

BETH® Blue Technology – Efficient Solutions for Clean Air

## WET ELECTROSTATIC PRECIPITATOR



## 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

## BETH® Wet Electrostatic Precipitator

### Ease of maintenance and proven operational reliability

For many years now, BETH® Wet Electrostatic Precipitators have been unsurpassed in terms of operational safety, durability and extreme filtration efficiency. Their advantages compared to conventional filter systems are their superior energy efficiency, low maintenance requirements, and especially their low investment costs.



#### **BETH® Wet Electrostatic Precipitator**

For volume flow rates from 1,000 to 500,000 m<sup>3</sup>/h



#### **BETH® Tar Electrostatic Precipitator**

For volume flow rates from 500 to 100,000 m<sup>3</sup>/h



#### **BETH® Oil Mist Electrostatic Precipitator**

For volume flow rates from 1,000 to 100,000 m<sup>3</sup>/h  
Co<sub>2</sub> extinguishing system on demand



#### **BETH® Special: Biomass Gasification**

Reduce emissions with BETH® filters  
High efficiency. Low maintenance. Low costs.



#### **BETH® Spares & Service**

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

# BETH® Wet Electrostatic Precipitator

**Good. Better. BETH®.**

- Volume flow rates: 1,000 - 500,000 m<sup>3</sup>/h  
≈ 588.6 to 294,300 cu.ft./min
- Temperatures up to 75°C
- For higher temperatures, BETH® provides an additional cooling zone

## High Voltage.

The Wet Electrostatic Precipitator rounds off the product range of BETH® with an extremely versatile dedusting system that provides the perfect solution for any process in which special dust or gas characteristics make dry separation impossible.

### High collection efficiency

For many years our reliable wet electrostatic precipitators have been unsurpassed in their operational reliability, long operational life and collection efficiency. They are perfect for separating aerosols, extremely fine dust particles, and H<sub>2</sub>O-saturated emissions containing tar or oil. Another positive effect is the additional bonding of toxic elements like HCl, SO<sub>2</sub>, NaCl and HF.

### Functional principle

The process gas vertically enters the ESP from below and is spread in a uniform flow profile across the entire filter cross-section by means of a gas distribution system. The particles / aerosols / water droplets are electrically charged by the application of high voltage (78-135 kV) between the spray electrodes and the honeycomb collecting electrodes. On their way through the electric field, the charged particles are transported by electrostatic attraction to the collecting electrodes, where they agglomerate with

the existing dust particles and are subsequently flushed off by a periodically working flushing system. The dust-water-mixture automatically flows into the filter sump located below the gas intake. The purified gas leaves the filter through the gas outlet hood located at the filter head.

### Vertical Gas Distribution

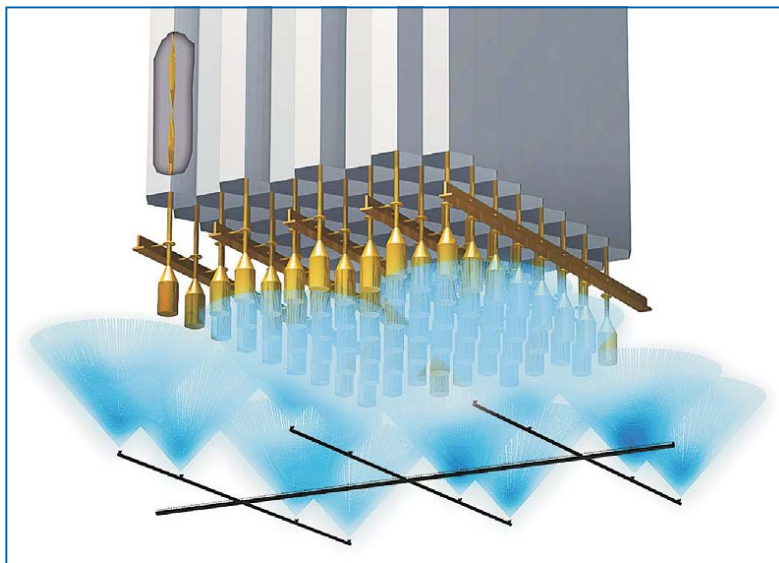
The gas is distributed from bottom to top through the honeycomb collecting electrodes (honeycomb clusters). The honeycomb shape results in a very large collection surface on a small base area.

