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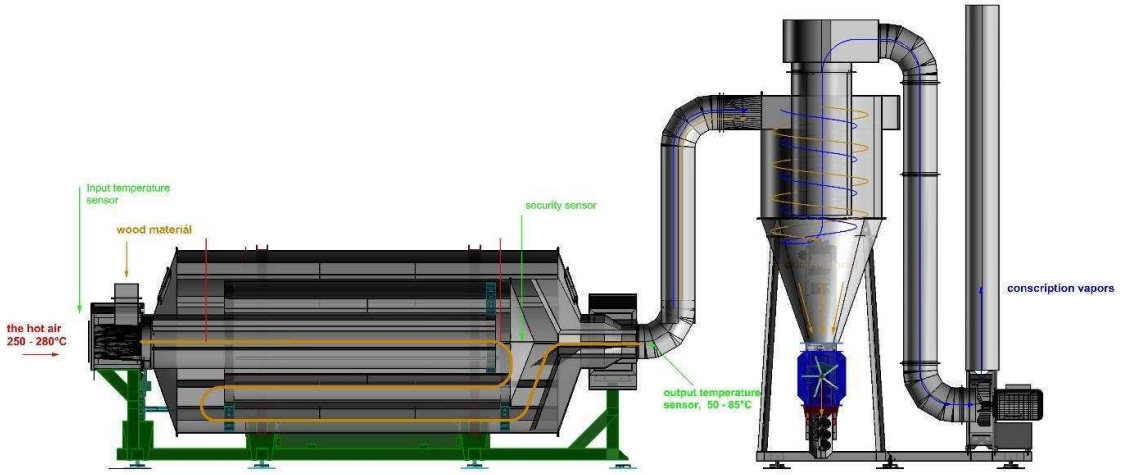
Biomass Drum Dryer LMK 2000 Model

The equipment is designed to dry material of vegetable and biological origin e.g. wood sawdust, wood shavings, woodchips, fermented biological waste from poultry production, biogas plants and suchlike sources of bio-waste. It can be used at lower input temperatures in order to dry agro material such are straw, hay, grain, stalks of cereals and suchlike material of vegetable origin. Performance, fuel consumption and installed input power are dependent on size and version of the dryer (see technical data of SPB). The set of technological devices – dryer of sawdust SPB consists of hot air boiler with fuel reservoir, rolling up auger, hopper with auger, drying steel three-chambered isolated cylinder, exhaust ventilator, solid particle separator – tourniquet and discharge conveyor.

Technology of drum dryer, hot air boiler and piping connection are designed as one functional unit in the term of process itself. Material in the drum is moved by rotation and pushed towards to a suction chamber by sliding vanes. Dry material is then sucked from the cylinder into the separator by exhaust ventilator and subsequently into the reservoir for dry material or presser reservoir by auger. The solid particle separator – cyclone with the exhaust ventilator ensures the exhaust of steam and dust from the drying drum and then the steam is led through air-technical pipeline from the separator out of the system. The dryer is equipped by electro motors with gearboxes in the way to minimalize the demand for input energy and thus the system works in a very energy saving mode. The dryer is heated by boiler of its own construction designed only for this purpose, the boiler is fully automated and woodchips, pellet or sawdust can be used as a fuel. The dryer can work in the manual mode with the assistance of operators or can be automatically regulated by a control system. The operation of the dryer is dependent on assembled version and consists in supervising the proper run of individual devices, setting required parameters for the dryer run, feeding material into the fuel reservoir, monitoring the material level in hoppers of the dryer and performing basic maintenance. The set of devices is equipped by safety components such are e.g. safety thermostat of output temperature, temperature sensor of fuel feeder and sensor of cover closure of fuel hopper. The drying drum is equipped by safety thermostat which switches of the boiler and ventilator in the case that the temperature is exceed and starts the weaning process of the set of devices. The whole system is controlled by a touch panel where the technology is displayed clearly.



