

L-ENZ

The dryer for bulk solids

Utilisation of water heat

- Biogas plants
- Biomass CHP plants
- Cogeneration of heat and power



LAUBER
DRYING TECHNOLOGY

Lauber-EnergieNutzZentrale: LAUBER dryer L-ENZ for bulk solids

The LAUBER dryer L-ENZ in combination with hook lift containers or static drying bays forms a system for drying bulk solids such as wood chips and firewood.

The L-ENZ is supplied completely installed and ready for operation with high-quality components including fan, frequency inverters, heating engineering and control system.

Warm air produced by the L-ENZ is pressed through flexible air tubes or insulated airducts into special hook lift containers.

These containers are equipped with a ventilated floor which allows the warm air to pass equally through the bulk solids. Typical drying time for wood chips is approx. 2 days. The containers are used both for transport and drying purposes.

This allows the wood chips to be chipped directly into the container and removed from the container only after the wood chips have been dried and transported to the intended location (no reloading necessary!).

The L-ENZ is supplied completely installed and ready for operation. Accessories: acoustic and thermal insulation.





Using dry wood chips in burning processes means saving thermal energy!

The heating energy (calorific value) of wood chips rather depends on its water content than on the species of wood.

Fresh wood chips with a water content of 55% (W55) provide approx. 2000 kWh of energy per ton. By drying the wood chips to 20% water content (W20), the calorific value is increased enormously up to around 4000 kWh per ton. Or in other words: in a burning process of one ton of dried wood chips approx. 400 l of heating oil can be substituted.

For wood chip boilers dry wood chips equate to higher efficiency, clean and more even combustion ensuring trouble-free operation and a long-lasting lifetime of the heating system.

The L-ENZ can also be delivered without housing.



L-ENZ 370 without housing.



Thanks to the special ventilated drying floor, wood chips, logs, grain, maize, hay, pressed fermentation substrate and numerous other bulk solids permeable to air can be dried in the same containers.

For connecting the L-ENZ with the drying containers, flexible air tubes will be used.



Efficient drying by utilisation of waste heat

- Biogas plants
- Wood cogeneration plants
- Biomass combined heat and power stations
- Cogeneration units of heat and power (CHP)
- Wood chips heating systems
- Landfill gas plants

By using water heat for the drying of wood chips, an economic, storable and renewable energy yield is achieved.

Wood cogeneration plants require for operation safety a moisture content of the wood chips of approx. 12%.

The LAUBER dryer L-ENZ uses the waste heat of the wood cogeneration plants to dry the wood chips and achieves reliably the prescribed minimum heat use according to the **Renewable Energy Sources Act (EEG)**.

A L-ENZ which is working in combination with a wood cogeneration plant, uses the waste heat and can ventilate the room additionally according to requirements.



By using a LAUBER dryer L-ENZ, **biogas plants** achieve the minimum heat use according to Renewable Energy Sources Act (EEG). The control system of the L-ENZ ensures that in wintertime preferential heat consumers such as fermenter heating or residential houses are supplied reliably with heat.

Not only wood chips, firewood and square hay bales can be dried in special ventilated containers but also grain, maize and pressed fermentation substrate.

For drying round and square hay bales, company Lauber offers appropriate ventilation systems.

Biomass CHP plant in Oberstaufen, Germany.





Biomass combined heat and power stations and wood chip heating systems cannot work efficiently if the energy demand is too low.

The L-ENZ utilises additionally heat and dries e.g. wood chips.

By drying the chips to a water content of 20% (W20), the calorific value is increased up to around 4000 kWh per ton.

A storable energy yield is achieved.

Dry wood chips can be stored with no or less loss in thermal energy.

Wood chips with a water content under 30% are considered as "suitable for storage" and no (further) microbial decomposition should occur.

Additional advantages are lower weight for transport as well as

increased storage capacity without loss of energy and without unhealthy spores, fungi and mould.

Reduction of heat for energy networks at too high return temperature.

The L-ENZ allows an equalisation of the heat utilisation in situations of varying energy demands.

The energy utilisation can be regulated according to different criteria such as return temperature, pressure differential or air exit temperature. Depending on the desired heat utilisation, the drying process can take more or less time.



