

## TEST FILTER:

# System for testing IMT technology application in flue gas treatment

## ABOUT THE SYSTEM

The TEST FILTER system includes a set of equipment for the elimination and treatment of gaseous organic compounds and odors from industrial and manufacturing processes.

## COMPONENTS OF THE SYSTEM

### 1) TEST-GC Microwave Thermal Reactor

The device's stainless steel housing contains a thermally insulated ceramic bed made of a material that strongly absorbs microwave energy, which makes it reach very high temperatures of 950 - 1150 °C without any fuel. In the presence of a well-defined amount of oxidizer, all organic compounds are eliminated as they are transformed into a basic form in the most efficient thermal process. The reactor bed design properties create a highly turbulent flow of the contaminated gas, which increases the time the contaminants are under oxidizing conditions. This, in turn, guarantees high efficiency of the thermal process. The device is designed to expose harmful volatile compounds to high temperatures for a minimum of 2 seconds.

### 2) Heat Exchanger

The industrial gases contaminated with aromatic compounds are preheated through the use of a waste-heat recovery system from the treatment process in the TEST-GC reactor. Thanks to this solution, the TEST FILTER system has the highest efficiency in terms of the amount of energy supplied to the process, with a thermal efficiency between 90 and 110%.

### 3) Activated Carbon Filter

A method to protect the system against, for example, a power failure in the TEST-GC reactor or a sudden uncontrolled drop in process temperature, is to use a conventional absorption filter. This makes the TEST FILTER system completely safe for handling and for the environment.

By using microwave energy, TEST FILTER is a system with zero emissions of CO<sub>2</sub>/NO<sub>x</sub>/SO<sub>2</sub> and other harmful compounds, while maintaining the process temperature between 950 and 1150 °C.

## PURIFICATION CHARACTERISTICS

### TYPES OF ODOUR-EMITTING COMPOUNDS, REDUCED BY THE TEST FILTER SYSTEM

Aromatic alcohols

Aromatic amines

Triphenylmethane dyes

Benzamides

Benzenesulfonamides

Benzenesulfonates

Benzoates

Quinolones

Dibenzocycloheptenes

Aromatic esters

Aromatic ethers

Phenols

Phenothiazines

Phenylethylamines

Flavonoids

Phthalates

Indanes

Aromatic carbamates

Aromatic ketones

Coumarins

Aromatic acids

Morphinates

Nitrobenzenes

Aromatic nitriles

Picrates

**TYPES OF GASEOUS HARMFUL ORGANIC COMPOUNDS  
REDUCED BY THE TEST FILTER SYSTEM**

C7+

ETHANE + ETHENE

PROPANE + PROPENE

I-BUTANE

N-BUTANE

I-PENTANE

N-PENTANE

2,2-DIMETHYLBUTANE

2-METHYLPENTANE

3-METHYLPENTANE

N-HEXANE

CO

METHANE [mole%]

HYDROGEN

HYDROGEN SULFIDE

METHYL MERCAPTAN

ETHYL MERCAPTAN

PROPYLENE MERCAPTAN

C7+

ETHANE + ETHENE

PROPANE + PROPENE

I-BUTANE

N-BUTANE

I-PENTANE

N-PENTANE

**EXAMPLES OF COMPOUNDS SUBJECT TO PURIFICATION  
IN TEST FILTER SYSTEM**

Acetone

Aliphatic hydrocarbons (decane, octane, hexane)

Aromatic hydrocarbons (AH) (toluene, xylene, benzene)

Polycyclic aromatic hydrocarbons (PAHs) (benzo[a]pyrene, biphenyl, naphthalene)

Pesticides

Chlorine-containing compounds (dichloromethane, methyl chloride, trichloroethane, chloroform)

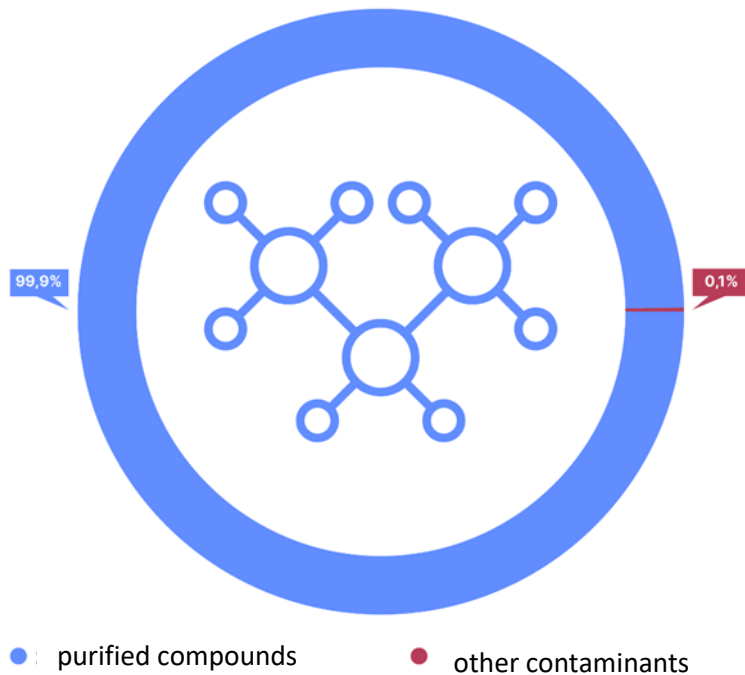
N-butyl acetate

Dichlorobenzene

4-phenyl cyclohexene (4-PC)

Terpenes

VOC



## TEST-GC REACTOR PARAMETERS USED IN THE TEST FILTER SYSTEM

TEST-GC	value	unit
Minimum efficiency [gas calorific value 0 kJ/m <sup>3</sup> n]	167	[m <sup>3</sup> n/h]
Maximum efficiency [gas calorific value 1,000 kJ/m <sup>3</sup> n]	5,082	[m <sup>3</sup> n/h]
Number of microwave generators	10	[units]
Microwave/heat power	30	[kWc]
Waste heat (hot water/air)	27	[kWc]
Thermal efficiency of the device	95	[%]
Minimum electrical power consumption from the grid	10	[kWe]
Maximum electrical power consumption from the grid	60	[kWe]
Process temperature	950-1150	[stC]
Organic compound purification efficiency	99.9	[%]
Enclosure	ISO 20'DV	
Length	6,058	[mm]
Width	2,438	[mm]
Height	2,591	[mm]
Device weight	5,500	[kg]
<b>BASE PRICE</b>	<b>230,000</b>	<b>[EUR]</b>

## TEST-GC REACTOR PURIFICATION EFFICIENCY

	value	unit
CO	99.5	%
H <sub>2</sub> S	99.9	%
SO <sub>2</sub>	91.3	%
butyl alcohol	99.7	%
toluene	99.9	%
xylene	99.9	%
benzene	99.9	%
aromatic hydrocarbons	99.9	%
acetone	79.3	%
butyl acetate	99.9	%
aliphatic hydrocarbons	99.9	%
ethylbenzene	99.9	%

## TEST-GC REACTOR EFFICIENCY

