

Dust Collection & Gas Scrubbing



Dust Collection & Gas Scrubbing

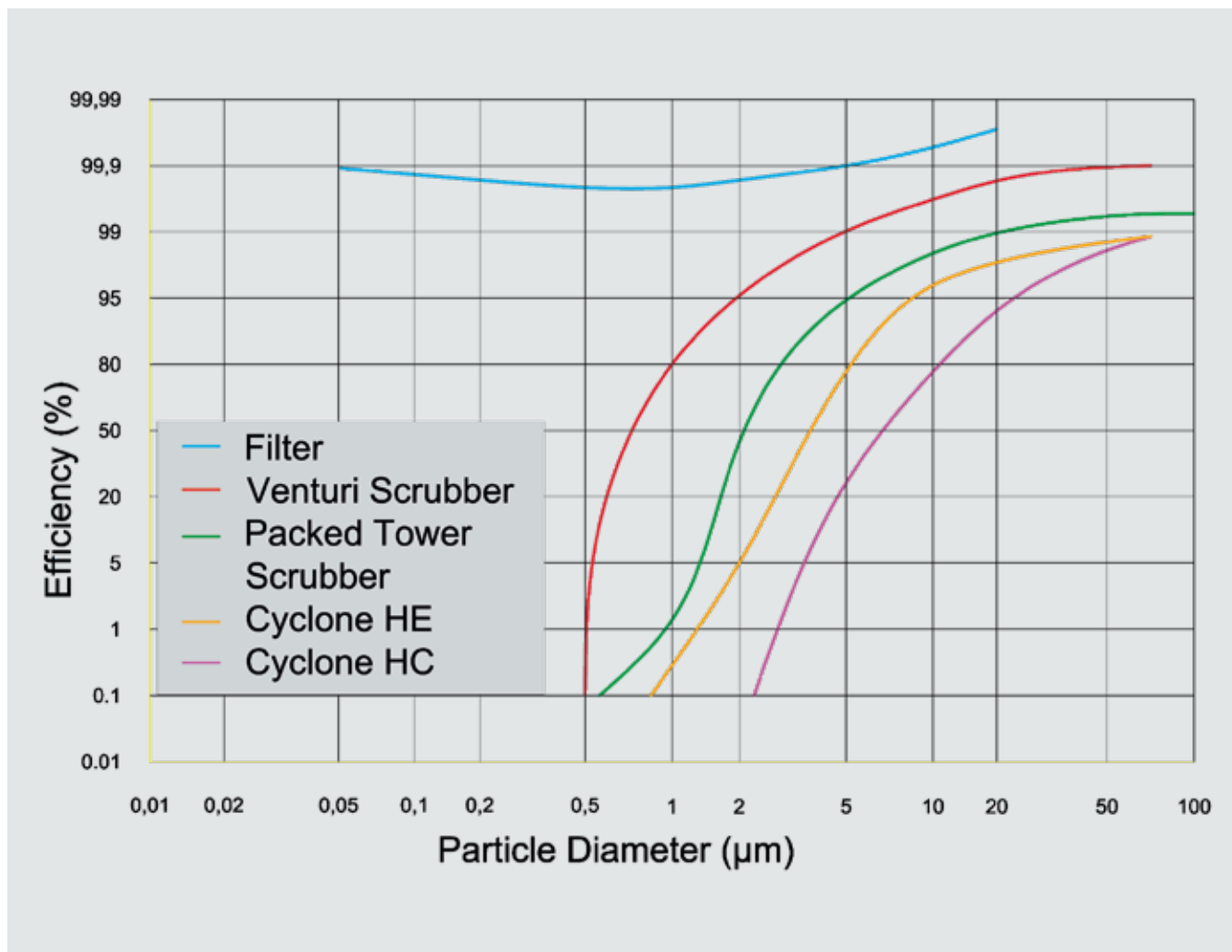
TEMA Process B.V. offers Dust Collection & Gas Scrubbing equipment and systems for emission control, gas cleaning and product recovery.

TEMA Process designs the Dust Collection & Gas Scrubbing equipment and systems in accordance to the latest standards, local conditions and product specifications.

Tema Process Dust Collection & Gas Scrubbing Line include:

- Jet bag-Filters
- Cyclones
- Venturi Scrubbers
- Packed Tower Scrubbers
- Dry Scrubbers
- Cyclones in combination with Jet bag Filters
- Cyclones in combination with Packed Tower Scrubbers

Figure 1.0 shows the Efficiency / Particle size relationship of above mentioned line of equipment.



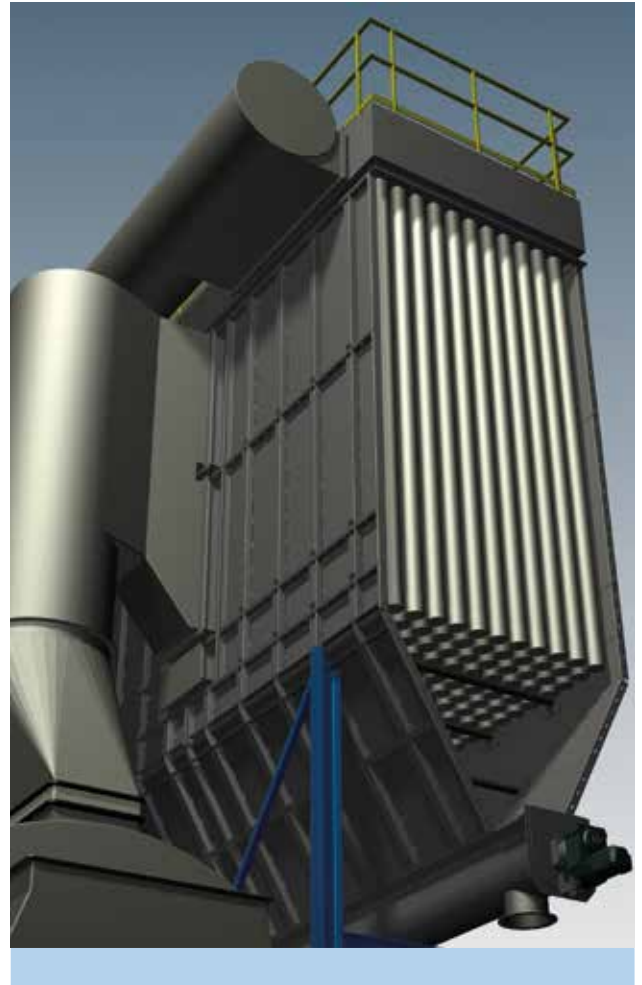
Design of Jet bag Filters

(Process Technical)

TEMA Process design for continuous Jet bag Filters is based on the process data and local conditions and can be offered "Taylor-made" suitable for the application.