Woodchip boiler with storage bunker.

Biogas plant in England with a L-ENZ 370, air duct and four drying containers.



L-ENZ

The dryer

Besides using containers with special ventilation bottoms there are other possibilities. Ventilation systems for trailers provided the customer or drying floor supporting up to 7 tons of wheel load for building static drying bays can be ventilated by a LAUBER dryer L-ENZ as well.

Dryers with moving floor such as the Fliegl Ecodry will be ventilated by the LAUBER dryer L-ENZ.



A docking station with guide rails for the positioning of the containers helps connecting the containers to the air duct. The control system of the dryer L-ENZ recognises the drying container and automatically starts and stops the air supply to the container.



Mobile hay drying box for drying round bales. A modular design allows individual extension.





Whether large, small or automated, LAUBER offers all solutions! Available power range 50 kW - 2.5 MW thermal



Technical data of LAUBER dryer L-ENZ

The Lauber dryer L-ENZ is available in different sizes. The possible quantity of connected containers depends on the material which shall be dried. Hook lift containers have a net volume of 30 – 40 m³.

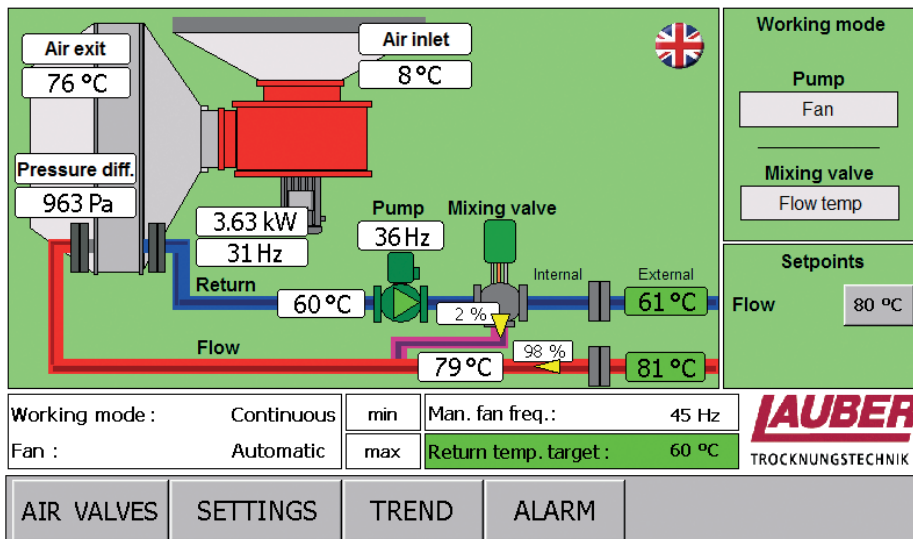
	Average power consumption	Nominal values	Nominal values	Container with wood chips	Container with wood logs
L-ENZ 80	1,0 kWh/h el.	3,0 kW el.	80 kW th.	1	1 – 2
L-ENZ 150	1,8 kWh/h el.	5,5 kW el.	150 kW th.	1 – 2	1 – 4
L-ENZ 280	2,5 kWh/h el.	7,5 kW el.	280 kW th.	1 – 3	1 – 6
L-ENZ 370	3,6 kWh/h el.	11,0 kW el.	370 kW th.	1 – 4	1 – 8
L-ENZ 650	6,1 kWh/h el.	18,5 kW el.	650 kW th.	1 – 6	1 – 12
L-ENZ 800	10,0 kWh/h el.	30,0 kW el.	800 kW th.	1 – 8	1 – 16
L-ENZ 1000	15,0 kWh/h el.	45,0 kW el.	1000 kW th.	1 – 10	1 – 20
L-ENZ 1250	18,0 kWh/h el.	55,0 kW el.	1250 kW th.	1 – 13	1 – 26

All types of L-ENZ generate the compression and quantity of air which is needed to dry bulk solids. Also dense bulk solids such as grain will reliably be dried. The quantity of air is adjusted automatically in dependence to the environmental conditions.

