

BETH® Blue Technology – Efficient Solutions for Clean Air

## BETHPULS BAG FILTER



## BETH® – Dedusting technology since 1887.

### Tradition and Innovation

Tradition and innovation – these have been the trademarks of BETH®'s history for more than a century. The company was founded in 1887 by W.F.L. Beth, an engineer from Lubeck who invented the world's first bag filter. The patent was issued as number #38396 by the »Kaiserliche Patentamt« on January 26, 1886.

Soon, the BETH® bag filter found its way into other industrial branches besides grinding mills, and in the course of the 20th century, the BETH® machine factory grew into an international leader in the field of industrial dedusting. At first, filtration was predominantly used for improving production processes, but by and by, it also became an important factor in operational safety and pollution control - long before »environmentalism« was an international slogan.

Reducing noxious and hazardous dust emissions made industrial production not only more economically efficient and environmentally friendly, but also more humane. It takes not long, the term »BETH® Filter« became a synonym for dedusting itself. In 1956, wet and dry electrostatic precipitators were added to the company's range of products.

The BETH® Filtration range of products includes filtering separators (e.g. bag filters in all variations), high-performance centrifugal separators (cyclones), dry electrostatic precipitators (dry ESPs) and wet electrostatic precipitators (wet ESPs) for use in the following industrial sectors:



Coal



Biomass



Rubber/Plastic



Metalworking



Non-Ferrous-Metals



Chemicals



Pharmaceuticals



Glass



Non-Metallic Minerals



Timber & Wood



Food



Recycling

## BETHPULS Bag Filter

### Ease of maintenance and proven operational reliability

Equipped with the appropriate filter media, BETH® bag filters can lower the dust concentration of clean gas to levels that stay comfortably below current and prospective emission limits. Their advantages compared to conventional filter systems are their superior energy efficiency, low maintenance requirements, and especially their low investment costs.



#### **BETHPULS Bag Filter Single-Line**

For filter surfaces from 10 m<sup>2</sup> to 3,200 m<sup>2</sup>  
± 5,000 Pa to ± 14,000 Pa



#### **BETHPULS Bag Filter Double-Line**

For filter surfaces from 1,344 m<sup>2</sup> to 6,400 m<sup>2</sup>  
± 5,000 Pa to ± 14,000 Pa



#### **BETHPULS »Horizontal Type«**

For filter surfaces from 32 m<sup>2</sup> to 178 m<sup>2</sup>



#### **BETHPULS »Cylindrical Type«**

For filter surfaces from 2,5 m<sup>2</sup> to 534 m<sup>2</sup>



#### **BETH Cyclone**

For volumes between 560 m<sup>3</sup>/h and 113,600 m<sup>3</sup>/h  
up to 450 °C



#### **BETH® Spares & Service**

Spare parts, maintenance and individual consultation updating solutions, plant reconstructions and plant recommissionings

## BETHPULS Bag Filter

### Bag filters since 1887.

BETHPULS bag filters are compact separators with filter bags that are cleaned automatically by compressed air pulses. Bag filters are mainly used for the dry separation of dust particles or for recovering useful dusts from air and other gas flows.

