



Heating with Biomass



8 000 kW Mt Lehman Greenhouse Ltd.

**Automated Boiler Systems
for Commercial, Industrial,
Communal, and Residential
Applications**







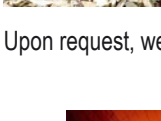
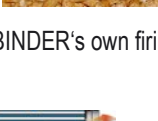




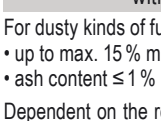
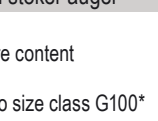


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Energy from biomass

BINDER – Sophisticated Boiler Systems



B i o m a s s F u e l s

Combustion Systems →		EBF	RRF	SRF-S	SRF-H	TSRF	Combustion Systems →									
							SRF-S	SRF-H	PRF	TSRF						
	Sander dust	●										Bark		●		
	Sawmill shavings		●	●								Shreds from packing, building or demolition wood		●		
	Shavings from planing and milling, briquets		●	●		●						Energy crops, chaffed		●		●
	Wood wastes from furniture making etc.		●	●		●						Pomace and other residues from food processing, etc.		●		●
	Woodchips, forestal		●	●								Wood pellets			●	●
	Arboricultural wood residues			●	●							Industrial wood pellets				●
	Woodchips, cut-offs, industrial			●	●							Peat pellets, agro-pellets				●

Upon request, we would be pleased to individually test your fuel at BINDER's own firing laboratory.

S y s t e m s
E r
S t o k e r
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a n d
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C o m
b u s i o n



EBF – Injection burner with stoker auger

For dusty kinds of fuel:

- up to max. 15 % moisture content
- ash content ≤ 1 %

Dependent on the required heat capacity, the correct amount of fuel is fed from the dosing silo, swirled into the combustion chamber by means of a high-pressure fan and then lit by the burner nozzle.

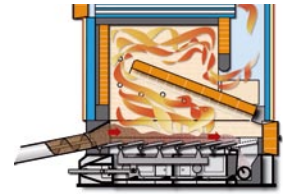


RRF – Solid retort burner with underfeed stoker auger

For low-ash fuels:

- up to max. 30 % moisture content
- ash content ≤ 1 %
- for granulated fuels up to size class G100*

Fuel is metered from beneath into the solid boiler retort by means of an underfeed stoker auger. Supply may be either from front or from the sides.

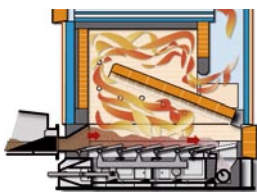


SRF-S – Moving grate burner with horizontal stoker auger

For wet, high-ash fuels:

- up to max. 55 % moisture content
- ash content > 1 %
- for granulated fuels up to size class G100*

Fuel is metered into the combustion chamber from the front by means of a large stoker auger and then distributed along the chamber by the reciprocating grates.



SRF-H – Moving grate burner with hydraulic stoker ram

For wet, high-ash fuels:

- up to max. 55 % moisture content
- ash content > 1 %
- for coarse and shredded fuels up to size class G150* (with slivers up to 35 cm long)

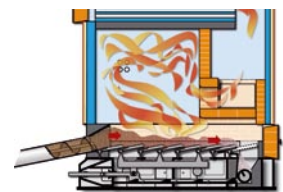
Fuel is metered into the combustion chamber from the front by means of a horizontal hydraulic ram and then distributed along the chamber by the reciprocating grates.



PRF – Solid retort burner for pellets with underfeed stoker auger

• for wood pellets

Pellets are metered from beneath into the solid boiler retort by means of an underfeed stoker auger. Supply may be either from front or from the sides.



TSRF – Moving grate burner for dry fuels

- for pellets made of wood or peat, agro-pellets
- for dry fuels up to max. 25 % moisture content
- ash content > 1 %

Fuel is metered into the combustion chamber from the front by means of a stoker auger and then distributed along the chamber by the reciprocating grates.

