INCINERATION & FLUE GAS TREATMENT SYSTEMS

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TAKING CARE
OF YOUR WASTE

SANTES
INCINERATOR

INCINERATION & FLUE GAS TREATMENT SYSTEMS

SANTES INCINERATOR

Awards

2012
Small & Medium Enterprise (SME) of the year

2012
Successful Exporter of the Year

2013
Successful Exporter of the Year

2014
Successful Exporter of the Year

Being a leading company in the incineration business, Santes, is developing new products considering the requirements of the clients. In this respect, Santes conducts R&D studies in order to meet these requirements and makes the related testing to result a well fitted products. Thanks to these studies, we are both growing our product range and the export volume of the company.

Considering the uniqueness of the equipment, services provided, quality of engineering, R&D works, export volume and percentage of the products, we have been selected as best Small & Medium Enterprise (SME) of the year 2012. The award handed over by Former Prime Minister Recep Tayyip Erdoğan.

With the great growth in export volume of the company, we have also been awarded as Successful Exporter of 2012 and we repeat this success in 2013 and awarded by ISIB.

Similarly, as a result of the continuation of this success of being an export company with export rate of over 90%, we have been awarded with the Successful Exporter of 2014, third time by ISIB.

ABOUT US

SANTES has been specialized on incineration technology since 1990 and has Bureau Veritas Certified ISO 9001:2008 quality management system and TUV certified CE Certificate.

SANTES aims to manufacture the most efficient and feasible incinerators while maintaining the environmental quality and sustainability. In accordance with those scopes, many incinerators serving for different purposes has been manufactured and most of them has satisfied the requirements of the customers and are still in operation.

Santes has systems throughout the world designed based on different criteria according to customer requests. At this extend, we conduct our R&D studies to develop new products in order to satisfy the needs and expectations of customers from various kinds of sectors.

WHY SANTES INCINERATOR?

Tailor - made design specifically for your waste.

Various kinds of fuel can be used as a source of fuel such as diesel, LPG, natural gas, fuel oil, waste oil and JP8.

Optional automatic loading and ash removal systems.

Energy recovery options as hot water, thermal oil, hot air, steam and even electricity based on the capacity and type of the waste.

High combustion efficiency; 99.99% for organics.

Fully automated control mechanism that prevents operational handicaps & easy maintanance.

Optional flue gas treatment units as dry or wet scrubbers.

European emission standards are met; harmful gasses are treated in the gas filtering units.

High waste reduction efficiency.

What are we doing?

SANTES INCINERATOR SYSTEMS

Santes Incineration Plants

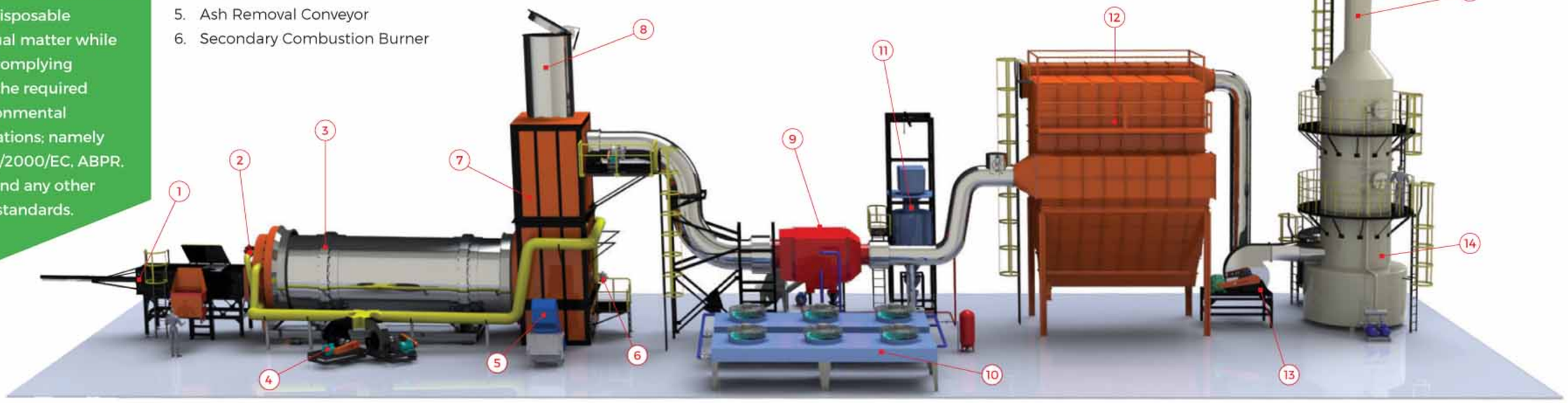
Santes Incineration Plants have been developed to incinerate organic, combustible materials and to convert these materials into harmless and disposable residual matter while fully complying with the required environmental regulations; namely EU 76/2000/EC, ABPR, EPA and any other local standards.

