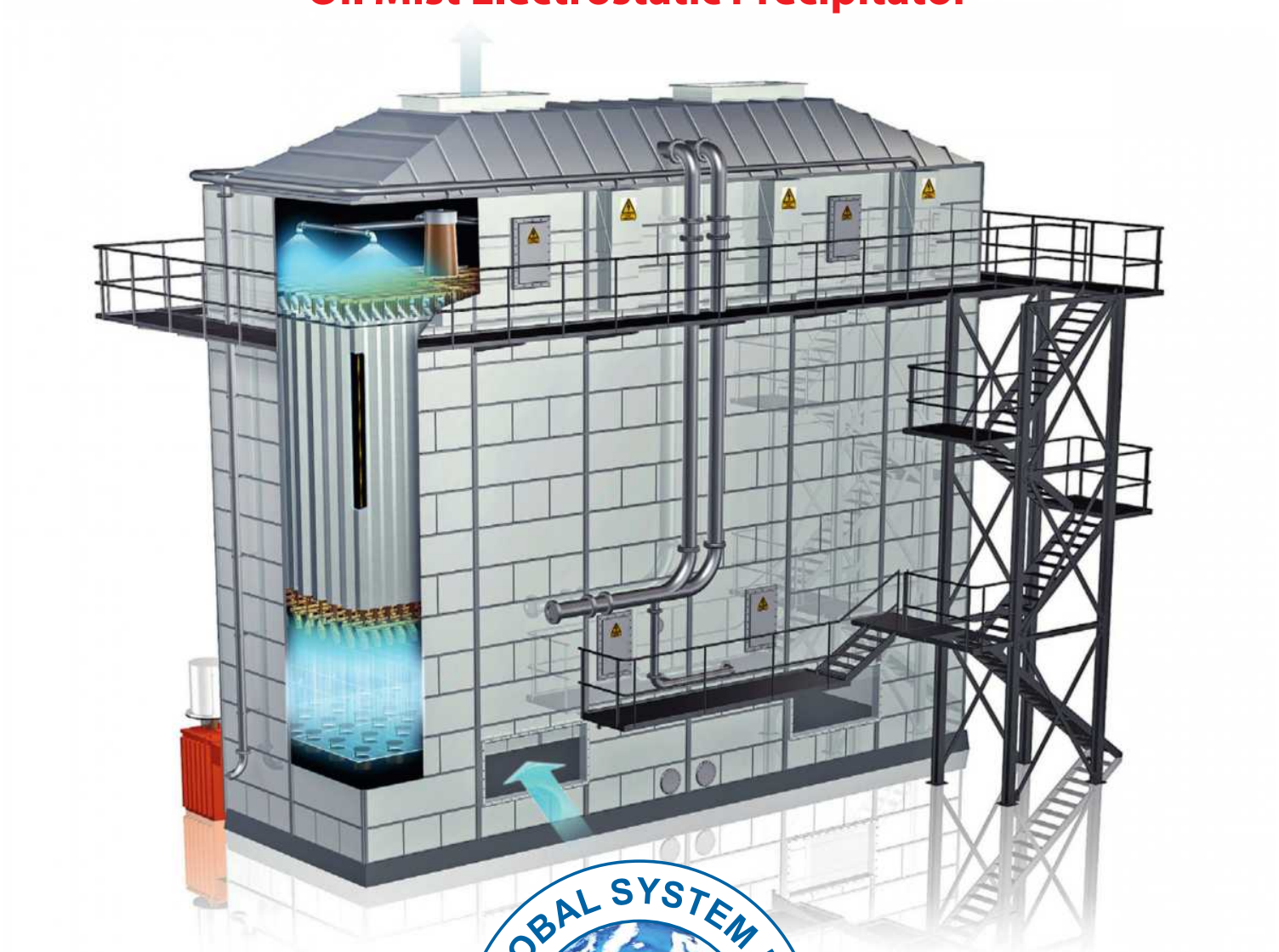
R&R® BETH

BETH FILTER SINCE 1887®

Wet Electrostatic Precipitator • Tar Electrostatic Precipitator
Oil Mist Electrostatic Precipitator