By working with installed frequency inverters, the power consumption is extremely low. By drying wood chips from W50 to W20, the power consumption is approx. 2 – 4 kWh / m³ wood chips. On average 1 – 3% electrical power is needed for utilising 100% of thermal energy.

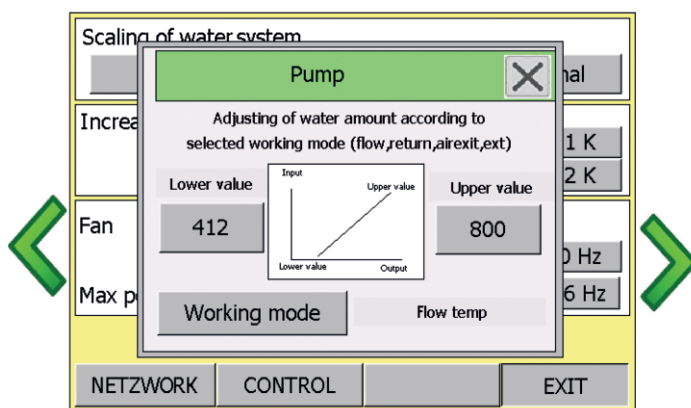
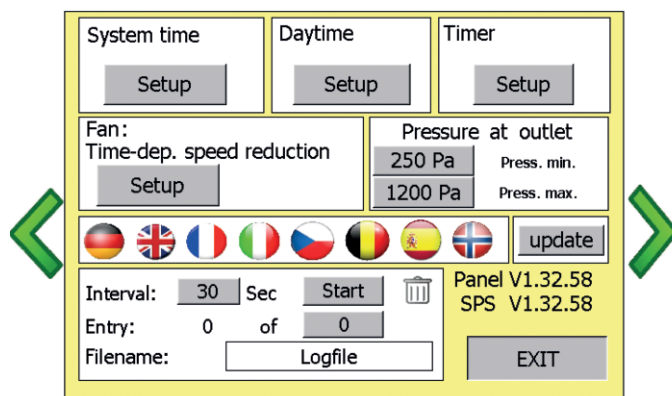
The control system

- ✓ For efficient drying of bulk solids including energy management of the heating network



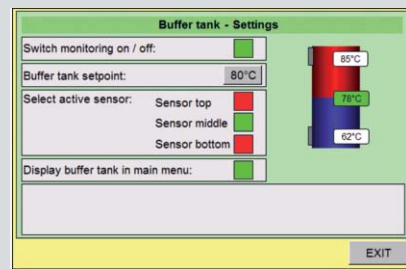
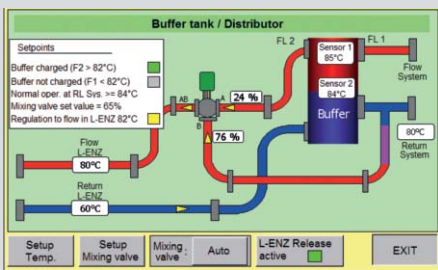
- ✓ Touch panel for a convenient handling and clear overview

- ✓ PC connection for remote-control possible



Integrated **energy management** for:

- ✓ Biogas units (AD plants)
- ✓ District heat grids
- ✓ Biomass boilers
- ✓ Landfill gas units
- ✓ Biomass heat and power station (CHP)
- ✓ Wood gasification units
- ✓ ORC systems

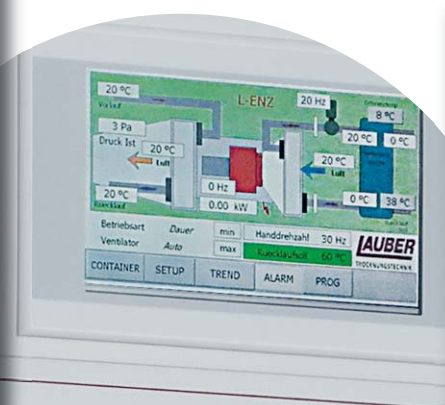


Ease of use

- ✓ Complete automatic control system
- ✓ With touch panel
- ✓ Clear visualisation and recording of all operating data
- ✓ Cooling process after drying (e.g. for grain)
- ✓ Remote control via PC possible
- ✓ Work according to external release possible
- ✓ Trend display and recording

