



Krantz Clean Air Solutions

Integrated Concepts for
Exhaust Air Treatment

Krantz

Good for the environment – profitable for your company

Energy efficient exhaust air treatment

The costs with regards the compliance with legal environmental regulations for manufacturing companies have increased steadily over the past years. Particularly the professional handling of pollutants and their elimination is becoming more and more important. In this area, Krantz makes a significant contribution regarding energy and cost effective purification of polluted production exhaust air.

Via constructive dialog with our customer, our engineers develop an individual exhaust air treatment concept which integrates seamlessly into the pre-existing production process and company structures. Through our wide range of competences based on decades of experi-

ence in the area of thermal treatment of exhaust production air, we bring our valuable know-how to the production process in order to efficiently resolve challenging and technically demanding tasks. We are also well-versed in Benchmarking, adapting the standards from other industrial sectors and companies, thus enabling the most suitable solutions to be applied.

Krantz exhaust air treatment plants not only guarantee reliable compliance with all legal regulations with regards air purification, but also allow for mid-term lowering of investment costs and predictable costs of operation. An additional advantage in efficiency is the significant reduction of carbon dioxide emissions.



Individual solutions for customer-specific processes

Everything under one roof – world-wide!

Where ever individual exhaust air treatment is an issue, we offer the cleanest solution!

Krantz's key to success for a future-proof of exhaust air treatment is the effective interaction of our diverse range of competences: from the customised engineering in the planning phase of the plant design and our know-how in the area of measurement technology and process analysis right up to our competence in thermodynamics and heat and power generation. We take charge of the energy efficiency of your air treatment plant over its entire life cycle.

Thermal post-combustion, as an efficient procedure for the treatment of hydrocarbon polluted exhaust air, safely and reliably meets all legal requirements with regards

air quality control and is a key factor in considerably lowering investment costs and reducing operating costs, long-term.

The treatment of production exhaust air containing hydrocarbon emissions (VOC), solvents or odours is not only essential for the maintenance of a clean environment but also of major importance to each individual company regarding the health and safety of its staff and in order to guarantee a smooth running production line. Why not put your trust in the long-term experience, the versatile range of competences and the influential and innovative strengths of Krantz Clean Air Solutions.

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Krantz Clean Air Solutions' fields of competence

- 01 **Measurement and analysis**
- 02 **Diversity of processes**
- 03 **Process simulation**
- 04 **Design**
- 05 **Manufacturing**
- 06 **Feasibility and energy studies**
- 07 **Electronics / Electrical engineering**
- 08 **Installation**
- 09 **Commissioning**
- 10 **Remote services**
- 11 **Maintenance**
- 12 **Customer support**

Industries / Sector-Know-how

- 01 **Automotive industry**
- 02 **Chemical and pharmaceutical industries**
- 03 **Printing industry**
- 04 **Electronic components and Semiconductor industries**
- 05 **FRP working industry**
- 06 **Wood and paper working industry**
- 07 **Painting industry**
- 08 **Metal working industry**
- 09 **Abrasives industry**
- 10 **Textile industry**
- 11 **Biogas upgrading**

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INTEGRA, FLEXA

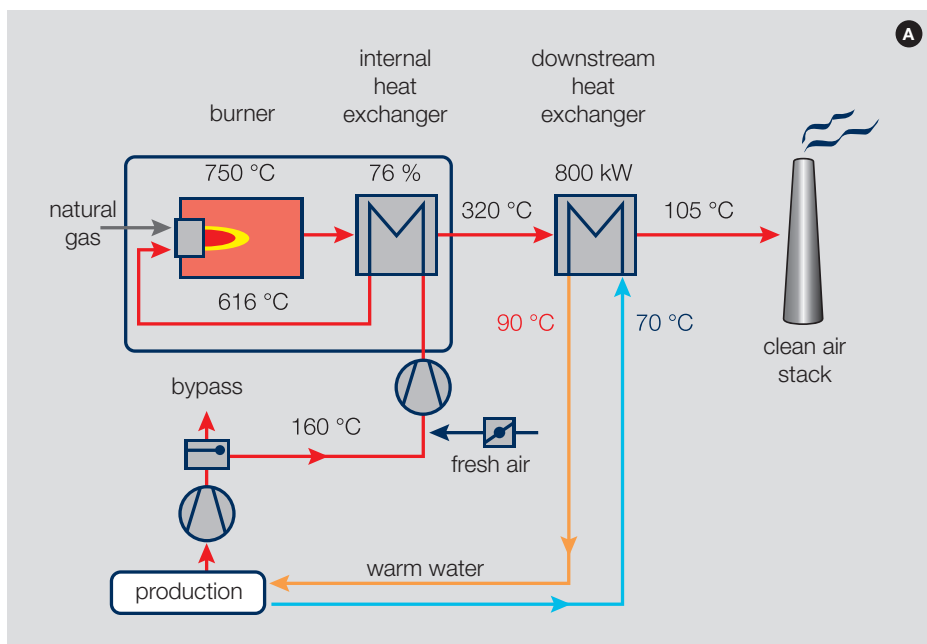
Thermal oxidisers with recuperative exhaust air pre-heating

Our compact thermal oxidiser types FLEXA and INTEGRA are the preferred units for the cleaning of industrial exhaust air with high concentrations of VOC's which occur mainly in printing, coating, laminating and impregnating processes.

