DAPULS

Pulse Jet-Filter System

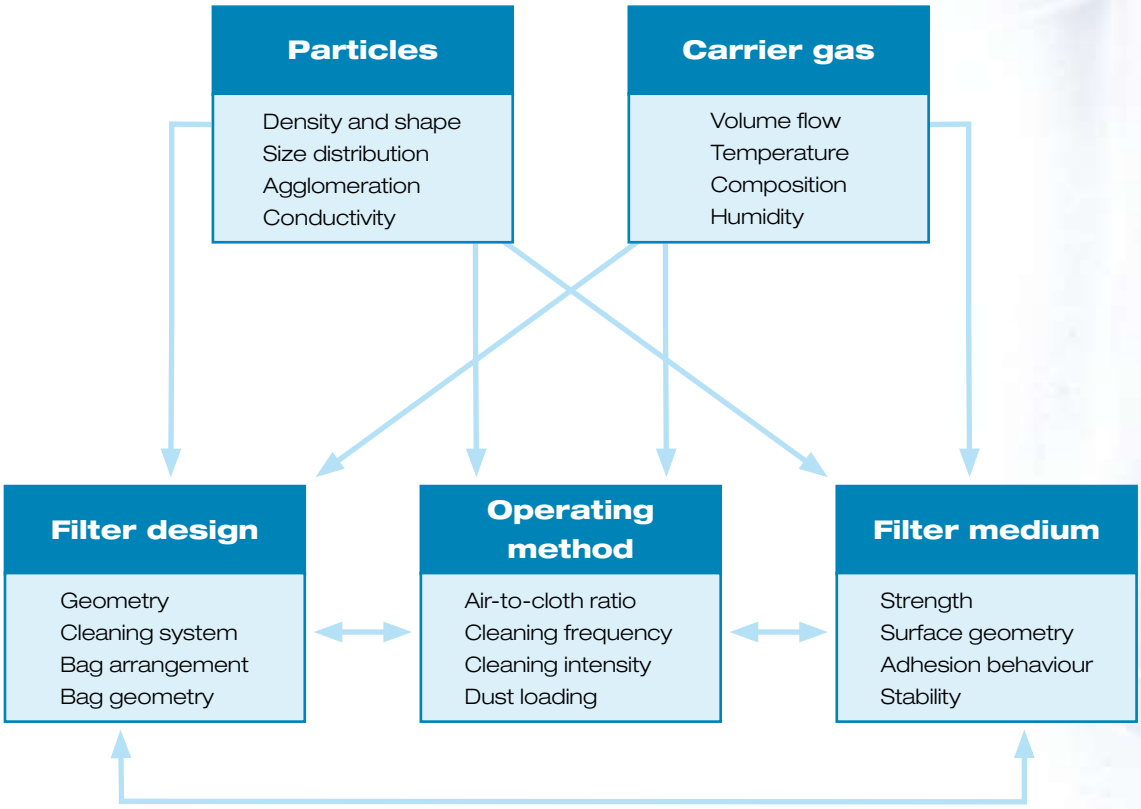
Efficient separation and
high availability

scheuch
TECHNOLOGY FOR CLEAN AIR

Efficient filtration requires know-how and experience

The fundamental task of a filtration plant is to clean a defined crude gas to the point that the specified limits for dust and contaminants can be complied with reliably and safely. However, this requirement is extremely complex because of a variety of influencing factors such as the composition of the carrier gas, the characteristics of the particles and the filter medium, the operating method, and the filter design. For this reason, the optimal filter design and consequently the associated overall size of the filter, which is significantly responsible for the cost structure of the plant, cannot be calculated exactly, but rather must be determined on the basis of experience and testing.

Influencing variables in surface filtration

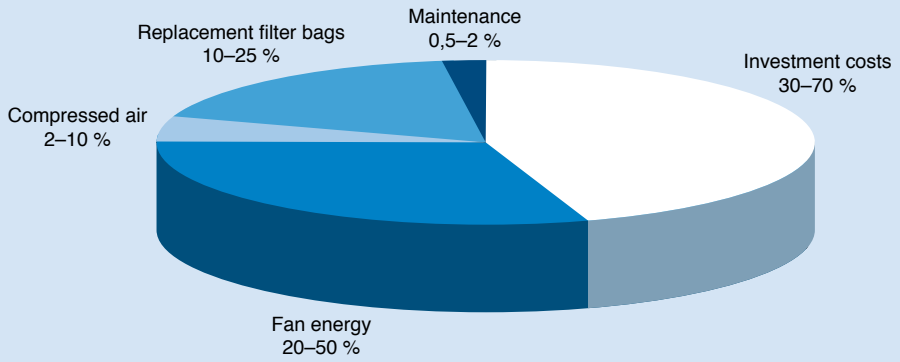


At Scheuch, we have extensive know-how in filtration technology and a wealth of empirical experience from thousands of filtration plants that are in operation worldwide in the most varied industrial sectors. Operating data from the plants as well as the most recent insights from our research projects influence the continuing development of our IMPULS filter program and expand the data pool used to create optimal plant designs.

