



STRAW-FIRED BOILERS AND HEATERS

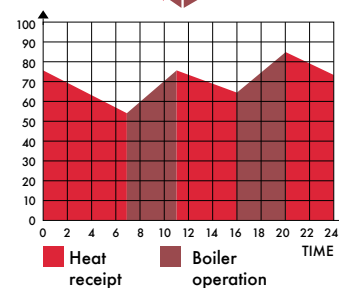
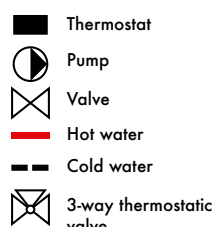
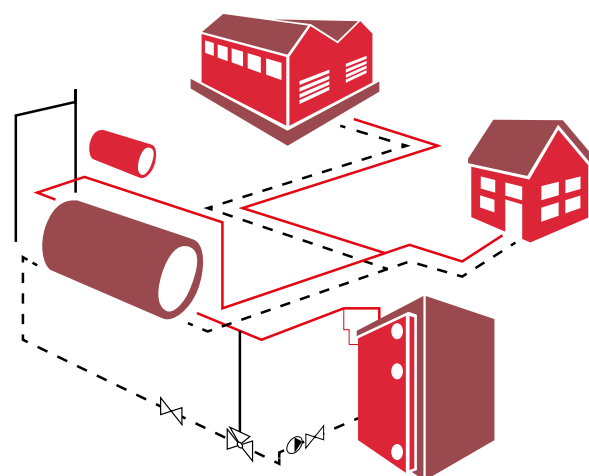
HOW IT WORKS?

STRAW AND OTHER BIOMASS

Biomass is the oldest and nowadays most widely used renewable source of energy. One of the most popular types of biomass is straw. Near 30 million tons of straw is being produced in Poland per year, some of which is used most frequently as feed and breeding bedding. The remaining part, approximately 10-12 million tons, can be used to produce heat.

For the power generation purposes the straw harvested from the field, in the form of bales (round or cuboid), should be stored under the roof to avoid wetting. The boilers can burn only dry straw with the maximum moisture content up to 20%.

PROCESS VISUALIZATION



DAILY CHART OF BOILER OPERATION AND HEAT RECEIPT BY HEATING NETWORK



Combustion process begins with loading the straw to the boiler. Fired-up boiler begins to heat the storage tank with water. After heating up the water the combustion process ends, and the hot water circulates between the tank and the system. After partial water cooling in the tank the boiler ignites again and the process begins again.

The boilers produced by us allow the combustion of not only straw but also other biomass (wood, sawdust, wood chips, hay, cardboard, etc.) Straw burning in the EKOPAL boilers gives a measurable environmental benefit: it reduces emissions and dust in the exhaust gas, we are dealing with so-called "zero balance" - the total reduction of CO₂.

ENERGY VALUE OF STRAW

FUEL	Cost of production of 1 kWh of energy
Straw 15% moisture content (own straw)	0,01 PLN/kWh
Straw 15% moisture content (purchased straw)	0,05 PLN/kWh
Wood 15% moisture content	0,12 PLN/kWh
Coal dust	0,14 PLN/kWh
Pellet	0,15 PLN/kWh
Eco-pea coal	0,17 PLN/kWh
Natural gas	0,27 PLN/kWh
Heating oil	0,43 PLN/kWh
LPG	0,45 PLN/kWh
Electricity	0,49 PLN/kWh

Prices are valid on 21.08.2015

ENVIRONMENTAL AWARDS



SAVINGS

HOW MUCH CAN YOU SAVE?

EXAMPLE 1

- for low power boiler

Approximate comparison of the costs of heating a detached house of approx. 180 m2 with an average thermal insulation of the building

Straw-fired boiler*	300 PLN
Straw-fired boiler**	900 PLN
Wood-fired boiler with gasification	1 900 PLN
Coal dust-fired boiler	3 400 PLN
Eco-pea coal-fired boiler**	4 000 PLN
Natural gas-fired boiler	5 500 PLN
Heating oil-fired boiler	8 890 PLN
LPG-fired boiler	9 300 PLN
Electric boiler	12 200 PLN

EXAMPLE 2

- for medium power boiler

Approximate comparison of the costs of heating a warehouse of ca. 800m2

Straw-fired boiler*	1 200 PLN
Straw-fired boiler**	2 200 PLN
Wood-fired boiler with gasification	4 600 PLN
Coal dust-fired boiler	6 900 PLN
Eco-pea coal-fired boiler**	9 600 PLN
Natural gas-fired boiler	19 000 PLN
LPG-fired boiler	20 000 PLN

*with own straw

**with purchased straw



EXAMPLE 3

- For air heater 2000kW

Investment cost: drying plant + silo + heater

880 000 PLN

Cost of drying 1t of corn from 30% to 13%

Heating oil	71,40 PLN/ton
Straw (purchased)	10 PLN/ton
Savings on drying 10 000 tons of corn with straw (one season)	600 000 PLN



WHY US?