BRIEFLY

In the main combustion chamber, wastes are incinerated at 800-1000˚C based on the type of the waste. Flue gases originated in the main combustion chamber are re-burnt with excess air at 850-1200˚C during 0.5, 1 or 2 seconds in the post combustion chamber based on the required standards.

In order to be fully in compliance with the desired Emission Standards, Flue Gas Treatment Units are included in Santes Incineration Systems. Flue Gas Treatment is based on multi pollutants control approach to remove hazardous content of the combustion gases due to waste incineration.

1. Automatic Loading Unit
2. Primary Combustion Burner
3. Primary Combustion Chamber
4. Primary Air Fans
5. Ash Removal Conveyor
6. Secondary Combustion Burner
7. Secondary Combustion Chamber
8. By-Pass Stack
9. Heat Exchanger
10. Air Cooler
11. Chemical Dosage Unit
12. Bag Filter
13. ID Fan
14. Wet Scrubber
15. Main Stack



ADVANTAGES OF INCINERATION

- Incineration is an efficient way to reduce the waste volume and demand for landfill space,
- The weight of the waste is reduced to 15% of the initial value,
- The waste volume is reduced to almost 5% of the initial value,
- The flue gas, which is containing heavy metals and other harmful substances after the incineration process, is cleaned and emitted through the stack environment friendly way form with the help of flue gas treatment systems,
- By using the ashes for environmentally appropriate construction, low costs are provided and furthermore the need for landfill capacity is reduced,
- Possibility of producing energy in the forms of; hot water, thermal oil, hot air, steam and electricity based on the capacity and type of the waste,
- The produced residues, ash and slag as well as the developed flue gases, are odor-free compared to the partly offensive smells caused by dumps,
- Helps to reduce greenhouse gasses
- Suitable for wide range of wastes.

INCINERATOR
IS SUITABLE FOR

- Medical Wastes,
- Municipal Wastes,
- Hazardous Wastes,
- Animal Carcass Wastes,
- Wastewater Sludge,
- Oily Sludge,
- Industrial Wastes,
- Airport Wastes,
- Propellant,
- Other Organic Wastes.

DESIGN PARAMETERS
FOR INCINERATOR

- Waste Type,
- Waste Content such as Carbon, Hydrogen, Sculpture, Chlorine and Oxygen percentages,
- Water Content,
- Calorific Value,
- Organic and Inorganic (Ash) Percentages in the Waste,
- Fuel Type,
- Required Emission Standards.

Main standards set for the incineration system is given in the following table:

Parameter	EU 2000/76/ EC - Waste Incineration Directive	EPA Standards		Animal By-Products Regulation (ABPR)*
		Municipal Waste	Municipal Waste	
Opacity	-	20 %	20 %	-
Total Dust	10 mg/m³	220 mg/m³	180 mg/m³	-
SO_2	50 mg/m³	300 ppm	220 ppm	-
HCl	10 mg/m³	60 ppm	60 ppm	-
HF	1 mg/m³	-	-	-
CO		350 ppm	350 ppm	-
NOx	200 mg/m³	250 ppm	250 ppm	-
Dioxin & Furans	0,1 mg/m³	-	-	-
Lead	-	0.5 mg/m³	0.5 mg/m³	-
Cadmium	0,05 mg/m³	0.04 mg/m³	0.04 mg/m³	-
Mercury	0,05 mg/m³	0.05 mg/m³	0.1 mg/m³	-
Sb + As + Pb + Cr + Co + Cu + Mn + Ni + V	0,5 mg/m³	-	-	-
Temperature for Post Combustion Chamber	850°C**	-	-	850°C
Residence Time	2 Saniye	0.5 veya 2 Saniye	0.5 veya 2 Saniye	2 Saniye

* Animal wastes are not subject to air emission standards for the capacities smaller than 50 kg/h.