The VOC's are oxidised at a combustion chamber temperature of approximately 750 °C. For optimal energy efficiency, initially the heat content of the hot clean air is used to pre-heat the polluted exhaust air. This takes place in an integrated tube type heat exchanger, in which each individual pipe is fitted with its own heat expansion, enabling a heat recovery

efficiency of up to 76 %. In order to further improve profitability, additional heat recovery systems for the generation of hot oil, steam, hot and warm water or warm air can be installed downstream.

The patented constructional features of the INTEGRA and FLEXA series ensure a reliable plant operation even in problematic applications, as for example in the case of exhaust air also polluted with precipitates (plasticizer emissions). The INTEGRA series boasts a particularly compact design, with the exhaust air fan integrated within the main unit.



- A** Schematic of a thermal recuperative oxidation
- B** Thermal oxidiser type FLEXA with a secondary air-air heat exchanger
- C** Thermal oxidiser type INTEGRA

REGETAR

Thermal oxidisers with regenerative exhaust air pre-heating (RTO)

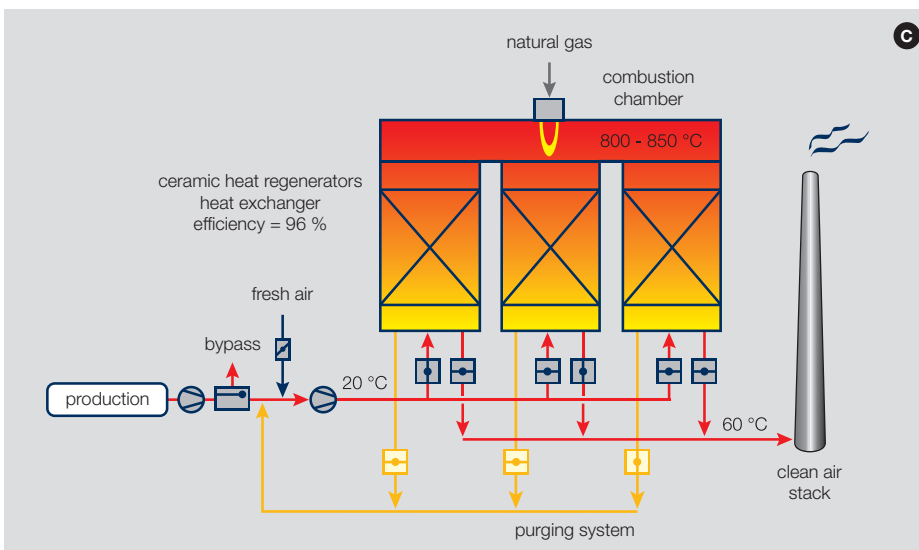
Our RTO plants, REGETAR series with two, three or more heat regenerators are employed for exhaust air treatment in all those industries which use solvents (VOC's) as part of their processes. These units can be employed for a wide range of VOC concentrations and operate very economically even where there are low concentrations of VOC's also without additional downstream heat recovery.

By employing ceramic heat regenerators and by means of alternating flow directions of hot clean air and cold exhaust air, up to 97 % of the heat energy can be used to preheat the exhaust air. This allows RTO plants to be operated autothermally with a VOC concentration of 1.5 g/Nm³ upwards, depending on the type of VOC.

Our REGETAR series RTO plants have continuously evolved since 1990 and possess, through their long history of development, and a multitude of matured technological improvements, a very high operational availability. In many cases the use of our patented buffer system allows the installation of a low cost and much lighter RTO unit.



- A Regenerative oxidiser with three heat regenerators
- B Regenerative oxidiser in tandem design
- C Schematic of a regenerative oxidiser