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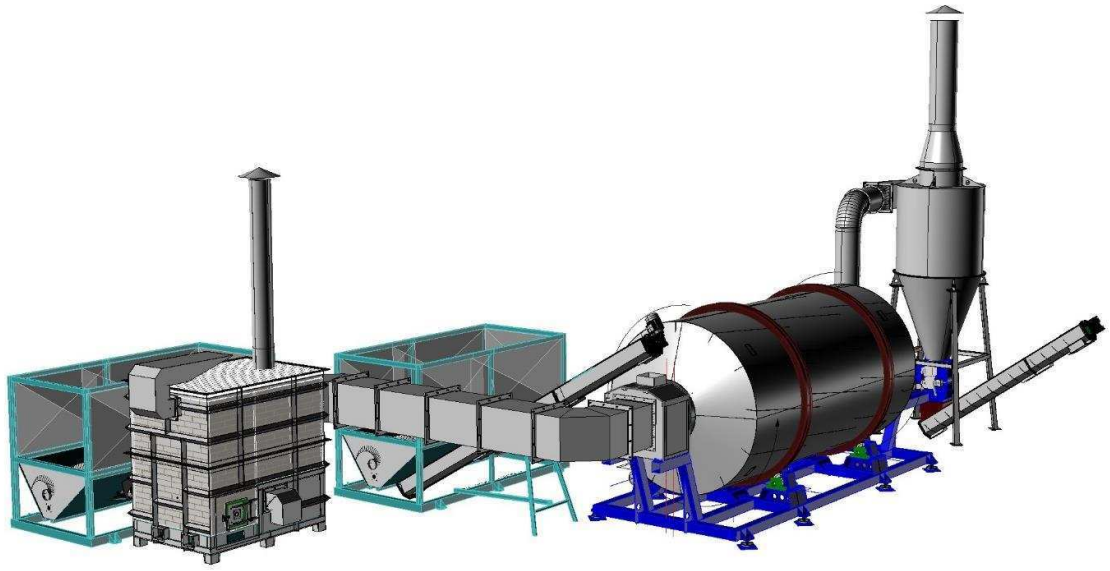

Basic data on drum dryer

Version of dryer		Drum dryer (
Possible material to be dried		Wood material – sawdust, woodchips, agro material, fermented manure, biological waste and other material of vegetable origin
Seze of drying material	mm	30x30x30
Moisture of input material	%	Min. 20% - Max. 85% moisture
Moisture of output material	%	Od 0% do 20% moisture
Input temperature of drying	°C	150 - 360
Output temperature	°C	40 - 85
Maximum quantity of processed input material at the average moisture (40%)	kg/hour	1.850
Maximum quantity of dried material to the average requiered moisture of 10%	kg/hour	1.280
Evaporative heat	MJ	1.470
Volume flow of air and flue gases through the set of devices	m3/hod	12.000
Diameter of drying cylinder	mm	2.150
Length of drying cylinder	mm	5.000
Maximum input power	kW	29
Voltage	V/Hz	3x400/50 pro EU (possibly other – USA,CAN)
Number of operators		1
Controlling		Controlled by PLC, manually or automatically

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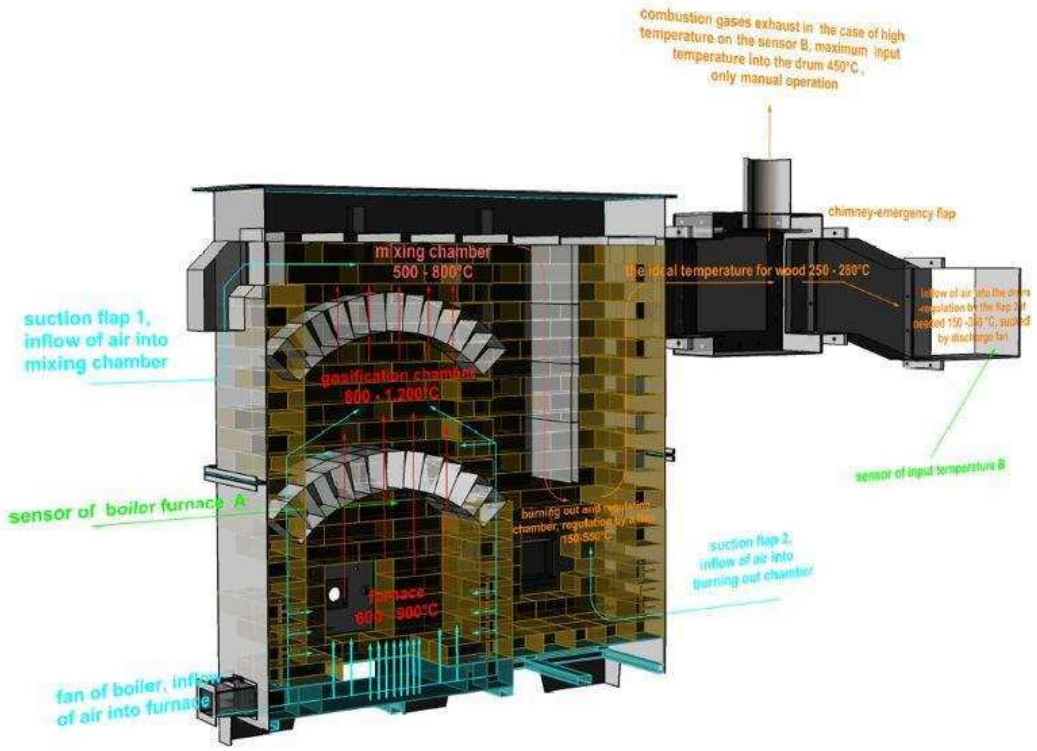
Hot Air Boiler Information



