AirAdvanced® **Treatment**

Regenerative Thermal Oxidation (RTO)

Advanced Systems for VOC and Odor Treatment

DESCRIPTION OF THE TECHNOLOGY

The **Regenerative Thermal Oxidation (RTO)** system by SUEZ AIR & CLIMATE efficiently **purifies gases contaminated** with Volatile Organic Compounds (VOCs) and other odorous substances. This technology achieves a purification efficiency of over 99.5% for emissions contaminated with VOCs or odors.

Thermal oxidation systems elevate the temperature of the gases to be treated, typically to around 750-850ºC, and up to 950ºC if the application requires it, **converting VOCs into carbon dioxide and water vapor**. These compounds can then be safely emitted into the atmosphere in compliance with current regulations.

Oxidación térmica

Before entering the RTO, gases may pass through a **rotary concentrator**, a pre-concentration unit that combines **zeolite adsorption with catalytic technology**. This additional system is particularly useful for gases with very high VOC concentrations. Air passes through the rotary concentrator, where VOCs are adsorbed onto the zeolite, allowing clean air to be emitted into the atmosphere. The adsorbed compounds **must then be treated in an RTO**, especially for exhaust gas processes with high concentrations of volatile organic compounds.

ADVANTAGES AND BENEFITS OF THE SOLUTION

Incorporation of heat recovery elements, **minimizing consumption and operating costs**.

Autothermal operation achievable when gas concentrations exceed 0,9-3 g/Nm^3

Best available technique (BAT) listed in the BREF for Surface Treatment Using Organic Solvents

KEY FIGURES

>99,5%
Purification Efficiency

>95%
Energy Recovery Efficiency

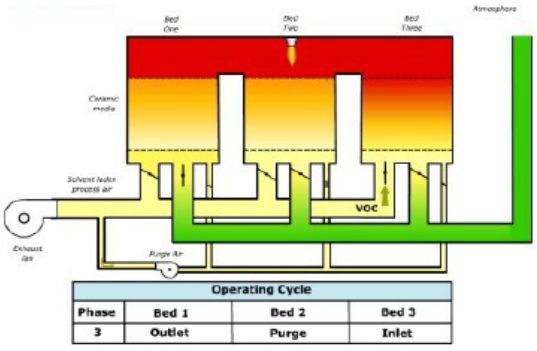
800-850ºC
Operating Temperature

DESIGN AND EFFICIENCY DATA

The **three-bed RTO** process begins with preheating the gases through a **ceramic heat exchanger** with an energy recovery efficiency exceeding 95%. The gases then enter the combustion chamber, where they are maintained at **the oxidation temperature** (approximately 1 second) using an auxiliary gas burner, oxidizing the VOCs into CO2 and H2O. Subsequently, the hot gases pass through a **second ceramic bed**, transferring their accumulated heat.

The operation of an RTO system is cyclic. When a ceramic bed becomes hot after being traversed by treated gases at high temperatures, the flow direction is reversed, allowing cold contaminated gases to pass through. This way, the bed releases its heat, preheating the gases sufficiently for the combustion chamber. When the bed cools, the gas flow direction is reversed again.

To enhance process efficiency and prevent the transfer of contaminants to the atmosphere during flow direction changes, RTO systems are designed with three ceramic beds. Before a bed that functioned as an inlet switches to function as an outlet, it undergoes a purge, which is directed to the inlet.



Operating Cycle			
Phase	Bed 1	Bed 2	Bed 3
3	Outlet	Purge	Inlet

INDUSTRIAL APPLICATIONS

RTO technology has a **wide range of applications** in various industries and processes, including:

- Treatment of solvent emissions in the chemical and pharmaceutical industries
- Printing processes
- Surface, wood, and metal coating industries
- Automotive auxiliary industries
- Rendering industry
- Roasting processes in the food industry
- Environmental infrastructures (waste treatment or drying plants)

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