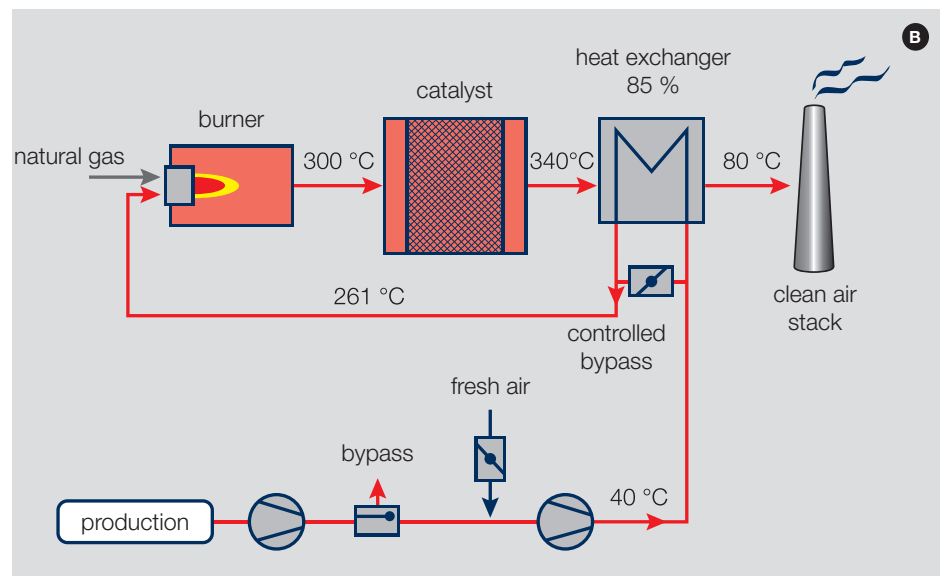


CAOX

Catalytic oxidisers

Our catalytic oxidisers of the type CAOX are used to treat exhaust air, for example from chemical and pharmaceutical industries, from print shops and from all kind of painting and coating processes.

In such a catalytic oxidiser, the oxidation of the VOC's, depending on their composition, takes place by means of a catalyst at a temperature of 200 °C to 450 °C. In each individual case, the most effective mixed oxide or precious metal catalyst is chosen from a large range of possible catalysts. In our catalytic oxidisers, up to 85 % of the heat energy is used to preheat the exhaust air by high efficiency, plate-type heat exchangers. The subsequent low clean air temperature enables catalytic oxidisers to function economically already without any secondary waste heat recovery system.



- A** Catalytic oxidiser for 70,000 Nm³/h
- B** Schematic of a catalytic oxidiser
- C** Catalytic oxidiser in a pharmaceutical industry



Concentrator units

Concentrator units with hydrophobic Zeolites

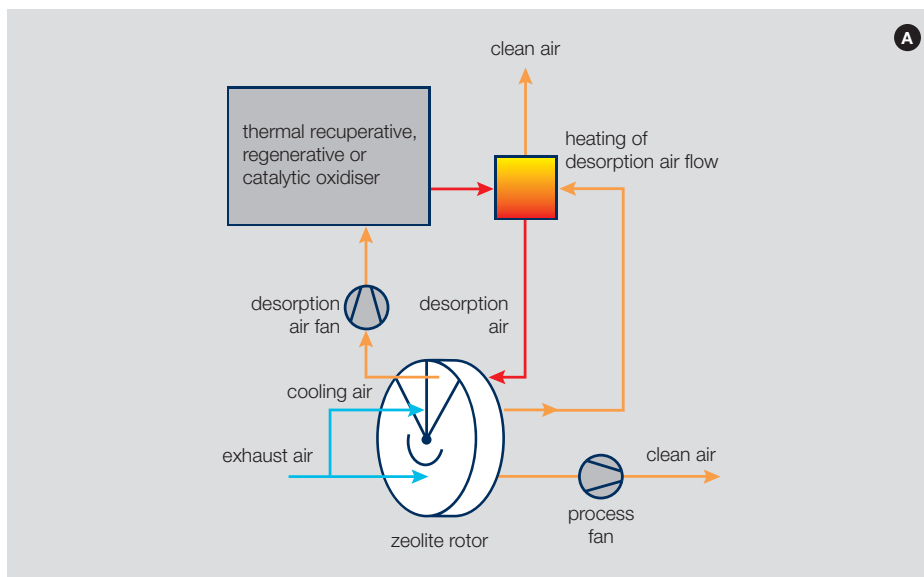
For the economic thermal treatment of large exhaust air volumes containing low levels of VOC, we offer a two-stage technical solution.

The adsorption of VOC's by hydrophobic and non-inflammable Zeolites at low temperatures, and the subsequent desorption with a hot desorption air flow reduces the exhaust air flow and increases the concentration of VOC's. Depending on the type of VOC and the composition, a concentration of up to a ratio of 1: 20 is possible.

In a second process step, the desorbed air is treated in a thermal, regenerative or catalytic oxidiser. The high concentration of VOC's in the desorbed air allows most systems the possibility of operating autothermally with

a VOC concentration of 0.5 g/Nm³ upwards without any additional fuel consumption. Most often, the resulting heat surplus can even be utilised by the additional use of a heat recovery system.

The innovative systems solution developed by Krantz Clean Air Solutions in the area of techniques for the concentration of VOC's was awarded the prize for innovation in the category Environment by the Federation of Reinforced Plastics (AVK).



- A** Schematic of a concentrator unit with a thermal oxidiser downstream
- B** Concentrator unit for 32,000 Nm³/h
- C** Concentrator unit with regenerative oxidiser downstream
- D** Innovation Award of the AVK



From a tradition of quality

Service Areas:

- Clean Air Solutions
- Air Distribution Systems
- Cooling- and Heating Systems
- Filter- and Damper Systems
- Plant Construction and Service

With its long history committed to quality and innovation, Krantz with its three business areas and its company tradition of more than one hundred years.

The Research and Development centre with more than 1.000 m² in Aachen lays testimony to this fact.

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The logo for Krantz, featuring the word "Krantz" in a stylized, blue, cursive script font.