### Centric Arrangement

Each honeycomb contains a centrally located discharge electrodes (»corona discharge« electrode) made from high-grade steel strip with screw fastening and individual tension weight. Adjustable baffle plates ensure ideal gas distribution inside the electric field.

• Optimum corrosion protection due to special interior coating or stainless steel design

• Problem-free purification of exhaust gases with near-saturation levels of dust



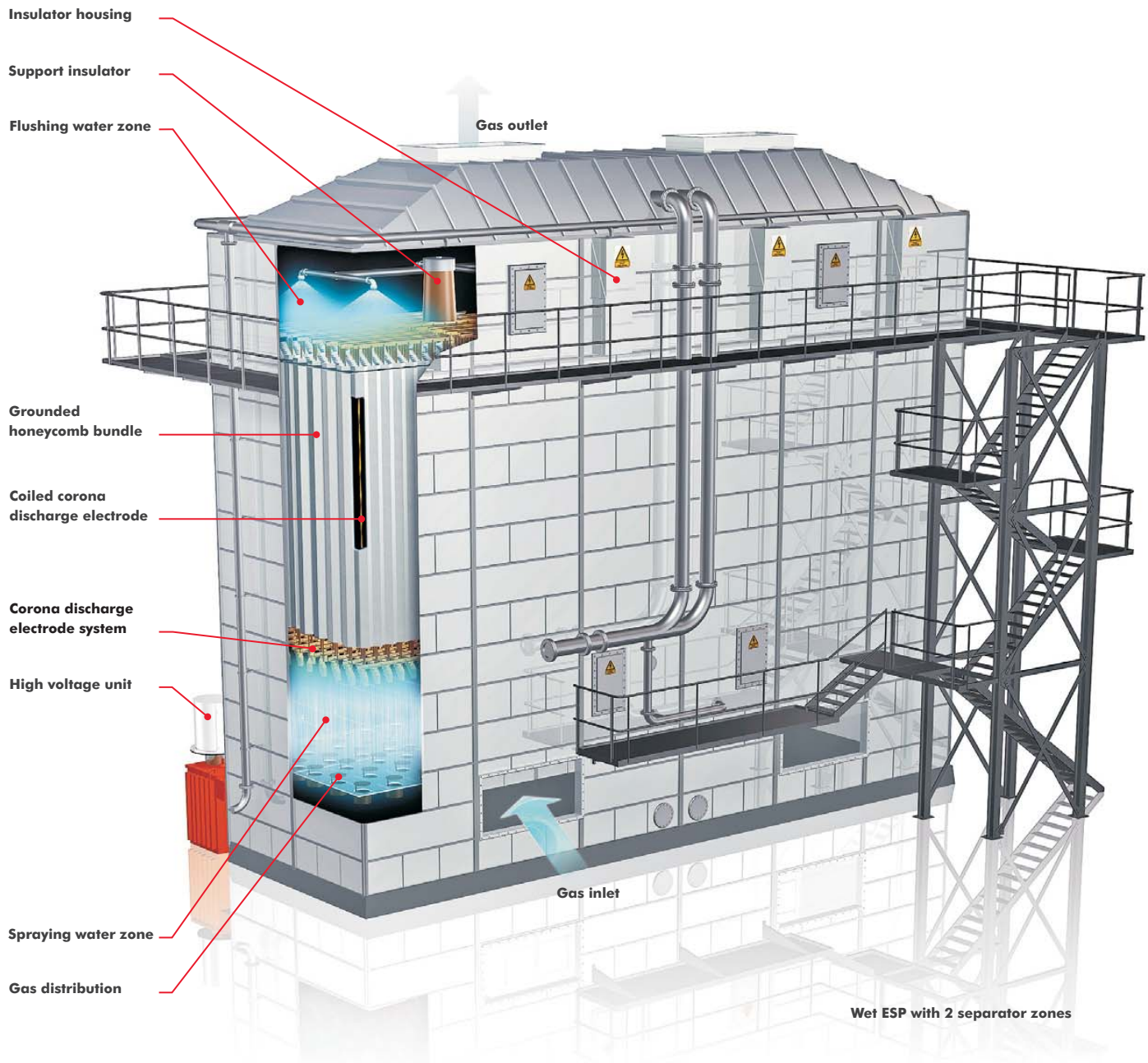
Gas conditioning and continuous moistening of the collecting electrodes and the (corona discharge) electrodes with spraying system



Electrodes cleaned by periodic flushing system



## BETH® Wet Electrostatic Precipitator



### Reduction

Ultra-fine and coarse droplets from upstream system components, like scrubbers, driers or quenchers, can be purified to meet legal emission limits. Optimal separation of aerosols and critical types of respirable dust with very low settling velocity.

