

Industrial air purification

REGENERATIVE THERMAL OXIDISER



VOC Abatement Plant

General Description

The Regenerative Oxidiser Plant type REF is an abatement plant, which is installed to clean waste air emission from processes by means of thermal oxidation (combustion) of the airborne organic pollutants.

The pollutants are thermally oxidised between 800 – 900 °C. The temperature is determined with the type and composition of pollutants, because the temperature of conversion varies from one pollutant to another.

Under such conditions where pollutants molecules are composed of carbon, hydrogen and oxygen (C, H and O), these pollutants will be converted to carbon dioxide (CO₂) and water vapour (H₂O).

The LESNI Regenerative thermal oxidiser is always adjusted to the relevant needs. The REF plants are designed in that way, that once pollutants inlet concentration are near 2.0 g/m³ organic carbon, the REF plant can reach auto thermal conditions.

The REF plant main sections are:

- Three heat recovery reaction chambers
- One combustion chamber
- Three inlet/outlet chambers.
- Proprietary disc valve system.

In the combustion chamber is installed a burner system with gas as fuel. The burner system is used as pre start heating up and as supply in periods with little or no inlet concentrations.

Every reaction chamber is filled with ceramic media and the inlet / outlet chambers are connected to air duct system with valves. The inlet air is lead through the plant by means of a fan.

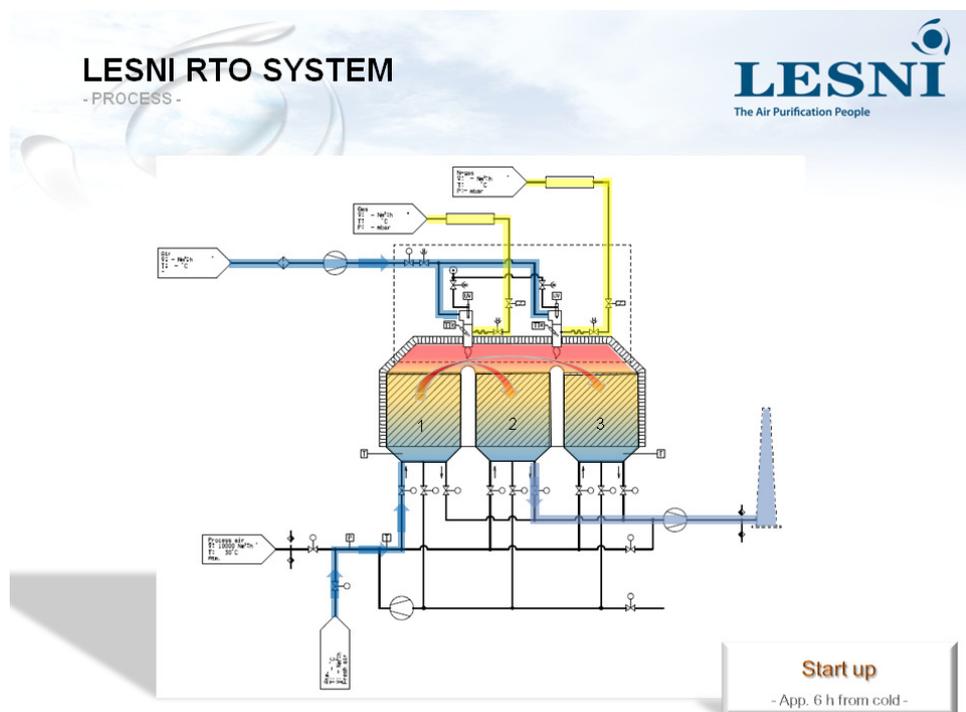
The valve system is controlling the change of airflow directions through the reactions chambers. By means of this change of airflow directions through the reactors, the ceramic media in the three chambers is caused to respectively retain and release the heat from / to the air.