** Temperature should be above 1100°C if hazardous wastes with a content of more than 1 % of halogenated organic substances, expressed as chlorine, are incinerated.

MEDICAL WASTE INCINERATION SYSTEMS

Medical waste, due to its content of hazardous substances, poses serious threats to environmental health. They composed of all types of wastes generated by health care organizations such as hospitals, clinics, physicians' offices, dental offices, veterinary facilities and other medical laboratories and research facilities.

Medical wastes that can be incinerated include:

- Infectious wastes from hospitals,
- Healthcare wastes from hospitals, clinics and polyclinics,
- Wastes from maternity hospitals,
- Expired drugs,
- Surgery wastes,
- Biomedical wastes,
- Pathological wastes,
- Pharmaceutical wastes.

Advantages of Medical Waste Incineration over Other Methods:

- Suitable for every type of medical wastes generate in hospitals including types A, B, C, D, and E.
- Much smaller area requirement when compared to landfilling or storage,
- No odor problem if properly designed,
- No ground water contamination risk as in landfilling,
- Much less end-products unlike other methods of handling such as sterilization or autoclave disinfection,
- Volume reduction as much as 95%,

Medical Waste Incinerators has two combustion chambers. In the main combustion chamber wastes are incinerated in 1000 °C with the principle of starved air incineration and the flue gas originated in this chamber is directed to the secondary combustion chamber. In the secondary combustion gases formed during the incineration of wastes in the main combustion chamber are re-burnt at 1200 °C during 2 seconds. Excess air is provided to the secondary combustion chamber to achieve complete combustion of organic content of the waste.

Disadvantages of autoclave:

- Not Suitable for All Waste Types
- Requires trained staff for operation,
- Inability to change waste appearance,
- Inability to change waste volume,
- Production of uncharacterized air emissions,
- Load density critical to treatment,
- Ergonomic Concerns.

HAZARDOUS WASTE INCINERATION SYSTEMS

Hazardous wastes can be in the form of liquid, solid, gas, or sludge. They can be discarded commercial products, like cleaning fluids or pesticides, or the byproducts of manufacturing processes. All hazardous waste in the form of solid, liquid, gas and sludge can be destroyed by Santes Incineration system.

Hazardous Waste Generators:

- Chemical Manufacturers,
- Printing Industry,
- Petroleum Refining Industry,
- Leather Products Manufacturing,
- Paper Industry,
- Construction Industry,
- Metal Manufacturing.

ADVANTAGES OF SANTES

INCINERATOR FOR HAZARDOUS WASTE

- Hazardous waste incineration method is suitable for a wide range of hazardous wastes such as highly flammable, volatile, toxic and infectious waste streams which should not be landfilled,
- Santes Incinerators designed to be fully in compliance with desired emission standards,
- Moisture content causes no problem,
- Produces clean ash in small volumes,
- Produces no dioxins even with added chlorine,
- Product gas has a much higher heating value,
- Feed contaminants, such as chlorine & sulfur, are reduced to their acid forms,
- Possibility of energy recovery.

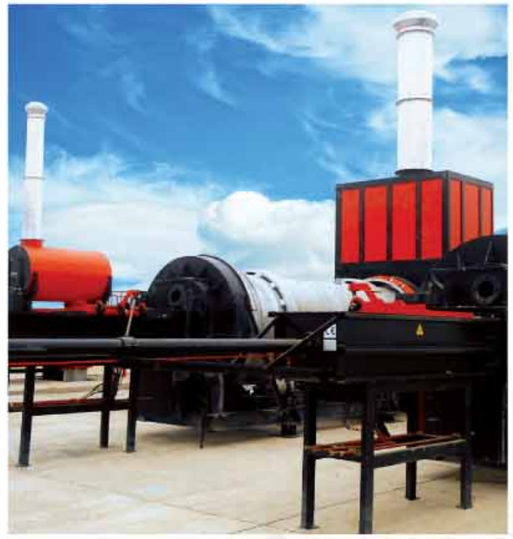
FUTURES OF SANTES HAZARDOUS

WASTE INCINERATION SYSTEM

- 1000˚C of Primary Combustion Chamber,
- 1200˚C of Secondary Combustion Chamber,
- Can be designed fully in compliance with EU/2000/76/EC or EPA standards thanks to flue gas treatment units,
- 0.5, 1 and 2 seconds residence time options,
- Automatic loading and ash removal system options.

