



**Venjakob**<sup>®</sup>

PFLOCK & MECKELER



**VEN CLEAN AIR**

**EXHAUST GAS PURIFICATION AND  
ENERGY RECOVERY SYSTEMS**

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### EXPERTISE AND FLEXIBILITY – RIGHT FROM THE VERY START

The effective purification of pollutants and the high energy recovery have shaped the consistent expansion of our range of services for decades. Thanks to the most up-to-date technology as well as members of staff with many years of experience, we implement innovative system technology which sets the standards in the field of exhaust gas purification. Whether it is thermal, regenerative, adsorptive or catalytic, the right choice of incineration technology is made as well as the systematic recovery of energy is carried out. This is based upon the intensive research which is carried out into the specific requirements of the customer.

Close contact with our customers is an important aspect of each project – from the construction stage right through to the assembly stage. The flexibility of the system construction method takes all spatial situations into consideration. The coated and highly efficient insulation guarantees resistance to weathering as well as low levels of energy loss regardless whether the system is intended to be built indoors or outdoors in winter-proof design. Once the system has been successfully commissioned, the availability of 24-hour service help as well as the replacement part warehouse will guarantee the reliability of the system technology.

#### ADVICE



**EXPERTISE:** The acquaintance of the individual situations at the location as well as the detailed analysis of all of the surrounding conditions will form the beginning of the teamwork. This complex method of operation guarantees that the tender is binding.

#### CONSTRUCTION



**INDIVIDUAL:** Based upon the system experience of many years, the construction of the customised system solution will take place with up-to-date 3D-CAD/CAM Technology. The digital order data accompanies each phase of construction and will be incorporated into the documentation.



■ Production of the customised equipment is carried out over an area of more than 4000 m<sup>2</sup>.



**HIGH PERFORMANCE:** The requirement for the ideal result is the perfect co-operation between qualified members of staff and innovative machine technology. The individual construction of the switchboard and the comprehensive quality inspection complement the production output.

PRODUCTION

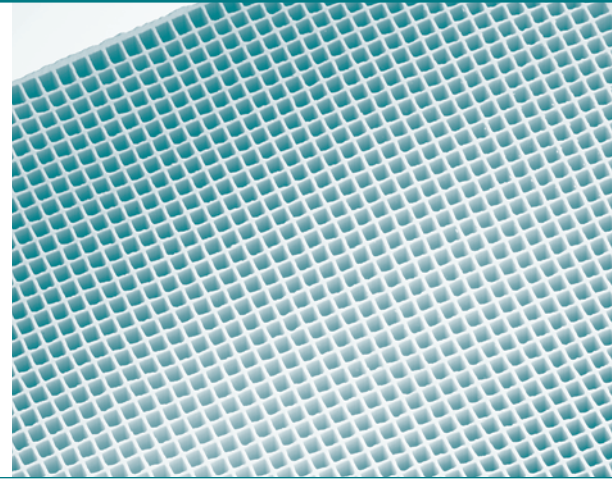
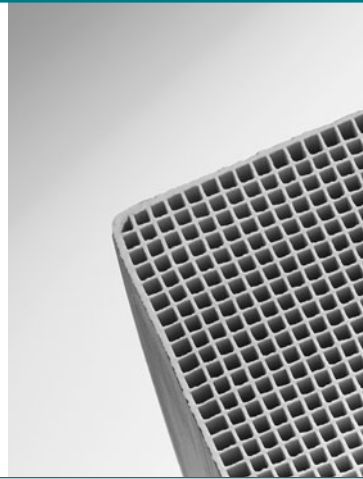


**RELIABLE:** Customer satisfaction which comes as standard on the assembly and commissioning has taken place, the complex training regarding the system technology, expert service help as well as a quick response in the event of a breakdown guarantee a long term co-operation between ourselves and the customer.

