TECHNICAL SUMMARY OF THE PROJECT "PREVOC PLAN"

Organic solvents are used in different stages of the thermoplastic sheet manufacturing system of the **RENOLIT** Ibérica, LTD. plant, and their fumes are extracted by a set of fans.

Extensive research and numerous tests and have been carried out in order to achieve a decrease in both VOCs quantity and concentration in air emissions.

Trials run on the pilot plant have established that the best system to treat VOCs emissions in the **RENOLIT** Ibérica, LTD. factory is a thermal oxidation plant. The contaminated gases are fed into a thermal oxidation reactor after passing through an inorganic molecular sieve that allows adsorbing solvent concentration peaks.

This molecular sieve is totally incombustible, avoiding the disadvantages of other systems such as active carbon filters, which sustain a fire hazard during the desorption phase.

The thermal oxidation regeneration treatment, designed specifically for this project, is composed of three towers linked by a transversal chamber placed at the top. Each tower is filled with inert ceramic packing media that allows heat accumulation. The gases pass through the different chambers, reaching an adequate VOCs concentration that allows the plant to achieve an optimal functioning, since gases with low VOCs concentrations have to be previously enriched.

The ceramic bed is heated and cooled according to the direction of the gas that passes through it. The cold gas to be filtered enters the first chamber and passes vertically through the ceramic bed. This gas captures the heat accumulated in the ceramic bed, which is preheated in a previous stage up to a near-reaction temperature of 800ºC. Consequently, the temperature of the ceramic bed is reduced significantly.

The thermal oxidation reaction is completed in the oxidation chamber in the upper part of the reactor, maintaining the right temperature conditions and residence times.
The reaction temperature is obtained by spontaneous ignition of the pollutants present in the gas to be filtered. Should the energy input not be enough, additional fuel, natural gas in this case, would be added.

When the gas leaves the oxidation chamber, it passes downwards through the ceramic bed present in the second tower. This ceramic bed, cooled in the previous phase, is heated and is thus prepared for the next stage, when the cold gas to be filtered enters the tower.

The switch from one stage to the next (the change in the direction of the gas) takes place when the difference between the temperature of the gases entering and leaving the second tower is above a pre-set value. There is usually a change of direction every 30-90 seconds.

During these cycles, a third tower is evacuating. This purge ensures a low level of pollutants in the gases leaving the chimney, and involves reflowing a small amount of filtered air through the third tower to drag the unfiltered gases remaining in the dead space to the suction fan, which brings them again into the oxidation chamber.

The average duration of one full cycle is between 90 and 240 seconds, approximately. The time required depends on several process parameters such as nature and concentration of the pollutants, and is adjusted during the unit initialization.