BRIEFLY ABOUT US

The Metalerg company's experience in the production of boilers burning straw reaches the early 90's of the twentieth century, when we started work on this technology in collaboration with the Danish Technological Institute. Today, the company has numerous patents and is a leader in modern straw combustion determining the direction of development for competitors and the whole industry of ecological heating.

Buying a straw-fired boiler is an investment for years; therefore the company focuses on the longevity of their solutions at the production stage.

This is evidenced by the customers, whose boilers operate continuously even for twenty years. METALERG also assumed that the boiler service should be maximally simplified.

So, the controllers based on modern components take over the whole management of the combustion process.

PRIZES FOR INNOVATIONS



WHY US?

OPINIONS

TADEUSZ TARACH

- Owner of agricultural farm

„Best heating there is for a farmer”



SIEGMUND DRANSFELD

- Owner of the Lucia hotel in Zakrzów

„I think that buying a straw boiler was one of my best investments.”



JAN MIERZWIAK

-president of the Seed Central in Kluczbork

„The investment in heaters EKOPAL S has paid for itself after one drying season”



These are low-temperature boilers, designed to work in an open system with a storage tank. The boilers have the biomass combustion (gasification) chamber, afterburner and a tube type heat exchanger.

The EKOPAL RM boiler is fitted with a high-pressure fan with an air damper adjusted automatically and microprocessor-based control system, which controls the biomass combustion process according to optimal parameters. In all series of sizes the same "countercurrent combustion system" remains invariably, and the only changes are the shape and size of the combustion chamber, dimensions of heat exchange surface and fan type. Currently we offer the boilers in the power range from 25 kW up to 600 kW.

The recipients of our straw-fired boilers are individual farmers and companies, gardeners, poultry breeders, pig farmers, dryers, as well as budgetary institutions (boiler houses with our boilers are mounted in schools and other rural buildings).

