Welcome at Hafner! We Manufacture Systems for Energy Recovery from Wastes and Biomass as well as for Treatment of Hazardous Wastes.

www.hafner.it
The design is in each case modified to the respective requirements, the facility is always laid out for the actual requirement, so as to save investment costs. An additional process line can be added and operated parallel if at a later point in time the incineration capacity needs to be increased. The system capacity with a standard facility can handle between 1000 t/y up to 25000 t/y. If required, this system can also provide for a greater throughput capacity per line.

Characteristics of all Hafner Systems:

- Set up in individual modules:
  - 8 modules like ship container modules, e.g. for a system with a throughput of 7000 t/y or 22 modules with an incineration facility with 25000 t/y.

- High Flexibility:
  - This system can be operated with different incineration temperatures for the energy recovery from household waste and similar wastes, but also for the incineration of hazardous and medical wastes.

- Very economical/low investment and operating costs
- Utilization of established and approved technologies
Mobile facility for de-centralized energy recovery from hazardous wastes

De-centralized systems for incineration of hazardous wastes and medical waste (mobih facility with an incinerating capacity of 5000 t/y)

Example: Hazardous waste incineration plant Hafner in Bozen

The following incineration temperature are achieved

- Maximum furnace temperature in rotary kiln: 1050 degrees C
- Maximum post-combustion temperature: 1300 degrees C

The system designed as described above is installed in 8 ship containers:

1. 1st container: furnace, with feeder and continuous ash discharge
2. 2nd container: afterburner chamber with additional burner and emergency flue stack
3. 3rd container: flue gas cooler with heat exchanger
4. 4th container: flue gas purification with fabric filter
5. 5th container: flue gas washing (dry adsorption process)
6. 6th container: catalytic NOX and Dioxin- and furan separation, ventilators, flue
7. 7th container: central controls
8. 8th container: service, emergency generator and compressor.

In addition to these basic containers, other containers are provided to temporarily store hazardous wastes. These containers are set up next to the system feeder.

Technical description

Rotary tubular kiln for hazardous und hospital wastes.

The following tender specification describes a mobile waste incineration plant.

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1) Basic Information
2) Process description
3) Technical features
4) Flue gas purification
5) Control devices

1. Basic Information:

The incineration facility is totally mobile and can be transported on a truck with a hydraulic gripping device.

All components are completely installed in ship container modules. The technical concept complies with the regulations of the European Union and more stringent national regulations, like the 17th Federal Emission Protection Regulation (BImSchV) of the Federal Republic of Germany.
2. Process description:

The solid and paste-like hazardous wastes are pushed into the rotary tubular kiln by a spiral-like screw conveyor or a stopper. Liquid wastes are injected via an injection nozzle into the rotary tubular kiln and into the afterburner chamber. The rotary tubular kiln is the most universal method of incineration of hazardous wastes of different composition. Solid as well as pasty and liquid materials can be fed into the furnace for incineration at the same time.

Through a high excess of air and through the constant addition of supplemental fuel, thorough incineration is guaranteed. The hazardous waste and the incineration air is introduced into the system from the front side of the rotary kiln. From the opposite end the slag and flue gas is being discharged.

3. Technical features:

General data:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating capacity</td>
<td>600-700 kg/h</td>
</tr>
<tr>
<td>Flue gas volume total</td>
<td>5000 Nm3/h</td>
</tr>
<tr>
<td>Number of containers</td>
<td>8</td>
</tr>
<tr>
<td>Total weight of system</td>
<td>100 Tonnen</td>
</tr>
<tr>
<td>Dimensions of containers</td>
<td>6050x2500x2560 mm</td>
</tr>
</tbody>
</table>

Rotating furnace: Technical Data:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotary kiln volume</td>
<td>5000 ltr.</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>900-1200 Grad</td>
</tr>
<tr>
<td>Holding time of flue gas</td>
<td>2 Sek. mindestens</td>
</tr>
<tr>
<td>Holding time of waste</td>
<td>1 - 2 Stunden</td>
</tr>
<tr>
<td>Minimum Oxygen content</td>
<td>6 %</td>
</tr>
<tr>
<td>Average wall lining thickness</td>
<td>250 mm</td>
</tr>
<tr>
<td>Loading system</td>
<td>Helicoidal conveyors</td>
</tr>
<tr>
<td>Burner</td>
<td>300.000 kcal/h</td>
</tr>
<tr>
<td>Rotary kiln weight</td>
<td>18900 kg</td>
</tr>
<tr>
<td>Primary air/fan volume</td>
<td>1000 Nm3/h</td>
</tr>
</tbody>
</table>

After-combustion chamber: Technical Data:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incineration temperature</td>
<td>1200 - 1300 degrees C</td>
</tr>
<tr>
<td>Holding time</td>
<td>2 Sec. minimum</td>
</tr>
<tr>
<td>Volume of chamber</td>
<td>12000 ltr.</td>
</tr>
<tr>
<td>Wall lining thickness</td>
<td>250 mm</td>
</tr>
<tr>
<td>Burner capacity</td>
<td>1000000 Kcal/h</td>
</tr>
</tbody>
</table>
4. Flue gas purification:

A complete incineration of the organic components in the flue gases is assured in the afterburner chamber through the appropriate air intake, high temperature and a long holding time.