ASSEMBLY

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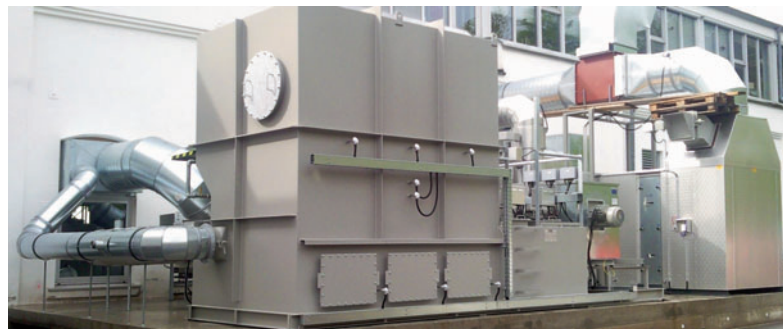
## RTO – REGENERATIVE THERMAL OXIDIZER

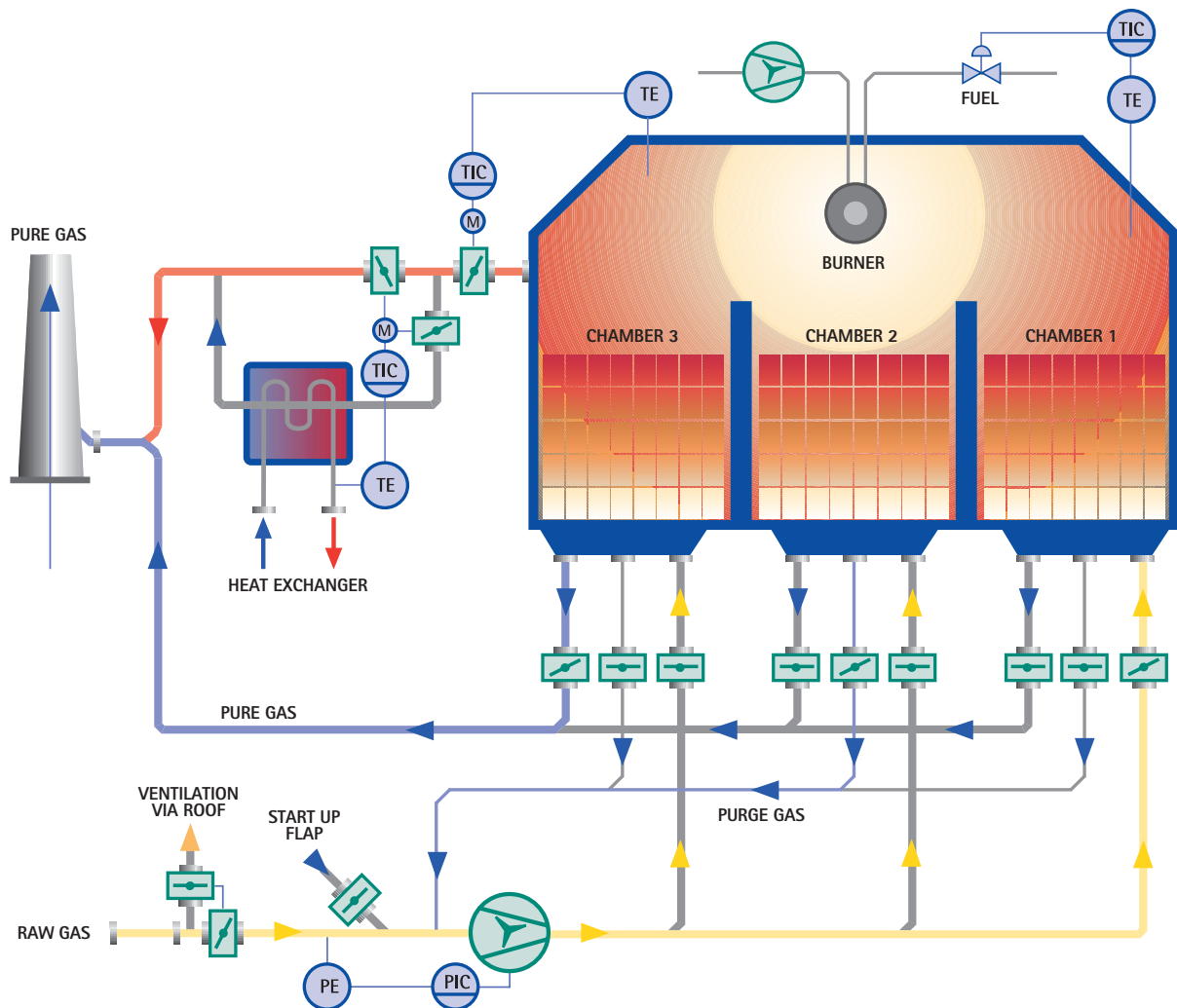
The degree of innovation which is implemented thanks to targeted further development in the field of regenerative incineration technology is impressive. The residue-free exhaust gas purification of volatile organic compounds (VOC) is exceptionally good when it comes to dealing with complex tasks in the field of web offset printing, gravure printing and flexographic printing as well as with regards to painting and lamination processes amongst other tasks. The process is based upon a flameless oxidation process which takes place at a temperature of over 800°C. The optional flameless introduction of gas also creates a noticeable operational cost

