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A Process Combustion Corporation Company

ENVIRONMENTAL PROTECTION · ENERGY CONSERVATION
PROCESS COMBUSTION CORPORATION
Since 1969
ISO 9001
SOLUTIONS FOR YOUR AIR POLLUTION CONTROL NEEDS

WET SCRUBBERS

For Acid Gas Absorption

Wet Scrubbers - Systems Expertise

Two FRP Absorption Systems for a Hazardous Waste Thermal Oxidizer

AirPol supplies air pollution control systems on an "Engineering Only" or a "Complete Turnkey" basis, as well as anything in between. We have outstanding expertise in design and supply of complete systems.

We specialize in combination systems for applications such as hazardous waste incineration, requiring quenching of the gases gas from 2,500°F to the adiabatic saturation temperature in a split second to prevent the creation of dioxins. Further treatment may include particulate removal, acid gas absorption, subcooling of the gas and final treatment for particulate and heavy metals removal in an AirPol wet electrostatic precipitator.

AirPol offers a "Total Service" concept. Every system is specifically designed for each application. We provide in-depth process knowledge and engineering expertise in addition to offering a complete package to meet any needs.

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For over 50 years, we have designed and built over 1,400 systems for all conceivable applications in many different industries.

AirPol Absorbers

This brochure describes AirPol's three major absorption scrubbers:

♦ Open Spray Towers ♦ Packed Towers ♦ Tray Towers

Acid Gas Control

There are many kinds of industrial acid gases. The most common are sulfur dioxide (SO_2 gases), hydrogen chloride (HCl), hydrogen fluoride (HF), hydrogen bromide (HBr), hydrogen sulfide (H_2S), etc. In order to efficiently remove these contaminants from a gas stream, a chemical reaction with an alkali is usually required.

AirPol Packed Tower for Hazardous Waste Incinerator

Reagents

The most common reagents used by AirPol are:

- Sodium hydroxide (NaOH) also called caustic soda or caustic
- Sodium carbonate (Na_2CO_3) also called soda ash
- Magnesium hydroxide ($Mg(OH)_2$)
- Calcium hydroxide ($Ca(OH)_2$) derived from lime
- Hi-Mag Lime (calcium hydroxide with magnesium additive)

AirPol air pollution control system consisting of two quench-absorber trains for a hazardous waste incinerator plant.

Material Selection

The material of construction in a wet absorber is of utmost importance. Gas temperature, type of acid gas, particulate erosion, composition of the recycle liquid, etc. must be considered.

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- Magnesium hydroxide ($Mg(OH)_2$)
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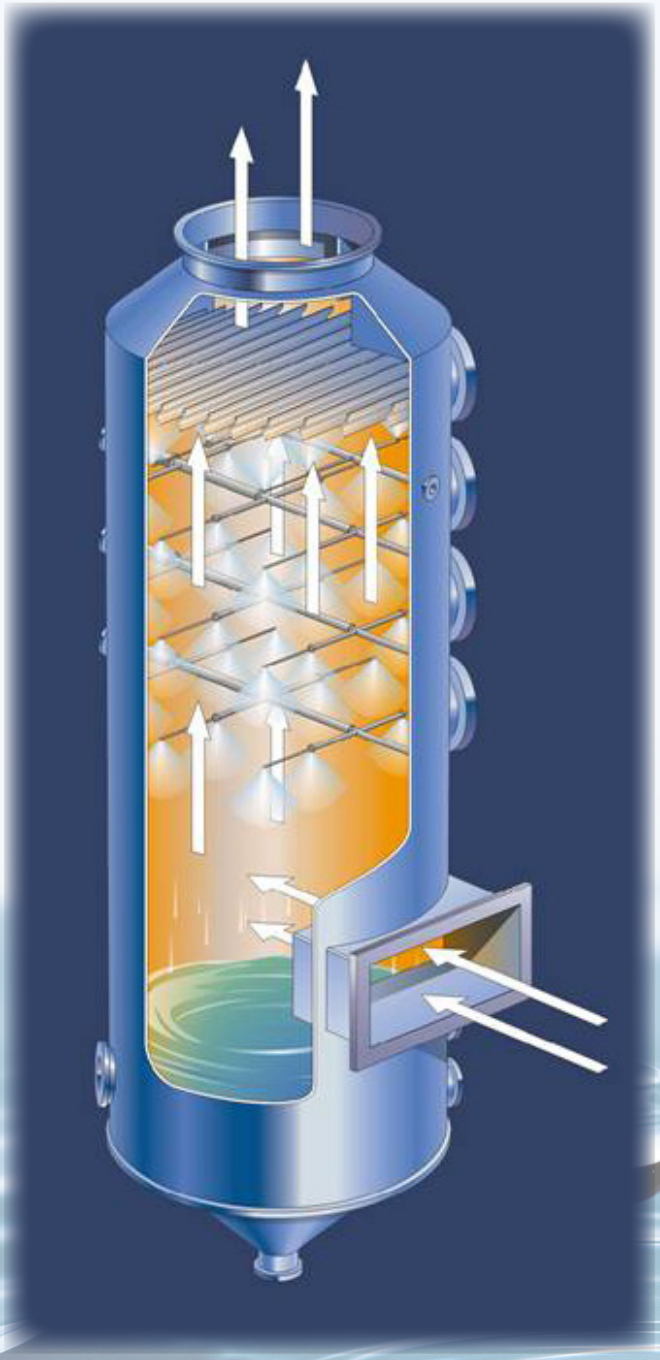
Open Spray Tower