Important criteria for the design are:

- Gas volume in Nm³/h
- Chemical composition of the gases
- Moisture content of the gases
- Temperature of the gases
- Dust in kg/h
- Characteristics of the dust, like corrosive, abrasive etc.
- Particle size range of the dust
- Local emission standards
- Explosion resistant (ATEX)
- Hygienic design
- On line or off line systems
- Materials of construction



Jet bag Filter under construction

Design of Jet bag-Filters

(Construction & Layout)

Based on process technical data the filter area is determined and the construction of the Jet bag Filter, suitable for the project, can be designed in

detail supported by special parametric software as partly shown below:

	A	B	C	D	E	F
1	Filter 3-3-16 Parameters					
2	Parameter	Sizes	Format			
3	Covers Left		2 ul	<i>possibly: 1+2+3</i>		
4	Covers Right		2 ul	<i>possibly: 1+2+3</i>		
5	Rows		9 ul			
6	Exhaust Front Left		1 ul			
7	Exhaust Front Right		1 ul			
8	Exhaust Back Left		0 ul			
9	Exhaust Back Right		0 ul			
10	Dust Outlet out of CL		0 mm	<i>Outlet out of center of middle hatch, neg</i>		
11	Lenght Filter Bags	3500	mm			
12	Height Part I	1800	mm	<i>possibly: 1600+1800</i>		
13	Height Part II	1800	mm	<i>possibly: 1800</i>		
14	Height Part III	1300	mm	<i>possibly: 500+1000+1300+1800</i>		
15	U_Conveyor	0	ul			
16	V_Conveyor	1	ul			
17	Filter Lenght	6330	mm	<i>Inside dimension</i>		

Filter 3 -3 -16 Parameters

The filter top part can be designed based on following variables:

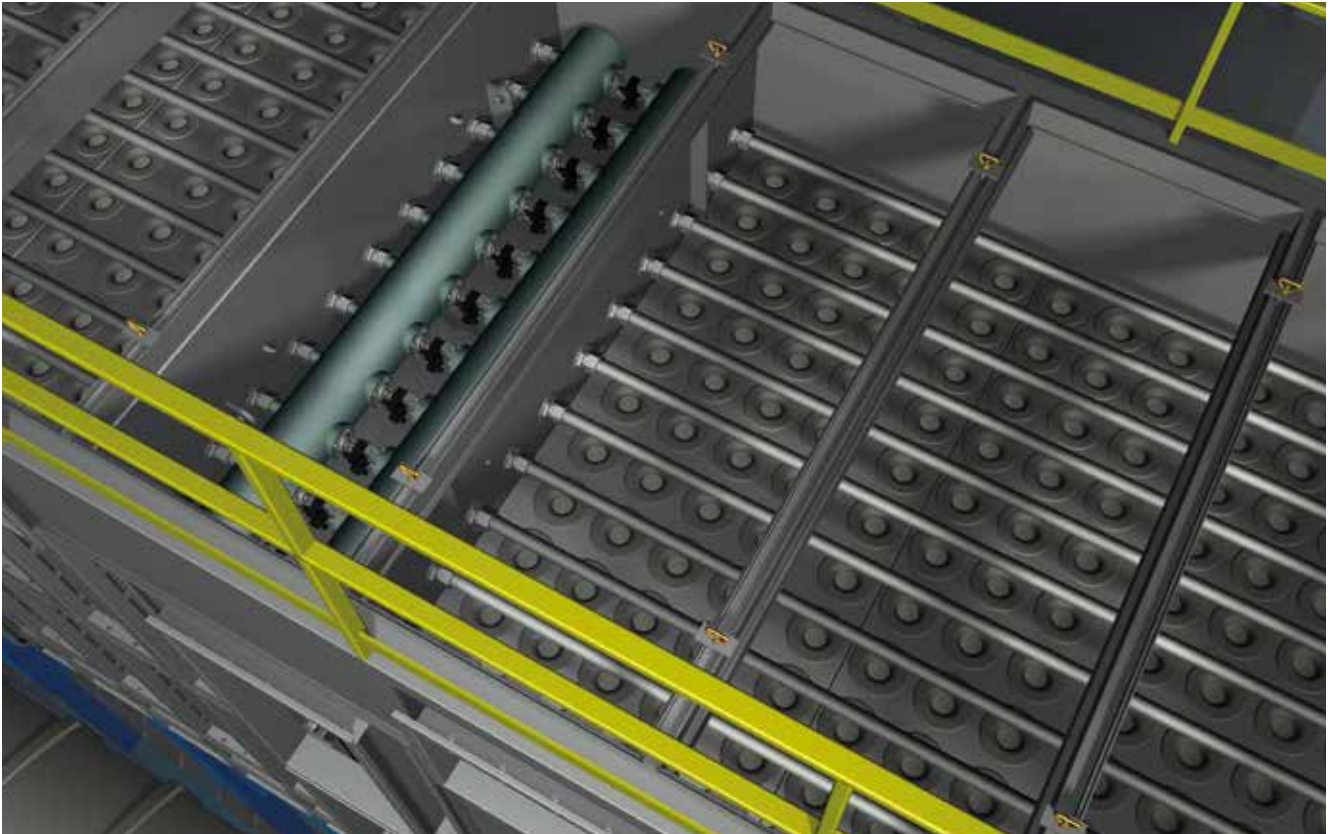
- Number of covers
- Layout of the covers
- The covers can be located on one side or 2 sides of the air buffer tanks
- Under each cover there are 4 rows in width and 8 – 16 filter bags in depth
- Materials of construction can be selected in accordance to the table of "construction materials" (page nr. 9)



