

WASTE MANAGEMENT

TECHNOLOGICAL CHART OF THE INSTALLATION FOR WASTE THERMAL TREATMENT EQUIPPED WITH A ROTARY KILN



TECHNOLOGICAL CHART

LOADING SYSTEM

A container with its content is automatically weighed and recorded in a computer system. Using a lift remains are supplied to a loading chamber. Afterwards a hydraulic piston pushes them into a combustion chamber with a rotary kiln. The automatic loading system disables to load the remains in two cases:

- during the start-up if the required temperature in the kiln and the afterburner is too low,
- during the operation if the required temperature exceeds maximal values or the limit values of pollution in air are exceeded.



Lift and hydraulic pistons

ROTARY COMBUSTION CHAMBER

Rotational speed of the chamber is evenly controlled in the range from 1 to 10 rotations per hour. It can also work periodically. A proper setting of speed determines efficiency of the installation and the level of bottom ash burning. It also has an influence on dust emission. The remains in the kiln move in the direction of flue gas movement.



Combustion chamber - 200 kg/h



ROTARY KILN combustion process inside

A rotary chamber is equipped with a gas burner. The burner's task is to hold a required temperature of the installation during a startup and operation. In the kiln the underpressure of 50 Pa is maintained while the remains are burnt. A temperature at the outlet of the chamber is 1000°C.

COMBUSTION CHAMBER



Rotary kiln – 700 kg/h



Rotary kiln – 1000 kg/h

AFTERBURNER - THERMOREACTOR

During thermal treatment in a rotary kiln remains are decomposed into solid and gas products. The gas products are transferred into the afterburner where organic substances at high temperature undergo thermal destruction and oxidation into the final products of combustion. Dimensions of the afterburner secure proper residence time of gas – 2.5 sec. and temperature above 1100° C.



Afterburner - 86 400 m³/h @ 1100°C

Temperature in the afterburner is controlled automatically with a modulating gas burner or additional air. An integral part of the afterburner is an emergency chimney. There is an emergency valve at the outlet of the chimney. The valve is closed during a standard operation and it opens immediately in emergency states. The afterburner is also equipped with an automatic system for removing ash.

Afterburner with rotary kiln



HEAT RECOVERY SYSTEM

Flue gases at a temperature from 1100 to 1200°C after leaving the afterburner go through a recovery heat system where saturated steam at a pressure from 6.0 to 22.00 bars is produced. After emitting heat flue gases are cooled to 220°C. The heat exchange surface of a recovery boiler is from 100 to 520m². The extensive surface of heat exchange guarantees rapid cooling of gas which results in reducing the level of dioxins (synthesis '*de novo'*).



Heat recovery boiler Q=3250 kg/h, p=12bar

HEAT RECOVERY SYSTEM



Heat recovery boiler with smoke tubes cleaning system on-line



Heat recovery boiler Q=3500 kg/h, p=24bar

EMISSION CONTROL SYSTEM

The emission control system consists of a multisectional bag filter and units for dosing sorbent and urea. After leaving a recovery boiler flue gases are moisturized and submitted to a flux adsorption which involves a direct dry injection of a high effective reagent into the gas flux. In the case of this installation a reagent 'Sorbacal ACSP' is used. The reagent mainly contains calcium hydroxide and active carbon. The flux adsorption with a bag filter based on teflon membranes is now one of the most effective methods for disposal of dioxins, furans of acid gas pollution, volatile dust and heavy metals. The bag filter consists of 4 chambers which are cut off at outlet with pneumatic valves.



Bag filter with exhaust fan and chimney

measurement system:

- a unit for collecting and transporting gas samples,
- a unit for measuring dustiness and referential parameters (static pressure, temperature and exhaust gas speed) indispensable for calculations,
- a measurement cabinet with analysers,

analytical system:

- a measurement data concentrator for processing data from analysers and detectors from an analog form into a digital one,
- an emissive computer for canvassing, archiving, verification and presentation of measurement data, creating charts and reports,



Unit for collecting and transporting gas samples for measuring dustiness and referential parameters

MEASURED PARAMETERS	UNIT	MEASURING RANGE	MEASURING ERROR [%]			
Total dust	[mg/Nm ³]	0 - 10	2.0			
Total organic carbon	[mg/Nm ³]	0 - 160	1.0			
Hydrogen chloride	[mg/Nm ³]	0 - 50	2.0			
Hydrogen fluoride	[mg/Nm ³]	0 - 10	2.0			
Sulphur dioxide	[mg/Nm ³]	0 - 2000	2.0			
Carbon monoxide	[mg/Nm ³]	0 - 700	2.0			
Nitric oxide	[mg/Nm ³]	0 - 1000	2.0			
Carbon dioxide	[%]	0 - 20	2.0			
Oxygen	[%]	0 - 25	2.0			
Humidity	[%]	0 - 30	2.0			
Gas flux	[m ³ /h]	0 - 10000	2.0			
Gas temperature	[°C]	0 - 200	2.0			
Static pressure	[mbar]	0-1600	0.25			

VALUES MEASURED BY THE EMISSION CONTROL MONITORING SYSTEM RANGES AND MEASURING ERRORS

MEDICAL AND VETERINARY WASTE INCINERATION PLANT HOSPITAL "MEDICAM" IN GRYFICE





MEDICAL, VETERINARY AND HAZARDOUS WASTE INCINERATION PLANT WASTE DISPOSAL PLANT SP. Z O.O. IN KONIN





PLASTIC WASTE INCINERATION PLANT "SABA" SP. Z O.O. IN PŁOCK





ANIMAL WASTE INCINERATION PLANT "TERMO-EKO-ENERGIA" SP. Z O.O. IN CHRZANÓW





MEASURED PARAMETERS	UNIT	ACTUAL MAXIMAL PARAMETERS PPM PROMONT	MAXIMAL STANDARDS INCINERATION PLANTS	MAXIMAL STANDARDS CARBON BOILER ROOMS
DUST	[mg/m³u]	6,6	10	
SO ₂	[mg/m³u]	37,7	50	400
со	[mg/m³u]	7,3	50	
NO _x	[mg/m³u]	145,3	200	300
HCI	[mg/m³u]	5,2	10	
HF	[mg/m³u]	0,4	1	
LZO	[mg/m³u]	6,6	10	

COMPARISON OF STANDARDS FOR ADMISSIBLE EMISSIONS

MEDICAL WASTE INCINERATION PLANT - ONCOLOGICAL CENTRE IN BYDGOSZCZ



WASTE INCINERATION PLANT HOSPITAL IN CHOJNICE



MEDICAL, VETERINARY AND HAZARDOUS WASTE INCINERATION PLANT HOSPITAL "MEDICAM" IN GRYFICE



PLASTIC WASTE INCINERATION PLANT "SABA" SP. Z O.O. IN PŁOCK



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MEDICAL WASTE INCINERATION PLANT ONCOLOGICAL CENTRE

IN BYDGOSZCZ

PLASTIC WASTE INCINERATION PLANT "SABA" SP. Z O.O. IN PŁOCK

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