

# PROSORP®

The Sorption Filtration Process



## The INTENSIV-FILTER PROSORP®-Process

Distinguishes itself through a high-efficiency adsorptive dry or semi-dry harmful-gas treatment.

PROSORP® consists of three process stages:

1. the off-gas conditioning,
2. the sorption stage, with/without recirculation of the used additives, as well as
3. the gas and solids separation.

These process stages are complemented by an optimised silo and dosing technology for the sorbents.

## The challenge

The legislator prescribes emission limit values for all industrial sectors which is continuously adapted to technical standards. Regulatory bodies such as the Technical Air-Directive (TA-Luft) technical air instructions, large and small-scale incineration-plant regulations, such as decrees for the Federal Air Pollution Laws

(BimSchV) Federal Emissions Protection Legislation, demand the installation of effective off-gas cleaning measures.

Apart from newly-erected plants, increasingly existing plants also have to be retrofitted with modern off-gas cleaning technology. Owing to the multitude of simultaneously occurring harmful gases in the off-gas, a simultaneous process such as PROSORP® is ideally suited to numerous processes.



Sorption installation after a sewage incinerator for separation of off-gas components according to regulation 17 BimSchV.



Sorption installation after a non-ferrous metal melting furnace for separation of polychlorinated hydrocarbons.



Sewage incineration.



Dry sorption installation after a special-waste incinerator rotary kiln.



**Mighty solutions** for tiny particles.

## The Solution

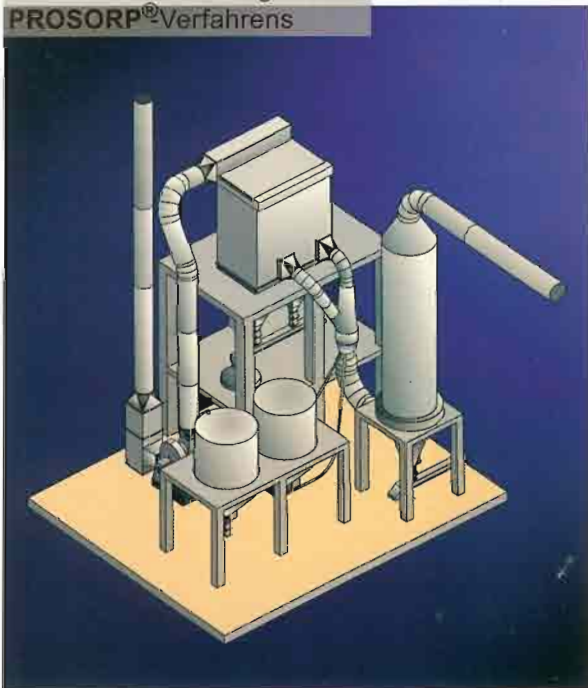
The **PROSORP**<sup>®</sup> process from INTENSIV-FILTER is a dry or semi-dry functioning simultaneous process for separation of numerous industrially created gaseous and solid harmful substances.

**PROSORP**<sup>®</sup> offers a strong-performing and cost-saving solution to harmful-substance production for new plants as well as for retrofitting existing plants.

Suitable solid additives filter harmful substances from off-gases via adsorption and/or chemisorption. In this process the filter-medium holds the additives back with the solid harmful-substance and then channels them out again from the filter.

Proven INTENSIV-FILTER-Technology is utilised in the **PROSORP**<sup>®</sup> process as a highly-efficient sorption reactor.

Grafische Darstellung des **PROSORP**<sup>®</sup> Verfahrens



## Off-gas conditioning

Depending on the task, the off-gas is firstly cooled and conditioned in the INTENSIV-FILTER-Tube-cooler or with a vapour-cooler by means of water-injection.