Jet bag Filter Top part (partly open)

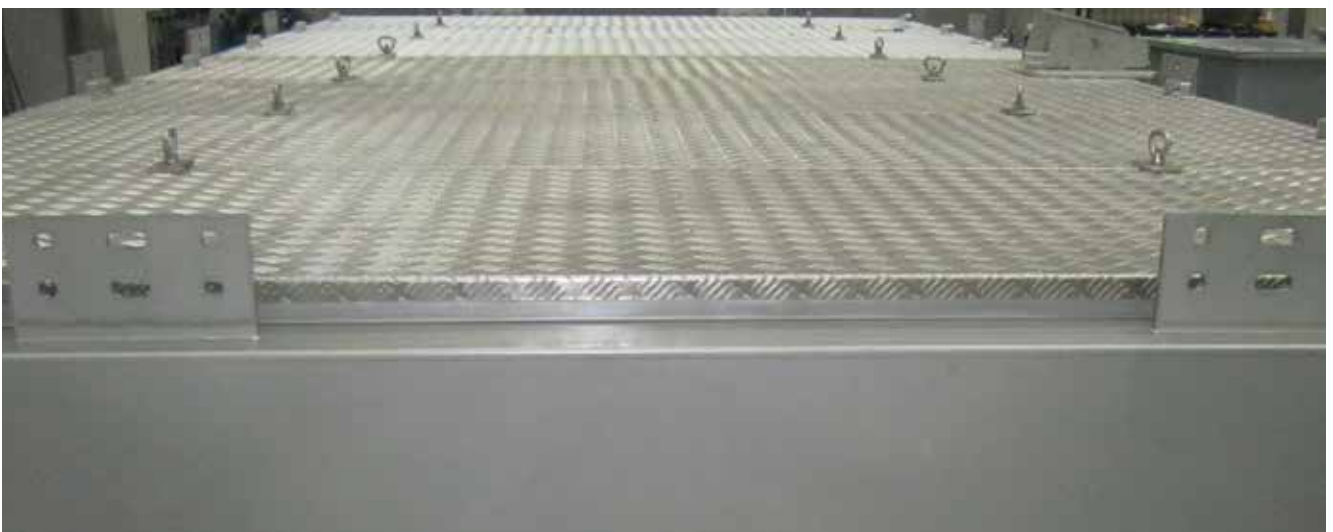
Design of Jet bag-Filters

(Construction & Layout)



Top view of Filter top part without covers

- The top part is standard made of stainless steel and is isolated.
- The maximum number of covers on one side of the buffer tanks are 4 (maximum 4 covers on each side!)
- The bags are protected by standard wear protection shields. (see page 6)
- The maximum number of covers on one side of the buffer tanks are 4 (maximum 4 covers on each side!)



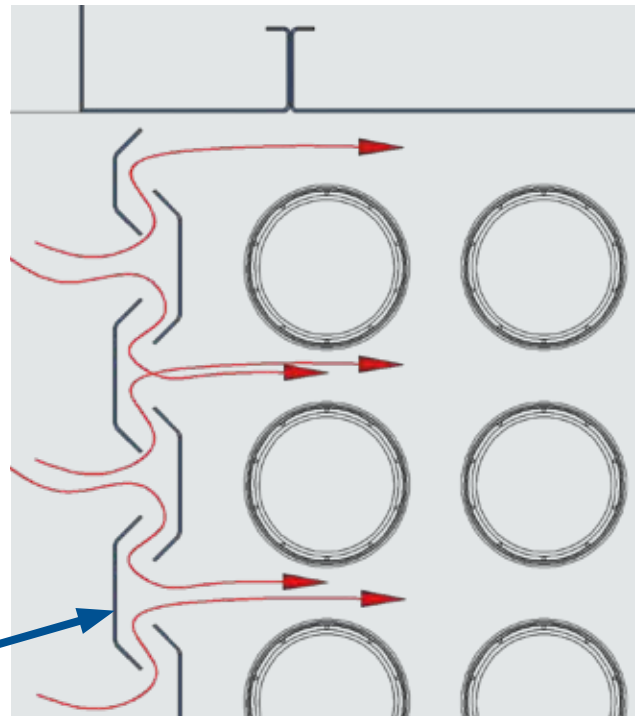
Top part with covers

Design of Jet bag Filters

(Construction & Layout)

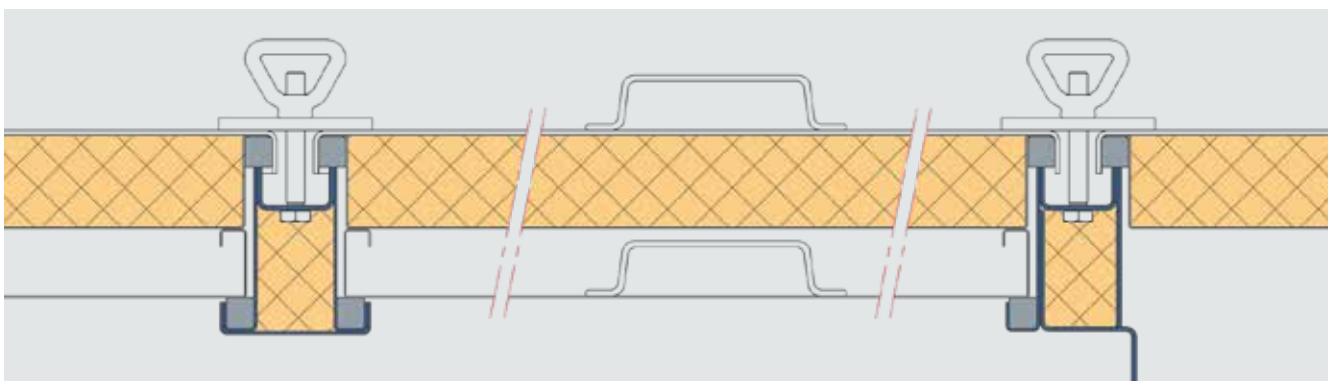


Inside view top-part of Bag Filter, bags, support cages & wear protection shields



