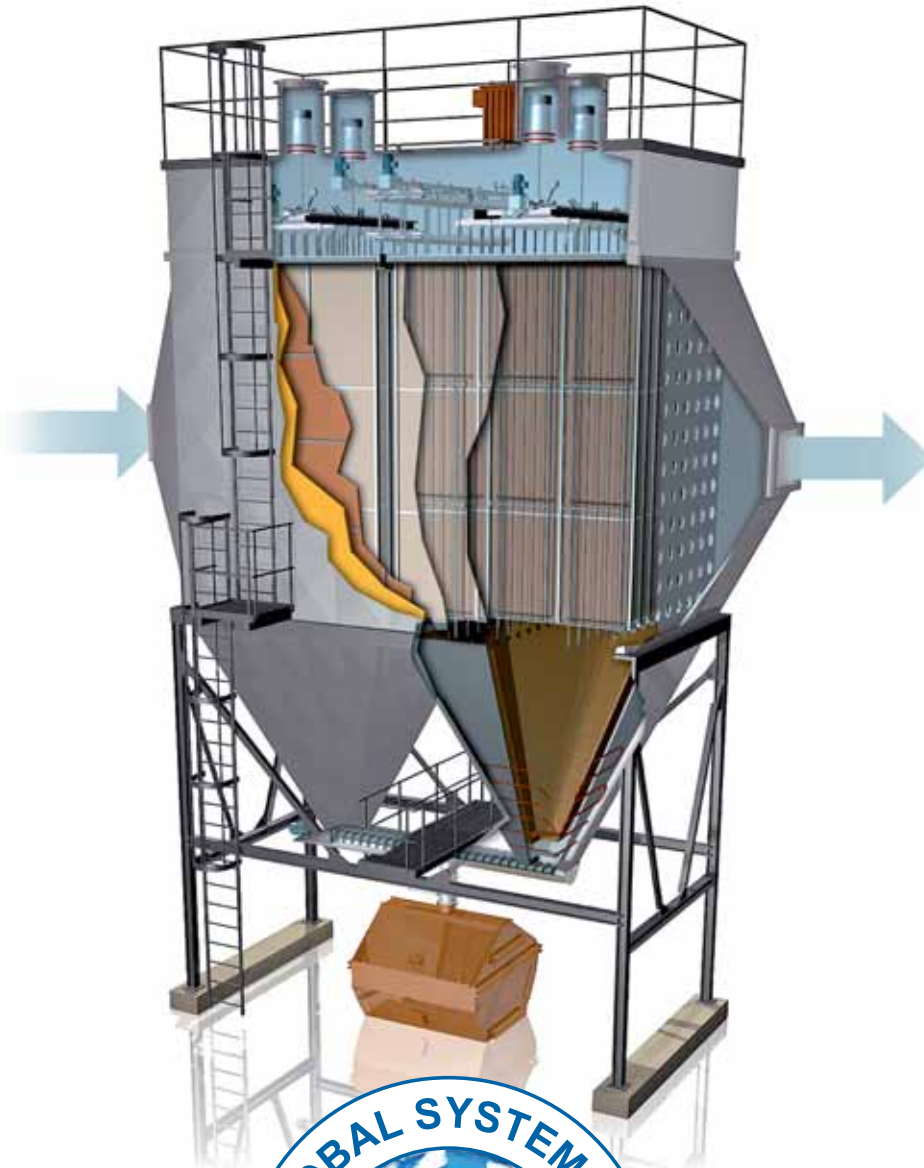


**R&R<sup>®</sup>**  
**BETH**



# Dry Electrostatic Precipitator





**R&R-BETH<sup>®</sup>** is an internationally active technology company in the field of filter, suction and dust removal technology with highly qualified and motivated staff.

The constantly growing needs of our customers and the steadily changing processes of the markets are the driving forces of our expansion for the dynamic and organic growth of our company. Targeted acquisition in relevant markets support this strategy.