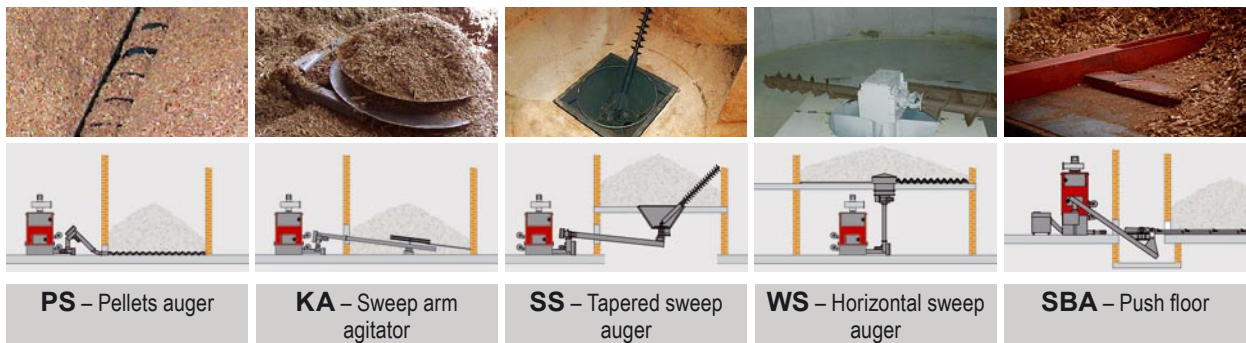
*)...Size class specifications depend on the kind of fuel used and are for guidance only.

Optimised for **Your** Needs

Type	Nominal Capacity in kW				Combustion Systems →	Heat exchanger	EBF	RRF	SRF-S	SRF-H	PRF	TSRF
RRK 15-20M				20 000		III	●			●		
RRK 12-15M				15 000		III	●			●		
RRK 8-10M				10 000 8 000		III	●			●		
RRK 6-7M				7 000 6 000		III	●			●		
RRK 4-5M				5 000 4 000		III	●			●		
RRK 2500-3000				3 000		III	●	●	●	●	○	○
RRK 1800-2300				2 100		III	●	●	●	●	○	○
RRK 1200-1650				1 650		III	●	●	●	●	○	○
RRK 1000				1 200		C	●	●	●	●	○	○
RRK 640-850				840 650		C	●	●	●	●	○	○
RRK 400-600				500 400 350		C*	●	●	●	●	○	○
RRK 200-350				300 250		C*	●	●	●	●	○	○
RRK 130-250				200 185		C*	●	●	●	●	○	○
RRK 80-175				149 117 93 75		C*	●	●	●	●	○	○
RRK 22-49				22 49		C*	●	●	●	●	○	○
RRK 15-35				15 35		C*	●	●	●	●	○	○

10 kW 100 kW 1 000 kW 10 000 kW

C...also available as containerised system, (*) with standard container



- | | | | | |
|--|--|--|--|---|
| <p>PS – Pellets auger</p> <ul style="list-style-type: none"> • with adjustable pressure relief device for rectangular bunkers • suitable for the transport and bunker discharge of wood pellets | <p>KA – Sweep arm agitator</p> <ul style="list-style-type: none"> • for granulated fuels up to size class G100* • for storage heights* up to 20 m using pressure relief cover • also available in FK design for smaller bunkers with lower storage heights | <p>SS – Tapered sweep auger</p> <ul style="list-style-type: none"> • for silos accessible from the bottom with a diameter of up to 7 m • for granulated fuels up to size class G100* • for storage heights* up to 20 m | <p>WS – Horizontal sweep auger</p> <ul style="list-style-type: none"> • for silos accessible from the bottom with a diameter of up to 10 m • for granulated fuels up to size class G100* • for storage heights* up to 30 m | <p>SBA – Push floor</p> <ul style="list-style-type: none"> • for coarse and shredded fuels up to size class G150* (with slivers up to 35 cm long) upon hydraulic supply • upon auger supply up to size class G100* |
|--|--|--|--|---|

*)...Size class specifications and storage heights are for guidance only, as they depend on the actual kind of fuel and design variant. Beware of bridging which might occur on a storage height that exceeds twice the silo width.

BINDER – A One-Stop Shop

As a systems supplier, BINDER provides and installs complete boiler systems – from the fuel container to the stainless-steel chimney, from the accumulator tank to the fully-fledged, mobile and containerised heating centre – with all the components produced and tested in-house.