The hot flue gases from the afterburner are being cooled off in a heat exchanger or boiler, prior to cleaning.

In the process the flue gases are first passed through a Teflon coated fabric filter. At this point, the solid and dust-like particles are collected. Through injection of a mix of white reactant (soda), furnace coke and bicarbonate in an additional step, the contaminants (HCl, SO2, HF, volatile heavy metals, hydro-carbons, dioxin) are removed out of the flue gases.

A catalyst is added in the next step of the process to further reduce nitric oxide, dioxin and furan in a catalyst.

5. Control devices:

Engines, fans, valves, switches, control units ... are designed and installed according to the state of the art and are controlled via a computer. This computer is capable to automatically triggering the necessary measures in case of a fault or failure in the system.

The operating personnel are notified in two steps:

As a first step a siren sounds, warning lights in a control panel identify the malfunction.

If the malfunction or breakdown is not corrected within the stipulated time period, the second step is triggered. The feeder is shut off, the emergency chimney is opened and the vacuum fan is turned off.

All metered values are collected in this central control, they are put into memory and in accordance with the local environmental conditions printed out via a printer.

Since a separation of dioxin and furan through furnace coke and a white reactant (soda) has already taken place before, the catalyst guarantees very good discharge results.

After this complete purification, the flue gases are released through a chimney into the atmosphere with a temperature of 240 to 260 degrees C.
Decentralized concept for energy recovery of household and industrial wastes

In the past, many waste incineration plants were design with excessive capacity, as a consequence they are often today not fully utilized and are inefficient.

The answer from Hafner to this:

Through the construction of relatively small decentralized systems we can offer regional solutions. The size of the respective system is designed based on the waste economy concept of the region or the industrial enterprise. With larger quantities two or several lines can be operated parallel to each other.

Through the combination of various sizes, offered as modules, one can, as in a building block system, compose systems to a desired size.

This guarantees a high flexibility, a great assurance of disposal and efficient handling.

Depending on the operation of the rotary kiln and the incineration temperature the incineration product can be either ash or sinter material or glazed slag.

Incineration Unit for 25,000 tons annually

Such a system consists of 3 essential elements, composed of several modules:

- Rotary kiln with afterburner chamber
- Heat exchanger and boiler
- Multi-step flue gas purification

Depending on the final standard, particularly as concerns the flue gas purification, 22 modules represent a complete system facility.

Process Description

The waste is picked up with a gripper and dropped into a funnel from there it is moved by a spiral-like screw conveyor or a hydraulic stopper, into the front side of the furnace.

Pasty and viscous liquid materials are pumped in, highly fluid material is injected into the burning chamber.

The throughput capacity is 3.5 t/h. The operational temperature in the rotary kiln is 950 - 1000 degrees C.

The rotating speed of the rotary tube and the feeding are controlled through a temperature- and oxygen tube. Through various nozzles the primary air is injected, creating a higher turbulence, it also assures a good oxidation.

The burner at the end of the rotary kiln is only ignited at the start up of the system or with a poor calorific value of the waste. The slag created from the incineration falls into a water bath at the end of the furnace.

With a higher calorific value material when higher incineration temperatures the rotary kiln is being operated with direct current.

The hot flue gas flows from the rotary kiln into the afterburner chamber and is held there for at least 2 seconds at an incineration temperature of 1050 degrees C.
Heating exchanger and boiler

The flue gas will be cooled down in a steam boiler to 260 degrees C.

The energy created through this is utilized in the form of heat, steam or electrical energy.

Cleaning of exhaust gases:

Here two possibilities can be offered depending on the exhaust gas composition and required emission values:

1. The dry adsorption process or
2. A combination process, taking the flue gases in addition through washing towers ("wet wash").

After cooling down of the flue gases they are sent through a teflon-coated hose filter. Here the solid and dust-like particles are separated. Through injection of furnace coke and reactant (soda), dioxin furane, SO2, HCL and heavy metals are minimized. The dust collected will be removed together with the absorption agent through the spiral-like screw conveyor.

The filter cleaning will be accomplished with air pressure jets.

With this combined process the flue gases are then sent through a "wet wash". In a GFK wash tower through a countercurrent principle the acidic components are washed out with water and filling material. In a second wash tower a pH value of 7 is set by adding soda.

The waste water of acidic and alkaline wet cleaning are neutralized and moved through a pump to the spray reactor. There they are injected through a nozzle into the flue gas for evaporation.

Prior to allowing the flue gases to mix with the catalyst, they are heated up with the countercurrent principle in a heat exchanger to about 250 degrees C. Through the injection of reaction agents into the catalyst the dioxin and furan as well as NOX are separated. Dioxine und Furane, sowie NOX ausgeschieden.
Decentralized facility for energy recovery from wastes with 25,000 t/y

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