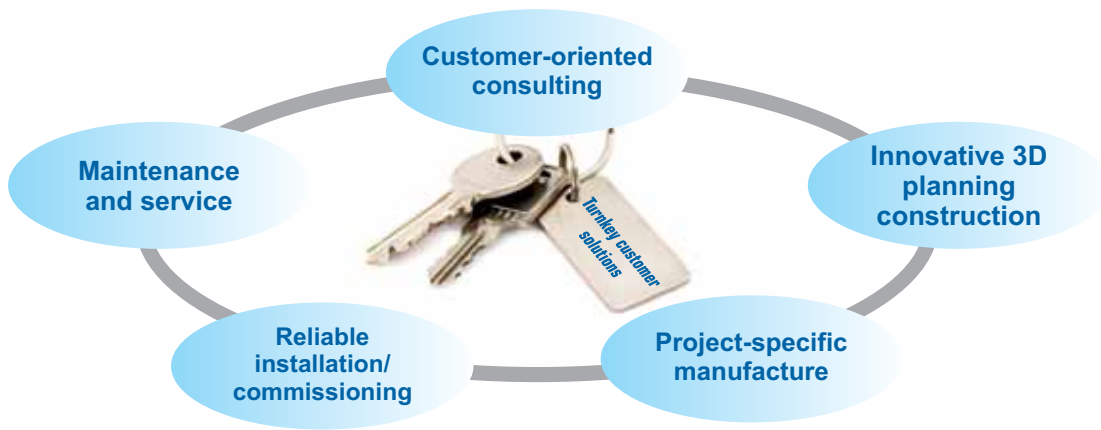
The family spirit in our proprietor-run company is an essential basis for the motivation of our employees. The associates, the management team as well as all employees build a community with a climate for good ideas and highest commitment.

Traditional values and experiences as well as sound education of young people are the basis of our sustainable growth. During the process, we seek active exchanges with colleges and universities as a bridge to science.

Individual assembly groups and complete turnkey facilities are designed, manufactured and installed by our employees with greatest of care and highest professional expertise. Reliability, high efficiency and durability must be guaranteed by our products in customer-specific facilities. Functionality, efficiency and quality are the guiding principles of our product ideas and development activities.

Jointly with our long-standing partners, we succeed in securing all those requirements, which are necessary for a smooth work process, from planning to installation and commissioning to maintenance of your facility.