Wear protection of Filter Bags

- Length of filter bags are available from 2000 mm – 5000 mm
- Bag support cages can be split in length in several parts for one filter bag with easy connection to reduce space for replacement of the filter material (see page nr. 8)
- The textile bags can be supplied in different qualities according to table figure 2.0 (page nr. 7)
- The filter housing is designed in several “modules”
- The dust is collected in a tapered chute with an integrated spiral screw for dust discharge
- The location of the screw discharge also can be chosen to meet local dust collection or transport
- The 3D design drawing is the base for laser cutting- and production drawings
- An enormous number of construction variations are possible considering the variables in number of covers, number of bags in the length rows and filter bags length



Double cover, isolated



Bottom view from Filter bags

Filter bag for most demanding solutions like:

- High temperatures
- Micro dust particles
- Chemical unfriendly environment
- Electrostatic dust particles

Properties of Textile Fibers for Dry Filtration

Figure 2.0

Fiber	Recommended continuous operation Temperature (Dry Heat)	Water Vapor Saturated Condition (Moist Heat)	Max.(short time) Operation Temperature Dry heat	Supports Combustion	RESISTANCE TO				
					Alkalines	Mineral Acids	Organic Acids	Oxidizing Agents	Organic Solvents
PP	94° C 200° F	94° C 200° F	107° C 225° F	Yes	5	5	5	3	5
PES	132° C 270° F	94° C 200° F	150° C 300° F	Yes	2	2	2	3	3
PAN	125° C 260° F	125° C 260° F	150° C 300° F	Yes	2	4	5	3	4
ARAMID NOMEX®	204° C 400° F	177° C 350° F	240° C 465° F	No	3	2	2	1	4
PTFE	260° C 500° F	260° C 500° F	290° C 550° F	No	5	5	5	5	5
PPS	190° C 375° F	190° C 375° F	232° C 450° F	No	5	5	5	2	5
POLYIMIDE P84®	260° C 500° F	195° c 383° F	300° C 580° F	No	2	4	4	4	5
FIBER GLASS	260° C 500° F	260° C 500° F	290° C 550° F	No	2	4	4	5	4

Legend: 1 - Poor; 2 - Fair; 3 - Good; 4 - Very Good; 5 - Excelent
 NOMEX® is registred Trademark of E.I. DU PONT DE NEMOURS
 P84® is registered Trademark of LENZING A.G.

Design of Jet bag-Filters

(Details of construction)



Support cage in filter bag



01. How to install a filter bag



02. How to install a filter bag



1/1 steel wire
support cage

1/2 steel wire
support cage



Top of support cage



Assembly of Filter Top part

Materials of construction

- Mild steel
- Heat resistant steel 16Mo 3
- Heat resistant stainless steel 153 MA, AISI 321, 1.4878
- Duplex steel
- Stainless steel AISI 304(L), 316(L), 904L, 254 SMO
- Titanium



Dust discharge spiral screw

Cyclones



A Cyclone is a relative simple device that uses centrifugal force to separate larger particles from air streams.

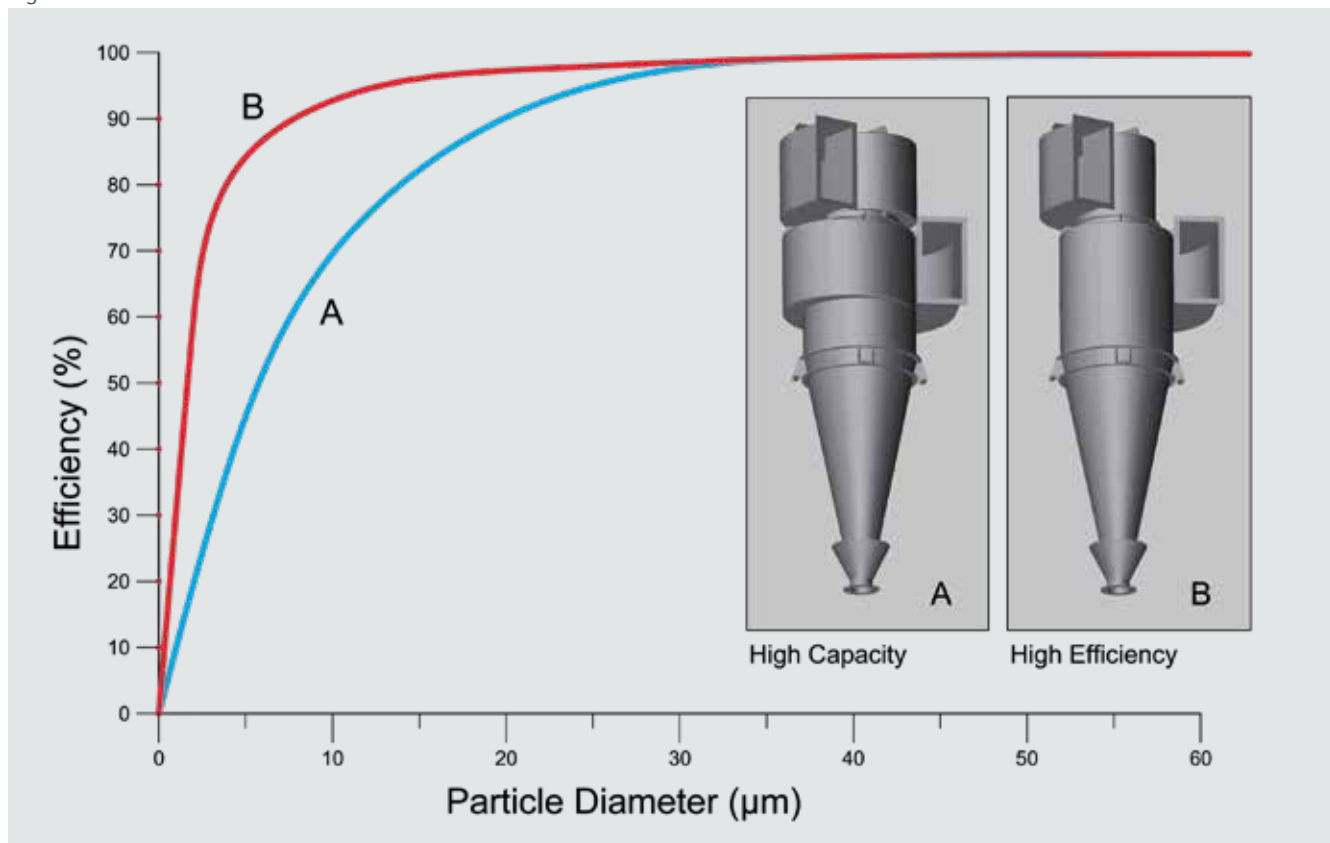
It is a high capacity / high efficiency separator (figure 3.0) that also can be used in combination with fluid bed Dryers / Coolers, Jet bag Filters, Packed Tower Scrubbers and other process equipment.