- fully-fledged containerised boiler systems
- control systems, from the boiler control downstream to network control
- transport systems for fuels and ash
- fuel storage containers, accumulator tanks, stainless steel chimneys, shredders, etc.



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Energy from biomass

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Start – and Have Heat Generated Around the Clock



The BINDER range of biomass boilers sets a benchmark for convenience and comfort in handling:

- automated de-ashing*
- automatic cleaning of the heat exchanger*
- computer based capacity/combustion control* and accumulator tank management*

Start the boiler and have heat generated around the clock – with only bi-annual servicing for routine inspection and cleaning.



"Ease-of-use and the level of maintenance are comparable to conventional oil fired boiler systems. The only difference is an extra two or three fuel deliveries per heating period, and even those could be triggered automatically."

Mayor Franz König,
municipal 500 kW pellet boiler

High Overall Efficiency Across the Output Range

BINDER boilers achieve efficiency ratings of over 92 percent¹ with woodchips.

- The CVP control package* gives fully modulating capacity control from 25 % to 100 %.
- Speed-control* on all fans minimises the electric power consumption.
- The Lambda O₂ regulation improves efficiency and brings out the most of your fuel.
- High quality engineering with a minimum on maintenance required provides for high availability.

1)...Test report A-1211-1/18d-06, NUA-Umweltanalytik GmbH

Lambda O₂ Regulation

This sensor system uses the exhaust O₂ level as an efficient indicator for complete combustion and ensures optimum combustion at all times.

- It reacts to deviations from the average by automatically adjusting the air intake and/or fuel supply.
- It provides for stable combustion without emission peaks even where fuel quality varies.

Secure and Safe Systems

- The modem interface* with the boiler permits immediate remote support through the internet and will ensure that future software extensions are available promptly.
- Using the BINDER Tele-package* you'll be notified automatically about any upcoming message – such as from the silo's fuel level control – even during a local power failure.
- Quadruple safety devices, approved and certified, prevent any fire reaching the fuel silo.



BINDER systems are built to last. Robust materials and good design ensures increased reliability, low maintenance costs, and a long lifespan.

Clean Emissions

BINDER boilers are 'carbon-neutral' systems with low pollution levels for NO_x, CO and particulates well within the limits. As a result, BINDER boilers are approved for smoke control areas under the Clean Air Act, due to:

- low-NO_x design*,
- a superb combustion zone design, allowing sufficient residence time to minimise unburnt gases,
- Lambda O₂ regulation to optimise the combustion on varying fuel quality,
- excellent exhaust gas cleaning, using mono/multi cyclones, electrostatic or baghouse filters*.

Low-NO_x Design*

For fuels with a high nitrogen content, such as bark or particle boards:

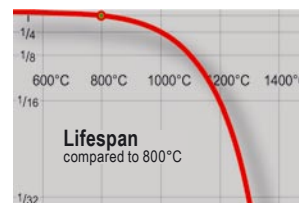
- Controlled flue gas recirculation* regulates combustion temperature and fuel-to-air ratio.
 - Regulated air supply allows air staging in the pyrolysis, the gasification, and the oxidation stage.
 - The optimum design of the combustion chamber permits a long residence time for the fuel and good mixing of the flue gases.
- The net effect is a highly efficient, low-NO_x boiler system.

Flue Gas Recirculation*

Depending on the temperature in the combustion chamber, this feature adds a regulated amount of flue gas to the combustion air, thus:

- preventing over-high temperatures in the combustion chamber,
- reducing the risk of clinkering and deposit formation,
- enabling a reduction in the exhaust O₂ level which improves the boiler efficiency.

This feature is particularly recommended for fuels with either a high calorific value, low ash fusion point, or a high nitrogen content.



Because of the greater volume of flue gas in the combustion chamber, more heat is dissipated from here towards the heat exchanger. Lower overall temperatures also increase the lifespan of firebricks and the grate.

