STATIONARY INCINERATOR UNITS

SIBF

Stationary Incinerator plant
Heat exchanger unit with
Exhaust cooler or
Waste to Energy system
Flue gas cleaning/filter plant

WASTE CAPACITY up to 5000 kg/h

made
in
Germany
INTRODUCTION

ASPECTS

Incineration is an important procedure for waste treatment.

The critical waste will be burnt in a sterile incineration process and the amount of waste will be reduced that must go to waste landfills.

Especially in the field of clinical waste the mobile incineration is an active instrument of and for disease control.

Basically there are no alternatives to modern incineration, because since 1 June 2005, the landfilling of untreated waste will be banned in Germany (acc. to TA Municipality Waste), in the European Union (EU) and in many other countries worldwide.

Waste may only go to a waste landfill as slag after its combustion. This reduces the need of landfill space, which is scarce and expensive, since the combustion residues need essentially less space.

Furthermore, during biodegradation processes of the untreated waste in the landfilling site, pollutants will be produced that burden the groundwater, the soil and the surrounding air of the landfill site.

Today, slag and combustion residues of a modern incinerator have a rest part of less than 3% carbon and usually they reduce the volume of garbage by 90 - 95%.

Also, the allowable percentage of biodegradable components in landfills has been limited to 3% maximum by the EU Directive 1999/31/EC, to protect the environment.

Therefore, incineration of waste is in the EU Member States and many other countries worldwide a necessity to protect the environment.

Environmental protection is not a local, it is a global interest!

In the field of combustion technology, we have an extensive know-how, experience and references. We guarantee our customers high availability of made-to-order equipment.

BASIC INFORMATION

SIBF Incinerator Units are combustion- and flue gas cleaning/filter plants with an excellent combustion capacity.

The main design demand for the construction of the incinerators are easy operability, rigid construction and long life time together with made in Germany quality and according to EC and local regulations.
## STATIONARY INCINERATOR UNITS
### SIBF

### KEY FIGURES

<table>
<thead>
<tr>
<th>Model</th>
<th>SIBF 1000: Up to 1000 kg/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity:</td>
<td>SIBF 2000: Up to 2000 kg/h</td>
</tr>
<tr>
<td></td>
<td>SIBF 3000: Up to 3000 kg/h</td>
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<tr>
<td></td>
<td>SIBF 5000: Up to 5000 kg/h</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of plant:</th>
<th>Grate system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeding:</td>
<td>Automated feeding and slag extraction</td>
</tr>
<tr>
<td>Suitable for:</td>
<td>Domestic waste and hazardous waste like industrial waste, medical waste, chemical residues that are solid and paste-like up to 30% moisture content.</td>
</tr>
</tbody>
</table>

Average caloric value of waste: 15,000 KJ/kg

### Optionally

<table>
<thead>
<tr>
<th>Heat recovery system:</th>
<th>Tailor made boiler system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flue gas volume 1000 kg/h waste:</td>
<td>Up to 9600 Nm3/h</td>
</tr>
<tr>
<td>Flue gas volume 2000 kg/h waste:</td>
<td>Up to 19200 Nm3/h</td>
</tr>
<tr>
<td>Flue gas volume 3000 kg/h waste:</td>
<td>Up to 29000 Nm3/h</td>
</tr>
<tr>
<td>Flue gas volume 5000 kg/h waste:</td>
<td>Up to 48000 Nm3/h</td>
</tr>
<tr>
<td>Steam:</td>
<td>Up to 40 barg at 40 °C</td>
</tr>
<tr>
<td>Steam flow 1000 kg/h waste:</td>
<td>Up to 4,1 t/h</td>
</tr>
<tr>
<td>Steam flow 2000 kg/h waste:</td>
<td>Up to 8,2 t/h</td>
</tr>
<tr>
<td>Steam flow 3000 kg/h waste:</td>
<td>Up to 12,4 t/h</td>
</tr>
<tr>
<td>Steam flow 5000 kg/h waste:</td>
<td>Up to 21,0 t/h</td>
</tr>
<tr>
<td>Generated electricity 1000 kg/h waste:</td>
<td>Up to 850 kW</td>
</tr>
<tr>
<td>Generated electricity 2000 kg/h waste:</td>
<td>Up to 2,0 MW</td>
</tr>
<tr>
<td>Generated electricity 3000 kg/h waste:</td>
<td>Up to 3,1 MW</td>
</tr>
<tr>
<td>Generated electricity 5000 kg/h waste:</td>
<td>Up to 4,4 MW</td>
</tr>
</tbody>
</table>

Each incineration system will be adapted to the project requirements. The data indicated on the table are reference values. Of course subject to change.
PROCESS DESCRIPTION

Waste is fed to the combustion chamber by a special loading device. With a conveyor the waste is transported on top of the loading device. Kind of waste transportation need to be discussed to find the most comfortable way for the customer. Through a chute, the waste reaches the heart of the furnace, the combustion grate.

Depending on combustion temperature waste is fed automatically into the combustion chamber.