benefit in non-autothermal operation. A compact housing normally contains three heat-exchanging chambers which are fitted with storage elements in the form of high-quality honeycomb bodies. Cold raw gases pass through the honeycomb body and in doing so almost heat up to the oxidation temperature. After the conversion of the pollutant has taken place in the incineration chamber located centrally above, the exhaust gas which is now purified reaches the next chamber and releases the heat onto the ceramic material. The effectiveness of the heat exchange of up to 97% achieves the highest level of economy and quickly reaches autothermal operation.

### SYSTEM EXAMPLES

Particularly when it comes to lower exhaust gas volume rates the compact system is an impressive development of regenerative incineration technology. The systems, which are completely pre-assembled and wired up in the factory, are characterised by the minimal amount of assembly effort they require on-site.





**CUSTOMER-SPECIFIC CONSTRUCTION:** The most varying of construction methods of the system can be implemented in order to adapt to the surrounding requirements. The "lying" horizontal construction method is distinguished by its area loads and low construction height, while the "standing" vertical construction method displays its value thanks to its low requirement of space. Furthermore the module construction method enables a simple adaptation to particular requirements, e.g. 2-chamber or 5-chamber system.

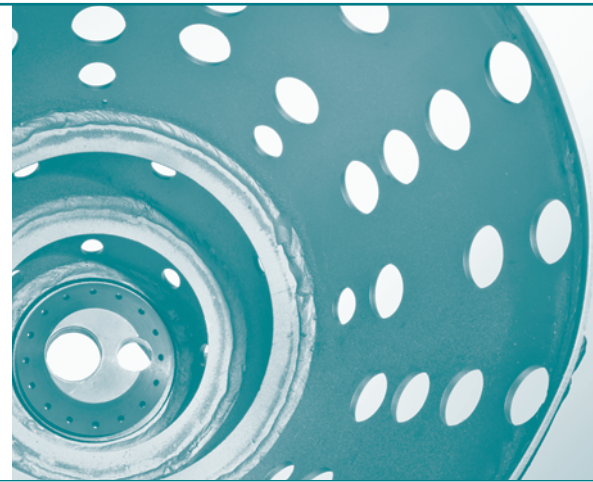
**HIGHEST LEVEL OF OPERATING SAFETY:** The core of the system is the valve technology which permanently guarantees a complete separation of raw and pure gases. Venjakob Umwelttechnik has begun its own in-house developments in this area in the form of flexible poppet valves which are pneumatically driven. The valves are extremely low maintenance, resistant to wear and tear and can be used in a wide range of temperatures.

## SYSTEM CHARACTERISTICS

- Exhaust gas flow of between 3,000 and 75,000 m<sup>3</sup>/h
- Can be used with low to medium concentrations of pollutants
- Low level of primary energy usage thanks to a high degree of heat exchange effectiveness
- Excess energy can be used thanks to targeted energy recovery
- Incineration chamber temperature of > 800 °C