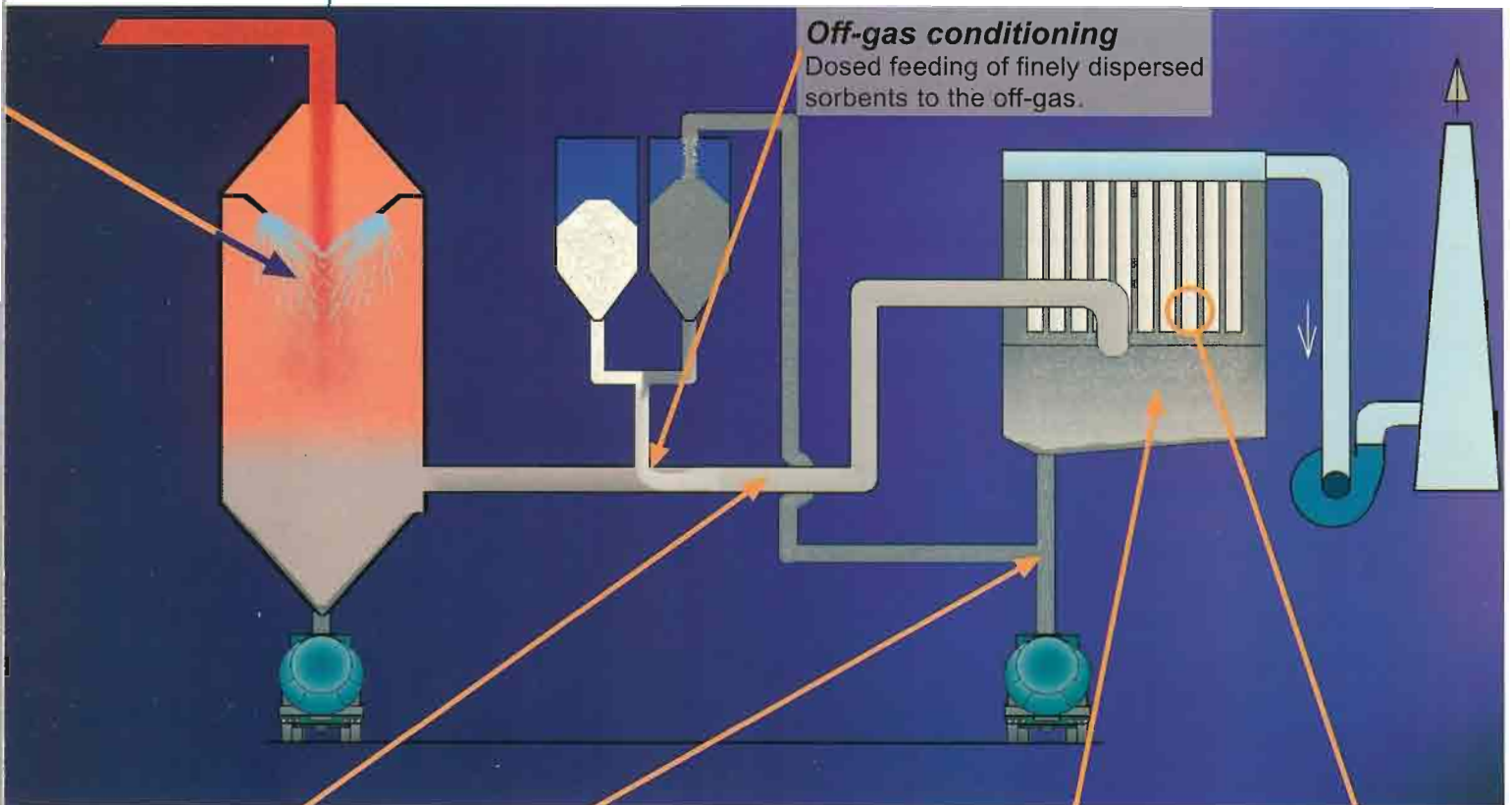
## The Experience

**INTENSIV-FILTER** has constructed plants of various dimensions and capacities for the following applications:

- Firing installations for solid and liquid fuels
- Plants for thermal treatment of waste and special waste
- Sewage incineration plants
- Soil rehabilitation plants
- Smelting ovens for aluminium, lead, copper and zinc
- Metal-refining plants
- Chemical industry plants

Among others, these materials were separated:

- Dust
- Sulphur dioxide, hydrogen chloride, hydrogen fluoride
- Heavy metals such as mercury, lead and arsenic
- Dioxins and furanes



**Off-gas conditioning**

Dosed feeding of finely dispersed sorbents to the off-gas.

**1. Sorption stage**

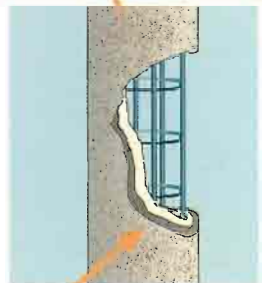
The mechanically or pneumatically-operating, homogeneous fine-dispersive spreading of the additive guarantees optimal contact between the harmful gas and the sorbent in the flow reactor.

**Recirculation**

A partial recirculation of the additive occurring in the filter ensures the most effective use of the sorbents through reintroduction into the off-gas stream in front of the bag-filter plant. Dosing and circulation volume of the sorbents are variable in order to encounter flexibly the varying off-gas volumes and harmful-substance concentrations with minimum sorbent usage.

**2. First sorption stage and gas and solids separation**

Main components of the **PROSORP**<sup>®</sup>-process from INTENSIV-FILTER for simultaneous separation of dust and gaseous harmful emissions is the INTENSIV-JET-Bag-Filter, which for decades has been successfully installed worldwide.