MUNICIPAL WASTE INCINERATION SYSTEMS

Incineration system provides an effective means of reducing the volume of MSW as well as providing an important source of energy. Produced steam can be used purpose of heating or power generation.



Municipal waste incineration system is designed with the consideration of several types of municipal wastes; including paper/ cardboard (packing material), plastic (foil, bottles, and dishes), metal cans, food-waste, cloth, garbage etc.

Waste is turned into ash and combustible gases at 1000˚C in primary chamber and primary chamber is designed as a rotary kiln for the systems with the capacities higher than 300kg/h. Originated gases are further combusted in secondary combustion chamber at 1100˚C for 2 seconds.

Incineration vs. Landfilling

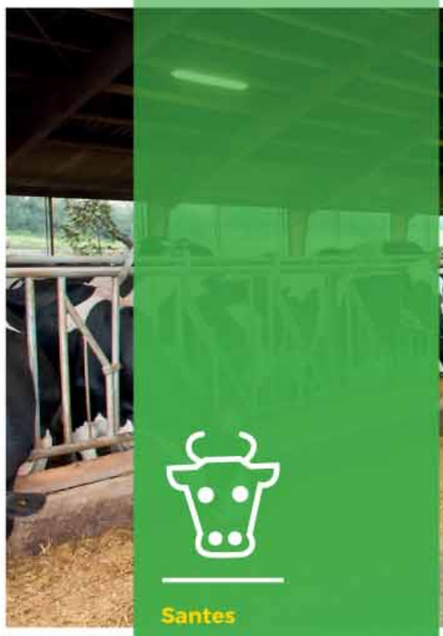
LANDFILLING	INCINERATION
- Hazardous gases emitted from landfill sites that cause local air pollution and contribute to global warming.	- Santes Incineration Systems includes Flue Gas Treat-ment and Emissions are in compliance with EU Waste Directive 2000/76/EC, US EPA or local desired standard.
- Pollution of the local streams occurred via toxic materials seeping through the ground from the landfill.	- Any end product of the Santes Incineration System does not lead such a problem.
- Landfills occupies quite big area for disposal.	- Incinerator does need very small area for incineration and can be used as a source of energy production of electricity, steam, hot water or hot oil.

ANIMAL WASTE INCINERATION SYSTEMS

Animal wastes from various sources need to be handle with special care. Santes offers well-suited solutions for specifically designed for your animal wastes.

Animal wastes include:

- Poultry animals infected from Bird Flu Disease,
- Farm animals infected from Swine Flu Disease,
- Farm animals infected from Mad Calf Disease,
- Animal Carcasses form Slaughter houses,
- Experimental Animals,
- Animals from Veterinary Applications,
- Poultry animals from farms,
- Pet Crematoriums,
- Animals from zoo.



Santes Animal Waste Incineratorsare designed specially for safe destruction of animal by¬products originated from various sources and listed above. Santes Incineration Systems are fully in compliance with the EU Animal By-Products Regulation (EC 1774/2002).

Santes Animal Carcass Incinerators are designed in such a way that the gas resulting from the process is raised in a controlled and homogeneous fashion, even under the most unfavorable conditions, to a temperature of 850˚C with 2 second residence time.

For on-farm use, Santes developed Incinerator Systems with the capacity of less than 50 kg/h so that these incinerators are classified as low-capacity range incinerators and exempt from planning permission.

OILY SLUDGE INCINERATION SYSTEMS

Environmental contamination by petroleum and its derivatives is a serious problem worldwide. Considerable amounts of hydrocarbons have been released into water and soil as a result of pipeline leaks, transport accidents, and storage tank ruptures.

Oil extraction and processing operations produce large volumes of oily sludge, which can constitute a severe pollution problem for this industry. The oily sludge contains crude oil (10-60%), water (30-90%) and petroleum solid particles (5-40%) in various proportions depending on its origin.

Oily sludge waste incineration system has been developed by Santes for the sludge from different applications. It is possible to generate energy from the oily sludge waste incineration systems since the calorific value of waste is usually very high. Therefore, Santes offers heat exchanging systems to recover energy in forms of steam, hot water and hot oil as well as electricity.