*...dependent on unit size and system configuration

Tried and Tested Technology



Boilertubes, best-practise chamfered and root welded, individually exchangeable if needed

Water-bearing boiler jacket

- absorbs the heat from the firebox (heat exchanger's first pass)
- preheats the return flow via a duct along the boiler jacket

Secondary air supply, λ -controlled, with optimally arranged nozzles for excellent mingling

- controlled negative pressure inside the firebox
- thermostatic sensor affecting PLC routine
- direct acting thermostatic water dousing system
- approved spring-loaded hopper damper or rotary air valve
- monitored fuel barrier or 2-fold mechanical separation

Anti-burnback provisions

- controlled negative pressure inside the firebox
- thermostatic sensor affecting PLC routine
- direct acting thermostatic water dousing system
- approved spring-loaded hopper damper or rotary air valve
- monitored fuel barrier or 2-fold mechanical separation

Moving grate boiler from > 150 kW

- large-scale technique now available for commercial applications
- fuel is evenly distributed and pre-dried
- comfortable and automatic de-ashing into a single ash container
- powered by means of a heavy-duty hydraulic unit

Grate element, made of special alloy, individually replaceable

Primary air supply, λ -controlled, with load-dependent distribution to combustion and burn-out zone

Ash scraper, for de-ashing of the whole boiler base

Ash auger, for removing of the ash into the detached container

Lining with customary, handy fire-bricks instead of manufacturer-specific moulded bricks: simple and cheap to repair

Boiler tube cleaning

- unique high-speed fluegas circulation system
- avoids emission peaks generated by air blasts
- automatic de-ashing in preset intervals, with cleaning effect over the entire tube length
- no interference with the combustion process

Combustion chamber

- stoichiometrically designed 3-zone system
- "hot" firebox, completely lined with brickwork

Radiation arch, with optimised air flow, made of customary arch firebricks

Grate screen, prevents damage from debris to the ash auger

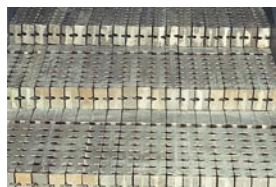
Industrial quality

- Wall thickness (standard):
Boiler vessel: 6 mm
Boiler base: 10 resp. 5 mm
- sturdy cleaning doors and inspection apertures, functionally arranged

Ideal Combustion Zoning

The flue gas flow complies with the TTT-principle – time, temperature, turbulence. It generates stable combustion resulting in low pollution and maximum efficiency under all load conditions.

- Rotation zone ① – permits the optimal mingling of the unburnt flue gases
- Turbulation zone ② – the hottest section of the combustion chamber provides for the complete oxidation of CO into CO₂
- Expansion zone ③ – the turbulent flue gases calm down, and most of the fly ash descends and settles.



Years of experience in material selection and in designing the combustion chamber safeguard the boiler's longevity, even if operated with troublesome fuels.

Combustion Chamber

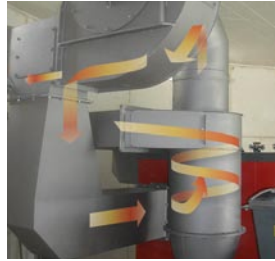
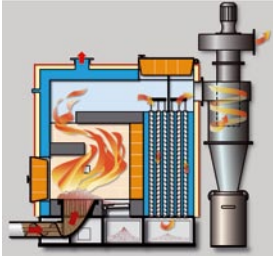
At temperatures up to and exceeding 1000°C, materials are exposed to hostile conditions that have to be compensated for:

- "hot firebox" for wet fuels: the combustion chamber is completely lined with superior refractory brickwork and cooled by the boiler's water jacket.
- "cool firebox", semi-lined with brickwork, avoids clinkering on dry fuels with low ash melting point
- High-grade anti-scale/heat-resistant chromium cast steel alloy is used for grates and the boiler retort, which are aired from below with primary combustion air.

Know-how and Reliability

Well Designed Heat Exchangers

- BINDER fire tube heat exchangers are highly efficient and are made to match your heating needs.
- Manual maintenance is minimised through a fully automatic high-speed cleaning system*.
- Sturdy tubing with 4.5 mm walls and optimum welding guarantees a long lifespan.



Tube cleaning: part of the exhaust gas is returned to the heat exchanger and blown through the fire tubes at such a velocity that particles already deposited are removed and then collected in the cyclone.

