REMONDIS SAVA GmbH

Thermal waste treatment as part of the circular economy

remondis-sava.de

REMONDIS®
WORKING FOR THE FUTURE

High temperature incineration of hazardous waste

REMONDIS SAVA specializes in the professional treatment of hazardous waste in accordance with legal regulations. The incineration plant is one of the most modern in Europe and provides thermal treatment for solid, liquid and pasty hazardous waste.

Clear objectives consistently achieved
REMONDIS SAVA fulfils its self-defined objectives for the treatment of dangerous waste by achieving high levels of responsibility and reliability:
_ Destruction and elimination of environmentally hazardous organic materials
_ Collection and concentration of heavy metals in filter dust
_ Reduction of waste volume
_ Recycling residual waste (slag, gypsum and filter dust)
_ Recovering metals (steel scrap)
_ Substituting fossil fuels with waste
_ Generating energy (feeding electricity into the public mains)

Hazardous waste treatment for industry and local communities
Since the plant was put into operation in summer 1998, REMONDIS SAVA has been ensuring that dangerous waste produced in the state of Schleswig-Holstein is disposed of safely. Since then, it is known throughout Germany and Europe as one of the most modern facilities with its state-of-the-art and environmentally sound hazardous waste disposal methods. REMONDIS SAVA has earned a reputation of being a reliable, flexible and professional partner for the disposal and recycling of hazardous waste.

The waste treated includes residual material from the chemical industry and waste from commercial products such as paints, solvents, tar, medicines, chemicals or plastics. This also includes products found in every household such as wood preservatives and varnish paint, chemicals, pesticides and contaminated packaging.

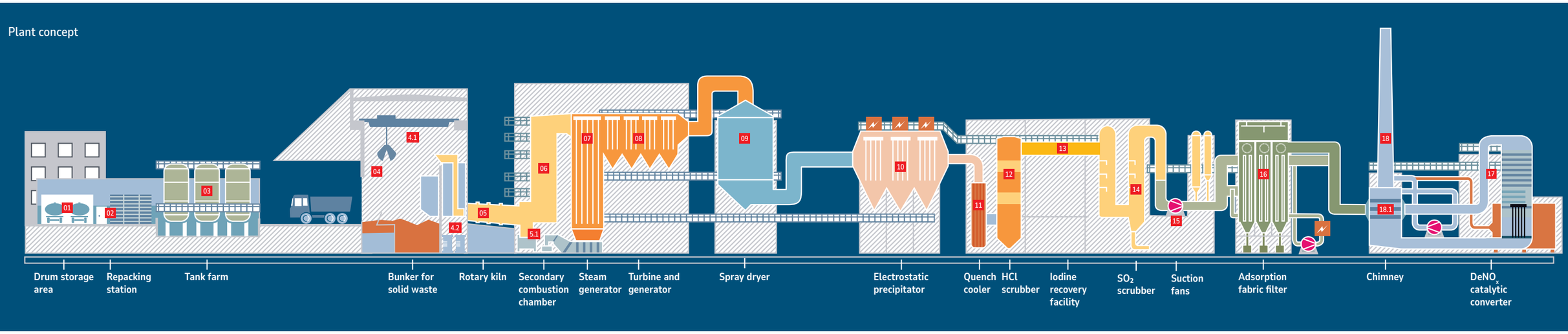
Complete range of services for the disposal of industrial waste worldwide
Since 2002, REMONDIS SAVA has been providing a specialist service disposing of obsolete pesticides and other chemicals throughout the world. Such projects have been successfully completed in Albania, Africa (Mauretania, Senegal, Cape Verde, Togo) and Romania. This full service is performed by our own specially trained and experienced field team.

Iodine recovery facility
At REMONDIS SAVA, we also have developed a globally unique process to recover iodine from waste in cooperation with a partner from Germany. The iodine-containing waste is thermally recycled in a rotary kiln. In a downstream stage, iodine is selectively separated from the flue gas. With this process, we show that vulnerable elements can be isolated from incineration. Our iodine is separated in the recovery facility with zero emissions, low energy consumption and no waste water, thus saving CO2. The iodine concentrates are ultimately supplied to the chemical industry as a raw material.