DEMILITARIZATION

Santes is one of the leading companies for designing and manufacturing Propellant Waste Incineration Systems in the scope of Demilitarization Projects. Propellant wastes include solid rocket fuel, gun powder, M1SU, M9SU M1 to M7. Since the volume of these wastes can expand enormously when it is attempted to incinerate such wastes and to avoid big deflagrations, waste amount to be fed to the furnace in each batch should be minimized. Santes takes this issue into consideration while making the design of these systems. The furnace is designed as a static furnace in order to minimize the escape of exhaust gas during deflagration.

Propellant waste incineration systems are designed fully in compliance with EU Waste Incineration Directive (2000/76/EC). In the system there exists static furnace for destruction of the wastes. Flue gas treatment units are included in the system to be in compliance with the emission standards given in 2000/76/EC.

Sludge is a great problem for wastewater treatment plants. This problem grows every day since the amount of sludge increases continuously and the land required for the storage of the sludge. Moreover, it has some other problems like odor when it is kept in open areas. Furthermore, for the land application of sludge there exist some limiting factors such as heavy metal content. In the case of land application, harmful effects of the sludge will be presented on soil, vegetation, animals and humans.

SLUDGE FUELISATION SYSTEM

Landfilling is not a solution for sludge disposal. On the contrary, it creates other problems and it has a great cost for the transportation and Landfilling. EU regulations states that wastes are to reduce

- by 2010 the amount of biodegradable municipal waste sent to landfill to 75 per cent of that arising in 1995,
- with further reductions to 50 percent by 2013 and
- 35 percent by 2020.

Therefore, Landfilling seems not to be a solution for sludge handling.

At this point, Santes offers a system which decreases the total volume of the sludge to about 5% of its original volume with the name of Sludge Fuelisation System. Within this system, Sludge first fed to the drying unit and dried sludge is directed to the incineration unit.

With the incineration of dried sludge necessary energy for the drying process is provided. Santes Sludge Fuelisation System consists of 2 processes which are;

- Sludge Drying System and
- Waste Incineration System

SLUDGE DRYING SYSTEM

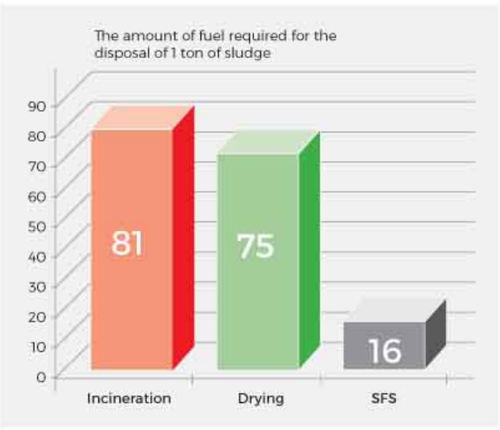
Drying process is based on granulated sludge with granulated equipment. This equipment provides aerateable layer with a large surface is formed which is essential for an efficient drying process.

The product is dried down to the desired moisture content. Afterwards it is transferred to a collecting conveyor belt.

At the end of this process, sludge has a 95% solid matter and only 5% of water. This process both decreases the amount of sludge to be incinerated and increases the calorific value of the sludge. The calorific value of the sludge increases about 300% of its original value. Therefore, this dried product can be fed to following incineration unit as an energy source.

SLUDGE INCINERATION SYSTEM

Sludge incineration system is for combustion and destruction of dried sludge. With this incineration system, sludge is turned into ash and can be safely disposed into waste deposition sites or can be used as packing material.



SPECIFICATIONS OF SLUDGE

INCINERATION SYSTEM

- Air tight loading of dried sludge via screw (helical) feeder,
- Fully automated and controlled by Program Logic Controller (PLC),
- Combustion of dried sludge at 1000°C,
- Resulted ash with the volume of 5% of initial value,
- Energy recovery with the help of heat exchanger unit to provide necessary energy for drying,
- Includes flue gas treatment system to be in compliance with the emission standards.

ADVANTAGES OF THE SLUDGE

FUELISATION SYSTEM

- Destruction of organic matter
- Destruction of living organism, therefore elimination of health problems that may be occurred due to untreated sludge,
- Less investment and operation cost,
- Safe disposal and independence for operators.
- Minimum area needed,
- Minimized transportation costs,
- Minimized insertion of pollutants in the environment,
- Use of heat for sludge drying so that optimized energy usage,
- Outstanding energy efficiency,
- Full compliance with the desired standards such as European Directive on Waste - 2000/76/EC, EPA or any local standards.