We serve all these industries worldwide



Automotive



Recycling and waste treatment



Energy, coal and biomass



Aviation and railways



Stone and earth



Plastic and rubber



Chemistry and pharmacy



Wood and wooden products



Paper and cellulose



Food



Varnishes and paints



Ferrous and non-ferrous metals



Textile and fibers



Non-woven/sanitary



Electro technology



Glas and ceramics



**R&R-BETH<sup>®</sup> – Dedusting technology since 1887.**

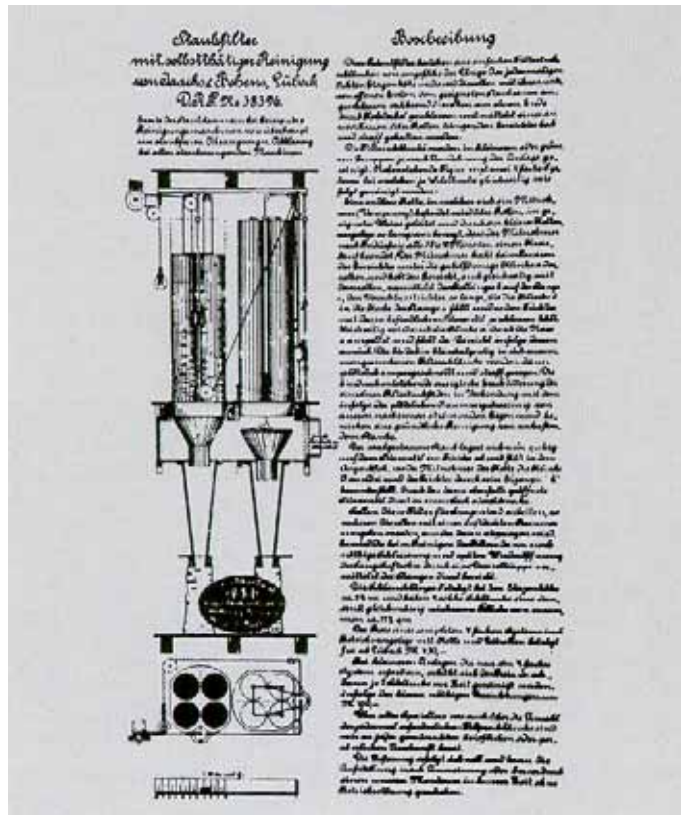
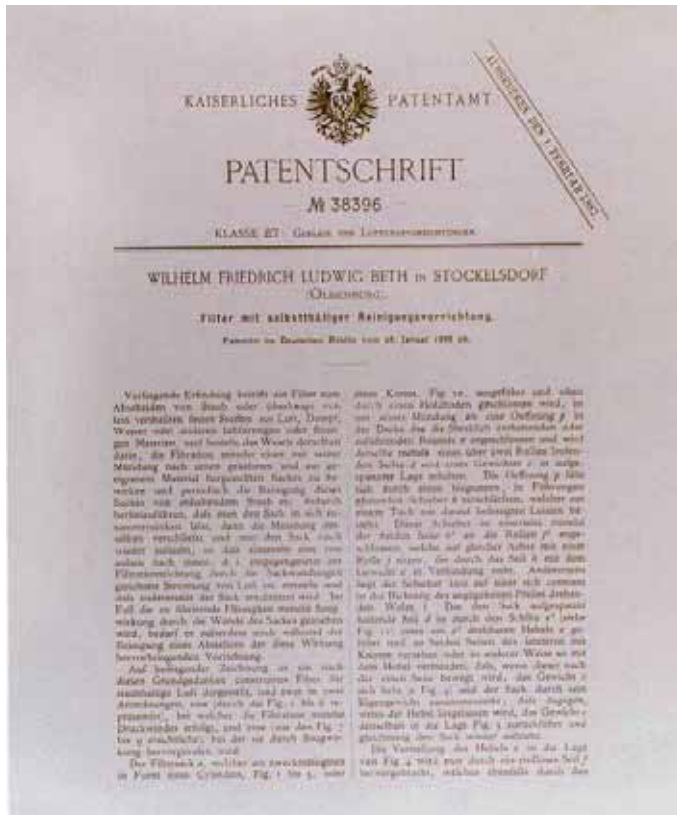
**Tradition and Innovation**

Tradition and innovation – these have been the trademarks of **R&R-BETH<sup>®</sup>**'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<sup>®</sup>** bag filter found its way into other industrial branches besides grinding mills, and in the course of the 20<sup>th</sup> century, the **BETH<sup>®</sup>** machine factory grew into an international leader in the field of industrial dedusting. When improvements were initially made to production processes, more and more filter systems were gradually added to increase operational safety and to protect the environment - and this was already happening at a time when environmental protection had no relevance.

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<sup>®</sup>** Filter« became a synonym for dedusting itself. In 1956, wet and dry electrostatic precipitators were added to the company's range of products.

**Patent**



## R&R-BETH® Dry Electrostatic Precipitator

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### Ease of maintenance and proven operational reliability

R&R-BETH® Dry Electrostatic Precipitators effortlessly lower dust contents well below the legal emission limits of 20 mg/m<sup>3</sup> in standard conditions. Compared to conventional filter systems, they offer considerable advantages because of their low energy demands, high operational reliability, low maintenance requirements, and – last but not least – low investment costs.



**R&R-BETH® Mini Electrostatic Precipitator**



**R&R-BETH® Small Electrostatic Precipitator**



**R&R-BETH® Standard Electrostatic Precipitator**



**R&R-BETH® Industrial Electrostatic Precipitator**



### **R&R-BETH® Spares & Services**

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

## R&R-BETH<sup>®</sup> Dry Electrostatic Precipitator

### High Voltage.

The R&R-BETH<sup>®</sup> Dry Electrostatic Precipitator can be used to extract ultra- fine dust particles from process gases up to a temperature of 420°C (≈788 °F) by means of an artificial electrostatic charge. For this reason, the unit is used in particular for extracting dust from hot gases in combustion plants and other processing.