The right design is decisive

One of the foundations for cost optimisation is an efficient filter that exhibits the most homogenous gas and particle distribution possible and that has an efficient cleaning system. Another factor that fundamentally determines the overall cost structure is the optimum ratio between two design parameters that interact with each other, the air-to-cloth ratio and pressure loss. As a matter of principle one should strive to maximize the air-to-cloth ratio and minimize pressure loss. Relying on our IMPULS filter program and their own expertise, our specialists are able to offer you the ideal solution for every requirement. Then high degree of preassembly in the transport-ready modules and elements makes a significant contribution to the reduction of transport costs and assembly times.

Total cost of ownership of IMPULS filtration plants over an operating period of 10 years



The cost profile varies significantly depending on the application and size.

Low investment

costs through compact construction and a high air-to-cloth ratio based on

- efficient IMPULS cleaning system
- optimal gas and particle distributions in the filter
- best possible utilisation of the entire filter surface

Low fan energy

costs through low pressure loss due to

- a lower plant resistance as the result of flow optimisation
- the selection of the right filter medium
- an efficient cleaning process over the entire length of the filter bag

Low costs for compressed air

due to

- less frequent cleaning
- high proportion of secondary air
- low cleaning pressure

Long service lifetimes for filter bags

guaranteed by

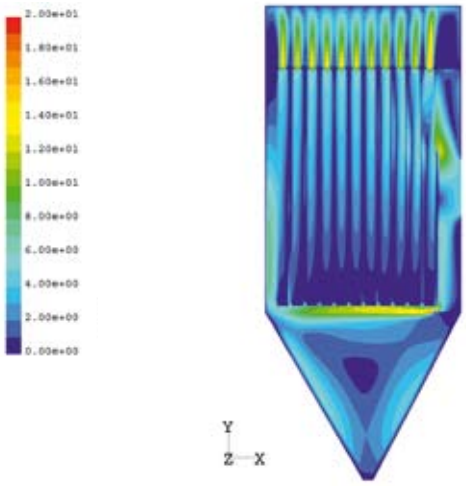
- selection of the appropriate medium
- bag-friendly, gentle cleaning process

High availability

due to

- proper design and standards-compliant execution of the plant
- corresponding safety and monitoring devices

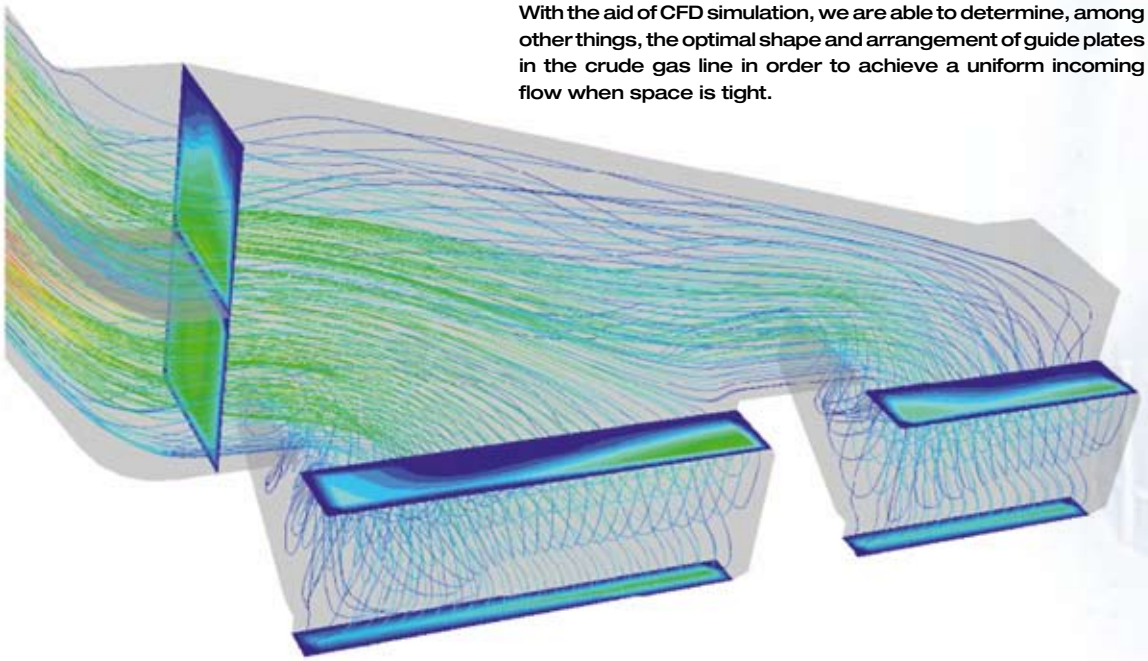
Optimal distribution of the gas and particle streams