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## TI - THERMAL INCINERATOR

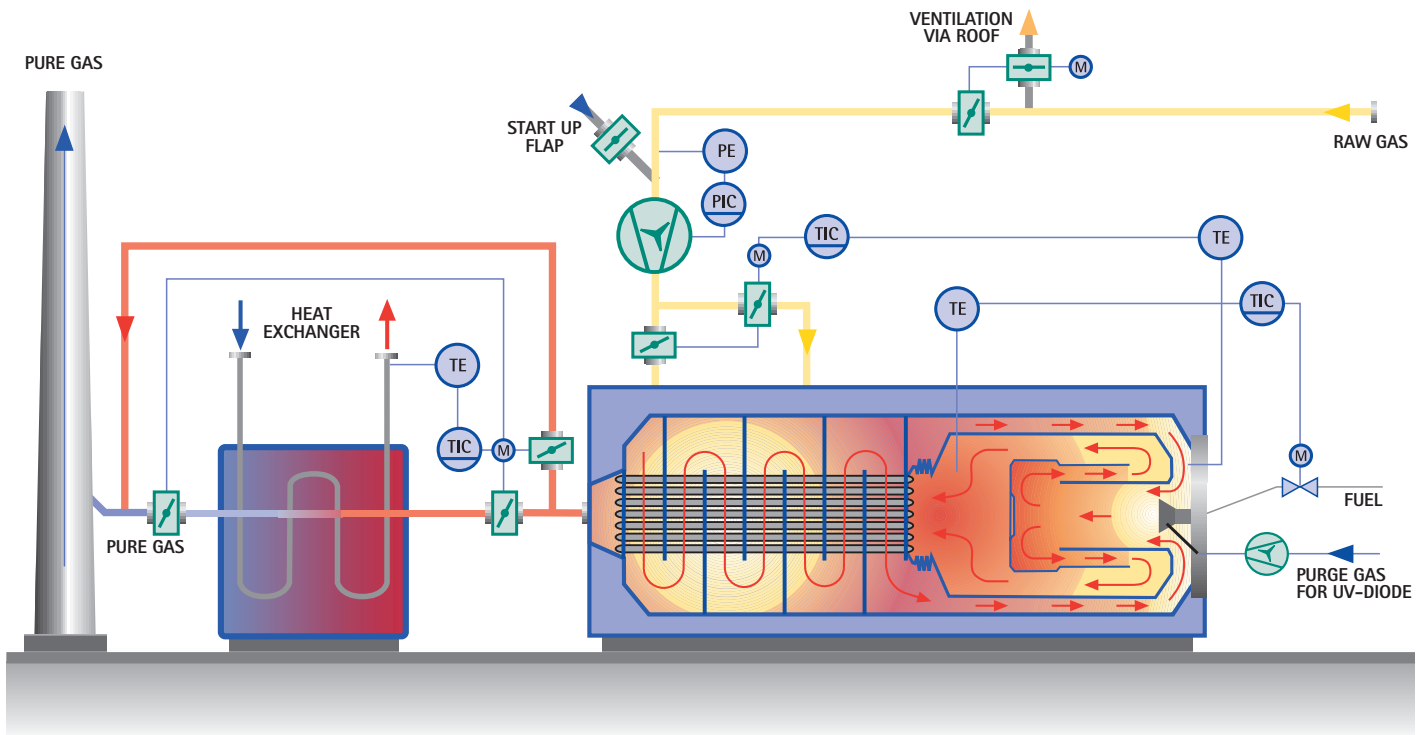
The classic technology for the purification of volatile organic compounds (VOC) is often directly integrated into the overall process with energy recovery systems. Therefore this is a significant component of complex production systems. The exhaust gas which is loaded with pollutants is pumped into the system via a centrifugal fan. The exhaust gas initially circulates around the integrated tube bundle heat exchanger in a cross current flow. In doing so this air heats itself up in an optimal manner. The pre-heated exhaust gas now arrives into the combustion chamber via the supporting burner.

The equipment which is installed in this area ensures that the exhaust gas is equally brought to the desired temperature level and that the required dwell temperature is observed in all operating conditions. The purified exhaust gas will then flow into the internal area of the tube bundle heat exchanger, releases the heat to a large extent onto the cold polluting air and can then be used as a pure gas in order to achieve the recovery of energy. The process makes allowances for ideal variable input parameters as well as changing requirements on secondary energy recovery.

### SYSTEM EXAMPLES

The integrated thermal incinerator represents an individual solution of thermal incinerator technology which has been developed for well-known system manufacturers in the printing industry.





**APPROVED TECHNOLOGY IN HIGH-GRADE QUALITY:** Sophisticated construction characteristics such as the special compensator which has been developed in-house for the absorption of the heat exchanger expansion cannot be rivalled by anything else on the market. The incinerator and the heat exchanger are arranged in a tandem fashion so that all areas can be easily reached for maintenance purposes. The square construction design enables the adjustment of the fans or secondary heat exchangers on the thermal incinerator so that the required space is minimized at the location.