#### Maximum separation rate

The electrostatic precipitator can operate either with or without an upstream cyclone (centrifugal separator). It can reduce raw dust contents of up to 50 g/m<sup>3</sup> to clean gas contents of 20 mg/m<sup>3</sup> in standard conditions or lower. This corresponds to a separation rate of more than 99%.

#### Functional principle

The dust-laden process gas enters the electrostatic precipitator horizontally and is spread across the entire filter cross-section in an uniform flow profile by a gas distributor.

By applying high voltage to the discharge electrodes located between the collection plates, an electric field is created that charges the dust particles.

Passing through the electric field, the charged particles are transported by electric field strength to the collecting electrodes, where they agglomerate with previously separated dust particles and finally are rapped off by the mechanical rapping system.

The rapped off dust particles drop into the filter hopper and are removed via the dust outlet. The purified gas leaves the filter through the gas outlet hood.

#### Horizontal gas distribution

The gas perfuses the filter lanes horizontally. The lanes consist of flexibly suspended collection electrodes constructed as panels with dust collector bags.

#### Widely Spaced Lanes

Within the lanes, the discharge frames with discharge electrodes made from high-grade steel grip are arranged at the center. Depending on type, R&R-BETH<sup>®</sup> filter lanes are spaced at a distance of 250, 300 and 400 mm, which ensures high availability.

#### Periodic Purging

The discharge electrodes are fastened with self-locking screw connections. The discharge electrodes are purged with periodically operating, enginepowered rapping systems.

#### Robust

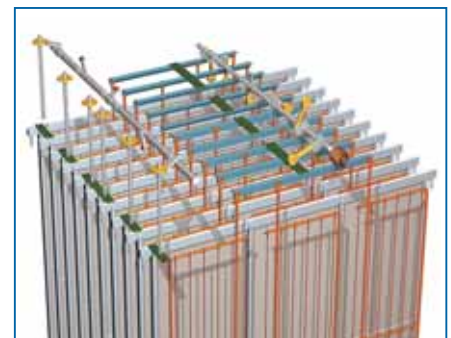
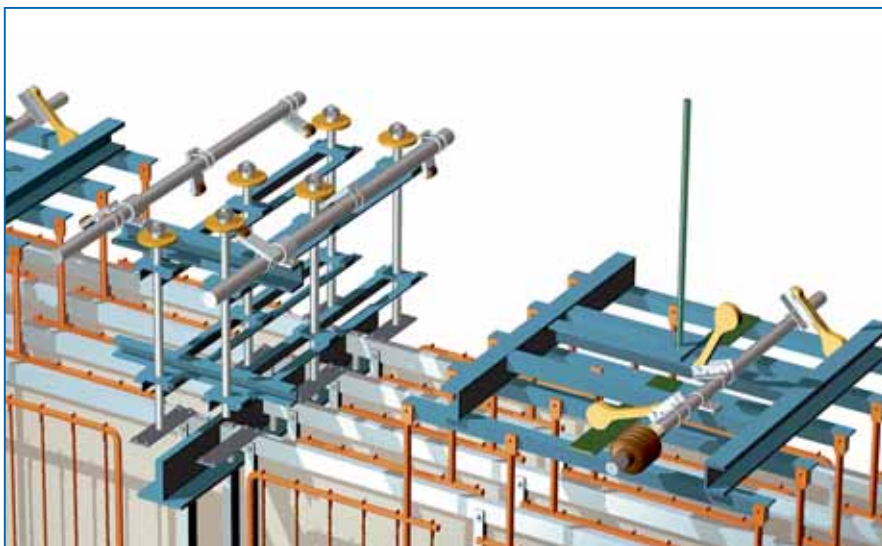
Built for gas temperatures of up to 420°C (788°F).