Boilers up to 150 kW are equipped with vertical fire tubes. Spring turbulators provide for optimum heat transfer as well as automatic tube cleaning.

Biomass-fuelled fluegas-to-air heat exchangers are available from 200 to 1200 kW for drying plants or for the production of thermowood. Typically such warm-air systems are also applied for factory or warehouse heating



Warm water boilers are designed for operation at 3 bar with 95°C flow temperature. Boilers up to 10 bar are available for the generation of hot water or steam.



Automatic De-Ashing

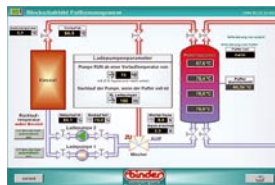
- Fly ash and bottom ash are automatically conveyed into a detached ash container, using screw augers* or drag conveyors*, or
- Ash is collected in integrated containers. Depending on the fuel ash content, these containers can be kept for weeks or months before further disposal.



Detachable ash-container* with a capacity of 0.15-1.5 m³ depending on the boiler size, on request even up to 3 m³



With the BINDER graphics package*, a computer terminal serves for the data input and display. The plant's parameters are monitored, displayed, and trend data may be sampled and evaluated for longer periods of time. The system can be linked via a modem to allow remote monitoring of the unit.



The integration of an accumulator tank – which may also be combined with solar heating – is perhaps the utmost efficient heating concept, ideal for district heating systems. It also allows a smaller capacity boiler unit to be used for the same peak load.

Fully Automatic Tube Cleaning System*

This feature provides high-speed de-ashing of the heat exchanger's fire tubes in frequent and preset intervals without interfering with normal operation:

- prevents the formation of deposits, thus maintaining a constant and efficient heat transfer,
- reduces the de-ashing maintenance to 1-2 basic procedures per year,
- protects against boiler corrosion.

Capacity Control (Standard)

- Air supply and fuel inputs are coordinated to attain the actual heat demand using PLC control and Lambda O₂ regulation.
- When heat demand drops, the unit is operated in part-load mode or is shut down.

Capacity and Combustion Control (CVP Control Package*)

Features a fully modulating computer control with 3 interlinking loops that permanently assess the actual requirement of heat, adjust the fuel feed accordingly, and match it with the continuously variable air supply.

- Reacts dynamically to changes in the combustion process through the Lambda O₂ control which immediately adjusts the secondary air supply.
- Variable air volumes are automatically compensated by the integrated negative pressure control.
- Speed-controlled fans minimise electric power consumption.
- Renders an optimal efficiency over the entire output range of 25 % to 100 %.

Accumulator Tank Management*

The use of hot-water accumulator tank systems works well with BINDER biomass boilers:

- Daily peak demands during full load periods are met through the accumulator tank.
- Heat demands during part-load periods are met through the boiler using modulating capacity control.
- Should the heat demand decrease further, the accumulator tank – now serving as the sole heat source – is loaded and then the boiler will be shut down.

Repeated starts and shut-downs are substantially reduced, which increases the boiler's lifetime and minimises air pollution as well.

4 Good Reasons to Choose Biomass Heating

Industrial Large-Scale Systems

BINDER systems are available for the generation of process heat or for co-generation in CHP plants.

- Among other options, push floors ①, drag conveyors ② and/or hydraulic ram feeders ③ with integrated cutting edges are on-hand, which can accept even the coarsest of fuels.
- Even high-moisture fuels can be sufficiently pre-dried in a moving grate system.

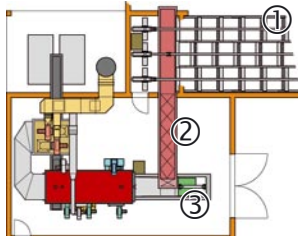
BINDER systems are therefore suitable for a wide range of low-cost fuels.