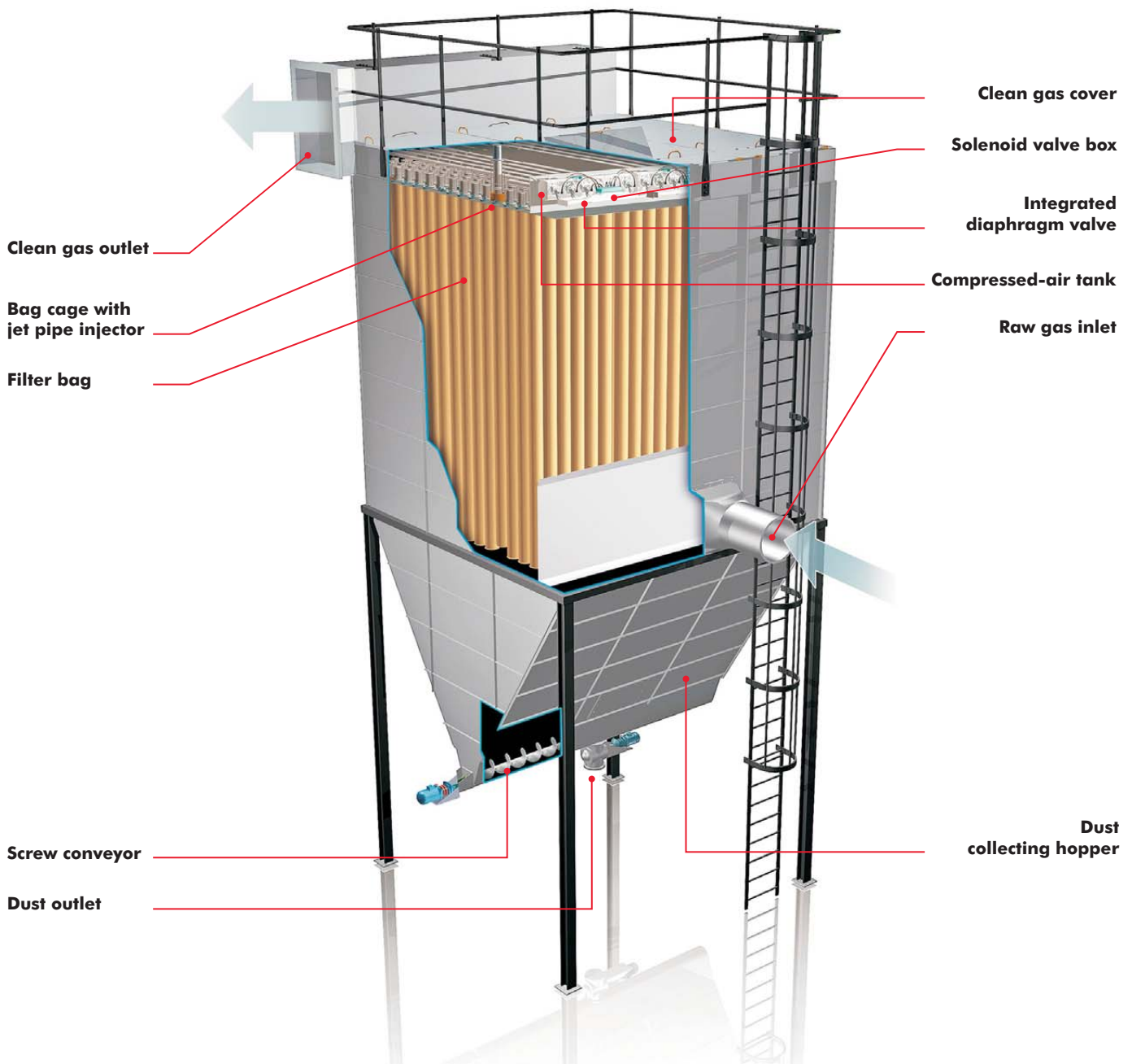
Every BETHPULS bag filter can be expanded from the smallest to the largest available size and is equipped with state-of-the-art electronic monitoring devices. Versatility is key: By combining the different designs with a wide variety of filter media, we will find the ideal solution for your particular filtration requirements.

Equipped with the appropriate filter media, our bag filters can lower the dust concentration of clean gas to levels that stay comfortably below current and prospective emission limits.

#### Robust

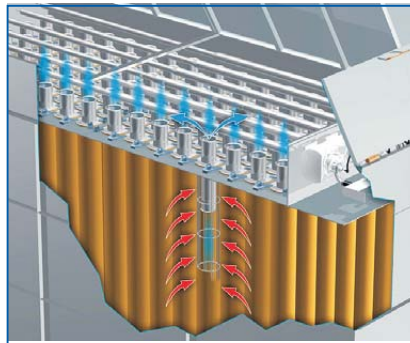
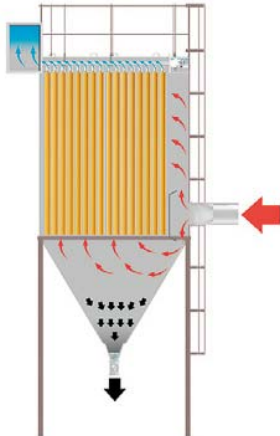


BETHPULS bag filters are a perfect match for rough and varying operating conditions.



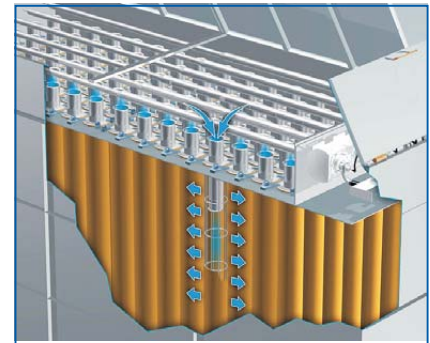
## Functional Principle »online«

With the so-called »online method«, purging takes place during the ongoing filtration process. The raw gas enters the lower part of the filter body and is separated into clean gas and dust at the filter bags.