These flow simulations show that velocities in the entire crude gas area are approximately equal and that there is consequently a homogenous distribution of particles.

Economical operation with homogenous dust discharge is only ensured by the uniform impact of gas on the filter bags and optimal utilisation of the entire filter surface. Velocity streams and the creation of particle streams should be avoided, as these can cause physical damage to the filter bags and casing after a certain period of time.

The optimum distribution of the crude gas in the filter depends primarily on the inflow of gas to the filter itself. In addition to such parameters as entry velocity, dust load and dust characteristics, the configuration of pipes leading to the filter significantly influences the uniform impact of gas on the filter bags.



With the aid of CFD simulation, we are able to determine, among other things, the optimal shape and arrangement of guide plates in the crude gas line in order to achieve a uniform incoming flow when space is tight.

With the help of modern CFD programs (Computational Fluid Dynamics), we are able to perform quick and reliable analyses of gas particle flows, mixing processes with heat transfer, and pressure loss computations. The insights gained during flow analyses using numerical simulation (CFD) and through experimental studies using a test model provide the basis for the filter design and directly influence ongoing product optimisation. They also confirm that Scheuch's IMPULS filtration plants offer an optimum distribution of the gas and particle streams.

The patented IMPULS cleaning system

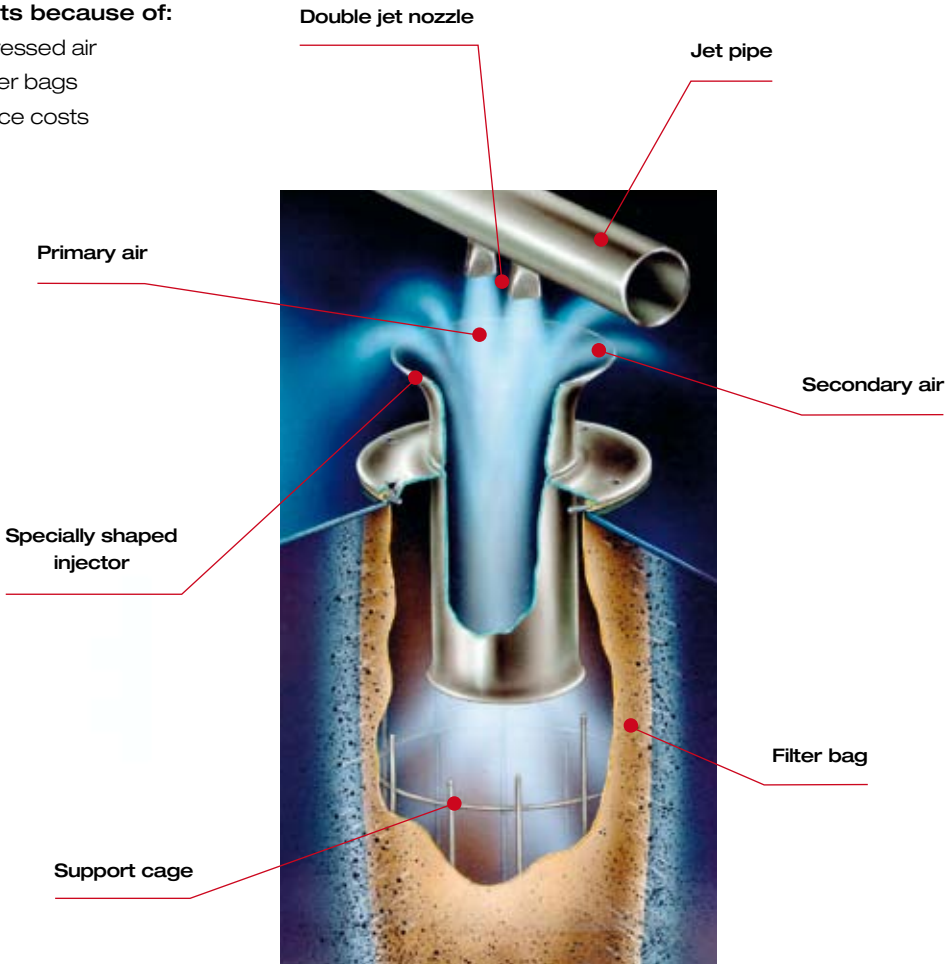
With the development of the IMPULS cleaning system, a decisive step was taken with respect to reducing operating costs and increasing operating safety. Because of specially shaped double nozzles on the jet pipe, the pulsed air jet pulls along an envelope of clean gas from the primary compressed air source as it makes its way to the injector. Both streams of gas are mixed by pulse exchange in the injector and simultaneously undergo a significant increase in pressure. This guarantees high cleaning efficiency over the entire length of the filter bag as well as a reduction in the frequency with which filter bags are cleaned.

