EISENMANN

EXHAUST AIR PURIFICATION
EFFICIENT AND COST-EFFECTIVE PROCESSES

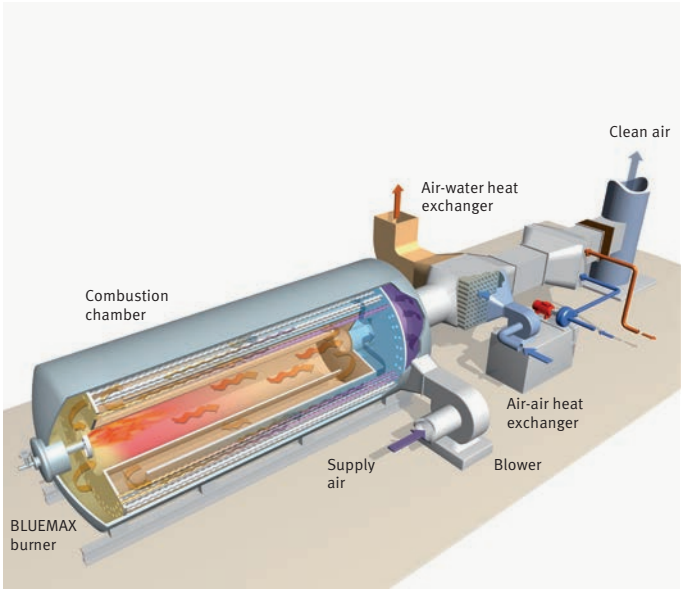
The decision what method constitutes the most economical solution in each individual case is determined by the following factors: the exhaust air volume, type and concentration of the emitted pollutants, exhaust air temperature, the value of the recovered materials, and especially whether the released energy can be directly recycled into the production process.

Thermal treatment
The fastest and safest method to eliminate volatile organic pollutants is oxidation. In this process, the polluted air is heated to the point where the majority of the organic materials oxidize into water and carbon dioxide.

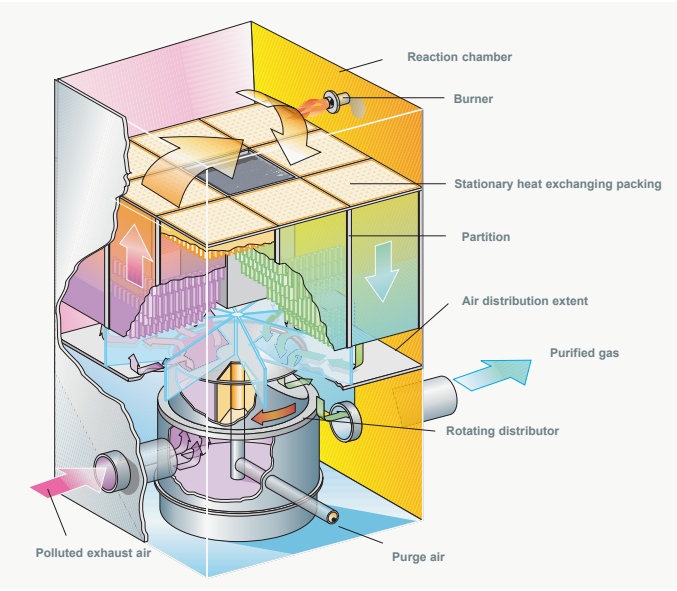
Recuperative thermal oxidation
In cases where the excess energy can be recovered and reused in the production process, recuperative oxidation is unbeatable. This process is known to be robust, safe and universally applicable.

Initially, the polluted exhaust air passes through a heat exchanger where it is pre-heated by the already purified exhaust air before being oxidized in the combustion chamber at a reaction temperature of 750°C. This ensures that the clean gas remains well under the required emission limit of 20 mg C/Nm³. Furthermore, low CO and NOx values in the purified gas are achieved.

The need for additional fuel depends essentially on the pollution content of the exhaust air and the degree of pre-heating available. The burner system from Eisenmann ensures that the required oxidation temperature will be maintained.



Oxidizer with integrated heat exchanger.



RTO cross section with rotating air distributor.

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Additional heat recovery systems can be added if there is a continuous need for additional energy. The heating of recirculating or fresh air, hot and warm water preparation or the heating of thermal oil and the generation of steam lend themselves to this purpose.

Regenerative thermal oxidation
Due to its minimal use of additional energy, and cases where recovered energy cannot be reused, the trend clearly goes towards RTO. In the design developed by Eisenmann complicated valve technology by a special air distribution system without expensive control technology.

Eisenmann's RTO system is characterized by simple and robust design and low investment and operating costs. Depending on the model size, the single reactor-system purifies exhaust airflows with a volume of 2,000-120,000 Nm^3/h at low space requirements. For larger volumes of air, several reactors are installed in parallel.

The material used for the regenerative heat exchanger mass in the reactor can be random packing or layers of structured ceramics. The heat exchanger bed is comprised of separate sections, where alternately one part functions as cooling stage and the other as the heating stage. The exhaust air passes vertically upward through the heat exchanger mass taking on the heat and raising the air temperature close to the oxidation of the pollutants at approx. 800°C. The hot purified gases passes downward through the other part of the heat exchanger mass transferring its energy back to the exchanger. This cools down the purified gases.

Adsorption
In contrast to the thermal processes mentioned before, adsorption operates without converting pollutants or temperature increase.

Concentrator unit
The wheel consists of chambers concentrically positioned around a shaft containing activated carbon as adsorption material. The exhaust air is directed from above through the adsorption material. While doing so, the solvent molecules settle on the activated carbon.

Desorption takes place in a separate section of the rotating wheel. Hot air is passed across the adsorption material in the opposite direction, and the settled pollutants are driven out. The resulting desorption flow can be with the use of several methods treated: via thermal oxidation or recovery.

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ET-D-001a-en-0612