



Explosion pressure resistant design
of the entire plant

One compact module,
one mounting unit

A high level of 85%
thermal efficiency

Catalytic exhaust air purification plant – S-KOX series for color pigment production

In Frankfurt-Höchst precursors for the color pigment production, among other things, are manufactured. In 2009 a catalytic exhaust air purification plant was installed to remove aromatic compounds up to a concentration of 8 g/m³.

Following a short installation phase of only five days the plant was successfully commissioned by the TÜV, going into operation as scheduled. This plant by SÜLZLE KOPF has been in permanent operation since 2009. The Operational Manager confirms that the plant has been working „throughout the entire period without failure and with 100% availability“.

Our scope of delivery included:

- Compact frame with small overall dimensions
- Heat exchanger of stainless steel
- Special heat exchanger construction ensuring easy access during annual revision
- The extremely difficult task of introducing the frame-mounted plant through a window opening in den 6. floor of the production building
- Integrating the plant in the production process and production system control

Plant description:

Approximately 1,500 Nm³/h of VOC containing exhausts with fluctuating concentrations of aromatics up to 8 g/m³ are drawn from the production reactors of the precursors for the color pigments. To pre-heat the exhaust air to light-off temperature it is then lead over a redundant designed explosion pressure resistant tube bundle heat exchanger before being introduced into the stainless stain catalyzer. Here the pollutants are chemically converted into water vapor and carbon dioxide. In the tube bundle heat exchanger the reaction heat developing from this exothermal oxidation is transferred to the crude gas which then exits over the stack. The temperature of the exhaust air leaving the plant is 70°C with a temperature difference of 50K. The concentration of the aromatic compounds in the exhaust air are definitely below the TA-Luft limit values of smaller 1mg/m³. Under extremely difficult conditions the plant was introduced into the building through a window opening in the 6. floor of the production building. To optimize the annual revision process the heat exchangers have a special design.

Technical specifications:

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|---|---|
| Plant capacity: | 1.500 Nm ³ /h |
| Pollutants: | aromatics up to 8 g/m ³ |
| Exhaust air limit value: | < 1 mg/m ³ |
| Autothermal working point: | 1,8 g/m ³ |
| Type of heat exchanger: | redundant tube bundle heat exchangers, explosion pressure resistant |
| Degree of thermal efficiency: | 85% |
| Energy consumption without exothermal reaction: | 27,5 kW |

Our range of services included:

- 3D installation plan and layout including machine and apparatus drawings
- Process und P&ID diagram
- Technical specifications
- Electrical/I&C engineering
- Foundation and loading including static and dynamic loads and moments
- Thermal calculations
- Risk assessment and SIL-calculations

This catalytic exhaust air purification plant at a world leading chemical company in Frankfurt Höchst Germany was designed and constructed in accordance to:

- BetrSichV, Ordiance on Industrial Safety and Health
- Explosion Protection Directive ATEX 94/9/EC
- Compliance to 4. BImSchV and TA-Luft limit values
- Continuous operation with a 2 day annual revision
- Plant documentation according to chemicals-related requirements
- DIN EN 746-2, Industrial thermoprocessing equipment - Part 2: Safety requirements for combustion and fuel handling systems
- Commissioning and intermediate inspections by TÜV Südwest
- VDI 3476-3 Waste gas cleaning - Methods of catalytic waste gas cleaning - Selective catalytic reduction

A four year trouble-free operation without any component failures continuously ensures compliance with the TA-Luft limit values < 1mg/m³. A two day annual revision is absolutely sufficient.

SÜLZLE KOPF is your partner for catalytic exhaust air purification plants with recuperative or regenerative heat recovery, and also for solutions applying:

- thermal technology
- regenerative technology
- adsorptive technology
- absorptive technology
- and for ozone destruction



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