YOUR GLOBAL SYSTEM PARTNER

www.rr-beth.com

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

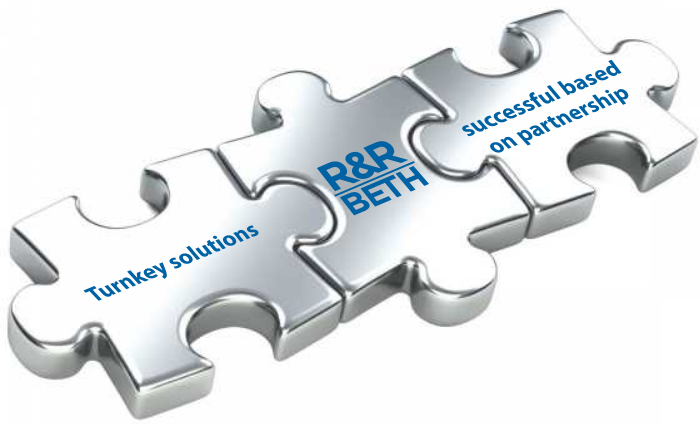
The constantly growing needs of our customers and the steadily changing processes of the markets are the driving forces of our expansion for the dynamic and organic growth of our company. Targeted acquisition in relevant markets support this strategy.

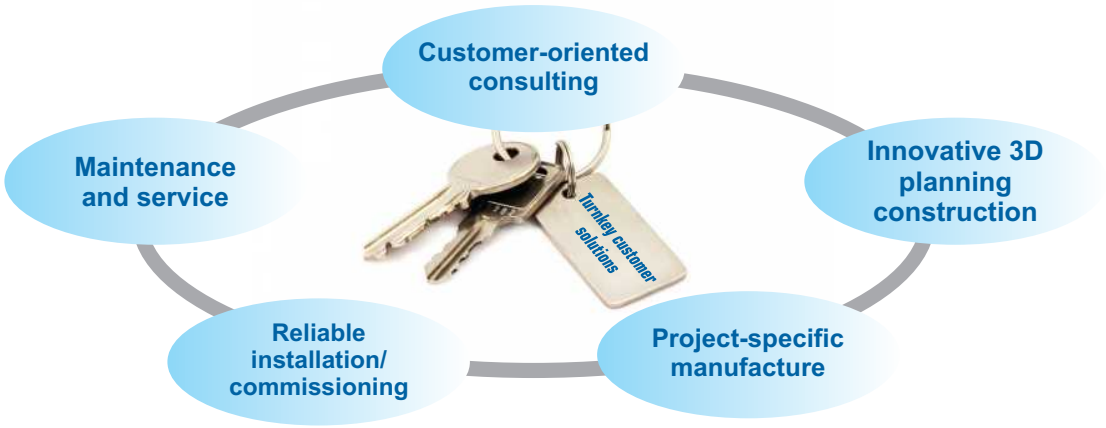
The family spirit in our proprietor-run company is an essential basis for the motivation of our employees. The associates, the management team as well as all employees build a community with a climate for good ideas and highest commitment.

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® Wet Electrostatic Precipitator

Ease of maintenance and proven operational reliability

Since many years , **R&R-BETH®** Wet Electrostatic Precipitators have been unsurpassed in terms of operational safety, durability and extreme filtration efficiency. The advantages compared to conventional filter systems are a superior energy efficiency, low maintenance requirements and especially their low investment costs.

R&R-BETH® Wet Electrostatic Precipitator

R&R-BETH® Tar Electrostatic Precipitator

R&R-BETH® Oil Mist Electrostatic Precipitator

R&R-BETH® Spares & Service
Spare parts, maintenance and individual consultation updating solutions, plant reconstructions and plant recommissionings.

R&R-BETH® Wet Electrostatic Precipitator

High Voltage.

The Wet Electrostatic Precipitator completes the product range of **R&R-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.

Good. Better. R&R-BETH®

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

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_2O-saturated emissions containing tar or oil. Another positive effect is the additional bonding of toxic elements like HCl, SO , NaCl and HF.

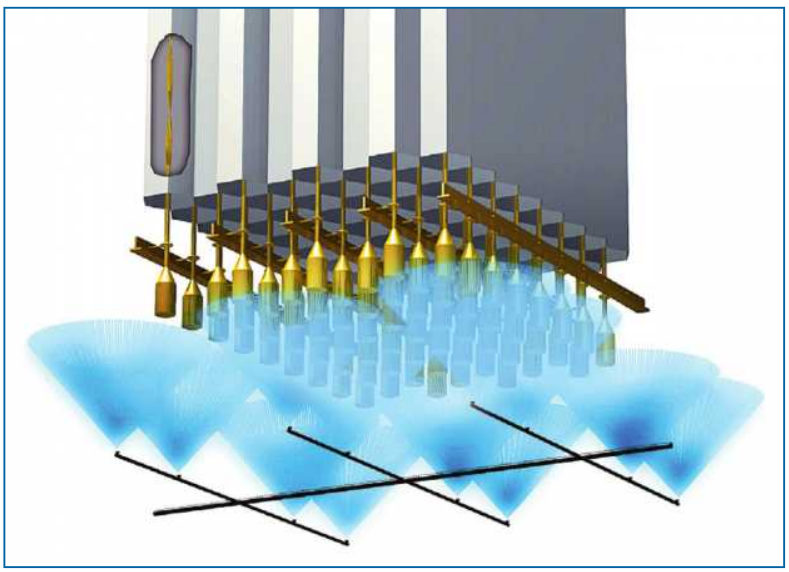
Functional principle
The process gas enters vertically the ESP at the bottom and is spread in an uniform flow profile across the entire filter cross-section by means of a gas distribution system. The particles / aerosols / water droplets are electrically charged by the application of high voltage (78-135 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.