Tecnical data of REMONDIS SAVA

Energy input	24,2 MW
Annual capacity	50.000 t
Incineration technology	Rotary kiln
Inicineration temperature	950–1.200 °C
Temperature in the secondary combust chamber	> 1.100 °C
Flue gas dwelling time	> 2 sec
Steam generation	28 t/h
Power generation	max. 4,5 MW
Flue gas cleaning	8-step treatment

Thermal treatment and waste gas purification produce residual materials, slag, dust and gypsum, which are used in landfill road construction or as mining safety measures. The heat generated is used to produce electricity, with up to half of the electricity produced being fed into the public grid.



Professional Disposal

REMONDIS SAVA GmbH in Brunsbüttel was planned and constructed by experts with many years of professional experience. Right from the very beginning, priority was given to protecting the public and to environment and plant safety. The results from safety analyses have played a major role and all relevant rules and regulations concerning safety at work and fire and explosion protection systems have been followed closely.

01 Drum storage area

Up to 800 tons of waste on pallets can be stored in the drum storage area.

02 Repacking station

In the approved repacking station, waste can be repacked for the drum elevator.

03 Tank farm

Liquid waste is pumped into the tank farm which has a total capacity of 720 cubic meters. In the approved repacking station, waste can be repacked for the drum elevator.

04 Bunker for solid waste

Solid waste delivered in containers is tipped directly into the 700 cubic meter bunker where it is mixed. Bulky waste is reduced by the shredder (4.1). Chemicals, pesticides, herbicides and other kinds of dangerous waste are fed directly into the rotary kiln via a drum elevator (4.2).

05 Rotary kiln

In the rotary kiln, the heart of the plant, environmentally hazardous organic substances undergo thermal treatment and are reduced to non-toxic materials. The rotary kiln is fed specific mixtures of solid, liquid and pasty waste to ensure the combustion properties vary only very slightly. During the thermal treatment, the waste is slowly rotated towards the end of the rotary kiln. The resulting slag drops into a water pool (5.1) where it is cooled down and any metal contents removed magnetically. The recovered scrap is recycled for use in steel production.

06 Secondary combustion chamber

The secondary combustion chamber ensures the complete destruction of any remaining organic substances. For this process, the dwell time of the flue gas has to be at least two seconds at a minimum temperature of 1,100 °C pursuant to the 17th Ordinance of the Federal Emissions Control Act.

07 Steam generator

Steam with a temperature of 320 °C and a pressure of 40 bar is generated in the steam boiler. The generated steam is fed into the turbine.

08 Turbine and generator

In the turbine plant, electric power is produced by the steam from the boiler. The maximum performance of the turbine and generator is 4.5 MW. 2 MW are reserved for internal requirements, the rest is fed into the public mains.

09 Spray dryer

Following the steam generation in the boiler, the flue gas is cooled down in a spray dryer by evaporating the neutralized waste water from the quench and the HCl scrubber. Heavy metals are absorbed prior to this by a mix of lime and activated carbon.

10 Electrostatic precipitator

The dusty flue gases, which have a temperature of 210 °C, slowly flow through the electrostatic precipitator. The fine dust is collected as a result of the ionization process of the dust particles.

11 Quench cooler

The quench cools the flue gas down to saturation temperature to protect the subsequent wet scrubbing modules. The flue gases are cooled down at a very rapid rate to prevent the formation of dioxins and furans. In the quench, mercury is also extracted from the flue gas.

12 HCl scrubber

In the HCl scrubber, hydrochloric acid and other halogens as well as any remaining dust and heavy metals are extracted during a two-phase procedure. The resulting waste water is treated in a neutralisation process and then evaporated in the spray dryer (9).

13 Iodine recovery facility

Iodine is dissolved in the acid wash together with other halogens, which are present in much higher concentrations. Subsequently Iodine is selectively extracted from the so-called crude acid in our recovery plant, concentrated and stored as an aqueous solution in a product storage tank.

14 SO_2 scrubber

The alkaline scrubber (lime-milk) also operates in two stages and eliminates SOx (sulphur oxides). As a result of oxidation with atmospheric oxygen, a gypsum suspension is formed. The mixture Is then drained and converted into dry gypsum which is recycled.

15 Suction fans

The fans transport the flue gas to the chimney and generate a negative pressure in the flue gas cleaning system, which guarantees that no flue gases can leak out unmonitored – along the entire system from the rotary kiln to the chimney.

16 Adsorption fabric filter

The flue gases are heated up again so that they can be purified with activated carbon in the adsorption fabric filter. After this, a mixture of fine lime and activated carbon is injected to remove organic trace elements and residual heavy metals from the flue gas.

17 $DeNO_X$ catalytic converter

The DeNOx catalyst transforms the nitrogen oxides into nitrogen and water by adding an ammonia solution.