EKOPAL RM

STRAW AND OTHER BIOMASS-FIRED BOILERS

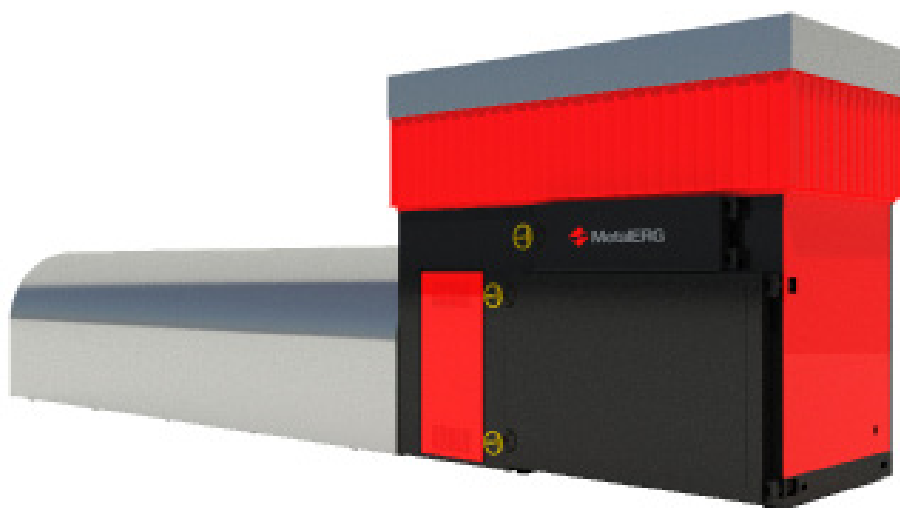


EKOPAL RM CATALOGUE

Parameter	Unit	RM 2	RM 5	RM 20	RM 30	RM 38	RM 40	RM 01	RM 02	RM 03-2	RM 03-3
Max. heat output*:	kW	25	40	70	100	120	180	300	400	500	600
Max. space of heated rooms:	m ³	350	500	1000	1500	2500	3000	6000	8000	10000	12000
Thermal efficiency	%	82									
Min. capacity of the storage tank	m ³	2,0	3,0	4,0	60,0	8,0	10,0	15,0	20,0	22,0	25,0
Single load of straw	pcs										
- bale 80x40x40 cm		2	3	4	6	8	12	approx. 20	approx. 20	approx. 20	approx. 40
- round bale Ø 125x120 cm						1	1	1	1	1	2
- round bale Ø 140x150 cm							1	1	1	1	
- round bale Ø 180x150 cm								1	1	1	
- bale 180x80x120 cm										2	2
- bale 250x80x120 cm											2
Boiler dimensions	mm										
- height		1570	1930	1725	2110	2105	2450	2875	2875	3045	3045
- width		1025	1020	1275	1310	1655	1860	2200	2200	2415	3300
- depth		2065	1975	2280	2280	2605	3125	3270	3270	3190	3500
Combustion chamber dimensions	mm										
- height		850	1200	900	1350	Ø 1300	1550	Ø 1900	Ø 1900	1950	1900
- width		620	620	900	900	Ø 1300	1500	Ø 1900	Ø 1900	2000	2900
- depth		950	950	1140	1150	1295	1500	1690	1690	1540	1580
Boiler weight w/o water	kg	1100	1500	1800	2200	3200	4000	5200	5600	8000	10000

EKOPAL RM

CONTAINER MOUNTED BOILERS FIRED WITH STRAW AND OTHER BIOMASS



There is also the possibility to execute the EKOPAL RM boilers as container-mounted. No need to build additional boiler room is an undoubted advantage of this solution (construction permit is not required). The appliance is free-standing and does not require permanent bonding with the base.

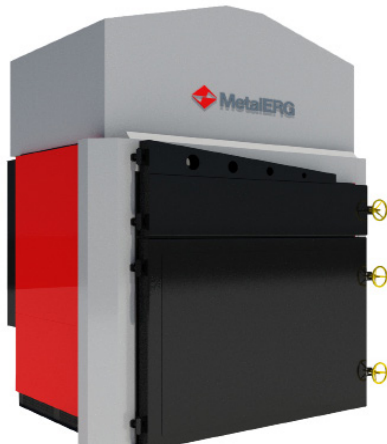
The kit includes:

- boiler,
- storage tank,
- expansion vessel,
- mini control station (controllers, fans, boiler connection with a storage tank)

EKOPAL RM CATALOGUE

Container-mounted

Specification	Unit	RM 5	RM 20	RM 30	RM 38	RM 40	RM 01	RM 02	RM 03-2	RM 03-3
Max. heat output*:	kW	40	70	100	120	180	300	400	500	600
Max. space of heated rooms:	m ³	600	1200	1800	2500	3000	6000	8000	10000	12000
Thermal efficiency	%	82	82	82	82	82	82	82	82	82
Capacity of the storage tank	liter	approx. 3500	approx. 5.000	approx. 8.000	approx. 10.000	approx. 12.000	approx. 15.000	approx. 20.000	approx. 22.000	approx. 25.000
Capacity of the expansion vessel	liter	approx. 120	approx. 170	approx. 260	approx. 330	approx. 400	approx. 500	approx. 650	approx. 750	approx. 850
Weight of the unit w/o water	kg	~2800	~3600	~5000	~8000	~10000	~11000	~12000	~15000	~17000
Unit dimensions (can be customized)	mm									
- height		2200	2500	3100	3400	3500	4100	4200	4770	4650
- width		5500	4800	6500	7200	9100	12300	13400	13550	14300
- depth		1875	2500	2320	2650	3100	3350	3350	3500	3500



ECOPAL S

AIR HEATERS FIRED WITH STRAW AND OTHER BIOMASS

Based on the straw-fired boilers type EKOPAL RM the company METALERG has developed the design of the range of air heaters, in which you can heat air to 120 °C. The straw burning system in these heaters is the same as in EKOPAL RM boilers, i.e. the countercurrent system. The range of air heaters includes 6 sizes of heaters with power from 100 kW to 1000 kW, adapted to all kinds of bales of straw, starting from the smallest cubes with dimensions of 80x40x40 cm through the round bales with a diameter of 120-180 cm, up to high density cuboids with dimensions of 250x120x80 cm. The air heater type EKOPAL S can be characterized as „2 in 1“ system, since it contains a boiler and tube type heat exchanger. The water was replaced in the heater

with high-temperature fluid. Heat is transferred to the liquid, and then using the tube type exchanger, built-in the heater, it is transferred to the air.