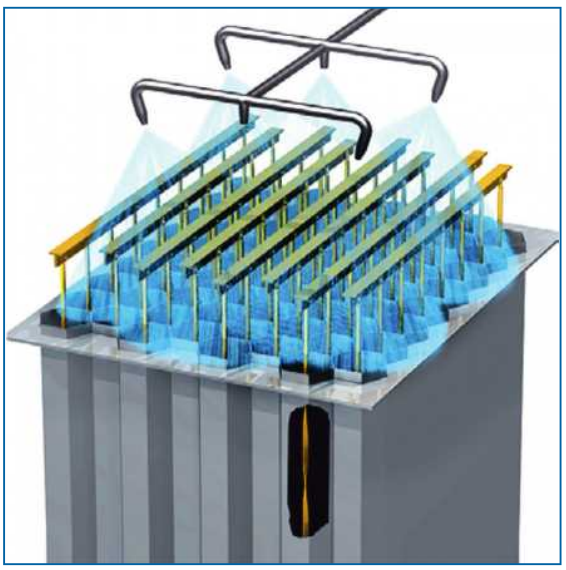
Centric Arrangement
Each honeycomb contains a centrically located discharge electrodes (»corona discharge« electrode) made from high-grade steel strip with screw fastening and individual tension weight. Adjustable baffle plates ensure ideal gas distribution inside the electric field.

R&R-BETH® optimized

- Optimum corrosion protection due to special interior coating or stain less steel design
- trouble-free purification of exhaust gases with near-saturation levels of dust