Proven in practice for decades, the **IMPULS cleaning system** is a guarantor of low operating costs because of:

- Low consumption of compressed air
- Long service lifetimes for filter bags
- Low service and maintenance costs

Cleaning phase

Filtration phase



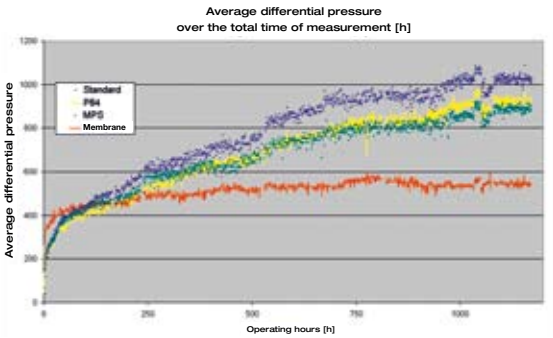
Patented IMPULS cleaning system

Additional advantages include reliable operation of the IMPULS cleaning system, even under difficult operating conditions, and the elimination of dew point undershooting because of the high proportion of secondary air. Last but not least, reducing the frequency of cleaning ("carpet brush" effect) also contributes to the realisation of low clean gas values.

The right filter medium

Because of its impact on filtration performance, pressure loss and — especially in the case of hot gas filtration — the anticipated service life, the proper selection of the filter medium has a decisive impact on operating costs. For this reason, we have for many years analysed and compared different grades of filter bags, both at our own Technikum test facility and on location with customers.

With our test facilities, in which we can simultaneously test filter bags of different grades, we can determine the long-term effects of



mechanical and chemical stresses under real-world operating conditions. Based on these findings, we can make sound and binding recommendations for the most diverse applications. With this know-how, we are able to work together with the manufacturers of filter media to optimise and develop both existing and new grades of filter bags.

Some of the grades used include:

Grade	Polyamide	Polyacryl-Initrilefibre	Polyester	Meta-aramide-fibre	Poly-phenylene-sulfidefibre	Polyimide-fibre	Polytetra-fluroethyle-nefibre	PTFE membrane on fibre glass
Trade name	Perlon Nylon Grilon	Dolanit Ricem	Trevira Diolen Terylene Dacron	Conex Nomex	Ryton Procon Fortron	P84	Teflon Rastex Toyoflon Profilen	Tetratex Pristyne
Technical designa-tion	PA	PAN	PES	AR	PPS	PI	PTFE	PTFE / GL
Long-term thermal stability (°C)	110	125	150	180	190	240	250	260

The intelligent control system

A cleaning system can only be as effective as its control system. For this reason, we began with the development of the IMPLUS filter program to simultaneously develop, build, and continuously adapt our own control systems to the needs of our customers.

This extensive knowledge base, including the ideas of customers, remains part of our company's in-house expertise and with it, we are able to move more quickly to develop targeted innovations - both for filtration plants and control systems - that serve our customers. As an example, we were able to apply in 2004 for a patent on a new, fully automatic program to optimise cleaning pressure and to optimise the cleaning intervals.