The Open Spray Tower is a vertical vessel with a number of spray zones. At the bottom of the tower is a liquid reservoir, from which recycle pumps supply liquid to each spray zone. Above the upper spray header is Mist Eliminator that will remove all liquid droplets from the gas. The mist eliminator is provided with a fresh water wash spray that prevents build up of reaction salts.



Typical Applications

- SO_2 Absorption of boiler flue gas
- HF absorption in the aluminum industry
- Lime Sludge Kilns

Advantages of AirPol Spray Towers

- Very high absorption efficiency
- Low pressure drop
- No scaling or build up of solids
- No nozzle plugging
- Accommodate high gas temperatures
- Tolerate high dust loadings
- High efficiency mist elimination

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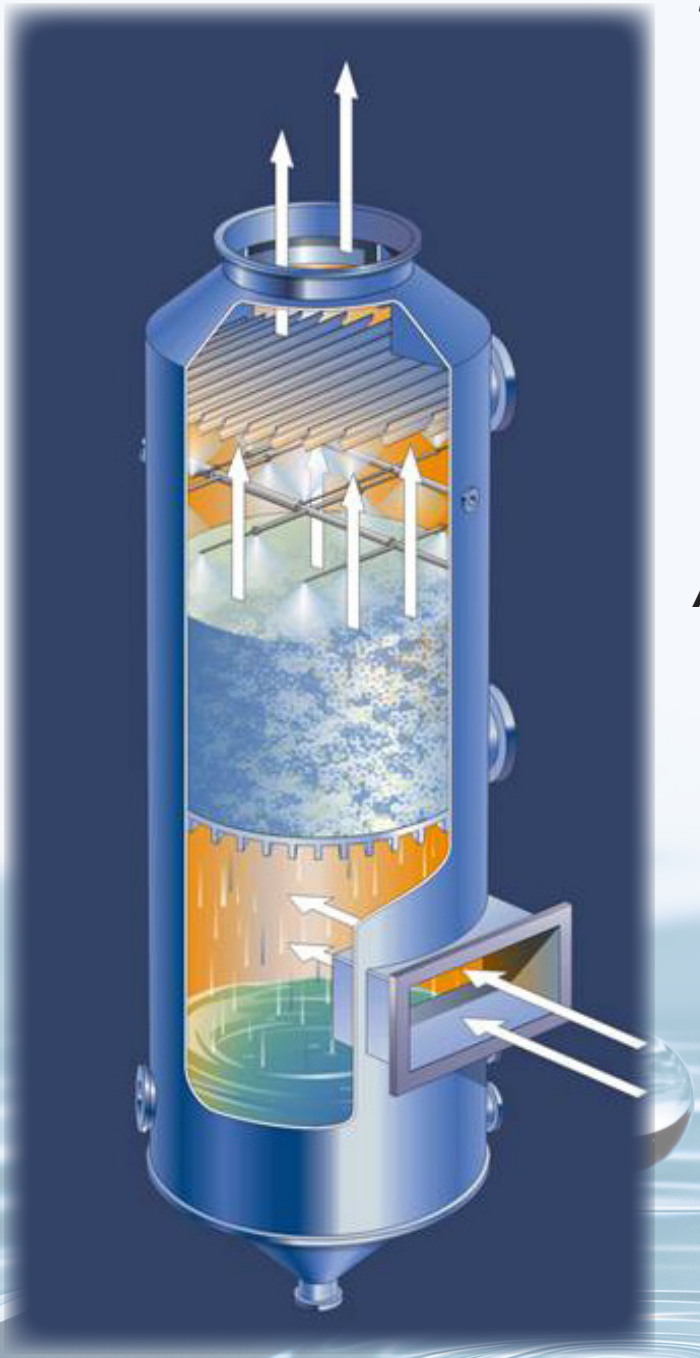
Packed Tower

