

RVT Process Equipment GmbH

Incineration plants

Incineration plants

For exhaust gases and liquid residues



Incineration plant for waste gases containing silane

Problem – solution

In many industrial production and manufacturing processes, gaseous and liquid media accumulate that require thermal treatment as part of the total purification chain in their disposal. For these applications, RVT Process Equipment GmbH offers plants for the incineration of

- Exhaust air (with the exception of regenerative systems),
- Exhaust gases (inert, high calorific value or combustible) and/or
- fluid media (waste waters, residues, solvents).

We supply...

key-ready plants incl. the steel structure, piping and EMSR, PL and safety equipment specific to incineration plants. Next to turn-key deliveries we supply core components e.g. burners as well as the optimization of existing plants.

Our services include

- First concept studies,
- Process-optimised design,
- Basic and detail-engineering,
- die Beschaffung aller Anlagenteile,
- Procurement of all plant components,
- Commissioning and
- Process optimisation.

We support our customers during the approval process, maintain the plants we build and troubleshoot malfunctions.

Fuels

Fuel supply and storage is included in the scope of performance for these plants. They use conventional fuels such as natural gas, LPG or heating oil but also weak gases, process gases and solvents.

Exhaust gas feed

The exhaust gas is directly fed into the main burner or the secondary burner using special exhaust gas injection lances.

If the exhaust gases are assigned to an ex-zone, a safety inspection will be carried out in compliance with the ATEX-Guideline. If needed the gas feed will be equipped with static and/or dynamic flame traps, such as:

- Detonation safety barriers,
- Liquid barriers or
- Monitoring of the discharge speed



Detonation safety barriers for waste gases according to zone 1

Liquid residues feed

Fluid wastes are first atomised using compressed air, nitrogen or water vapour special two-material lances. The lance cross-sections are selected so that the lances can't plug.



waste gas flame

Burner, combustion chamber and heat recovery



800 kW-burner

Burner, exhaust gas lances

The burners and exhaust gas lances are designed and constructed for each specific use case. The selection of materials is made taking into account the process conditions such as temperature and corrosiveness of the media.

Combustion chamber

The combustion chambers can be arranged vertically or horizontally. The following are used for the housing:

- ceramic fibres,
- FF- and FL-bricks,
- Concrete or
- Ramming masses

Their construction and insulation thickness are determined by the heat transmission calculation.

The important thing here is observing the water and acid dew points.



Refractory lined combustion chamber



Burner with fuel and waste gas piping



Gas tube boiler for waste heat recovery

Heat recovery

Our systems are optimised with respect to investment and operating costs. We test whether air pre-heating or other use of the exhaust heat is economically efficient. If needed, our systems can generate steam, hot water, thermal oil or hot gas.

Flue gas cooling and purification

Dry or moist

Dry flue gas cooling

If heat reclamation is not economical or it will contaminate the heat exchanger, the temperature of the flue gas must be reduced to values under 250 °C for the down-stream plant components (catalytic convertors, filters, bellows, chimney). This is done by adding air or spraying in completely vaporised water.

The water is atomised in a two-material jet with compressed air.

Moist flue gas cooling

Moist flue gas cooling proceeds by means of jet gas quench systems until the cooling limit temperature is reached.

The quenches are made of steel, steel/rubber or GfK.

Jet gas quenching also works as the first step in flue gas purification and assumes the emergency cooling function in the combustion chamber if the fan fails.



Honeycombs of a wet electrostatic filter

Moist flue gas purification

Depending on the hazardous materials incinerated or on the fuel being used, the incinerators are supplemented with additional flue gas cleaning components.

RVT implements its own proven innovations as moist processing systems:

- Hot gas quenching
- Venturi washers
- Packing columns,
- Droplet and aerosol separators
- or combinations of the above

If necessary moist electro filters will be installed downstream in pipe or honeycomb construction.