Energy efficiency

- ✓ Frequency inverter for both fan and heating pump included
- ✓ Working mode according to return temperature
- ✓ Working mode according to pressure differential
- ✓ Measuring instruments
- ✓ Setting of priorities for containers/drying bays possible
- ✓ Almost maintenance-free



LAUBER EnergieNutzZentrale

Operational safety

- ✓ Important heat consumers will be supplied preferentially
- Operating principles of the frost protection:**
- ✓ Supervising of all relevant temperatures
 - ✓ Automatic increase of amount of heat
 - ✓ Stop of fan
 - ✓ Error message
 - ✓ Closing of frost protection valve at air inlet (optionally supplied)

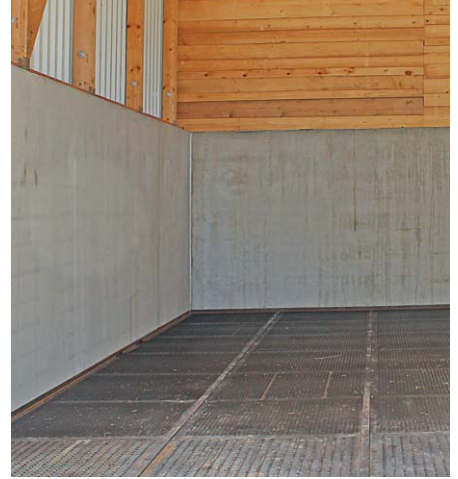
- ✓ If the L-ENZ is **working according to return temperature**, the available heat will automatically be utilised and the CHP kept at an optimal temperature level.
- ✓ If the L-ENZ is **working according to air exit temperature**, a desired low air temperature will be maintained to allow drying of temperature-sensitive materials.

- ✓ **Control system with touch panel** Visualisation of the drying data.
- ✓ Electrical air valve regulation for automatic drying in dependence to individual time programs or optionally in dependence to material temperature or final moisture.

- ✓ When falling below a **desired minimum flow temperature**, the heat utilisation of the L-ENZ will automatically be reduced to avoid influencing advanced heat consumers.
- ✓ **Monitoring and administration of on-site buffer tanks.**

L-ENZ

Bayes for vehicular access

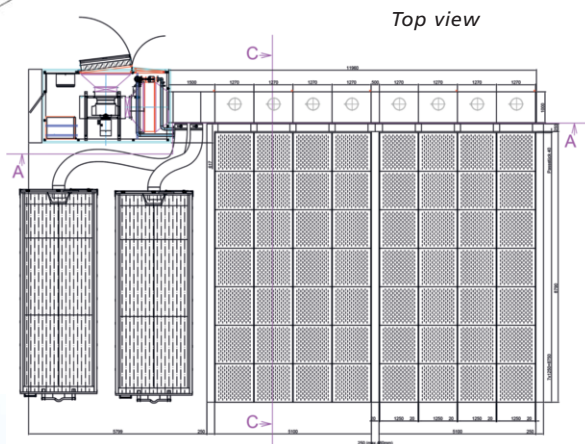
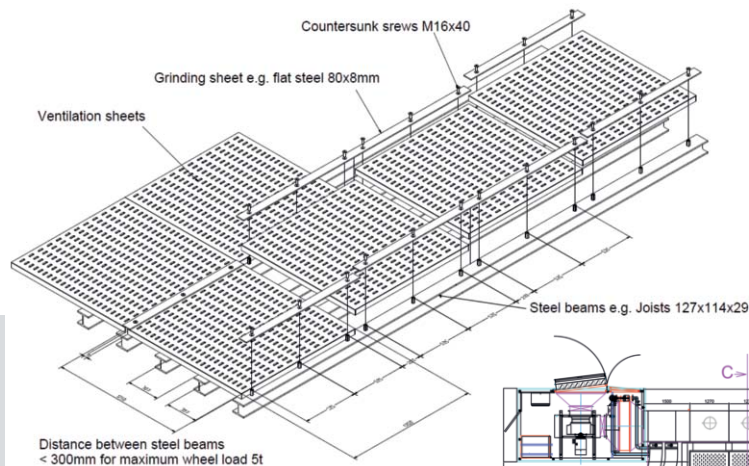


The L-ENZ can be used in many different ways.