An even and sufficient air supply from below, with the air required for combustion (primary air), produces an excellent burnout. The slag is removed by a discharge system suitable for the application.

The first section of combustion chamber is for drying, reducing of water content and burning of the waste by feeding of air. On the grate suitable for the application a completely burning of waste is guaranteed and the ash will moved to a water cooled conveyor system. This conveyor transports the ash into a bin which have to be discharged from time to time.

The hot combustion gases are led into the reactor section of the combustion chamber.

The reactor section is designed to guarantee a residence time of the flue gases of 2 seconds at a temperature level of around 1100°C to reach complete combustion.

At the end of the chamber an oxygen sensor measure the content of rest oxygen. If the content of oxygen is lower than 5%vol. additional combustion air is feed to the second combustion chamber to secure enough oxygen to get complete combustion and avoid creating of CO (unburnt carbon).

The flue gases enter a heat exchanger unit. This can be a cooling system or a boiler system.

Flue gases are cooled down to approx. 200 – max. 300 °C, depending of the kind of the filter system. The flue gases are mixed with Bicarbonate and Activated Carbon. These additives are fed by means of a fan into the flue gas stream before it enters the filter unit.

Clean flue gases are sucked by an ID fan through the complete plant and are released into atmosphere via a stack.

The whole combustion unit is operated under under-pressure so that, in case of a leakage no gases coming out of the system.

WASTE FEEDING SYSTEM

Waste is collected in special bins or drums by customer. These bins or drums must be moved to waste feeding system and dumped there by the customer or can be burned if bins and drums are burnable. Other waste feeding solutions are possible and could be a part of an engineering request of our clients.

COMBUSTION CHAMBER WITH BURNER AND DEASHING SYSTEM

The combustion chamber collect all the waste and it has sections to dry, to ignite and to burn the waste and finally remove the ash out of the combustion system.

The chambers are lined with a high quality refractory system to withstand highest temperatures.

For start-up, a diesel fuel burner is installed to heat up the combustion chamber to 850°C.

If this temperature is reached the waste feeding can start.

Depending on calorific value of the waste the burner power will be reduced. During normal operation the burner is stopped completely.
Through a chute, the waste reaches the heart of the furnace, the combustion grate. Depending on the application, a suitable system is selected from a wide range of variants, such as roller grate, feed grate or reciprocating grate.

The design of the combustion grate as well as the movement of the individual grate bars or grate rollers intensively mixes the waste introduced. An even and sufficient air supply from below, with the air required for combustion (primary air), produces an excellent burnout. The slag is removed by a discharge system suitable for the application.

Main combustion section
Temperature: 850 °C
Residence time of waste: 30–60 minutes

The flue gas from the main combustion section can contain not burnt components. Therefore the combustion chamber above the grate forms the reaction chamber for further combustion of the resulting gases. To ensure that combustion is as complete as possible, further combustion air (secondary air) and, if necessary, recirculated flue gas are injected in a targeted manner. That ensures the complete combustion of all smell and organic components. The selected residence time of the flue gas will be 2 seconds at up to 1.100 °C.

Post combustion section
Temperature: 1.100 °C
Residence time of flue gas: > 2 seconds

TREATMENT OF EXHAUST GASES
ENVIRONMENTAL FRIENDLY AIR COOLING SYSTEM

There are two ways to deal with the exhaust gas. Since the filters do not withstand the high temperatures, it can either be cooled or used for energy production.

The first option is a cooling system.

The hot flue gas is cooled down from a temperature of approx. 1100 °C to 600 °C in a U-shaped pipe cooler system through natural convection and radiation by ductwork.

To ensure a good cooling effect, at its downstream installed air cooled heat exchanger will cool the flue gas down to a temperature between 180 °C - 200 °C.

The cooler system is mounted between the incinerator and the filter plant.

The advantage is that this facility do not require water consumption.

Advantages on a view:
- Low energy consumption
- No water consumption
- No steam is emitted to the atmosphere

Picture:
Sample of an environmental friendly air cooling system
The second possibility is to use the exhaust gas for energy production. Waste to Energy is profitable environmental protection!

The hot flue gas from the combustion plant is cooled down in a boiler casing to about 350 °C. We install the boiler walls within the combustion chamber.

Please note that a boiler depends always on the requirements of the customers. Therefore every boiler is tailor made product. It is not a standard part!

Upon request, we design a tailor made solution for you!

Basics

Heat recovery system: Tailor made boiler system

Flue gas volume:
9.600 up to 48.000 Nm³/h

Steam:
40 barg at 400 °C.

Steam flow:
4,1 up to 21 t/h

Generated electricity:
850 up to 4400 kW

Picture: Boiler walls

Picture: Sample SIBF 5000
STATIONARY INCINERATOR UNITS
SIBF

ADDITIVE DOSING SYSTEM

There are components inside the flue gases that can only be deactivated by chemical treatment. By using of Sodiumbicarbonate the content of SO2, HCl and HF can be drastically reduced. Adding activated carbon removes heavy metals and dioxine.

These additives are fed to the flue gas stream by a blower before flue gas enters the filter unit.