Dry flue gas purification

If dry flue gas purification is required, the following systems come into consideration:

- Cartridge, hose or electro-filters,
- Catalytic convertors,
- Adsorber.



Hose filter, raw gas side

Example

Combustion of siliceous exhaust gases

Sample plant for incineration of exhaust gases containing silicium

Chlorsilanes are converted into silicon dioxide, SiO_2 , an extremely light white dust, and hydrochloric acid, HCl , in the flame. The calorific values of the exhaust gases depend highly on the Si/Cl ratio, since the oxidation of silicon releases enthalpy, while the formation of hydrochloric acid proceeds endothermically.

Incineration is the first step of purification, followed by dust separation and rinsing with HCl and chlorine.

Burners system

Swirl burners and specialised exhaust gas lances are used. Exhaust gases with low calorific values are mixed with the burner's outside air; exhaust gases with high calorific values replace in part the primary fuel.

Combustion chamber

The combustion chamber is aligned vertically with an outlet at the bottom to deal with the accumulation of dust. The retention time for the flue gas in the combustion chamber is 2 seconds, the burnout temperature is less than $1000\text{ }^\circ\text{C}$, in order to prevent the SiO_2 fine dust from being baked on.

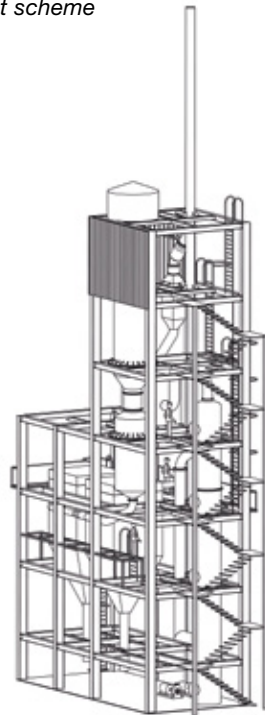
Cooling

Cooling is affected using an air-water quench to $200\text{ }^\circ\text{C}$

Dust Separator

A hose filter is used to separate dust. The hoses are sprayed from top to bottom in order to force the extremely light dust downward (apparent weight of ca. $50\text{ kg}/\text{m}^3$). The dust falls into the big bag attached underneath the filter.

Plant scheme



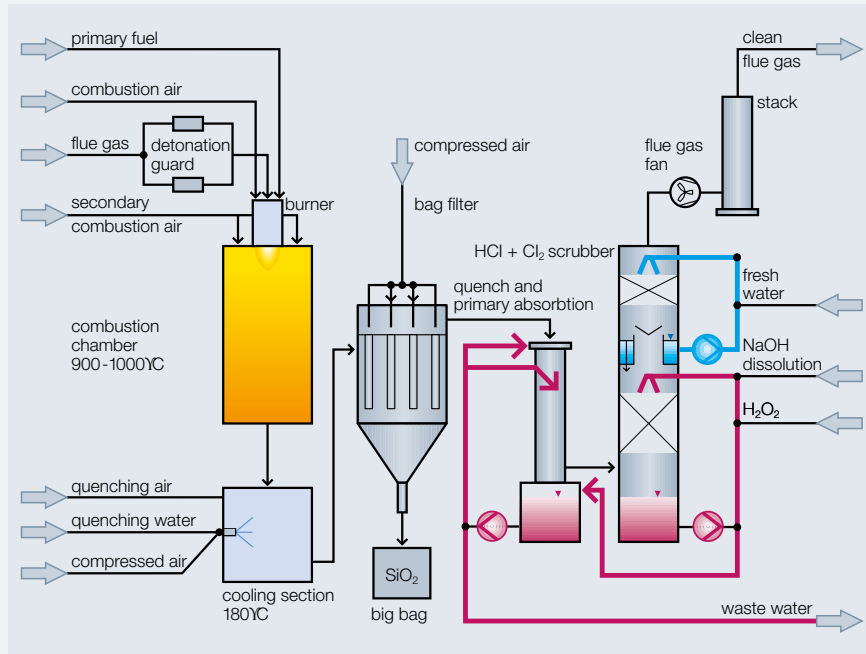
Assembly of a complete, pre-lined combustion chamber with attached, flanged air/water quenching head



Flue gas stack with emission control device

Example

Combustion of siliceous exhaust gases



Simplified process scheme

Flue gas scrubbing

HCl-absorption is affected aqueously by adding caustic soda.

