pellets
Project type - Modernization
Savings - 40% vs. gas

VARTO



Capacity - 1200 kg of steam per hour
Operating steam pressure - 8 bar
Fuel - wood pellets
Project type - Modernization
Savings - up to 40% vs. gas

ZINKA



Capacity - 2500 kg of steam per hour
Operating steam pressure - 6 bar
Fuel - wood pellets
Project type - New construction
Savings - up to 30% vs. drum boilers

KYIV MEAT PROCESSING PLANT



Capacity - 1200 kg of steam per hour
Operating steam pressure - 8 bar
Fuel - wood pellets
Project type - New construction
Savings - 55% vs. electricity

GIRNOV



Capacity - 2000 kg of steam per hour
Operating steam pressure - 10 bar
Fuel - natural gas
Project type - New construction
Savings - up to 20% vs. drum boilers

MARAMAX



Capacity - 2500 kg of steam per hour
Operating steam pressure - 6 bar
Fuel - sunflower husk pellets
Project type - Modernization
Savings - up to 30% vs. drum boilers

KREMENETS MILK PRODUCTS



Capacity - 6000 kg of steam per hour
Operating steam pressure - 6 bar
Fuel - wood pellets
Project type - Modernization
Savings - 50% vs. gas

ECO-PEL



Capacity - 1500 kg of steam per hour
Operating steam pressure - 4 bar
Fuel - wood pellets
Project type - New construction
Savings - up to 30% vs. drum boilers

ORTOLEND



Capacity - 1200 kg of steam per hour
Operating steam pressure - 5 bar
Fuel - technological wood chips
Project type - New construction
Savings - up to 30% vs. drum boilers

SOL UNION



Capacity - 2500 kg of steam per hour
Operating steam pressure - 8 bar
Fuel - wood pellets
Project type - New construction
Savings - up to 30% vs. drum boilers

MOVA AND CO



Capacity - 1500 kg of steam per hour
Operating steam pressure - 4 bar
Fuel - wood pellets
Project type - Modernization
Savings - 50% vs. electricity

ABOUT



EU CERTIFICATION:
Our products are fully certified in accordance with European Union standards, including CE marking and compliance with the PED 2014/68/EU directive.



INTERNATIONAL EXPERIENCE:
In 2024, our first boiler was successfully put into operation in Poland, which opens a new era in our European expansion.



TECHNOLOGICAL LEADERSHIP:
The production of heat exchangers with an operating pressure of more than 100 bar demonstrates our ability to create equipment for the most demanding industrial environments in Europe.



INTEGRATED SOLUTIONS:
Our project implementation department provides a full range of turnkey services in cooperation with leading European partners.



PROMPT SERVICE:
We guarantee the departure of a service team to an object anywhere in Europe within 24 hours, ensuring the smooth operation of the equipment.

THE COMPANY



INNOVATIVE TECHNOLOGIES:
The use of advanced welding technologies in thermoboxes guarantees the highest quality of heat exchanger manufacturing that meets the most stringent European standards.



QUALITY ASSURANCE:
Each boiler undergoes a full cycle of tests in production, which ensures flawless operation from the first day of operation in any European conditions.



FINANCIAL FLEXIBILITY:
Cooperation with leading European financial institutions allows us to offer flexible financing terms, including leasing and lending.



ENVIRONMENTAL RESPONSIBILITY:
Our equipment complies with the strictest European environmental standards, contributing to the reduction of CO2 emissions and energy efficiency.



CONTINUOUS DEVELOPMENT:
Investments in research and development as well as cooperation with European technology centers allow us to continuously improve our products to meet the needs of the EU market.



INNOVATION AND
CRAFTSMANSHIP IN EVERY
SOLUTION



THERMAL OIL BOILERS



SOLID FUEL STEAM GENERATORS



BSPU (BLOCK STEAM POWER UNITS)



GAS STEAM GENERATORS



MANUFACTURING OF HEAT
EXCHANGERS

CONTACTS

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BOILERS



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