The AirPol Packed Tower effectively absorbs acid mists, odors and gaseous compounds through the counter-current flow of gases and scrubbing liquid over a packed bed. The action provides intimate contact needed for efficient, thorough absorption and chemical reaction required for a wide range of industrial processing operations. The counter-current Packed Tower will outperform any scrubber available today.



Typical Applications

- Incineration
- Fluorine Gases
- Sulfur Dioxide Gases
- Hydrogen Chloride Gases
- Chemical Processing
- Plating Operations
- Steel Pickling

Advantages of AirPol Packed Towers

- Higher collection efficiency for low cost operation
- Lower pressure drop for economical energy use.
- Offer a wide variety of packing materials to meet application requirements.
- Constructed of corrosion-resistant materials: reinforced fiberglass, stainless steel and higher alloys on request.
- No moving parts or high velocity areas assure maintenance and trouble-free operation.
- Gas channeling is prevented by proper spacing of internal components which results in increased efficiency.
- Other standard features include: access doors, lifting lugs, hold-down lugs and best available packing for the specific application.

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Tray Tower

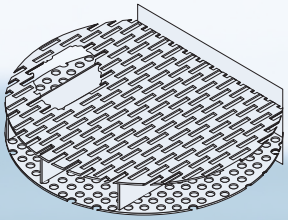
The trays are in principle perforated plates, upon which a layer of liquid is kept at a certain level by a weir. Typical examples of trays are shown below. After leaving the top tray, the gas passes through a mist eliminator for droplet removal.

Typical Applications

- Particulate Removal
- Acid Gas Absorption
- Gas Cooling

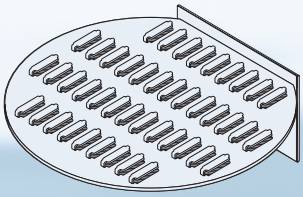
Advantages of AirPol Tray Towers

- Good particulate removal
- High absorption efficiency
- Excellent gas cooling
- Accept high gas temperatures
- Medium pressure drop
- Resistant to solids build-up
- High efficiency mist elimination



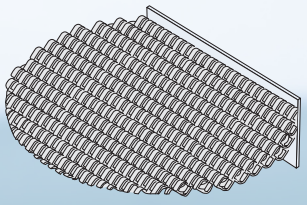
Impingement Tray

A dual layer tray provides intense gas-liquid mixing. It cools and absorbs gases and removes fine particulate. The bottom layer divides the gas stream into a myriad of small bubbles while the upper layer provides a target area for impingement and additional break up of air bubbles above each orifice.



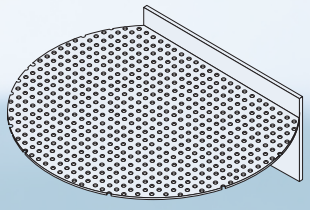
Valve Tray

An adjustable impingement tray maintains constant efficiency and pressure drop via a movable self-adjusting cap for varying gas volumes. The tray design also provides effective cooling capabilities and gaseous absorption.



Tubular Slot Tray

The tubular slot tray has been designed especially for gases with high particulate loadings. It provides excellent cooling and gas absorption and resists plugging from heavy concentration of particulate and fibrous material.



Sieve Tray

A multi-orifice plate in which a gas stream is sub-divided into numerous jets as it penetrates a layer of water on the tray. It is used primarily to cool a saturated gas stream, reduce gas volume, and condense steam plumes.