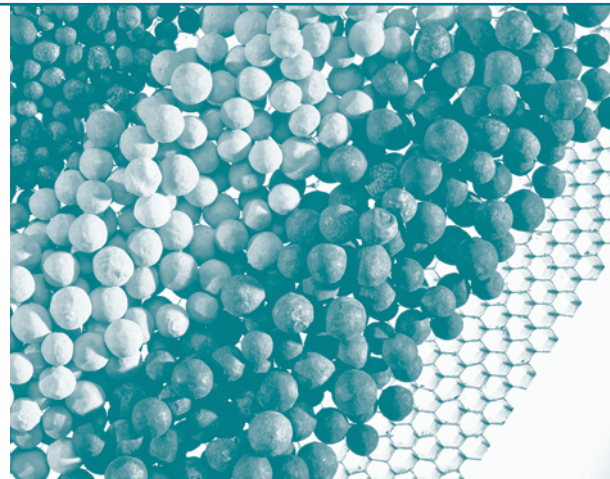
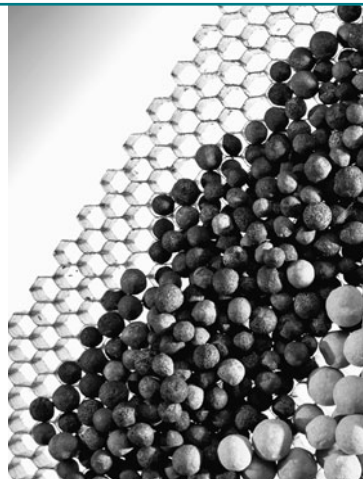
**DIFFICULT TASKS:** A case for the thermal incinerator. Where other technology reaches its limits, the thermal incinerator from Venjakob Umwelttechnik remains completely reliable. This particularly applies when handling exhaust gas which contains particles or silicone and with regards to highly variable operating conditions. The combination with energy recovery systems which are adjusted to the requirements leads to a high level of economy. Innovative product development has shaped this robust type of system for over 30 years.

#### SYSTEM CHARACTERISTICS

- Exhaust gas flow of between 300 and 35,000 m<sup>3</sup>/h
- Can be used with high or unknown amounts of pollutant concentration
- Robust construction design, simple to operate
- High level of energy potential for secondary energy recovery
- Incineration chamber temperature of > 750 °C

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## CTO – CATALYTIC THERMAL OXIDIZER

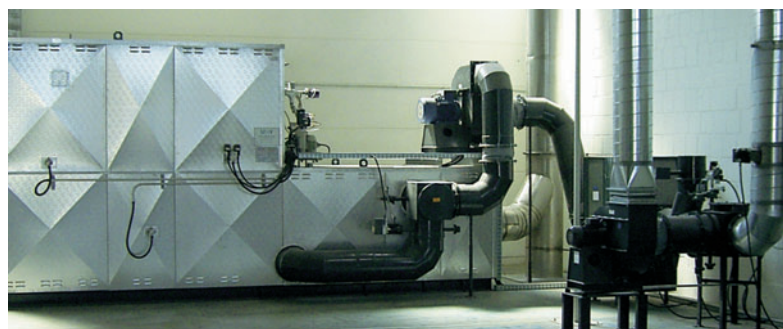
The CTO from Venjakob Umwelttechnik displays its value particularly whilst dealing with small special tasks. Similar to the thermal incineration system, the exhaust gas which is to be purified is initially pumped into a recuperating heat exchanger in order to be optimally pre-heated. Now auxiliary energy in the form of natural gas/propane gas or electrical energy will be applied should it be required in order to reach the necessary reaction temperature. The catalyzer quickly reduces the temperature which is required to convert the pollutant in comparison to pure thermal type systems. During the

conversion phase, no attrition of the catalyzer occurs which means that the material can be used over a period of many years. The reaction enthalpy which becomes free – as is the case with all thermal systems – will be used in order to support the pre-warming of the exhaust gas so that the usage of auxiliary energy is significantly reduced. Due to the fact that the catalyzer will lose some of its activity due to particular pollutants (e.g. silicone and heavy metals), it is important that this matter is to be individually agreed upon during the planning phase according to the given composition of the pollutant.