Accessible with wheel loader.
Floor supports wheel load of 5 tons.

Modular design with steel panels.

Besides hook lift drying containers, static drying bays with ventilated drying floor can be used. The air duct with its funnels ensure an equal air distribution.



Lauber Drying Bays:

- ✓ Flexible use of existing areas
- ✓ Full-surface ventilation
- ✓ Removable for cleaning purposes
- ✓ Suitable for drying logs, chips, grain, maize, hay bales and others



grain

firewood logs

hay bales

squared hay bales



LAUBER components for drying bays allow a full-surface ventilation and accessibility



Construction of the substructure and walls of the drying bays possible with timber, concrete or steel.

Drying bays for implementation into hall buildings.

Incl. planning of technical setup.



Level entry thanks to integrated ventilation floor.

Drying containers – universally applicable



- ✓ High effective loading volume of containers because ventilation floor requires only 10cm in height
- ✓ Different covers and lids available
- ✓ Ventilation equipment for trailers and containers provided by customer

- ✓ Equal ventilation through air baffles
- ✓ Uniform ventilation ensures drying without leaving moist spots

The ventilation floor with its even and flat design and multiple air channels ensures a uniform drying.



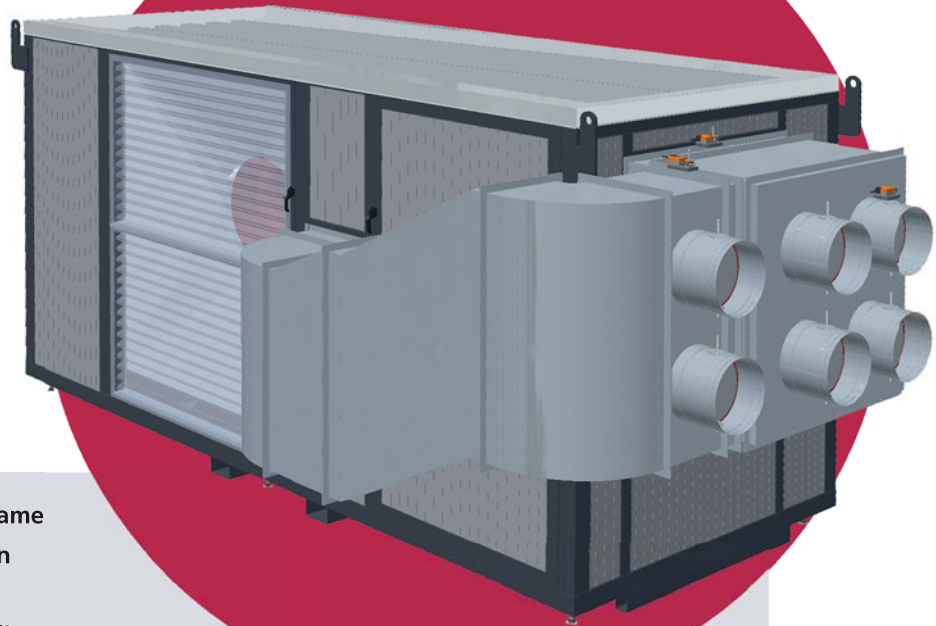
The connection for the air tube is positioned in the wider of the leaf doors of the container.



The lid with pinion jacks offers a convenient opening and closing of the container. An air-permeable felt is riveted on the frame construction of the lid. For weather-proofed covering the additional roll-up tarpaulin will be closed.