#### Extensions

##### R&R-BETH<sup>®</sup> standard scope of delivery:

- Filter housing insulation
- Low-voltage electrical system
- Installation and commissioning

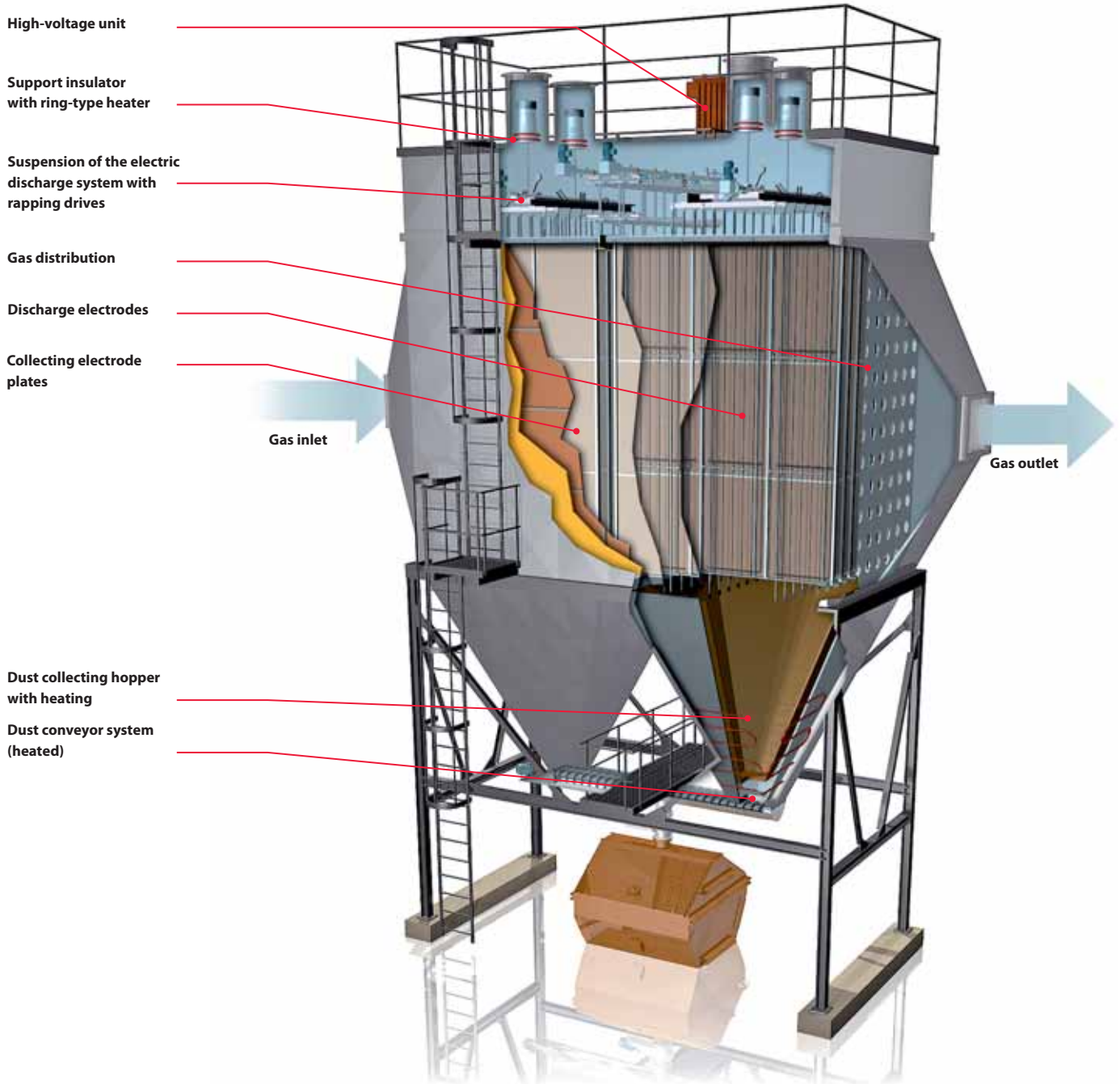
If requested, ESP can be equipped with extensions such as fans, silencers, pipe-work and smoke pipes.