**2. Second sorption stage**

The active sorbents form an absorption zone on the filter-bag surface of the downstream INTENSIV-JET-Bag-filter plant, which is comparable to the pouring of a solid bed adsorber. Through a cleaning action of the filter bags adapted to the **PROSORP**<sup>®</sup>-process, the coating of the filter-bag surface is constantly renewed and kept at a high level. The harmful substance which is bound to the solids is channelled out with the used adsorbent and the process dust.



The **PROSORP**<sup>®</sup>-process

*with Intensiv-Filter technology.*

## The advantages of the PROSORP®-process

- High flexibility with regards to volume and composition of the harmful substances.
- Minimal operating costs and small volume of solids through optimal application of the sorbents utilised.
- No waste water.
- High availability and low maintenance requirement through proven and robust INTENSIV-FILTER-plant technology.
- Modest space requirements.



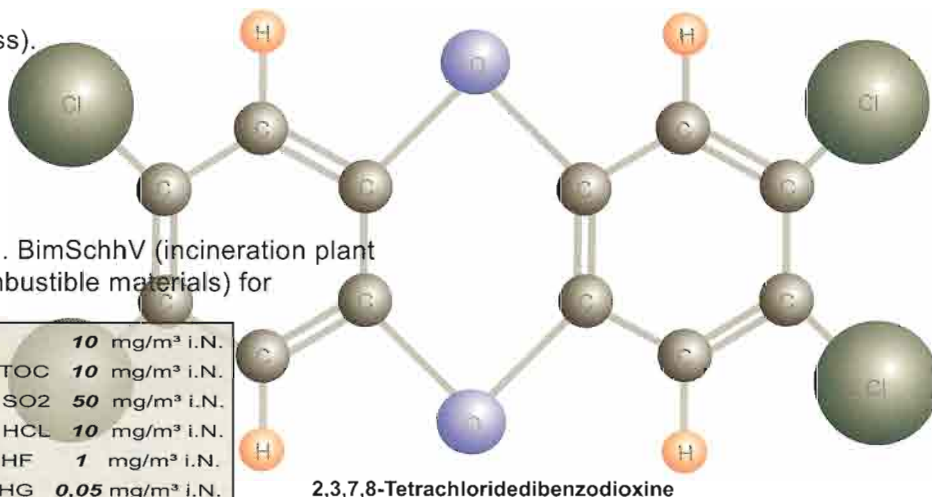
PROSORP®-plants from INTENSIV-FILTER function problem-free with various additives.

- Hydrated lime (Calcium hydroxide).
- Activated carbon / Activated coke.
- Sodium bicarbonate (Neutrec-Process).
- Aluminium oxide.
- Zeolite.
- Mixture of various additives.

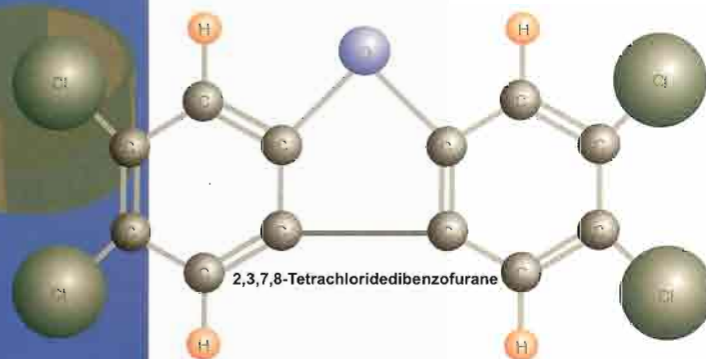
The emissions limit values of the 17th. BimSchhV (incineration plant regulations for waste and similar combustible materials) for

Dust (total)*	10 mg/m <sup>3</sup> i.N.
Organic substances (total carbon)*	TOC 10 mg/m <sup>3</sup> i.N.
Sulphur oxide ( as SO <sub>2</sub> )*	SO <sub>2</sub> 50 mg/m <sup>3</sup> i.N.
Hydrogen chloride HCl*	HCL 10 mg/m <sup>3</sup> i.N.
Hydrogen fluoride HF*	HF 1 mg/m <sup>3</sup> i.N.
Mercury HG**	HG 0,05 mg/m <sup>3</sup> i.N.
Cd, TI** ( in total )	Cd,TI 0,05 mg/m <sup>3</sup> i.N.
Sb,As,Pb,Cr,Co,Cu,Mn,Ni,V,Sn,**(in total)	0,5 mg/m <sup>3</sup> i.N.
Dioxins und furanes (PCDD/F)**	PCDD/PCDF 0,1 ng/m <sup>3</sup> i.N.

\*Daily mean value \*\*Mean value over the sampling period;  
Sample size 11 % O<sub>2</sub>



The composition of the additive mixtures is adapted to the individual application to avoid danger of explosion or fire.



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