Diameters from 400 to 2000 mm.

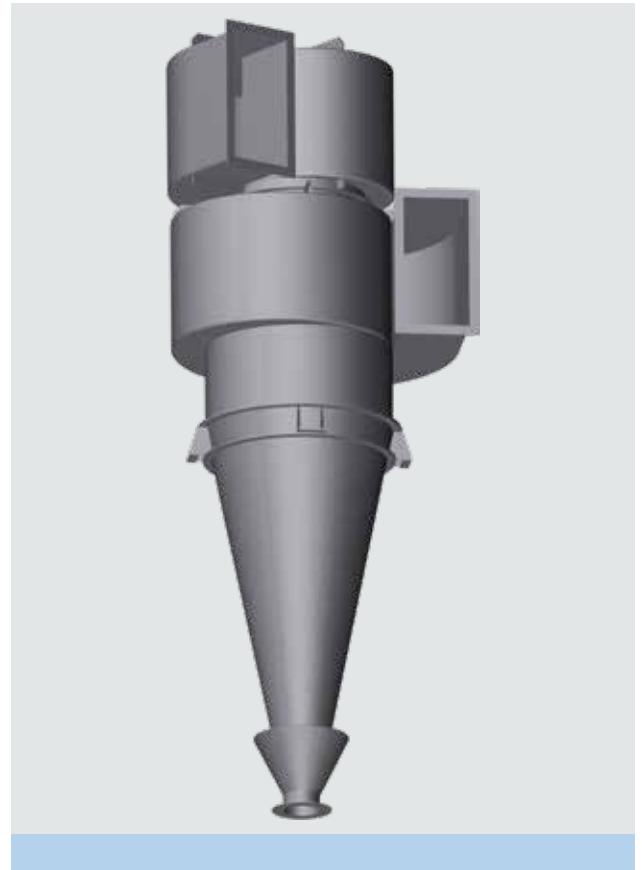
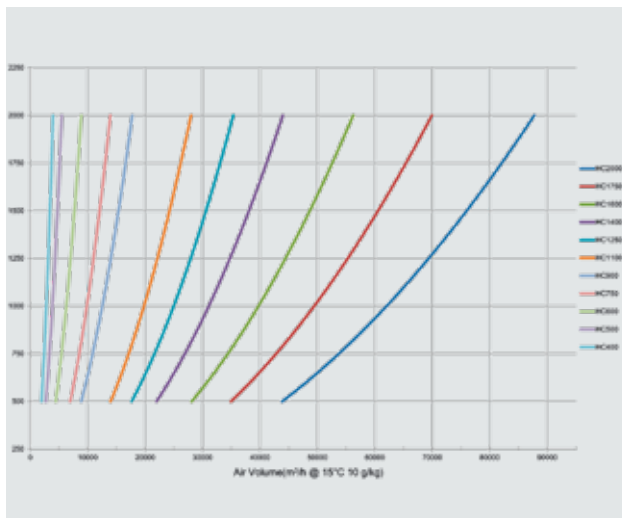
Materials of construction

- Mild steel
- Heat resistant steel 16Mo 3
- Heat resistant stainless steel 153 MA, AISI 321, 1.4878
- Duplex steel
- Stainless steel AISI 304(L), 316(L), 904L, 254 SMO
- Titanium
- Wear resistant design

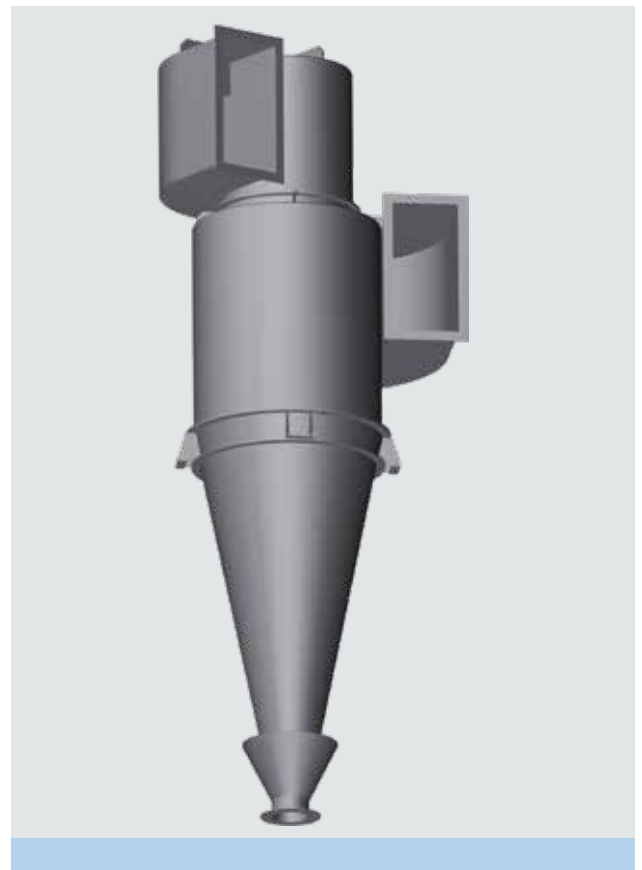
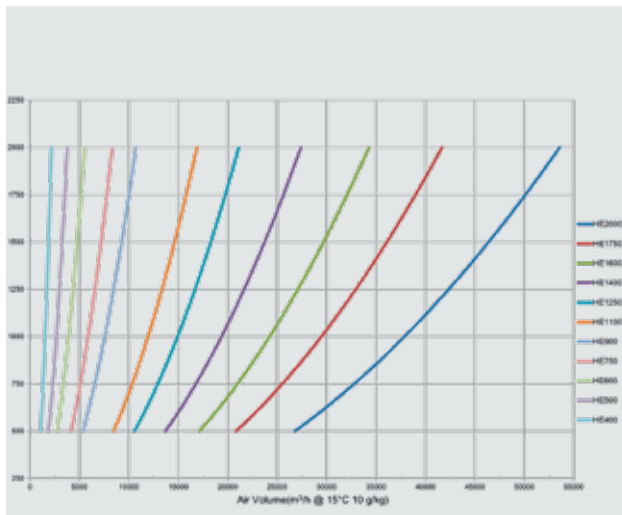
Figure 3.0