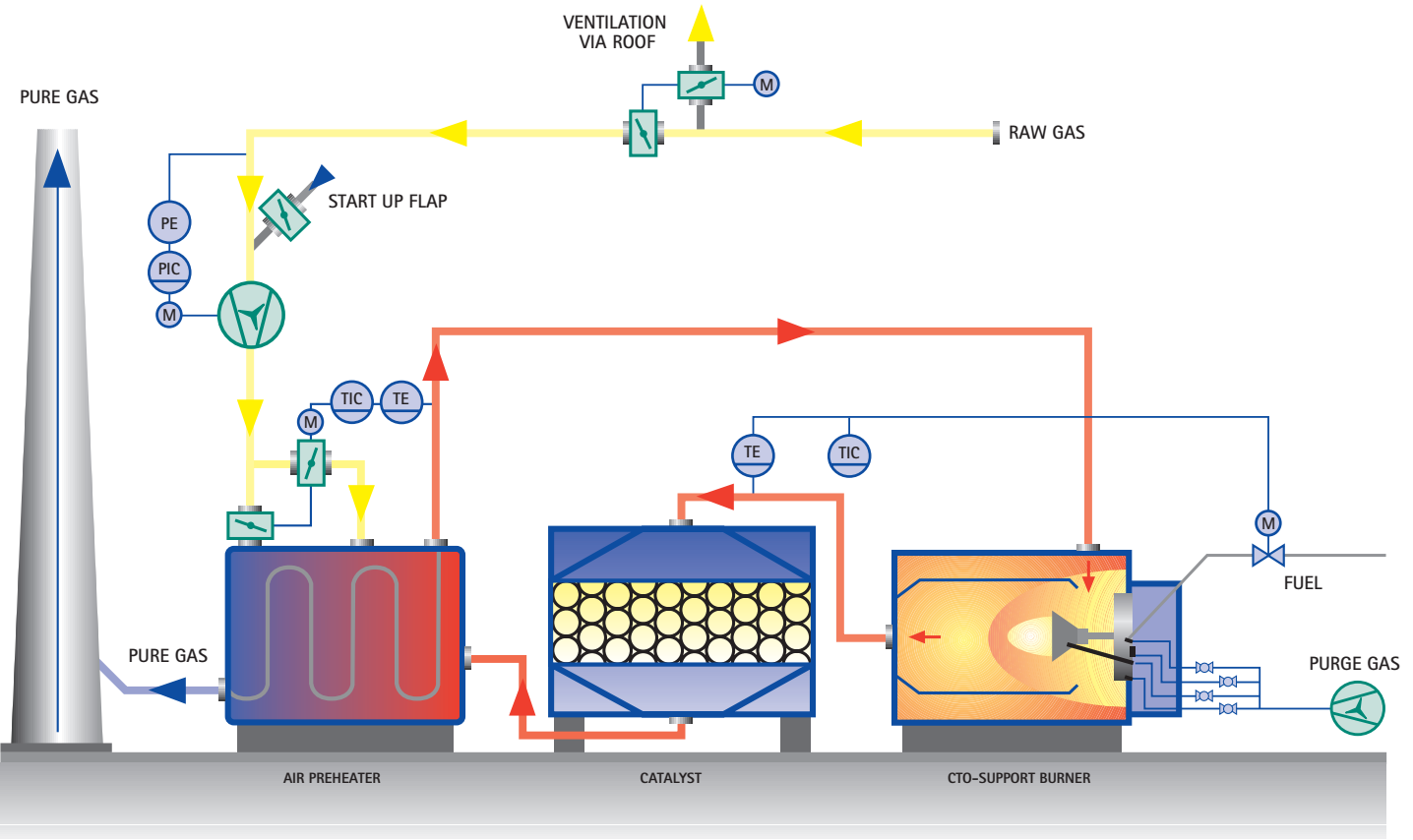
### SYSTEM CHARACTERISTICS

- Exhaust gas flow of between 1,000 and 15,000 m<sup>3</sup>/h
  - Can be used with low to medium amounts of concentrations of pollutants
- Low level of primary energy usage thanks to low temperatures
- An economic alternative for the purification of organic pollutants
  - Reaction temperature of > 280 °C

**EFFECTIVE:** Thanks to the co-operation with well-known catalyzer manufacturers, it is guaranteed that the best solution will always be offered. The selection of the catalyzer will take place individually after the requirement analysis has been completed. From noble metal catalyzers in pellet, honeycomb or foil form, or a mixed oxide catalyzer in bulk material form, the multitude of choice cannot fail to impress. The aim of the construction is to optimise the installation into the complete system whilst taking fluidic aspects into consideration.