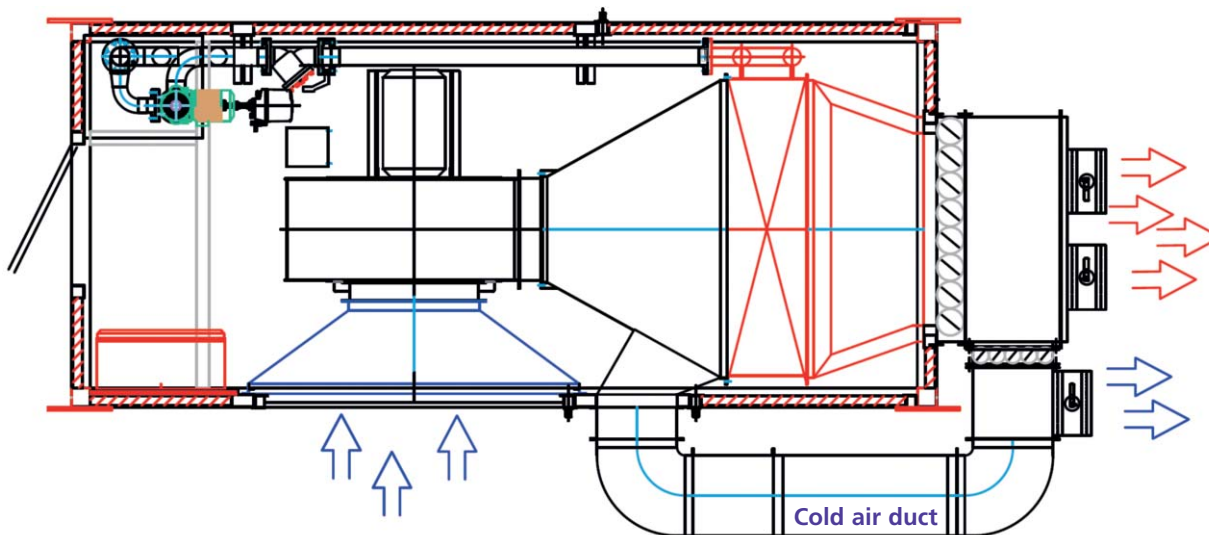


New option Heat exchanger bypass



- ✓ Drying and cooling at the same time without the need of an additional fan
- ✓ Advanced regulation according to return temperature: The fan speed will be adjusted to deliver a desired high air volume and pressure. The automatic regulation of the multi-leaf dampers ensures a defined heat utilisation which means only as much heat as actually available will be used.

- ✓ Simultaneous working according to return temperature and air exit temperature possible under certain circumstances.



1. Normal conditions: Hot air for the fastest possible drying
2. In case of lack of heat: Mixing of hot and fresh air for generation of high air volume and pressure
3. Fresh air for cooling grain after drying