To separate the molecular chlorine created after the Deacon equilibrium, hydrogen peroxide is added as a reducing agent.

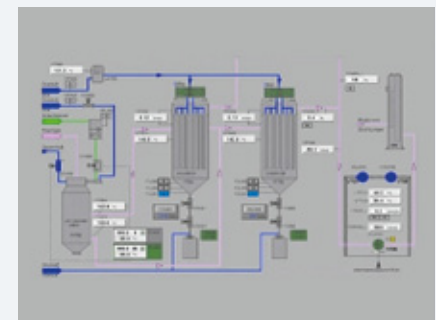
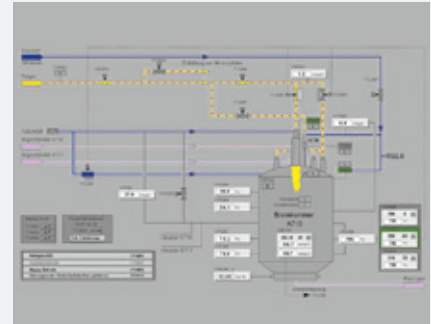
Flue gas fan, chimney

The system described is operated at negative pressure in order to prevent the escape of hazardous materials into the surroundings.

RVT services:

The plant was planned, constructed and commissioned key-ready by RVT.

Included in the scope of delivery are the steel construction, pipes and wiring as well as complete metrological and process control equipment.



Process control of burner unit and flue gas cleaning

Our experience

For your demand

Our experience is your benefit

- Complete solutions using mature technology
- Decades of accumulated expertise
- Project planning (basic and detailed engineering) and realisation from a single source
- Our own key components, such as the burner system, the flue gas cooling system and flue gas scrubbing
- Skilled support during the approval process
- Completion of all necessary safety assessments
- Planning of process condition and visualisation
- Supervision of assembly and commissioning by our expert engineers
- Plant optimisation
- Training your operating personnel
- On request we assume regular maintenance of our plants
- Trouble shooting
- Reference plants in the chemical industry



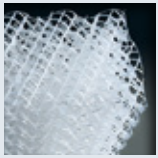
RVT Process Equipment has been certified according to ISO 9001 since 1996, and according to ISO 14001 since 2010.

We are a certified and approved specialised company according to § 19 of the Water Resources Management Act (WHG).

The way to RVT Process Equipment



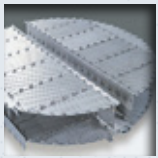
Tower packings for mass and heat transfer



Structured packings for mass and heat transfer



Column internals



Mass transfer trays



Biological carrier media



Turn-key units for waste gas scrubbing



Ammonia recovery processes



Combustion plants for the disposal of exhaust air, waste gases and liquid media



Our addresses

RVT Process Equipment GmbH
Paul-Rauschert-Straße 6
96349 Steinwiesen, Germany

Phone +49 (0) 9262 77-0
Fax +49 (0) 9262 77-700
E-Mail info@rvtpe.de

RVT Process Equipment, Inc.
9047 Executive Park Drive
Suite 222
Knoxville, TN 37923, USA

Phone +1 (865) 694-2089
Fax +1 (865) 560-3115
E-Mail info@rvtpe.net

Kunshan
RVT Process Equipment Co., Ltd
No. 66 - 68, Shaojing Road
Development Zone Kunshan
215300 Kunshan
Jiangsu province
P.R. China

Phone +86 (512) 55 18 82 55
Fax +86 (512) 55 18 81 87
E-Mail hui.chen@rvtpe.com