



## TREATMENT PROCESSES FOR VOLATILE ORGANIC COMPOUNDS (VOC)

Processes	Concentration (g/Nm <sup>3</sup> )	Auto-Thermal (g/Nm <sup>3</sup> )	Sust. delivery (Nm <sup>3</sup> /h)	Performance	Limits of exploitation	Fields of application
Oxidation Thermal Recuperative	>5		< 100.000	HCT(1)<20 mg/Nm <sup>3</sup> CO<100 mg/Nm <sup>3</sup> NOx<100 mg/Nm <sup>3</sup>	1 - low concentrations 2 - no energy recovery capacity	1 - printing shops 2 - painting of aluminium 3 - induction 4 - pre-lacquering 5 - paint driers 6 - hydrocarbons storage 7 - petrochemical
Oxidation Thermal Regenerative	<10	1,5 to 3	1.000 to 300.000	HCT(1)<20 mg/Nm <sup>3</sup> CO<20 mg/Nm <sup>3</sup> NOx<10 mg/Nm <sup>3</sup>	1 - high concentrations	1 - printing shops 2 - painting of aluminium 3 - induction 4 - pre-lacquering 5 - paint driers 6 - hydrocarbons storage 7 - petrochemical 8 - chemical industry 9 - pharmaceutical industry 10- manufacture of ships boards 11- manufacture of tiles and bricks 12- foundries
Oxidation Catalytic Recuperative	<20	3 to 4	100 to 50.000	HCNM(2) <20 mg/Nm <sup>3</sup> Nox < Thermal oxidation	1 - presence of powder 2 - presence of heavy metals 3 - elevated content chlorinated derivatives 4 - elevated content silicon derivatives 5 - catalyst endurance	1 - printing shops 2 - painting of aluminium 3 - induction 4 - pre-lacquering 5 - paint driers 6 - hydrocarbons storage 7 - petrochemical 8 - chemical industry 9 - pharmaceutical industry 10- manufacture of ships boards 11- manufacture of tiles and bricks 12- foundries
Oxidation Catalytic Regenerative		0,7 to 1	up to 100.000			
Concentration: Roto-concentrator	<1		up to 400.000	HCT <20 mg/Nm <sup>3</sup>	1- high concentrations 2 - high boiling 3 - elevated temperature 4 - elevated humidity 5 - zeolite endurance 6 - association with another technology	1 - printing shops 2 - semi-conductors' production 3 - fiber glass working 4 - printing and flexography 5 - chemical industry
Adsorption: on activated carbon	0,2 to 8		1.000 to 200.000	HCT 20 to 100 mg/Nm <sup>3</sup> chlorinated<20 mg/Nm <sup>3</sup>	1 - elevated temperature 2 - presence of powder 3 - elevated humidity 4 - polymerizable compounds 5 - ketones 6 - complex separation 7 - activated carbon endurance	1 - degreasing (chlorinated) 2 - dry dearing 3 - rotogravure printing 4 - publishing industry 5 - chemical industry 6 - pharmaceutical industry
Absorption : Scrubber	≤ 50		1.000 to 100.000	HTC <50 mg/Nm <sup>3</sup>	1 - complex solvents recovery 2 - association with another technology	1 - Alcohols 2 - DMF 3 - heavy products 4 - refineries and petrolchemical 5 - chemical industry 6 - pharmaceutical industry 7 - cokery 8 - cold lamination
Condensation	> 10		up to 2.000		1 - association with another technology	1 - degreasing 2 - hydrocarbons storage 3 - chemical industry 4 - petrochemical 5 - pharmaceutical industry (operation in inert nitrogen atmosphere)
Biological Treatment: Biofilters	< 1		up to 150.000	HTC <150 mg/Nm <sup>3</sup>	1 - selection of the suited strain 2 - cold gases (20 to 40 °C) 3 - particles and aerosol (<20 mg/Nm <sup>3</sup> ) 4 - elevated humidity 5 - pH 6 - nutrition balance C.N.P. to be maintained 7 - need for space	1 - depurators breeding 2 - slaughter houses 3 - printing shops 4 - agricultural and food industry 5 - chemical industry

**REMARKS:**

HTC(1) = total hydrocarbons

HCNM(2) = Non metanic hydrocarbons