Electric discharge electrodes system (gas purification zone)

Left: Collecting and discharge electrode rapping system. Cleaning of the discharge electrodes and collecting electrodes by periodically acting motor-driven rapping systems.

## R&R-BETH® Dry Electrostatic Precipitator



### R&R-BETH® optimizes

#### Electric heating

Electric heating of the insulators, the filter hopper and the dust conveying system prevents build-up of dust caused by falling below the dew point.

#### Optimized gas distribution

Gas distribution is optimized by gas baffle plates and perforated plates that can be individually adjusted for larger gas volumes.



## R&R-BETH<sup>®</sup> Mini Electrostatic Precipitator

**V<sub>max</sub><sup>∞</sup>**

For gas volumes from up to 6,900 Am<sup>3</sup>/h



Maintenance requirements reduced to once a year after initial break-in phase



Reduced energy consumption – increased performance



Pre-assembled components for fast and cost-efficient installation



Robust construction for extremely high durability



### R&R-BETH<sup>®</sup> Electrostatic Precipitator

For gas volumes from up to 6,900 Am<sup>3</sup>/h (≈ 530 to 2,825 cu.ft./min), **R&R-BETH<sup>®</sup>** offers Mini Electrostatic Precipitators in 6 different sizes. In addition, there are two versions to choose from:

The **R&R-BETH<sup>®</sup>** Mini electrostatic precipitator was developed for small boiler plants up to 1,3 MW with biomass gasification.

#### Space-efficient

Due to its low installation height, the **R&R-BETH<sup>®</sup>** Mini ESP can be installed directly inside the boiler house.

#### Catch and Release

The maintenance door (located at the rear) is equipped with quick-release catches.

#### Tough

Built for gas temperatures of up to 300°C (572°F).

#### Variable

The **R&R-BETH<sup>®</sup>** standard design can be individually adapted to conditions at hand anytime.

#### Energy-efficient

Compared to filter separators, the **R&R-BETH<sup>®</sup>** Mini ESP uses significantly less energy. With its state-of-the-art high voltage control technology, the **R&R-BETH<sup>®</sup>** ESP can also claim superior separation efficiency.



## R&R-BETH® Small Electrostatic Precipitator



Pre-assembled components for fast and cost-efficient installation



Reduced energy consumption – increased performance



Robust construction for extremely high durability



Customized adjustment to specific requirements



Maintenance requirements reduced to once a year after initial break-in phase



### R&R-BETH® Small Electrostatic Precipitator

Ever since the government started to offer subsidies for the use of biomass for energy production, there has been an increased need for inexpensive and unproblematic methods for extracting dust from small boiler plants between 500 kW and 2,500 kW that can reliably reduce gas dust content to below the legally required clean gas dust content.

R&R-BETH® has developed Small and Mini Electrostatic Precipitators especially for this type of application.

#### Variable

The R&R-BETH® standard design can be individually adapted to conditions at hand anytime.

#### Tough

Built for gas temperatures of up to 420°C (788°F).

#### Space-efficient

Due to its low installation height of 6.0 m to 7.0 m (19.6 ft. to 23ft.), the ESP can be installed directly inside the boiler house.

## R&R-BETH<sup>®</sup> Standard Electrostatic Precipitator



Pre-assembled components for fast and cost-efficient installation



Reduced energy consumption – increased performance



Robust construction for extremely high durability



Customized adjustment to specific requirements



Maintenance requirements reduced to once a year after initial break-in phase



### R&R-BETH<sup>®</sup> Standard Electrostatic Precipitator

#### **Cost-efficient**

Due to their standardized construction, we can offer these filter types at very competitive prices.

#### **Pre-assembled**

The largely pre-assembled components make quick on-site installation easy and cost-efficient.