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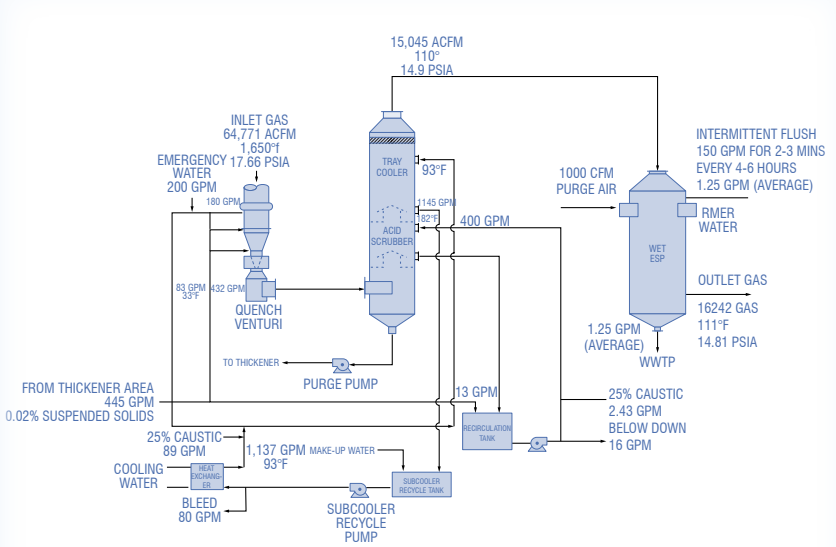
AirPol Integrated Systems

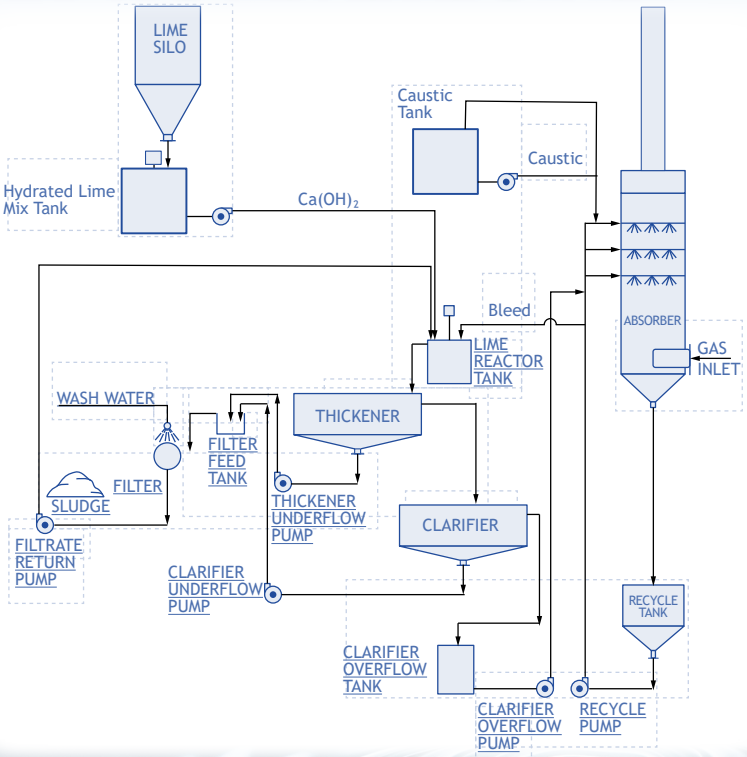
The different Acid Gas Absorbers are in many cases integrated with Quenchers, Particulate Scrubbers or Wet Electrostatic Precipitators (WESP) to form combination systems in order to attain the required end result. AirPol has many years of experience and expertise in a multitude of combination systems.



One typical example is a Quencher Venturi, for temperature reduction and particulate control, followed by a Packed Tower, for acid gas absorption, and finally a WESP for heavy metals control.

Another example is the AirPol Dual Alkali System, that combines the very high acid gas absorption with the simplified disposal of a lime by-product.

AirPol Dual Alkali System



The flow sheet shown is a simplified version of the AirPol patented Dilute Dual Alkali System, using caustic as absorption reagent in the Absorber and hydrated lime as external reagent for disposal. Another version of the system uses soda ash as internal and pebble lime as external reagent. Both versions work equally well.

The use of sodium in the Absorber has many advantages such as the highest attainable acid gas removal and ease of operation with no scaling and build-up problems.

The external reaction between sodium and calcium regenerates the sodium for re-use in the Absorber and yields a calcium based by-product, which can be disposed of in a landfill without leaching into the ground.

The AirPol Dilute Dual Alkali System thus has a very high efficiency and low operating cost and combines the best features of a sodium system with that of a lime based system.

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AirPol SYSTEMS

- **Particulate Control**
- **Venturi and Cyclonic Scrubbers**
- **Acid Gas Control**
- **Absorbers**
- **Particulate/Heavy Metal Control**
- **Wet Electrostatic Precipitators**
- **Integrated Systems**

Air Pollution Control Systems
The ULTIMATE Choice

Services: *Engineering ♦ Design ♦ Consulting ♦ Pilot Testing ♦ Turnkey Systems*

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