Function

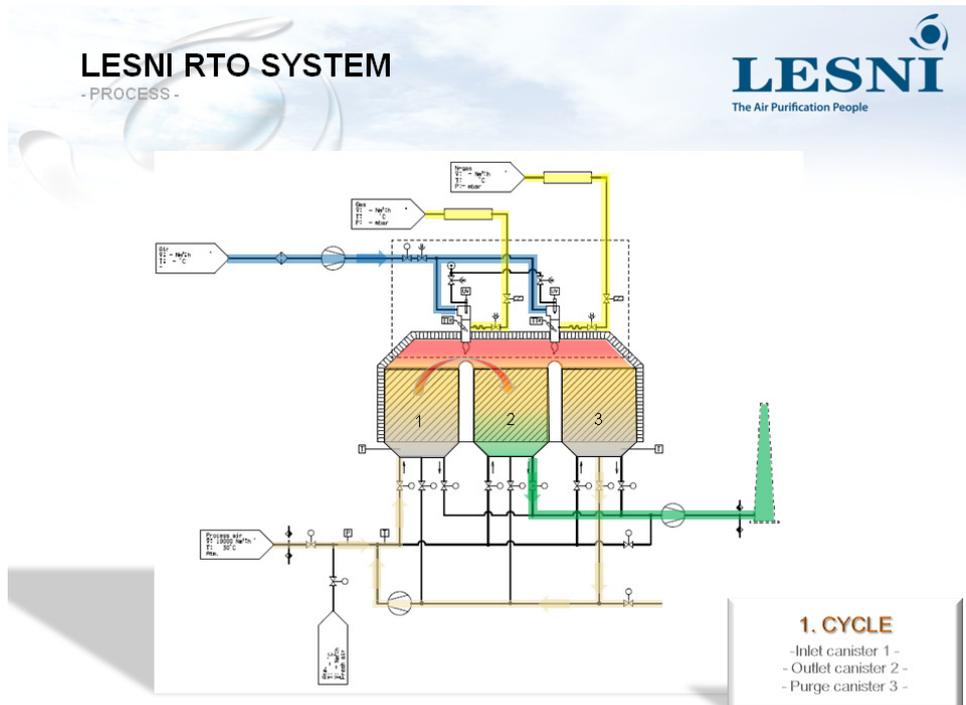
The LESNI A/S RTO Plant type REF is controlled and supervised from a PLC system, from where the plant is also operated.

Main functions are:

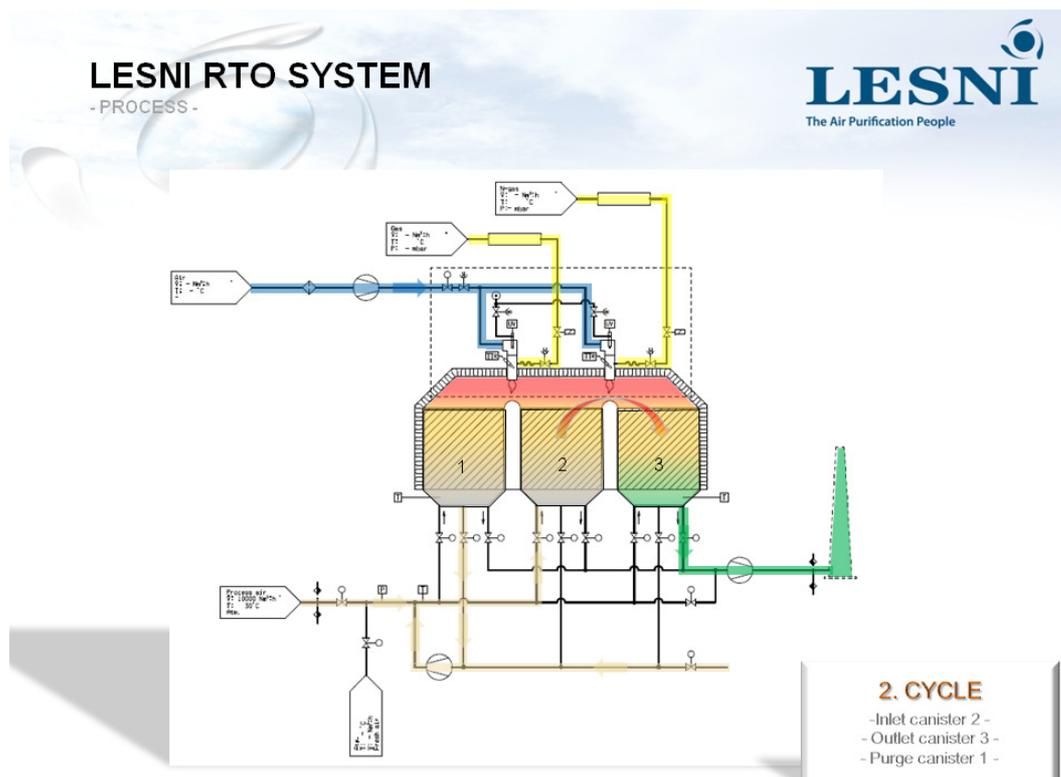
The necessary energy for maintaining the airflow through the plant, is delivered by the main fan, which is placed on the outlet of the plant, hence the reactor is working in negative pressure.