### 1. Filtration Phase

Nozzle tubes are installed above the filter bags, cleaning each row of filter bags separately with compressed air pulses. For this purpose, compressed-air tanks with integrated diaphragm valves are installed at the end of the nozzle tubes. The diaphragm valves are operated by fully enclosed pilot solenoid valves. An electronic controlling device pilots the solenoid valves periodically.



### 2. Cleaning Phase

The compressed air escaping from the storage reservoir is led into the filter bags via nozzle tubes and jet pipe injectors located directly above the filter bags. Due to the injector effect, the compressed air pulse sweeps along secondary air from the clean gas section. With this highly effective method, filter bags with a length of up to 7,000 mm can be thoroughly cleaned.

## Functional Principle »offline«

The filter is a chamber construction on both the raw gas and the clean gas side. The dust-laden gas enters the lower part of the filter body through the raw gas channel and is separated into clean gas and dust at the filter bags.

For cleaning the filter bags, one filter unit at a time is disconnected from the volume flow by way of a pneumatically operated poppet valve, the filter units being divided by section walls within the filter body.

The disconnection takes place from the clean gas side. The disconnected row of filter bags is backflushed by nozzle tubes located above the filter bags. For this purpose, compressed-air tanks with integrated diaphragm valves and fully enclosed solenoid valves are installed at the end of the nozzle tubes.

The solenoid valves are operated periodically by an electronic monitoring device. The compressed air escaping from the storage tank is led into the filter bags of the disconnected row via the nozzle tubes and jet pipe injectors assigned to the individual filter bags. Due to the injector effect, the compressed-air pulse sweeps along the clean gas. The mixture of



compressed air and clean gas abruptly and thoroughly backflushes the filter bags.

After the entire row of filter bags is cleaned and a preset time lag (depending on the specific task at hand) has passed, the filter unit is reconnected to the volume flow and set back into fil-

tration mode by opening the poppet valve. After that, the next filtration unit is removed from the filtration process for cleaning. Additionally, every filter unit can be sealed off from both the raw gas and the clean gas side for maintenance work.

## BETHPULS Bag Filter »Single-Line«



Pressure classes from  
± 5,000 Pa to ± 14,000 Pa



Explosion pressure shock  
resistant up to 1.4 bar



Reduced energy consumption  
– increased performance



### BETH® Bag Filter »Single-Line«

BETHPULS single-line bag filters are equipped with filter surfaces ranging from 10 m<sup>2</sup> to 3,200 m<sup>2</sup> (≈108 sq.ft. to 34,500 sq.ft.) Custom-designed filters can be supplied with larger filter surfaces. Available standard pressure classes from ± 5,000 Pa to ± 14,000 Pa Explosion pressure shock resistant up to 1.4 bar with explosion pressure relief according to the VDI 3673 norm / DIN EN 14491 norm (DMT-tested).

#### Time-Tested

The BETH® bag filter has been put to the test for decades of operation, proving its superior value time and again.

#### Playing it safe

For applications involving the safe extraction of combustible or explosive dust types, the filter unit can be equipped with the requisite safeguards of preventative and (if necessary) constructive explosion protection.



## BETHPULS Bag Filter »Double-Line«



### BETH® Bag Filter »Double-Line«

BETHPULS double-line bag filters are equipped with filter surfaces ranging from 1,344 m<sup>2</sup> to 6,400 m<sup>2</sup> (≈ 14,467 sq.ft. to 68,889 sq.ft.). Custom-designed filters can be supplied with larger filter surfaces. Available standard pressure classes from ± 5,000 Pa to ± 14,000 Pa Explosion pressure shock resistant up to 1.4 bar with explosion pressure relief according to the VDI 3673 norm / DIN EN 14491 norm (DMT-tested).

#### Why BETHPULS Bag Filters?

- Low investment costs
- Explosion protection and ATEX compliance
- Extremely low maintenance requirements
- Filter surface areas > 6,400 m<sup>2</sup> (≈86,890 sq.ft.)
- Compact, solid construction
- Customizing options
- Pre-assembled components for fast and low-cost installation
- High separation rate
- High energy efficiency
- High availability
- High durability
- High operational safety
- Uncomplicated spare parts service
- Effortless compliance with legal emission limits



## BETHPULS Bag Filter »Cylindrical Type«



Minimal pressure loss due to excellent flow distribution



Fast, simple and cost-efficient installation



Low maintenance  
– low cost



### BETH® Bag Filter »Cylindrical Type«

Due to their sturdy welded construction, BETHPULS cylindrical bag filters are ideal for applications with special pressure resistance and density requirements. The filter bags are installed and removed from the clean gas side (access via manhole or pivoting torispherical head). Standard BETHPULS cylindrical bag filters are equipped with filter surfaces ranging from 2.5 m<sup>2</sup> to 534 m<sup>2</sup> (≈27 sq.ft. to 5,748 sq.ft.). Custom-designed filters can be supplied with larger filter surfaces.