Installation of an 8,000 kW boiler



Steam dome of an 840 kW boiler



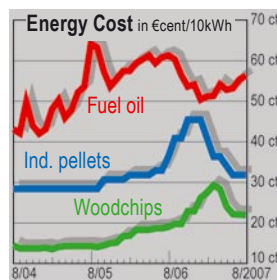
What You Should Consider When Selecting a Biomass Heating System

- Make sure you size the boiler system to your needs. Oversized or undersized boilers are less efficient and have a shorter lifespan.
- To which extent can you be guaranteed a constant fuel quality? Make sure that the boiler is capable of consuming a wide range of fuels and that it comes with a compensating control such as Lambda regulation.
- Check that the boiler system complies with local and national pollution limits. Eventually check your own fuel through laboratory sample firing.
- The materials in the hot sections of the boiler are exposed to severe stress. Therefore, scrutinise the quality and temperature limits of the refractory lining, the wall thicknesses, as well as the serviceability of parts. Complex solutions aren't necessarily the most durable ones.
- Insist on visiting some reference units and talk to their owners. Check your supplier's experience in the field of biomass combustion.

1 Cost-effective Heating for the 21st Century

State-of-the-art biomass systems are more capital intensive than conventional oil or gas fired equipment, though many countries now offer capital grants and other incentives.

However, because of lower fuel costs, this investment is usually recovered in a short period of time – the higher your heating requirements, the quicker the payback period.



Whether your project is a district heating network, a hotel, or a residential care home: you are going to profit from low and predictable heating bills, that are 30 to 50% lower than those for oil heating. Independent from price increases and crises in other regions of the world.

Indicative for Central Europe, excl. VAT

2 Widespread Availability of Fuels

Sander dust, forest wood waste, bark or other biomass fuels – the by-products of your enterprise will contribute in reducing your heating bills as well as your disposal costs.

Even wet materials, stored in the open, can be used by BINDER boilers.

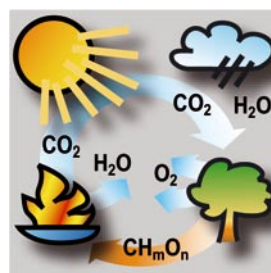
3 Climate Protection Campaigns

As a local authority you may have committed yourself to implement the ideas and goals of Sustainable Development, deriving from 'Local Agenda 21' or 'Climate Targets'.

Biomass boilers are 'carbon-neutral' systems, which reduce global warming and replace fossil fuels with a truly renewable source. Plus, they could make use of your waste from landscape management too.

4 Biomass = the energy source of the future

- In the near future, carbon will have a value and will be traded on commodity markets.
- Biomass is a renewable source of energy that virtually grows just around the corner. It is energy crisis-proof, is locally available, and doesn't cause ecological disasters.
- Biomass supports and creates domestic job opportunities, increases buying power in your region and lessens our dependency on fuel imports.



Biomass is "carbon-neutral", i.e. its combustion emits just that amount of CO₂ which has been previously absorbed from the atmosphere by photosynthesis under the influence of light – in exchange for mankind's indispensable oxygen.

Biomass therefore is pure, stored solar energy.



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Energy from biomass

25 Years of Experience



Josef jun., Stefanie, Josef sen. and Johannes Binder

The products we develop make sense from both an economic as well as ecological point of view. They are truly a technology that meets all the criteria for successful Sustainable Development. This is a principle we also follow in all our business activities:

- through honest, fair, and long-term partnerships with our customers and suppliers
- through constant improvements in the systems we offer
- through the appreciation of staff initiative, teamwork, and self-motivated employees
- through the resource-efficient manufacturing of products that have been designed for durability
- in the long tradition of a family firm with solid growth and sound foundation. We don't aim at short-term profit, but long-term growth and sustained development. We look forward to working with you and your organisation.

Josef Binder sen., Managing Director

Our sales partner nearest to you:



Made in Austria

On its two premises spread over 11 hectares and with 6.200 m² of shop-floor area, BINDER manufactures more than 200 boiler systems per year.

The cooperation with nearby university research facilities and related organizations – with Austria being recognised for her expertise in wood heating with stringent pollution limits – as well as the know-how of its high-skilled 100-plus employees secure the high technological standard of BINDER boilers.



Worldwide Service

With more than 3.000 boilers installed all over the world – from Canada to Japan – BINDER has become a major player in this field. Reliable service and maintenance is provided through our own service team headquartered in Bärnbach, Austria, and supported by 13 sales and service organizations in 11 countries.