Basic technical data on hot-air boiler SPBK 800

Type of equipment		Hot air boiler SPBK 800
Rated boiler output	KW	800
Possible fuel to be burnt		Wood material, woodchips, sawdust, pellets, wood residuals
Maximum size of burnt material	mm	30x30x30
Moisture of fuel in order to reach rated output	%	Max. 35
Regulation of burning and combustiobn		Continuous according to PLC and requirement of drying cylinder
Regulat. of output in continual operation		30% min. output up to 100% rated output
Volume of fuel reservoir	m3	2,5
Volume flow of air through boiler	m3/hod	12.000
Maximum temperature in the fireplace	°C	1.100
Control of air sucking		Automatically by servo motors
Voltage	V/Hz	3x400/50 pro EU (possibly other – USA,CAN)
Maximum input electric power	kW	1,9
Flue pipe diameter for chimney flap	mm	200
The total weight	kg	4.350
Fuel consumption (woodchips at moisture within 30%)	kg/hod	125

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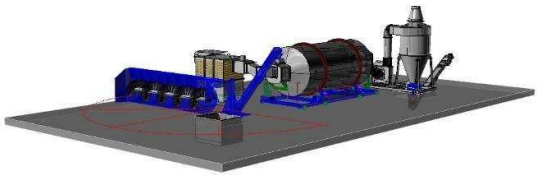
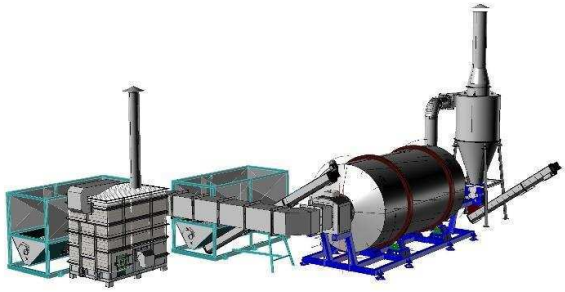
Material moisture at input into the dryer	Input temperature into the cylinder	Required output moisture	Quantity of dried material at output
30 %	300°C	10 %	1.450 kg/hour
35 %	300°C	10 %	1.320 kg/hour
40 %	300°C	10 %	1.280 kg/hour
45 %	300°C	10 %	1.220 kg/hour
50 %	300°C	10 %	1.180 kg/hour
55 %	300°C	10 %	1.090 kg/hour
60 %	300°C	10 %	1.040 kg/hour
65 %	300°C	10 %	980 kg/hour
70 %	300°C	10 %	920 kg/hour
75 %	300°C	10 %	850 kg/hour
80 %	300°C	10 %	780 kg/hour

The calculation of quantity of dried material is calculated at input material as wood sawdust at input temperature at 300°C into the drying cylinder and to required output moisture of 10%. The calculation of output quantity in kg/hour may vary depending on type, size and quality of drying material. The output can be adjusted by the change of input temperature which may reach between 240°C to 350°C which is the maximum allowed temperature to dry wood material.

The set of devices may be delivered with the auger for dry material or rolling up auger ensuring continuous feeding drying material into the system.



Version with rolling up auger



Version without rolling up auger

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The following components are integrated into the LMK 2000

- hopper with an auger
- Hot-air boiler with fuel supply and control unit
- Isolated drum of dryer with partitions and sliding vanes
- Finishing drying zone – the pipe system fitted with diffuser
- Discharge ventilator
- Solid particles separator i.e. cyclone
- Dispenser of dried material – tourniquet
- Auger of dried material from the dispenser – tourniquet
- Feeding auger of hoppers of presser
- Electro installation, electro switchboard with circuit breakers and controlling of the set of devices
- Control system of dryer including sensors, thermostats and thermometers

- **The hopper,** i.e. reservoir of the dried material with the capacity of 3,0 m^3, is made of the 2 mm thick sheet coated with the paint RAL. Part of the hopper is an auger supplying the material from the hopper into the drying drum. The transport piping is of 200 mm diameter; the hopper is driven by gearbox with 2,2 kW electric motor fitted with the IP55 protection and controlled and regulated by the control unit of the switchboard.
- **Boiler SPBK 800 (800 KW)** - is a hot-air boiler made of steel boiler material. The boiler is fitted by fireclay bricks, there is a furnace in the boiler, combustion and post-combustion chamber. Parts of the boiler are also stabilized chamber of hot air, conveyor supplying fuel into the furnace, intake of secondary and primary air into furnace and into the combustion chamber, fans, thermocouples for measurement and regulation of temperature, 3 regulating flaps for stabilization of temperature, fuel reservoir with the capacity of 1,8 m^3, electronic boiler controller and safety self-extinguishing emergency device which puts the boiler out of operation when the heating system is overheated. The boiler is surface finished with the black paint, the fuel reservoir in the paint of brand RAL.