High capacity Cyclones



High efficiency Cyclones



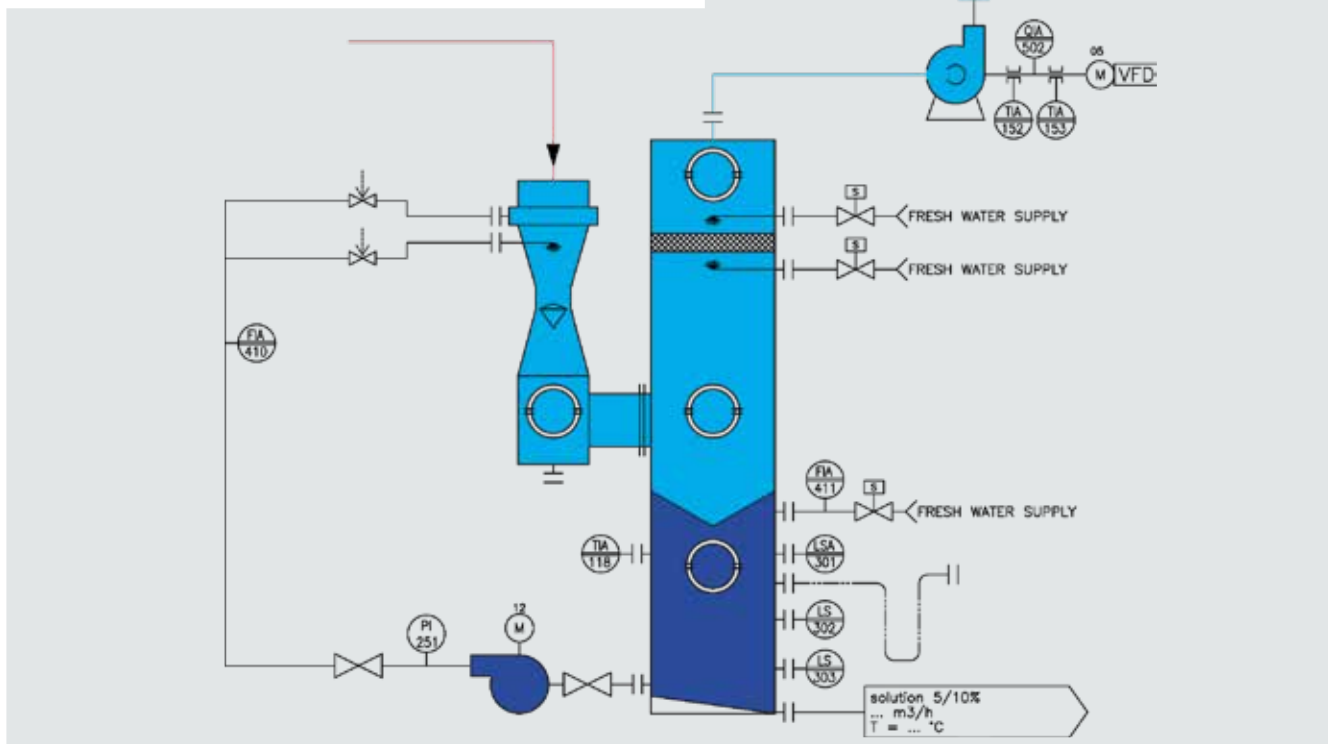
Venturi Scrubber



Venturi scrubbers are used to remove particulate matter from a gas stream. A „Venturi Scrubber“ consist of a contact section called a venturi section in combination with a droplet separator section.

Exhaust gas with dust is fed into the venturi section where it passes through a water mist at the venturi throat at high velocity. This results in thorough mixing of water droplets and dust particles which agglomerate to form larger particles which are subsequently removed from the gas in the separator section.

The water supply units and spraying systems allow recirculation of water with high dust contents. These systems are used for cleaning particulate matter from exhaust gas with stringent emission level, soluble dust mainly in the mineral and chemical industry.