**SYSTEMATIC ENERGY RECOVERY:** The remaining or superfluous energy contained in the pure gases of the Venjakob Exhaust Gas System often provides sufficient potential to effectively support building heating or other energy consumption points. It can either be implemented as an individual system for thermal oil, warm and hot water, warm air, steam or combined as a downstream system solution for exhaust purification as well as production for the system technology.

**SYSTEM CHARACTERISTICS**

- Exhaust gas flow of between 300 and 40,000 m<sup>3</sup>/h
- Heat exchanger for the heating of water, steam, air, exhaust gas and thermal oil
- Can be used in all temperatures up to more than 800 °C
- Reduction of operating costs concerning the process and building heating
- Low level of pressure loss and high resistance to corrosion





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## AD – EXHAUST PURIFICATION WITH ADSORPTION

Venjakob's adsorption technology is particularly impressive when it comes to removing solvent-based air pollutants in very low and medium concentrations. The innovative method guarantees consequent compliance with the VOC Directives as well as the "TA Luft" (Technical Instructions on Air Quality Control) regulations. Adsorption can also be used to smooth out pollutant concentration peaks. During the adsorption process, the pollutants are physically bonded to the surface of a solid material (e.g.

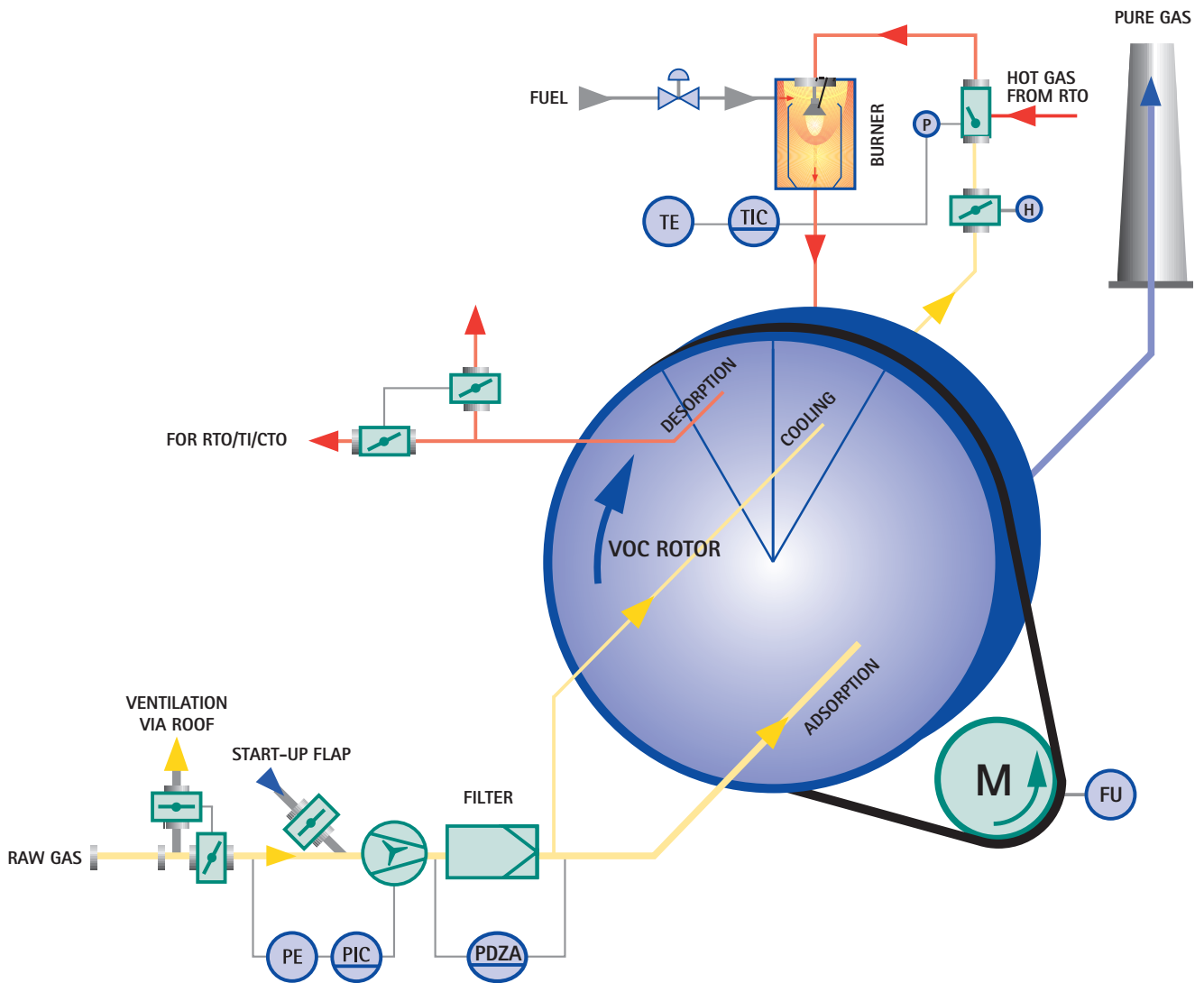
activated carbon, zeolite). A small, hot flow of gas removes (desorbs) the pollutants from the carrier material and then the purification process begins in a highly concentrated form in a compact RTO, TI or CTO. The surplus heat from the purification process is used to heat the desorption air flow. If necessary, a gas burner can be used as well. The operating costs of the exhaust gas purification system are very low due to the concentrated pollutants (autothermal operation).