- **Drying drum** – is the steel welded single-casing insulated cylinder with partitions and sliding vanes. The length is 5.000 mm, diameter of 2.150 mm which is connected from the front side to the hopper which is a part of rolling up auger and intake of hot air and flue gases. From the back side it is enclosed by the material discharge device with discharge vanes and connected to the exhaust fan. The drum is mounted on four cylinders, the drive of the drum is ensured by a toothed gear of cylinder driven by transmission VARVEL brand with the electro motor with the power of 3,6 kW/400V/50Hz. The rotation of the drum is regulated and controlled by a control unit of the switchboard. The drum is surface finished with the heat resistant paint and isolated by technical isolation of 30 mm of brand ROCKWOOL.

- **Finishing drying zone** – **the pipe assembly** consists of connecting piping with the diameter of 450 mm and 1 piece of deceleration diffuser. It is made of rolled sheet 2 mm thick and subsequently hot-dip galvanized both from the inside and outside. At the bottom, there is a cleaning access door to the assembly in order to remove the impurities. The individual parts are mutually interconnected by flanges complying with the standard ON120517.

- **Transport discharge fan -** with the transport performance of 12.000 m3/hour, driven by electro motor of 15,0 kW/400V/50Hz, protection IP55, regulated and controlled by control unit from the switchboard. The fan is connected to the frame and the pipe assembly by flexible joints.

- **Solid particles separator** – cyclone, the capacity is 3.500 – 12.000 m3/hour, the cyclone body is made of black sheet of 2mm and surface finished by two components abrasion-resistant paint. The supports are made of profiles. All in the RAL paint.

- **Dosing device – tourniquet** – is equipped by transmission with electromotor with the power of 0,75kW/400V/50Hz, controlled and operated by control unit from the switchboard.

- **Discharge auger** – the diameter of transport pipeline is 200 mm, the length of auger 3000mm, transport performance 3-9m3/hour, driven by transmission with electromotor of 2,2kW/400V/50Hz, protection IP55, controlled and regulated by control unit from the switchboard.

- **Frame construction** – the assembly is mounted on the steel frame made of profiles with anchoring supports for adjusting assembly in the plane and fixing by chemical anchor to the floor. The frame and supports of the cyclone are finished by the paint in the tint of RAL…

- **Control system** – the whole set of devices is controlled from the central switchboard with the automatic regulation operated by touch display. The control system is equipped by software programme developed only for this purpose and keeps the set parameters during the operation, diagnoses and reports technical defects, malfunction of any components of the device and non-standard fluctuations during the drying process. This is reported by a red warning light and acoustic siren. It is possible to put the device into the full automatic mode after the setting of required parameters but with the needed control of staff over the proper operation and activities of the whole device – set of SPB10.

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Roll off auger version and attached components

- rolling up auger with the hopper and auger
- hopper with an auger
- Hot-air boiler with fuel supply and control unit
- Isolated drum of dryer with partitions and sliding vanes
- Finishing drying zone – the pipe system fitted with diffuser
- Discharge ventilator
- Solid particles separator i.e. cyclone
- Dispenser of dried material – tourniquet
- Auger of dried material from the dispenser – tourniquet
- Feeding auger of hoppers of presser
- Electro installation, electro switchboard with circuit breakers and controlling of the set of devices
- Control system of dryer including sensors, thermostats and thermometers

- **Rolling up auger –** device which delivers drying material into the hopper of the dryer, collecting radius 5000 mm at the angle of 160°, designed from rolling up auger with the diameter of 900 mm, frame construction with running wheels, rotary anchor at the material input into the hopper. The rolling up auger is driven by electro motor of 2,2kW/400V fitted by gearboxes of VARVEL brand. The movement of milling cutter is controlled automatically and the movement is ensured by VARVEL brand transmission with the electro motor of 0,55kW/400V with electromagnetic brake. The movement and speed of the material movement is control from the switchboard of the dryer.
- **The hopper,** i.e. reservoir of the dried material with the capacity of 2,8 m^3, is made of the 2 mm thick sheet coated with the paint RAL. Part of the hopper is an auger supplying the material from the hopper into the drying drum. The transport piping is of 200 mm diameter; the hopper is driven by gearbox with 2,2 kW electric motor fitted with the IP55 protection and controlled and regulated by the control unit of the switchboard.
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