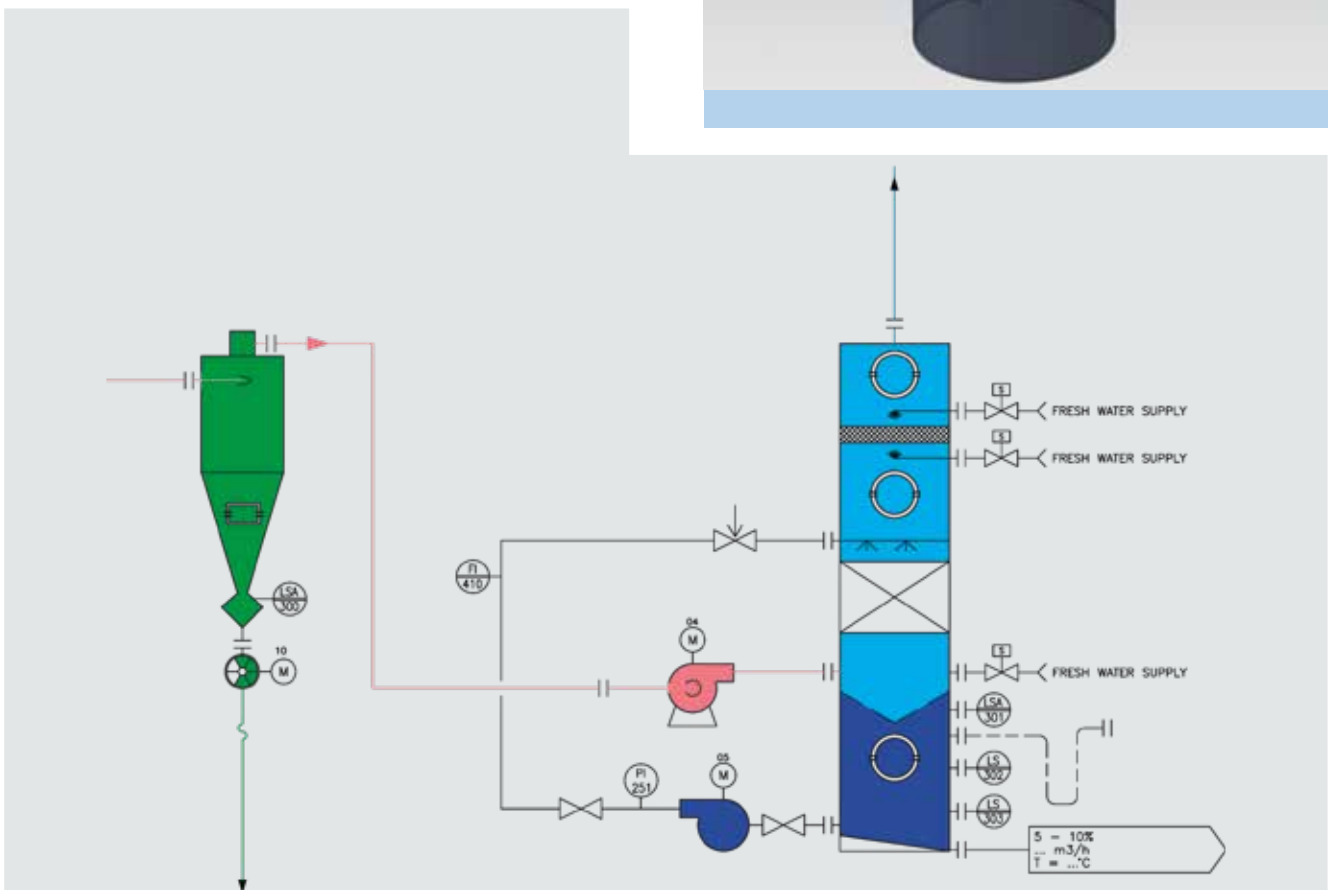
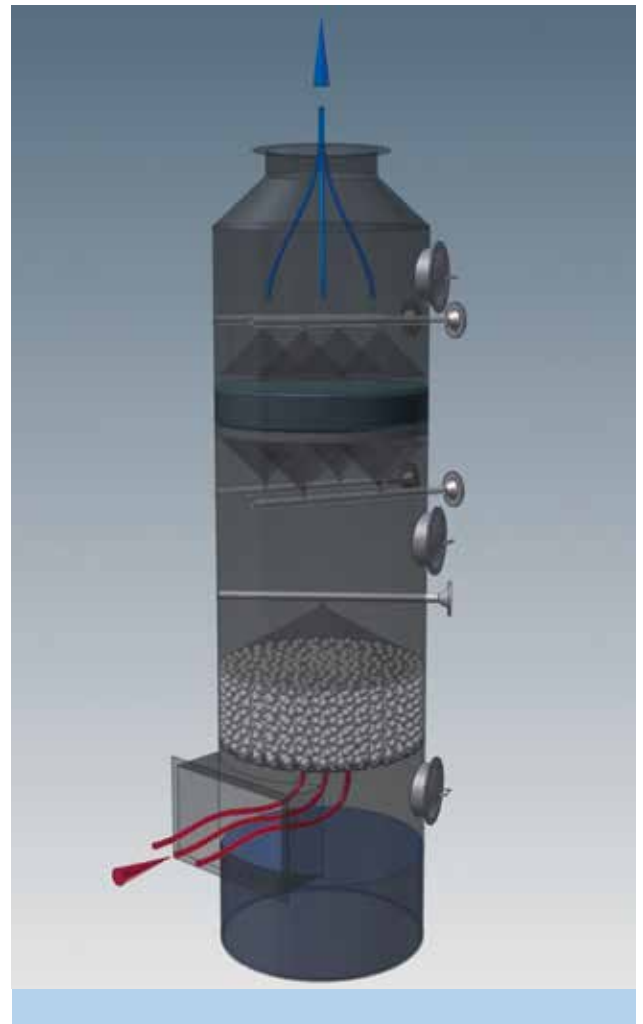
Packed Tower Scrubber

Packed tower scrubbers are used to remove particulate and / or vapor contaminants from an exhaust gas stream by way of dilution or absorption.