#### **Tough**

Their extremely robust and simple construction, as well as ingenious integrated detail solutions, result in high usability and outstanding durability. Built for gas temperatures of up to 420°C (788°F).

#### **Variable**

The R&R-BETH<sup>®</sup> standard design can be individually adapted to conditions at hand anytime.

#### **Energy-efficient**

Compared to filter separators, the R&R-BETH<sup>®</sup> Standard ESP uses significantly less energy. With its state-of-the-art high voltage control technology, the R&R-BETH<sup>®</sup> ESP can also claim superior separation efficiency.

## R&R-BETH® Industrial Electrostatic Precipitator



Pre-assembled components for fast and cost-efficient installation



Reduced energy consumption – increased performance



Customized adjustment to specific requirements



Robust construction for extremely high durability



### R&R-BETH® Industrial Electrostatic Precipitator

For dust extraction from large gas volumes **R&R-BETH®** offers the Industrial Electrostatic Precipitator. ESPs of this size are usually designed and developed for the specific process conditions at hand.

**R&R-BETH®** Industrial ESPs are always custom built for each project to meet the individual requirements of our customers.

#### Tough

Built for gas temperatures of up to 420°C (788°F)

#### Less maintenance

Maintenance requirements are reduced to once a year by using few and slowly revolving plant components.

#### Energy-efficient

Compared to filter separators, the **R&R-BETH®** Industrial ESP uses significantly less energy.

#### Why R&R-BETH® Electrostatic Precipitators?

- Low pressure loss (approx. 2.5 mbar)
- Continuous separation process
- Very low maintenance requirements
- For gas temperatures up to approx. 420 °C
- Solid construction
- Customizing options
- High separation rate
- High energy efficiency
- High availability
- High durability
- High operational safety
- Uncomplicated spare parts service
- Trouble-free compliance with legal emission limits

## R&R-BETH<sup>®</sup> Spares & Service

### Friendly, reliable and competent

From planning to on-site assembly and maintenance, one source is all you need – **R&R-BETH<sup>®</sup>**. 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 **R&R-BETH<sup>®</sup>** 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 service 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 **R&R-BETH<sup>®</sup>** 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 **R&R-BETH<sup>®</sup>** 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@rr-beth.com](mailto:service@rr-beth.com)



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





## R&R-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. **R&R-BETH®** Original Equipment is designed and developed along with the machines themselves. Every **R&R-BETH®** spare part passes through the same production process, including inspection and quality control, as the original part inside your machine.

#### Only the R&R-BETH® brand guarantees true R&R-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 **R&R-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.

OEM



#### Good question

Why choose **R&R-BETH®** »OEM« spare parts?

**R&R-BETH®** optimizes.  
Evolving towards even better performance

**R&R-BETH®** guarantees.  
Maintaining the manufacturer's warranty

**R&R-BETH®** perfects.  
Improving the efficiency and service life of your plant

**R&R-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.**

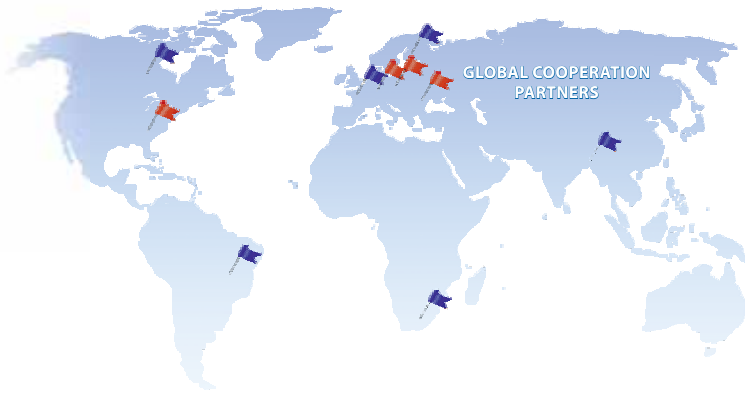
References





References





GLOBAL COOPERATION PARTNERS

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**R&R<sup>®</sup>  
BETH**

Technologies protect living spaces of present and future generations