Flue Gas Treatment Systems are mainly used to be fully in compliance with desired emission standards. These units are designed based on the content of the waste. Flue Gas Treatment System is a multi-pollutant control approach to remove the hazardous content of combustion gases originated from different sources. All flue gases have different characteristics; therefore has to be considered individually.

FLUE GAS TREATMENT SYSTEMS

In order to obstruct harmful effects of flue gases, their concentrations have to be reduced to definite levels, mentioned in the regulations. Two main regulations for the whole world are EPA and EU 2000/76/EC standards.

SANTES offers cost-effective and reliable gas cleaning solutions to comply with the most stringent emission standards for various kinds of plants from different sectors.

There are two main methods in flue gas treatment systems; namely:

- Dry Scrubber
- Wet Scrubber.

DRY SCRUBBERS

Dry scrubbing units include cyclone, reactor and bag filter units.

CYCLONE

- Used for removal of course particulate matter from the flue gas,
- Easy to operate,
- Very low operation cost,
- Application range is wide,
- Can be used at very high temperatures as much as 1000°C,
- Allows to be used in high corrosively,
- Withstands dust concentrations as high as 2000 g/m³.

REACTOR

- Based on sorption principles,
- Uses activated carbon for dioxin & furan and heavy metal removal,
- Uses hydrated lime or sodium bicarbonate for acidic content removal such as SO_2 and HCl,
- No water consumption,
- No slurry or waste water production,
- Low waste disposal costs,
- Lower pressure loss.

BAG FILTER

- Used for removing particulate matter from flue gas with very high efficiencies,
- Has jet pulse cleaning mechanism for self-cleaning,
- Superior to other particulate removal system,
- Easy to operate,
- Able to remove very small particles,
- Wide range of applications from 500 Nm³/h to 500000 Nm³/h.

Wet Scrubbers are working with the principle of liquid spraying into gas to remove:

- Acidic content such as SO_2, HCl and HF,
- Particulate Matters

WET SCRUBBERS

Wet scrubbers are used to absorb soluble gases into water or other liquids such as solutions and to remove particulates from gas streams by contacting with water or other liquid. In order to eliminate gaseous pollutants such as SO_2, HCl, HF, flue gas is quenched with the special solutions in liquid droplets sprayed to the combustion gas alkaline solution is injected to the gas coming from the dry scrubber.

SANTES Flue Gas Treatment Systems are designed with the alkaline solutions. Moreover, they are designed in such a way that they are economical, simple to operate, and can easily be fabricated of corrosion-resistant materials. Removal efficiency of pollutants is improved by increasing contact time in the scrubber or by the increase of surface area of the scrubber solution by the use of a spray nozzle or packing material placed into the scrubbing towers.

In SANTES Flue Gas Treatment Systems, there are 2 types of wet scrubber units:

- Venturi Scrubber,
- Wet Scrubber Towers

VENTURI SCRUBBER

- Able to remove particles with high efficiencies,
- Gas enters from the top of the unit and moves in the same direction with water,
- Main removal is achieved in the throat section of the unit. For efficient removal, gas is passing through the throat with very high speed,
- Even small particles can be removed by venturi scrubber,
- In addition to the particle removal, temperature decrease is achieved in the venturi scrubber,
- It has very high removal rates when it is compared with the other treatment methods.

WET SCRUBBER TOWERS

Spray Towers or Packed Bed Towers are applied based on the concentration of the pollutant and required removal efficiency. General characteristics for Wet Scrubber Towers are:

- Both gaseous and particulate matters can be removed in these towers. However, mainly used for gaseous pollutants,
- While water and flue gas creates countercurrent flow and interfere with each other, treatment of pollutants take place,
- In the wet scrubber unit, flue gas is quenched with NaOH solution in liquid droplets and solution is recycled and the system works as a closed circuit,
- pH of the system adjusted automatically.