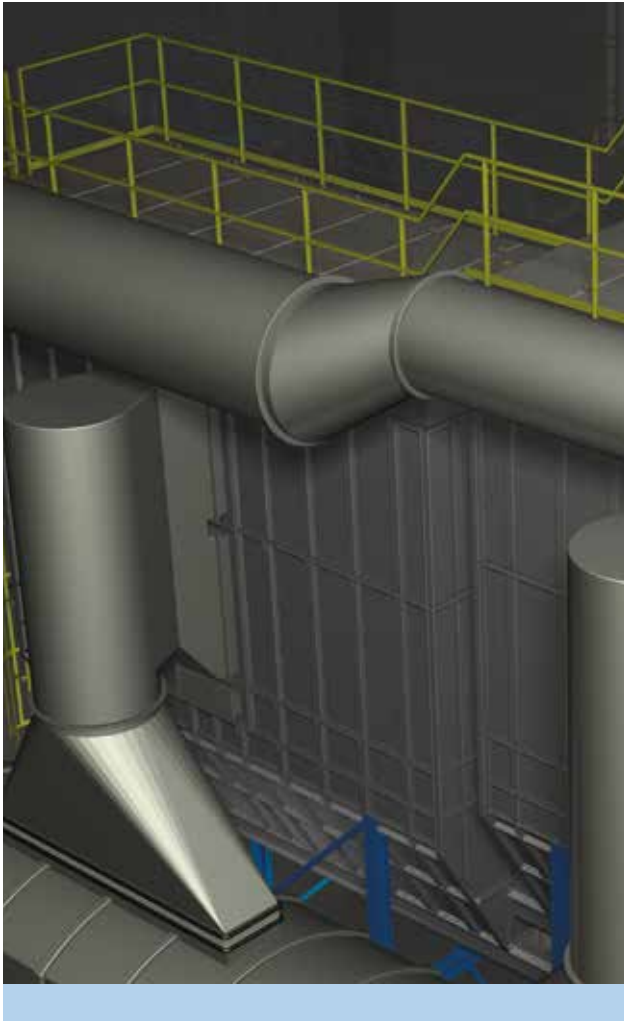
A packed tower is an efficient method of carrying out mass transfer between gas and liquid phases. Packed tower scrubbers incorporate packing media to facilitate intimate contact between a scrubbing liquid and gas to be scrubbed.

Applications are: reduction of dust or gaseous emission levels, product recovery, air pollution and odor control.

In countercurrent scrubber operation, the gas flows upward through the packing material, while the liquid flows downward by gravity through the packing material. The liquid wets the surfaces of the packing material, providing a large amount of surface area for diffusion of one or more components of the gas stream into the liquid stream, thereby cleaning the gas.



Dry Gas Scrubbing

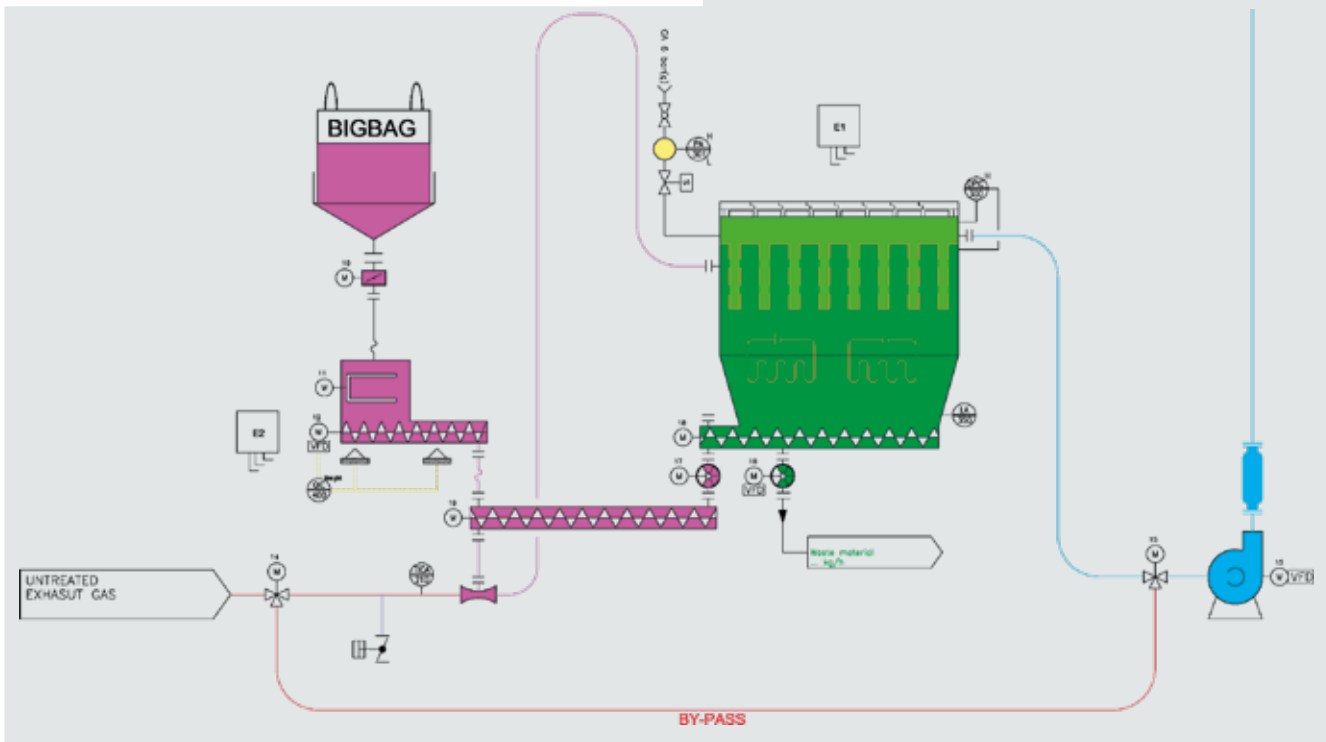


Adsorption of acidic gases and organic compounds occurs in the reaction ducting and in the dust cake on the fabric filter bags.

The unused and recycled adsorbent ($\text{Ca}(\text{OH})_2$, sodium bicarbonate, activated carbon) are injected into a „reacting“ duct and then dispersed over the complete filter area.

The final emission levels on HF, HCL, SO_x and organics is depending on the used adsorbent, stoichiometric value and operating temperatures.

For smaller systems the adsorbent is premilled and supplied in Big-Bags on larger systems on site milling and silo-storage can be used.





Installation of ATEX certified cyclones



Fluid bed Deduster

TEMA PROCESS B.V.

Ingenieur R.R. van der Zeelaan 5
8191 JH Wapenveld
The Netherlands

phone +31 (0) 88 5225 800
fax +31 (0) 88 5225 899

www.temaprocess.com
sales@temaprocess.com