Several different filter control devices are available depending on the filter size and the requirements with respect to the optimization of energy costs, safety monitoring devices, and integration with central control systems or a customer's own visualization systems.

Options for filter cleaning systems

In order to be able to optimize the consumption of compressed air, the following types of cleaning systems are available:

Dynamic

In this kind of control system, the device reacts automatically to fluctuating dust loads and air amounts and optimally adjusts the cleaning intervals and the differential pressure to the operating conditions.

Differential pressure dependent

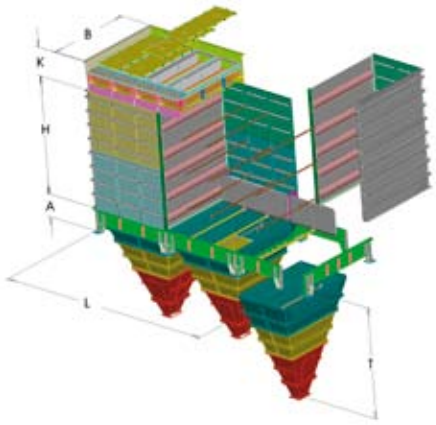
The cleaning impulses are triggered when a preset differential pressure is reached.

Continuous

The cleaning impulses occur regularly at preset, fixed intervals.

Individual designs

The application spectrum for IMPULS filters ranges from dedusting in the wood processing, wood based panel, metals and industrial mineral industries to the filtration of process and hot gases in, for example, the cement industry and the separation of contaminants (sorption process) when cleaning flue gases generated by combustion processes.



In order to ensure the high degree of flexibility necessary to create pinpoint designs for the most diverse applications, the entire filter program is designed as a modular system consisting of five model lines. Large-scale filtration plants are generated using parametric variant modelling. The parameterisation of design types increases flexibility with respect to dimensioning, design, metal thickness, etc. Consequently, customer-specific designs can be realised without additional expense, something that could be previously done only by creating a costly special design.

The following configurations are available:

Row filter

Row filters consist of individual units that can be arranged in rows of up to 16 units. This type of design makes it possible to subsequently expand the filter installation and is only intended for online cleaning.