FILTER PLANT WITH DEASHING SYSTEM

There are two ways to filter the exhaust gas. On the one hand we can use ceramic filter cartridges and on the other hand bag filters. Which of these are suitable is determined rimarily by the amount of exhaust gas. If an application of a ceramic system is not advantageous for technical reasons, we use a filter bag system with equal technical processes instead.

The temperature range for the additives should be from 150°C up to 300°C. In this range the additives can transfer the contents. Flue gas mixed with additives create a layer on outside surface of the filter and accumulate during operation. The dust layer causes a pressure drop and a differential pressure measurement indicate necessary cleaning step.

At a certain differential pressure level the filter will be cleaned by pressure air jet which clean the filter by a jet impulse and the dust layer on the outside surface of the filter will fall down. At the bottom of the filter the ash accumulates and transported by a screw conveyor to out of the filter system and feed by a rotary valve to a big bag station.

The insulation at the outside of filter body keeps it from corrosion, during shut down periods.

The dust inside is contaminated with sulphur and other components. If the temperature falls below sulphur's dew point, corrosion will happen. The filter can easily removed when necessary.

It can be replaced by operation staff after training.

ID FAN

The whole combustion system is operated as "underpressure system". This offer the advantage in case of leakages that no flue gases coming out of the system. Flue gases are moved by an ID- fan which is speed controlled by an inverter. The fan guarantees an underpressure of minus 2 mbar inside the combustion chamber. The fan is equipped with vibration control and temperature measurement at ball bearings. Maximum operating temperature for the fan is 300°C.

STACK

The stack guide the clean flue gases to atmosphere and is fixed on the ground floor. Two nozzles DN 80 can used as sample points for environmental measurements. These nozzles are accessible from filter top.
CONTINUOUS GAS MONITORING SYSTEM

Option

Envisaged analyses could be HCL, CL2, NOX, SOX, CO and TOC.

The operation frequency can be either continuous operation or activation at a predefined frequency or upon demand.

REQUIRED CONSUMABLES

Additives (e.g. sodium bicarbonate) and activated carbon (if necessary), compressed air, electrical power, fuel and water.

FORBIDDEN MATERIALS

Amunitions and other explosives, lightning ammunition, akkus und batteries, mercury containing thermometer, PVC (small amounts per feeding sequence allowed).

SUPERVISING

We can send our supervisors for mechanical and for electrical erection, during the local erection period.

DOCUMENTATION

Description, layout drawing, process flow diagram, heating-Up instruction, instruction manual in English, hazard analysis, human factors safety analysis, process safety analysis, list of components, power consumption list, spare parts list and wear parts list.

LIMIT OF SUPPLY

Additional access, stairs, etc. if necessary, big bags for residuals, buildings and civil works (also civil works drawings must be prepared locally acc. to local legal regulations), connection to the control cabinet, consumables supply, including compressed air, emission measurements if necessary, electric power, fuel and water, erection and insulation, lighting, lightning protection if necessary, local approvals and permissions, official permits to install and operate the system, main electrical cabling to the control system, oil and lubricants, except the first filling, scaffolding, lifting devices, cranes, if necessary, transportation, customs clearance and unloading of equipment.

Technical notice: Each incineration system will be adapted to the local requirements. The data indicated in this technical offer are reference values. Subject to change.
## STATIONARY INCINERATORS

### PLANT CONFIGURATION

| -5000 kg/h |

### CHARGING
- Manual feeding  
- Manual slag extraction  
- Automated feeding  
- Automated slag extraction

### INCINERATION
- 10% moisture content  
- < 3% Polymeric substances such as Plastic, PVC, rubber etc.  
- < 30% Polymeric substances  
- Liquid waste lance spray system

### HEAT RECOVERY (WASTE TO ENERGY)
- Steam boiler  
- Steam turbine

### COOLING
- Environmental friendly Air Cooling System

### FLUE GAS CLEANING
- Flue gas cleaning system  
- Execution as dry sorption system (DSS)  
- Additive dosing system  
- Bypass connection for a scrubber system.  
- Prepared for subsequent installation.  
- Scrubber system

### FUEL LIMITS (DSS)
- Chlorine <0.6 % wt  
- Sulphur: <0.3 % wt  
- Nitrogen: <0.9 % wt  
wt means weight percent
Higher values can lead to increased demands of the flue gas cleaning system. For example, it may be necessary to install a Scrubber System! See above.

### GAS MONITORING
- CEGM (Continuous Exhaust Gas Monitoring) System  
Envisaged analyses could be Chlorides (HCl, Cl2), NOx,  
SO2 as SOx, Carbons as TOC, CO and TSP (total suspended particles) etc.

### PLANT CONTROL
- Control box for indoor erection incl. main switch, redundant emergency stop as well as all necessary fuses, contacts, relays and clamps, key switch for Start-up, completely cabled.  
- Visualisation  
All relevant process parameters and data are monitored and stored on a PC visualisation system.

Each incineration system will be adapted to the project requirements.
IMPRESSUM

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Germany
web:  https://www.zanni.group
      https://www.zanni.group/impressum.html

LOCAL OFFICE

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