Incineration plants
For exhaust gases and liquid residues

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,
- procurement of all plant components,
- commissioning and start up
- 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.

Liquid residues feed
Fluid wastes are first atomised using with compressed air, nitrogen or water vapour special two-material lances. The lance cross-section are selected so that the lances can’t plug.
Burner, combustion chamber and heat recovery

Burner, exhaust gas lances

The burners and exhaust gas lances are designed and constructed for each specific use. 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.

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 converters, 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.

**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 converters,
- adsorber.
Example
Combustion of siliceous exhaust gases

Sample plant for incineration of exhaust gases containing silicium
Chlorsilanes are converted into silicon dioxide, SiO₂, 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 °C, in order to prevent the SiO₂ fine dust from being baked on.

Cooling
Cooling is affected using an air-water quench to 200 °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 kg/m³). The dust falls into the big bag attached underneath the filter.
**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.

**Example**
**Combustion of siliceous exhaust gases**

![Diagram of combustion and flue gas scrubbing](image)

**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

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