18 Chimney

The chimney releases the hot flue gas (approx. 140 °C) into the atmosphere at a height of 60 m. The flue gas, which first travels through a gas-gas heat exchanger (18.1), is monitored and measured continuously.

Cleaning flue gas with state-of-the-art technology

The 17th Ordinance of the Federal Emissions Control Act and the ‘Technical Instructions on Air Quality Control’ ensure that Germany has very strict emission limit values – especially compared to international standards. The emission ceilings approved for the REMONDIS SAVA plant are lower than the normal values – generally half the legally prescribed limit. By using modern technology and prudent processing methods, the figures recorded by REMONDIS SAVA remain far below these limits.

Safety and responsibility for our environment
REMONDIS SAVA ensures that hazardous substances in waste are destroyed safely by supplying the plant with a homogenous blend of different wastes. The waste mixtures are created during extensive pre-treatment processes such as, for example, the crushing of solids or the mixing of liquids by convection.

The combustion temperature in the rotary kiln and the afterburn chamber is kept at such a level that the hazardous waste is converted into an environmentally harmless material. The temperature has to be at least 1,100°C.

The emission values of REMONDIS SAVA are clearly below the prescribed maximum emission values.

Safety of the groundwater is ensured by an underground sealing coat which stretches along all the areas of the plant where materials which could pollute water are handled. The plant itself operates without waste water. Odor emissions from the bunker area are prevented by an extensive exhaust air system. All emptying stations for tank trucks and containers have suction units. This air is fed into the incineration process separately via a central collection line.

All emission data is not only checked and documented on site, but is also transmitted to the responsible monitoring authority.

Continuous monitoring
In order to ensure permanent monitoring of compliance with these regulations, the latest emission data is transmitted online to the monitoring authority. The emissions measuring station continuously records and monitors dust, CO, NOx, SOx, HCl, Hg and total C. In addition, we publish the current monthly average values on our website.

REMONDIS SAVA Emission Data

Parameter	Emission limits 17th BImSchV*	Emission limits REMONDIS SAVA*	Mean annual value of 2023
Carbon monoxide	50 mg/m³	50 mg/m³	5,47 mg/m³
Particulates	5 mg/m³	5 mg/m³	0,12 mg/m³
Carbon total	10 mg/m³	5 mg/m³	0,54 mg/m³
Hydrogen chloride	30 mg/m³	25 mg/m³	3,56 mg/m³
Sulphur oxides	120 mg/m³	100 mg/m³	78,44 mg/m³
Nitrogen oxide	0,01 mg/m³	0,01 mg/m³	0,0011 mg/m³
Mercury	10 mg/m³	10 mg/m³	0,04 mg/m³

* The emission limit values are daily limit values. REMONDIS SAVA's annual average values are well below the limits set out in the 17th Ordinance of the Federal Emission Control Act (17th BImSchV) and of the planning approval decision (PFB) of REMONDIS SAVA.

REMONDIS SAVA Annual*

Parameter	Limit value	Results of a year’s measurement
Hydrogen fluoride	1,0 mg/m³	0,1 mg/m³
Total of cadmium and thalium	0,05 mg/m³	0,0002 mg/m³
Total of antimony, arsenic, lead, chromium, cobalt, copper, manganese, nickel, vanadium and tin	0,50 mg/m³	0,02 mg/m³
Total of arsenic, benzopyrene, cadmium, cobalt and chromium	0,05 mg/m³	0,002 mg/m³
Dioxins and furans as TE**	0,10 ng/m³	0,003 ng/m³

* The results given are the maximum measured values minus the expanded measurement uncertainty.
** The toxicity equivalent (TE) is a sum value for the assessment of the total toxicity of all dioxins, furans and polychlorinated biphenyls.

The levels of heavy metals, hydrogen fluoride, dioxins and furans in waste gas are determined discontinuously once a year. In this area the values are well below the permissible limits as well.

REMONDIS®

WORKING FOR THE FUTURE

REMONDIS SAVA is part of the REMONDIS Group, one of the world's leading recycling, service and water companies. The company group has branches and companies in over 30 countries in Europe, Asia and Australia. With over 40,000 employees, the group serves millions of citizens aa well as many thousands of companies. The highest levels of quality. Working for the future.

REMONDIS SAVA GmbH
Ostertweute 1 // 25541 Brunsbüttel
T +49 4852 8308-0 // F +49 4852 8308-12
info.sava@remondis.de
remondis-sava.de