### SYSTEM CHARACTERISTICS

- Exhaust gas volume rate of 10,000 – 100,000 m<sup>3</sup>/h
- Purification of extremely low to medium amounts of pollutant concentration in the exhaust gas
- Lower primary energy consumption due to concentration of the pollutants
- Flexible uses and compact design
- Highly economic due to extremely low operating costs

**MOBILE PILOT SYSTEMS:** With the development of a pilot system it was possible to carry out practical tests on the customer's premises so as to determine the suitability of the adsorbent as well the ideal amount required for the customer's specific requirements. Before building a large system the mobile pilot system ensures reliable determination of the adsorption and desorption conditions.





EXAMPLES OF CUSTOMERS:

AS CRÉATION  
TAPETEN,  
GUMMERSBACH

BAUMANN-  
DRUCK,  
KULMBACH

GGP MEDIA,  
PÖSSNECK

HEYNE & PENKE  
VERPACKUNGEN,  
DASSEL

HONEYWELL  
BREMSBELAG,  
GLINDE

O-CELLS SE,  
THALHEIM

LINDEN,  
LÜDENSCHIED

MONDI INNCOAT,  
RAUBLING

VSM,  
HANNOVER

REFERENCES

We work towards the target with a high level of commitment and dedication. We respond to the trust placed in us with individual system solutions as well as excellent service help. The satisfaction of our partners enables the consistent and innovative growth of Venjakob Umwelttechnik.

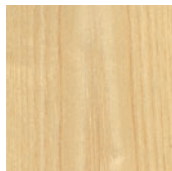
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## SURFACE COMPETENCE WITH KNOW-HOW

Venjakob Umwelttechnik belongs to the Venjakob Company Group which has been an internationally recognised and worldwide operative system manufacturer of innovative surface technology for over 40 years. The conception of individual system solutions, the optimisation of production processes as well as the development of innovative system technology are carried out based upon the experience accumulated over many years as well as the profound expertise of our members of staff. Individuality, close contact with our partners in the most varying of fields as well as conceptual thinking and actions shape the daily operations at our Company.



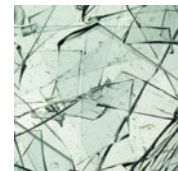
Wood



Plastic



Metal



Glass

**VEN BRUSH**  
BRUSHING | SANDING

**VEN CLEAN**  
CLEANING

**VEN MOVE**  
HANDLING

**VEN TRANS**  
CONVEYOR TECHNIQUE

**VEN SPRAY**  
COATING

**VEN DRY**  
DRYING

**VEN CLEAN AIR**  
EXHAUST AIR PURIFICATION

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