### BETH® optimizes.

#### Wet, but dry

Supporting insulators of the discharge system are kept dry with purging air to prevent flashovers.

#### Save dust removal

Specific electrical dust resistance is irrelevant because the resistance in saturated atmospheres is always favorable for separation.

# BETH® Tar Electrostatic Precipitator



Volume flow rate from 500 to 100,000 m<sup>3</sup>/h



Reduced energy consumption – increased performance

## BETH® Tar Electrostatic Precipitator

For volume flows from 500 to 100,000 m<sup>3</sup>/h (≈ 294 to 58,860 cu.ft./min), BETH® is offering the BETH® Tar Electrostatic Precipitator. BETH® Tar ESPs are specifically designed for applications in coking plants and after gasification plants, for protecting the downstream gas motors and turbines. The technical design of the tar ESP is based on that of the BETH® Wet ESP, but usually comes without a spraying and flushing water zone.

### Biomass Gasification

Until recently, the main problem with biomass gasification has been the inadequate quality of the gas, particularly its high concentrations of tars and dust. The filter technology of BETH® Tar ESPs has changed all that.

### Clean

Hydrocarbons, tar, oil, and flue are filtered safely and reliably from the gas stream, reducing concentrations from 50g/Nm<sup>3</sup> tr. to as low as 10 mg/Nm<sup>3</sup> tr.

### Time-Tested

BETH® tar ESPs have been put to the test in decades of continuous operation, proving their superior efficiency time and again.

- Optional as pressure vessel
- O<sub>2</sub> measurement, stainless steel version
- Heated insulators and filter casing
- Nozzles for cleaning, inerting and evaporating



### High Voltage Control



BETH® ESPs are controlled with the help of topnotch, state-of-the-art computer technology. The digital high voltage control is equipped with the most up-to-date safety features for protecting the ESP. For more information, visit [www.prometos.com](http://www.prometos.com)

## BETH® Oil Mist Electrostatic Precipitator

**Vmax<sup>∞</sup>**

Volume flow rate from  
1,000 to 100,000 m<sup>3</sup>/h



Reduced energy consumption  
– increased performance



Low maintenance  
– low cost



CO<sub>2</sub> extinguishing system  
on demand



### BETH® Oil Mist Electrostatic Precipitator

For volume flows from 1,000 to 100,000 m<sup>3</sup>/h, BETH® is offering the BETH® Oil Mist Electrostatic Precipitator.

The technical design of the oil mist ESP is based on that of the BETH® Wet ESP, but usually comes without a mist and cleaning water zone.

By request, the oil mist ESP can be equipped with

- CO<sub>2</sub> extinguishing system
- Fire protection flap
- Pipework
- Ventilator

#### Cost-Efficient Alternative

Due to its extremely low maintenance requirements, the BETH® Oil Mist ESP is a cost-efficient alternative to peripheral filter systems.

#### Optimum Separation Rate

Aerosols and critical fine dust types with very low settling speed are separated at an optimum rate.

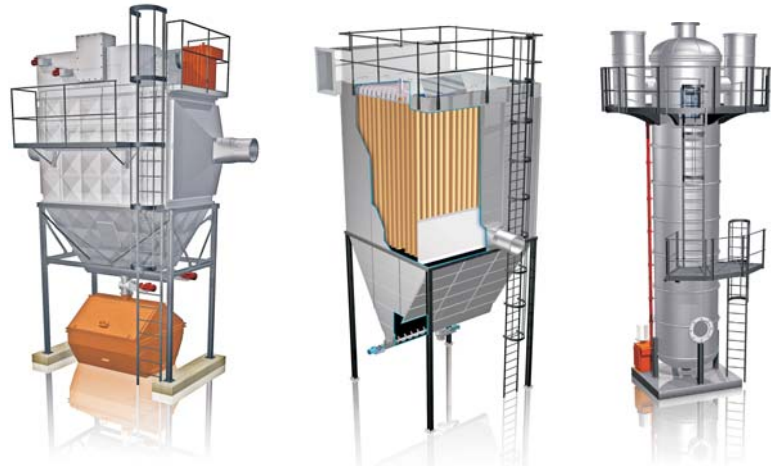
## BETH® Spares & Service

### 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 spectrums 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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