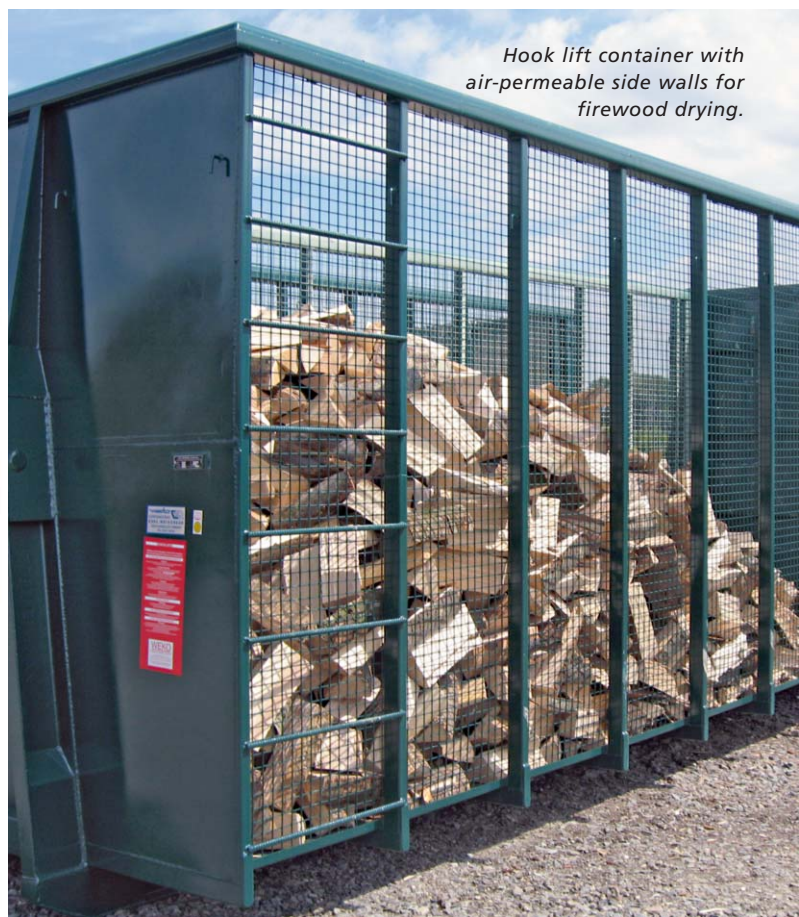
Drying of firewood in drying kilns



Drying firewood in drying kilns with the proven fresh air / exhaust air drying technology gives the possibility to control the drying process according to the moisture content of wood. Air in the drying kiln will be exchanged only at that time a programmed climate (equilibrium moisture content) is reached. Thus, thermal energy can be saved. By reaching more than 60 °C drying temperature, all present wood pests in the wood will be destroyed (heat treatment process).

Drying kilns are produced in all sizes. This fact allows the customer to choose the appropriate size of kiln for loading the firewood in standard or special-sized skeleton boxes, containers etc. Company LAUBER provides customized solutions which meet the individual demands, loading capacities and loading sizes of every single customer.

Charging of a modern drying kiln with integrated heat recovery system with special hook lift containers.



Hook lift container with air-permeable side walls for firewood drying.



Skeleton boxes with 1 m³ of firewood each in a small drying kiln (container solution).



Loading of a drying kiln with skeleton boxes filled with firewood.

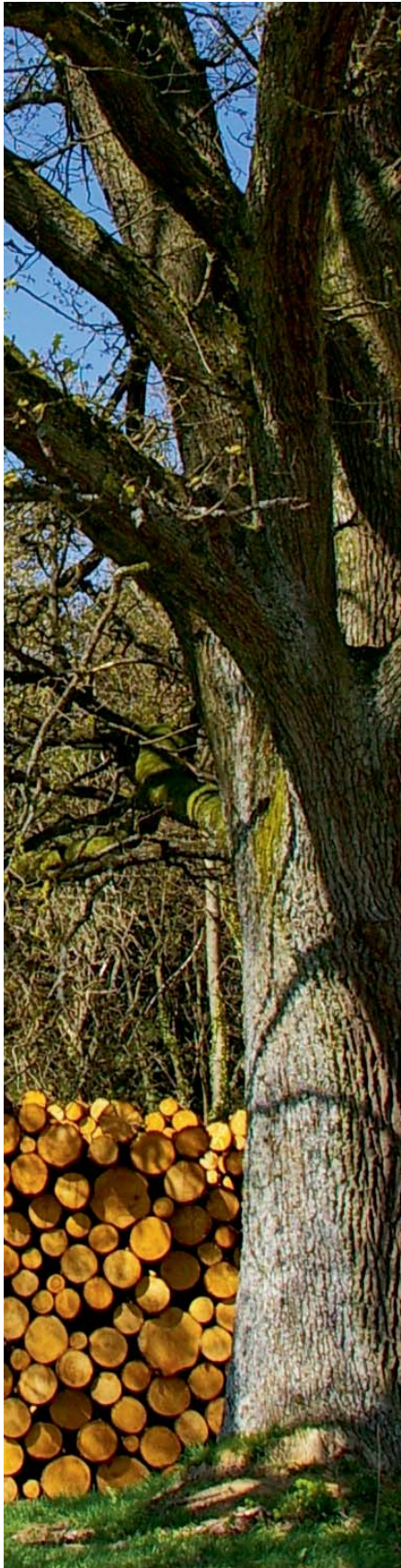
Special-sized skeleton boxes.





Your professional partners in all questions of drying and heat treating 50 years of experience in drying technology

- Small and medium sized drying kilns
- Special dryers for high temperature up to 250 °C
- LAUBER dryer L-ENZ for bulk solids



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