Available in different pressure classes:

- explosion pressure shock resist. up to 13 bar
- pressure resistant
- vacuum resistant up to -1 bar

#### Advantages

- Very low investment and maintenance costs
- Easy to operate
- Easy to assemble
- Easy bag replacement from the clean gas side
- High cleaning efficiency low consumption of compressed air
- Minimal pressure loss due to excellent flow distribution
- Easily accessible components

## BETHPULS Bag Filter »Horizontal Type«

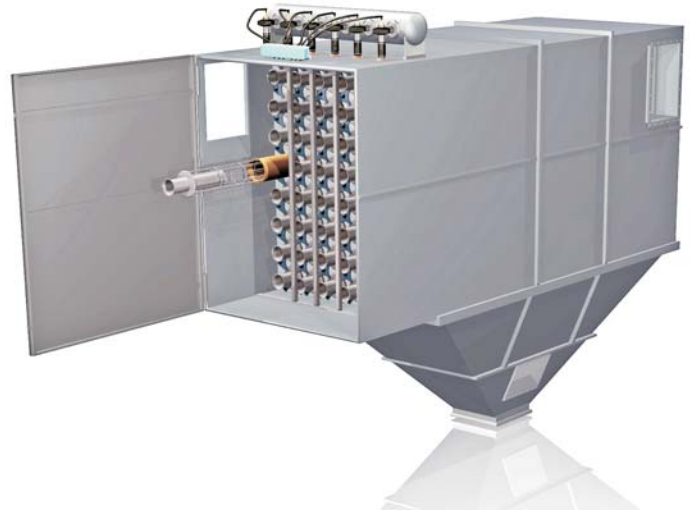
### Bag Filter »Horizontal Type«

BETHPULS filter type series BP 45 to 180 H.10 operates with horizontally installed filter elements. BETHPULS horizontal filters are available with regular dust collection hoppers or bins and also in a bin-mounted version.

The horizontal installation and operation of the filter elements makes this BETHPULS series the perfect choice for locations with limited headroom. Designs with filter surfaces ranging from 32 m<sup>2</sup> to 178 m<sup>2</sup> (≈ 345 sq.ft. to 1,916 sq.ft.) are available.

In BETHPULS horizontal filters, the dust-laden gas enters the raw gas side through an impact surface at the back of the filter housing.

The dust is collected at the outer surface of the filter elements, which are cleaned continuously and automatically by jet pipe injectors. This way, the filtration process can go on without interruptions.



Compressed air pulses are injected sequentially and periodically by jet pipe injectors via blast nozzle pipes, sweeping along secondary air from the clean gas room into the filter elements. This inversion of the filtration direction causes the filter medium to

change its shape, thus flushing and cleaning the filter elements.

The collected dust is dislodged from the filter surface and falls directly into the hopper for easy removal.

## BETH® Cyclone



### Centrifugal Separator »Cyclone«

BETH® cyclones are high performance centrifugal separators with an extremely high separation rate and low pressure drop.

They have proved a resounding success in numerous industrial operations. Depending on application and type of dust, they can be used as either stand-alone dedusters or pre-separators.

BETH® cyclones are available in twenty different installation sizes that are designed for flow volumes from 560 m<sup>3</sup>/h to 113,600 m<sup>3</sup>/h (≈ 330 cu.ft./min to 66,860 cu.ft./min). Of course, these cyclones can be used for even larger volumes if they are installed as twin (or even quadruple) separators.

In the standard version, BETH® cyclones can be used at temperatures up to 450°C (842°F) – the filter media being selected according to the respective procedural requirements.

The dust content of raw gas can range from a few grams to several kilograms per cubic meter, depending on the case at hand. When dust contents are high it is essential to adjust the outlet devices (such as rotary valves or double flap valves) to increased material flows.

Abrasive dusts such as quartz, corundum, or cement can lead to considerable material wear, also depending on circumferential speed and the resulting side friction in the separators. This is why separators that are predominantly used for these dusts can be equipped with suitable wear protection, such as a wear-resistant sheet metal inlay or a cast basalt lining. Choosing the perfect wear protection depends on the case at hand and various procedural parameters.

