

## RETROFITTING

### General Conditions

The existing RTO (Regenerative Thermal Oxidation) will be fitted with ceramic honeycomb blocks in order to reduce operating costs and minimise deposits in the heat exchanger. The heat exchanger elements have been specially designed to be used in RTO systems to ensure a reduction of VOCs and nuisance odour emissions. The heat exchanger elements are well suited for applications with high temperatures and dust-loaded waste gases.

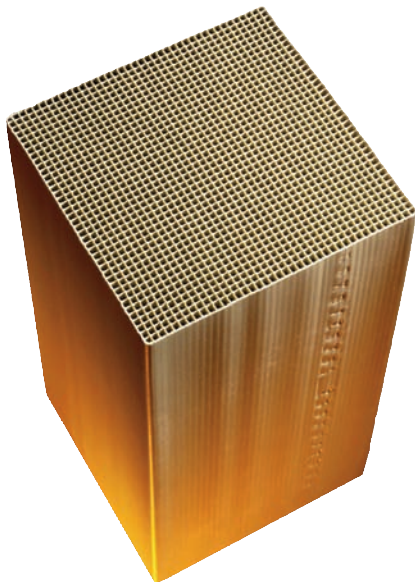


Figure 1 Ceramic honeycomb block

### Equipment

#### Ceramic Honeycombs

Each heat exchange chamber is filled with ceramic honeycomb blocks. These blocks are temperature stable up to 1,200 °C and resistant to chemical and mechanical wear. They are made of extruded ceramic blocks with square channels which ensure a low pressure drop even for high flows. The size of the channels can be optimised for the individual application in order to guarantee free flow combined with a large heat exchange surface.

The individual blocks are all manufactured to the same size. It is thus possible to pack them densely and hereby avoid any deviating flow. The design of the heat exchanger allows a laminar flow throughout the whole temperature range between inlet and outlet temperature. This laminar flow results in a low pressure drop. In addition, the system shows a linear rise in pressure drop during overloading, i.e. the pressure drop remains directly proportional to the flow; honeycomb systems can therefore be better overloaded at equal fan capacity.

### Supporting Grid

The existing grid is checked for its suitability and an offer will be submitted for possible necessary modifications due to the use of the new type of blocks.

### Insulation

An inspection of the existing interior insulation of the combustion chamber and the heat exchangers will be carried out. The insulation in the heat exchanger area will be replaced and partly completed. Defective parts of the combustion chamber insulation will be pointed out and a quotation for their replacement or repair will be submitted. Any repair or replacement work will be carried out with high-quality high temperature resistant insulation material.

The existing insulation will be kept as far as possible. During the fitting of the ceramic honeycomb blocks into the heat exchanger chamber a layer of ceramic fibre mats will be stuffed between the ceramic blocks and the existing insulation in order to avoid any bypass flow. This ceramic fibre mat insulation is heat resistant up to a temperature of 1,200 °C.

### Retrofitting and Start-up

#### Retrofitting of the plant

The existing packing material is manually removed from the chambers and filled into the containers provided by the customer. The customer is in charge of the final disposal of this packing material. The ceramic honeycombs are placed on the grid in a number of layers. For each layer, ceramic fibre mats are placed between the existing interior insulation and the ceramic honeycomb blocks to ensure optimum tightness.

The retrofitting process is supervised by an expert chief erection engineer as required. After the installation of the ceramic blocks, the manholes are closed and the plant is prepared for start-up.

#### **The customer will provide the following for erection work:**

- Lifting gear
- Scaffolding, if necessary
- Lighting
- Electrical connection and electricity for installation equipment
- Possible adaptation work for the control system

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## Start-up

After completion of the retrofitting work, the plant will be started up by the customer. A qualified start-up engineer shall be present during start-up and will remain in place for one day in order to optimise the system.

## Guarantees

Thermal efficiency A minimum thermal efficiency of 94 % is guaranteed for the plant during normal operation. The thermal efficiency is calculated as follows:

$$\eta_{\text{therm}} = \frac{T_{\text{Combchamb}} - T_{\text{out}}}{T_{\text{Combchamb}} - T_{\text{in}}} * 100[\%]$$

## Quality

### Workmanship:

All necessary components for the retrofitting are supplied by CTP. CTP has a long-standing experience in the fields of R&D, design, planning, construction and operation of RTO systems and has already supplied numerous such systems to customers all over the world.

### References:

The supplier will submit upon request a list of at least 10 reference plants showing that it has a minimum of 10 years experience with the supply of RTO systems. This list contains company name, location, flow and control system.



Figure 2: Before retrofitting



Figure 3: During retrofitting



Figure 4: Final steps

V. 1.0



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