SPRAY TOWERS

- Consist of empty cylindrical vessels made of stainless steel or FRP,
- Includes clog-free nozzles to spray liquid into the vessel,
- Nozzles are placed across the tower at different heights to spray all of the gas as it moves up through the tower,
- Low pressure drop when compared to other filtration units,
- High removal efficiency around 85% for SO_2 and HCl

PACKED BED TOWERS

- Consist of special packs made of stainless steel,
- Includes clog-free nozzles to spray liquid into the vessel,
- Higher pressure drop when compared to other filtration units,
- Very high removal efficiency around 99% for SO_2 and HCl

VOC (UOB) ABATEMENT SYSTEMS

VOC: Common Problem in Industrial Plants

Volatile organic compounds (VOC) which are one of the main components used in many industrial process suddenly evaporates when contacted with the air and causes serious health effects and adverse environmental effects.

Main industries facing with VOC problem are:

- Paint industry,
- Solvent producers,
- PET and PET film manufacturers,
- Packing industry,
- Printing & lamination,
- Chemical processing,
- Aluminum extrusion painting,
- Can/coil coating,
- Floor/wall coverings,
- Metal finishing & recycling,
- Plastic finishing & recycling.

Santes provides a cost effective solution with high destruction efficiency having low fuel consumption called RETOX.

Reduce Your Operation Cost with Proper Selection of the Technology

The selection of the technology is a very important step in VOC abatement since the selection of the applicable technology will affect the operation cost of the system.

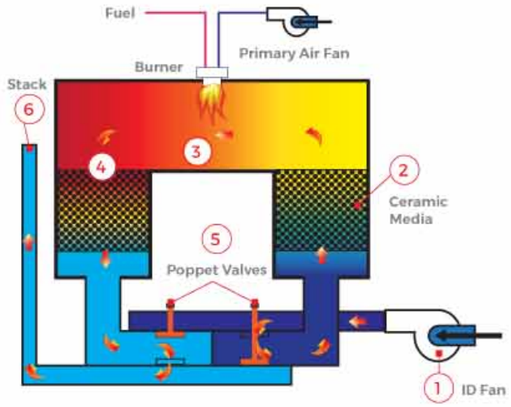
- There are 3 major abatement technology for VOC handling namely;
- Regenerative thermal oxidation (RTO),
- Thermal oxidation and
- Adsorption technology with activated carbon.

In adsorption technology, all the process is physical rather than the chemical which results as a limited performance when compared with the other technologies and it is not suitable for all kinds of pollutants. The initial cost of the system is very low; on the other hand the constant requirement of the activated carbon increases the operation costs.

Thermal oxidation systems depend on the chemical oxidation of the compounds and convert the VOC's to CO_2 and H_2O at very high temperatures (about 850°C). The destruction efficiency of this technology is very high whereas the fuel consumption is also very high.

HOW RETOX WORKS?

1. VOC containing flue gas is introduced from the inlet section of the system via fan.
2. Special poppet valves direct the flue gas into the first column where the energy of the gas is recovered and the flue gas is preheated. In this section, the flue gas and VOC is progressively heated and directed to the combustion chamber.
3. 850°C is provided in this combustion chamber in order to fully oxidize the contaminants and provide complete removal.
4. Then, the flue gas is directed into the second column in order to recover the energy inside the gas and to transfer it to the next coming gas stream.
5. Once the energy in the first column is completely used, then the flue gas stream is switched to the other column to make the recovery continuous.
6. Cleaned gas is emitted from the stack to the atmosphere.



ADVANTAGES OF SANTES

RETOX SYSTEMS

- No fuel consumption when there is enough VOC in the stream,
- Very high removal efficiencies 99+%,
- Lowest possible operating costs,
- Minimal maintenance requirements,
- Low electricity consumption thanks to special heat recovery media,
- High thermal recovery efficiency up to 95%,
- Cost effective design and low capital cost,
- Ability to design and manufacture 2 can and 3 can systems,
- Operator friendly solution with PLC integrated system

WASTE SEPARATION SYSTEMS

Material separation is very important step in the waste cycle. Advantages of waste separation can be summarized as:

- Recycling Saves Energy,
- Recycling Saves Environmental Conditions and Reduces Pollution,
- Recycling Saves Natural Resources,
- Economic Benefits of Recycling,
- Recycling Saves Space for Waste Disposal.

WASTE SEPARATION

UNIT INCLUDES

- Waste collection hopper,
- Belt conveyor,
- Metal separator,
- Platform,
- Compactors and balers.

SANTES
INCINERATOR

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