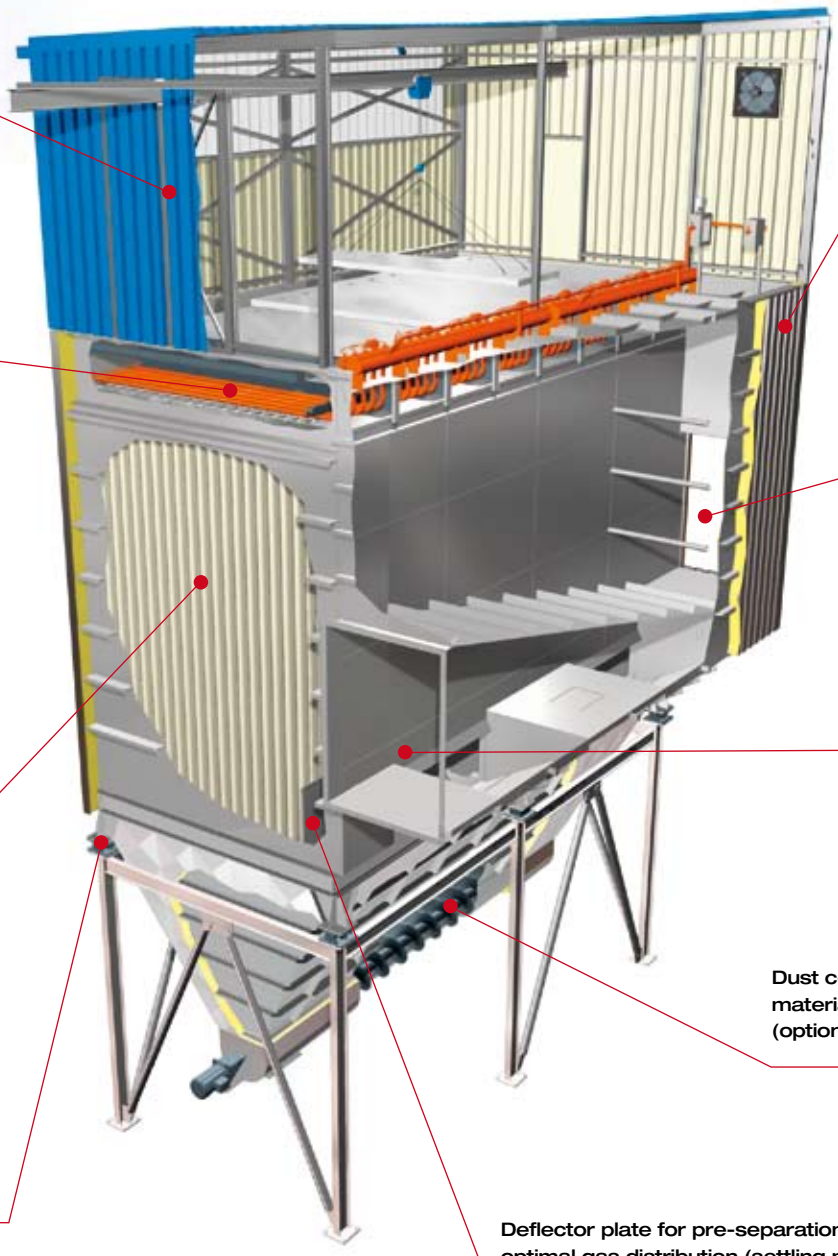
Chamber filter

Intermediate walls separate the chambers in chamber filters and can be operated with both online and offline cleaning. In offline cleaning, one entire chamber at a time is removed from the filtration phase and cleaned. This has the advantage of being able to perform maintenance work even during filter operation.

Circular filter

The IMPULS filter in a circular configuration is a compact, heavy-duty separator. It is especially well suited for the separation of very large amounts of material. Because the crude gas inflow area is implemented as a centrifugal separator (cyclone), it is also particularly well suited for use in conveyor systems or dust extraction plants.

Operating principles and characteristics



Design features

- Volume flows from 500 to 3,000,000 Am³
- 10 standard filter bag lengths
- Hot gas design for temperatures up to 260° C
- Pressure surge protected design including pressure release devices according to VDI 3673 for explosive dusts
- Dust loading up to circa 1,000 g/Nm³
- Casing design pressure up to –15,000 Pa
- Casing wall thickness from 2.5 to 6 mm
- Materials: Galvanized sheet metal, mild steel or stainless steel

Operating safety and service pay off

One of the most important demands made by filter operators is for high availability of the filtration plant, especially in the case of process filters. Scheuch offers an extensive selection of innovative safety packages, both for the monitoring of filter function and for protection against explosion. Using the know-how of our experts with respect to filtration and process technology, as well as fire, explosion and noise protection, we are able to develop concepts for maximum operating safety.

Functional monitoring

In addition to the monitoring of temperature, pressure, fill levels and the speed of discharge devices, there is also an available option for checking the performance of the bag cleaning system by monitoring the blast pipe or pressure tank. In addition, damage to filter bags can be determined and localised by the intelligent control system through the continuous measurement of clean gas dust levels.

Fire- and explosion protection

Of course, the entire IMPULS filter program, including peripheral devices as well as the pressure relief and decoupling systems, complies with the appropriate standards and laws. In addition, we can also offer extinguishing barriers or an inert operating mode for the suppression of explosions.

Industrial services

Modern maintenance and upgrade concepts combined with consultations on plant optimization ensure that users enjoy high plant availability and significant reductions in operating costs. Extensive measurement procedures for analysing gas and dust, for examining filter media, and for the field of industrial acoustics, allow us to offer filter operators the best possible customer support.

Thousands of filtration plants are in operation worldwide

Cartridge filter for
sand blasting unit

Circular filter in the wood
processing industry

Row filter in the
wood based panel industry

Pressure surge resistant filter
for dedusting a coal grinding mill

Row filter in the
foundry industry

Chamber filter for
cleaning flue gas

Chamber filter in the cement industry

Chamber filter in the steel industry

Special implementations based on the IMPULS filter

EMC
Energy Minimizing Concept

EMC

The patented Energy-Minimizing-Concept guarantees lowest operating costs for applications with high dust loading and fine types of dust.

LIGNO

LIGNO

For the wood processing industry, the LIGNO filter offers reliable residual dust levels below 0.1 mg/m³ – awarded the H3 and GS certification marks.

Flue gas cleaning

Flue gas cleaning

The highest separation rates and lowest exhaust gas emissions are achieved even in the most demanding applications, such as the thermal utilisation of scrap wood and trash.

IMPULS COMPACT

IMPULS-COMPACT

This filter model is pre-assembled, equipped with hoses and delivered ready for connection. Fans and sound absorbers can be optionally integrated.

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