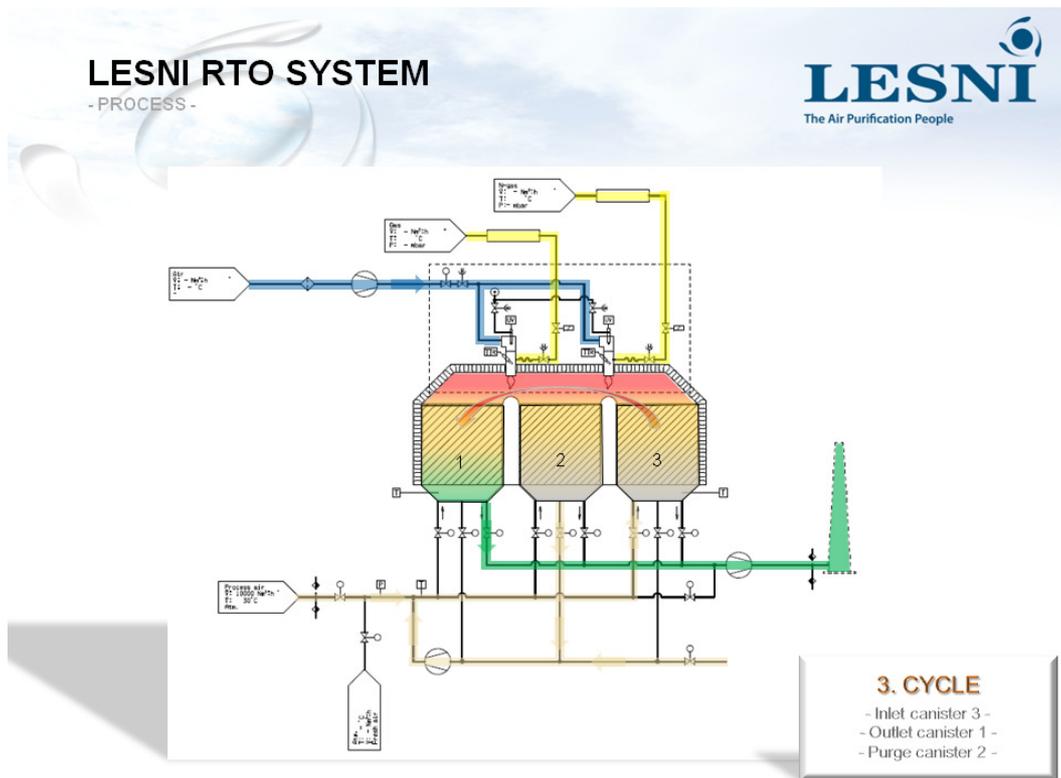


The airflow is lead to the valves into the inlet chamber and from there up through 1st reaction chamber, where the air receives the energy from the heated ceramic mass and into the combustion chamber, where if necessary it receives energy from the gas burner. From here the airflow is lead down through the 2nd reaction chamber, where it gives the energy to the ceramic mass, and then through to the stack. During this period the 3rd reaction chamber is purged with some air, which in turn is sent back to 1st reaction chamber to be purified again (see picture cycle 1).



The same principle of operation is then used in rotating sequence of chambers / canisters for cycle 2 and cycle 3 (see picture cycle 2 and cycle 3).





The LESNI Regenerative Thermal Oxidiser; type REF has a bypass function, where the unclean air is lead directly to stack, bypassing the hot oxidiser for safety and maintenance.

The temperature of the plant is controlled by regulation valve in the gas burner system. The free to run condition of the REF is achieved when the set point temperature in the combustion chamber is reached.

All the valves of the plant are pneumatically operated. That is why, the supply of compressed air is continuously supervised and when it fails, the REF plant will shut down. The plant is delivered with an accumulation tank for compressed air to secure, that when failure occurs, sufficient capacity is available to shift all the valves and the plant into bypass position.

References



Plastic Printing Industry
Solvents - 40.000 Nm³/h



Wood-Working Industry
Solvents - 20.000 Nm³/h



Rendering Industry
Odour - 60.000 Nm³/h



Food Industry
Odour - 60.000 Nm³/h



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