For applications involving explosive dusts, BETH® cyclones are modified in an explosion proof version. Like all of BETH's products, these separators have stood the test of time in many different cases of operation, such as brown coal (lignite) separation.

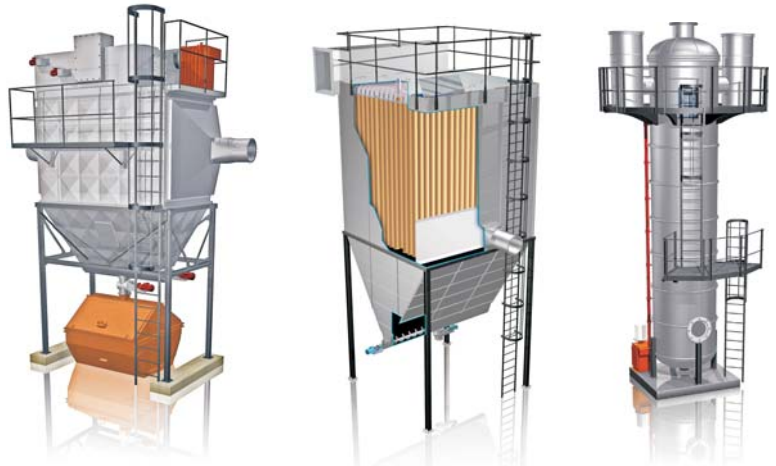
## BETH® Spares & Service

### Friendly, reliable and competent

From planning to on-site assembly and maintenance, one source is all you need – BETH®. As your competent partner in plant engineering, we are asking ourselves one question: »How can we bring your technology one step forward?« and then we offer you the solution that is guaranteed to bring you the best performance, safety and efficiency.

#### Spezialized

Our team here at BETH® has one priority: To maximize the efficiency of your industrial plants and systems. We are a team of service specialists from the field of filtration, equipped with a treasure trove of experience that is beyond compare in this industrial sector. For many decades, we have supported and worked with the industry – a partnership that has resulted in our intimate knowledge of all media, materials and requirements.



#### Our spectrum includes:

- Planning and implementing industrial plant reconstructions
- Planning and implementing plant recommissionings
- Finding innovative updating solutions, both standardized and customized
- Providing service, maintenance and individual consultation
- Supplying original BETH® spare parts (OEM)



#### At your service

Do you have a question regarding our products or do you need support for servicing your filter units? Our BETH® SERVICE team will be happy to help you find a solution to your problem!

Just call: +49 451 530 - 7500 or send us an e-Mail: [service@beth-filter.de](mailto:service@beth-filter.de)



**For ultimate performance, safety and efficiency.**



## BETH® Spare Parts Management

### OEM – Original Equipment Manufacturer

»A chain is only as strong as its weakest link.« This is certainly true for the interaction of a machine and its auxiliary equipment. Incompatible equipment can impair the performance of your plant in the same way that original equipment can enhance it.

#### Setting standards that imitations just can't reach

Our perfectly engineered production processes and ultra-precise workmanship make all the difference. BETH® Original Equipment is designed and developed along with the machines themselves. Every BETH® spare part passes through the same production process, including inspection and quality control, as the original part inside your machine.

#### Only the BETH® brand guarantees true BETH® quality

Using non-original spare parts will void the manufacturer's warranty of your plant. Even worse: spare parts of inferior quality can damage your entire plant and result in total mechanical breakdown. Therefore, fine-tuning the interplay of all individual components is absolutely essential for optimal performance, efficiency and safety.

#### Precision vs. Imitation

Using BETH® original equipment will minimize your maintenance costs. Cheap knockoffs may seem like a bargain at first, but their poor durability and functionality will rack up costs in the long run.



#### Ready at hand

In order to keep potential machine downtime to a minimum, we will gladly compile a specific list of all spare and wear parts of your plant – along with advice on which parts should be stocked on site in case of an emergency.



#### Good question

Why choose BETH® »OEM« spare parts?

BETH® optimizes.  
Evolving towards even better performance

BETH® guarantees.  
Maintaining the manufacturer's warranty

BETH® perfects.  
Improving the efficiency and service life of your plant

BETH® minimizes.  
Keeping maintenance costs constantly down

For further information on spare parts, maintenance or plant optimization, simply give us a call: +49 451 530 - 7500 or contact us via e-mail: [service@beth-filter.de](mailto:service@beth-filter.de)

**A clear advantage for you – and a great benefit for the environment.**



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