Advantages :

- 100% replacement of the previous expensive fuel (oil, gas, coal or coal dust)
- easy adjustment of air temperature and its small drop between charging operations
- easy and comfortable operation
- permanent maintenance through the heat carrier
- No need to drain the fluid after the heating season
- possibility to adapt the heater to water heating after drying season

THE INVESTMENT RETURNS USUALLY AFTER 1-2 SEASONS OF CORN DRYING

ECOPAL S CATALOGUE

Parameter	Unit	EKOPAL S-100	EKOPAL S-300	EKOPAL S-400	EKOPAL S-700	EKOPAL S-1000
Output:	kW	100	300	400	700	1000
Max. air temperature	°C	120*				
Boiler dimensions	mm					
- height		2600	3500	3800	4210	4510
- width		1480	2200	2360	2800	3430
- depth		2370	3000	3360	3400	3550
Combustion chamber dimensions						
- height		1000	1350	1550	1885	1990
- width	kg	900	1300	1500	1900	2800
- depth		1145	1300	1550	1560	1560
Own weight	kg	2800	9000	9500	11000	16000
Fluid quantity		~1000	~2200	~2600	~4000	~5200
Heater efficiency	%	to 85				
Single straw charge	pcs	4 cubes 40x45x80cm	1 round bale Ø125x120cm	1 round bale Ø125- 150x150 cm	1 round bale Ø125- 180x150 cm or 2 bales 180x80x120 cm	2 round bales Ø125- 130x150 cm or 2 bales 250x120x80 cm
Straw consumption @ max. output	kg/j	32	96	128	224	320

*optional increase in temperature to 140° C

BIO-ECO-MATIC

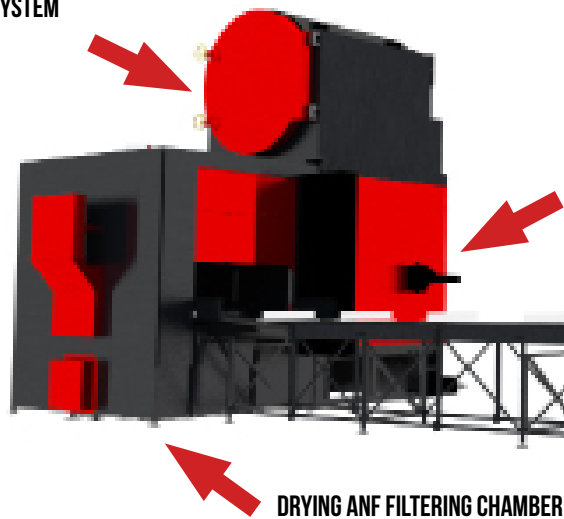
AUTOMATIC STRAW-FIRED BOILERS

Bio-Eco-Matic is the first fully automatic straw-fired batch boiler. The use of the system for automatic loading of the whole bales of straw along with a feeding chamber which is also a filter and dryer allowed for significant improvement of straw combustion process, which results in time and financial savings for the final customers.

It can be additionally fitted with an automatic ash removal system and heat exchanger cleaning system to maximize the easiness of service. Bio-Eco-Matic was optimized in terms of both efficiency and low emissions. With the outputs from 500 KW to 2 MW it is an excellent solution for large agricultural farms, rural communities, as well as companies located in rural areas.



HEAT EXCHANGER WITH AUTOMATIC
CLEANING SYSTEM



 **MetalERG**



COMBUSTION CHAMBER WITH AUTOMATIC
ASH-REMOVAL SYSTEM

FEEDING TABLE

DRYING AND FILTERING CHAMBER

EXHAUST AFTERTREATMENT SYSTEM



MINI-CYKLON

The basic and easiest dust removal system used by MetalERG. This is the so-called "collecting chamber", aimed at removing the largest fraction of particulate matter in the exhaust gas. It operates on a principle of a cyclone (centrifugal force), which causes that greater solids in the exhaust gas are separated and fall to the ash reservoir and dedusted exhaust gas is directed to the stack. The applied guide vanes force proper flow with the greatest possible speed in order to achieve maximum centrifugal force. The efficiency of such a device is about 40% in the range of the largest fraction of particulate matter.

MULTICYCLONE

Extended - much more advanced version of the collecting chamber. The system operates similarly to the collecting chamber using a centrifugal force.

The device consists of a set (battery) of small collecting chambers, where the flowing exhaust gas reaches high peripheral speeds. Because the dimensions of individual „cyclones“ are small, the system creates several or more small „cyclones“. This design allows the achievement of much higher efficiency (up to 70%) and a much wider range of dust PM10 and PM2.5. This design causes that only clean (free of dust) exhaust gases are sucked in through the stack and the dust falls into the dust chamber. The carried out studies show a reduction of the dust content from about 450mg /m³ to about 150 mg /m³.



ELECTROSTATIC PRECIPITATOR

Electric precipitator is a kind of dust collector where dust removal from the flue gas occurs with a help of electrostatic forces acting on the particles of dust.

Voltage usually used is at 30-80kV, which is very effective (a level of 99%) for aerosol type dust. In our system we use a dual exhaust gas cleaning system, thereby obtaining an overall efficiency of over 90% (from the average emission of 370mg / nm³ the emission is obtained below 40 mg / mm³ and with the correct use and care of the fuel quality the results were obtained at 10-12mg / nm³

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