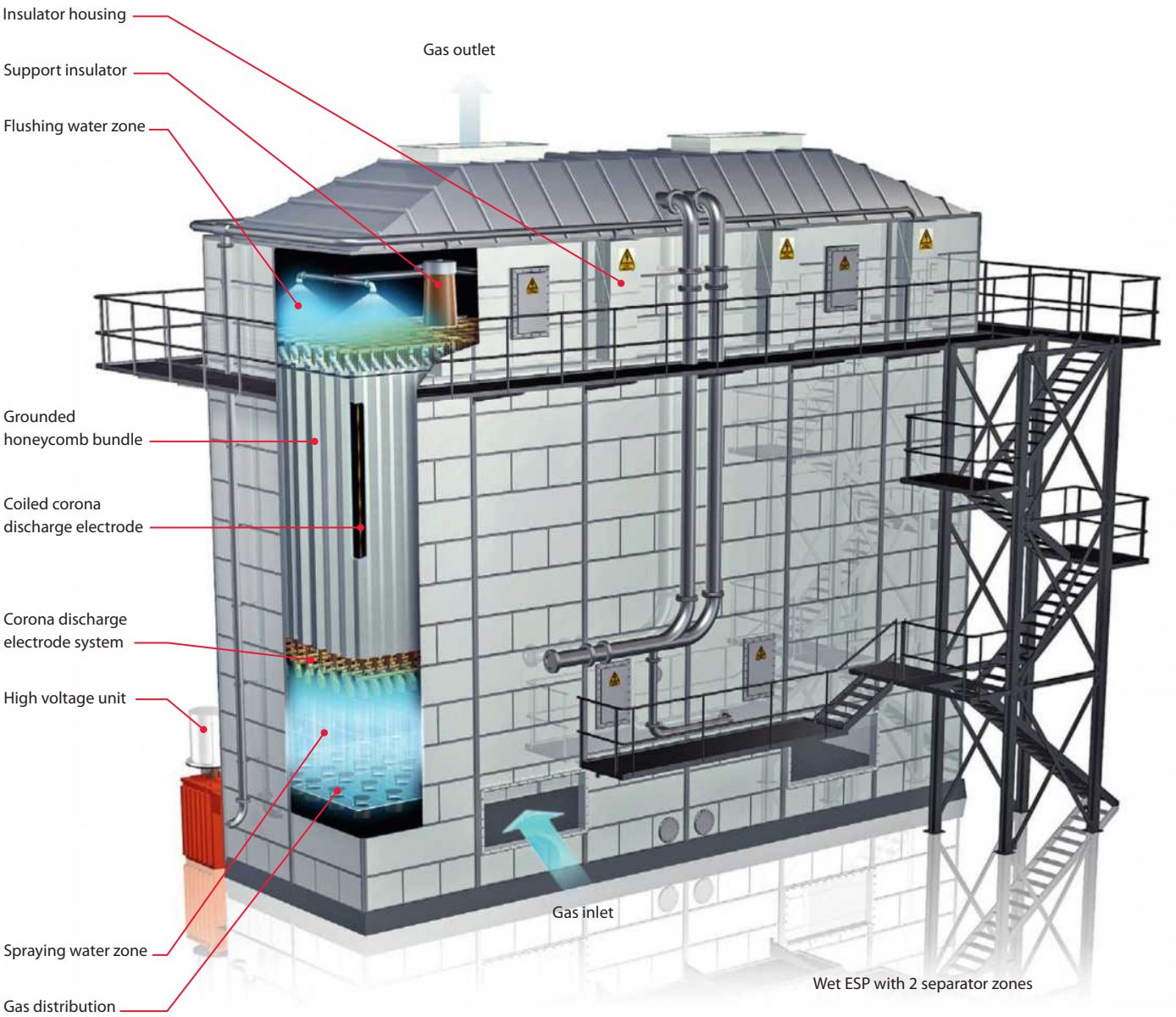


Gas conditioning and continuous moistening of the collecting electrodes and the (corona discharge) electrodes with spraying system



Electrodes cleaned by periodic flushing system

R&R-BETH® Wet Electrostatic Precipitator



Wet ESP with 2 separator zones

Vmax∞ Volume flow rate from 1.000 bis >100.000 m^3/h

Reduced energy consumption – increased performance

Low maintenance – low cost

CO_2 extinguishing system on demand

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

R&R-BETH® optimized.

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.

R&R-BETH® Tar Electrostatic Precipitator

Volume flow rate from 1.000 bis >100.000 m^3/h

Low maintenance – low cost

Reduced energy consumption – increased performance

CO_2 extinguishing system on demand

High Voltage Control

R&R-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 upto- date safety features for protecting the ESP.

R&R-BETH® Tar Electrostatic Precipitator

For volume flows from 500 to >100,000 m^3/h (294 to 58,860 cu.ft./min), **R&R-BETH®** is offering the **BETH®** Tar Electrostatic Precipitator. **R&R-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 the **R&R-BETH®** Wet ESP, but usually comes without a spraying and flushing water zone.

Biomass Gasification

Until now, 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 **R&R-BETH®** Tar ESPs has changed this matter fundamentally.

Clean

Hydrocarbons, tar, oil, and flue gas are filtered from the gas stream in a safe way. The **R&R-BETH®** Tar ESP allows a reduction of concentrations from 50g/Nm3 tr. to 10 mg/Nm3 tr.

Time-Tested

R&R-BETH® Tar ESPs have been proven in decades of continuous operation, demonstrating their superior efficiency over and over again.

If requested, the **R&R-BETH®** Tar ESP can be modifed as follows:

- Designed as pressure vessel
- O_2 measurement, stainless steel version
- Heated insulators and filter casing
- Nozzles for flushing, inertisation and steam cleaning

R&R-BETH® Oil Mist Electrostatic Precipitator

Volume flow rate from 1.000 bis >100.000 m^3/h

Low maintenance – low cost

Reduced energy consumption – increased performance

CO_2 extinguishing system on demand

R&R-BETH® Oil Mist Electrostatic Precipitator

For volume flows from 1,000 to >100,000 m^3/h, **R&R-BETH®** is offering the **R&R-BETH®** Oil Mist Electrostatic Precipitator.

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

If requested, the **R&R-BETH®** Oil Mist ESP can be modifed as follows:

- **CO extinguishing system**
- **Fire protection flap**
- **Pipework**
- **Ventilator**

Cost-Efficient Alternative
Due to its extremely low maintenance requirements, the **R&R-BETH®** Oil Mist ESP is a costefficient alternative to other decentralized filter systems.

Optimum Separation Rate
With the **R&R-BETH®** Oil Mist ESP aerosols and critical fine dusts with very low settling speeds can be separated optimally.

R&R-BETH® Spares & Service

Friendly, reliable and competent

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

Spezialized
Our team here at **R&R-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 unique 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®** 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®** 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

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.

Good question

OEM

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

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

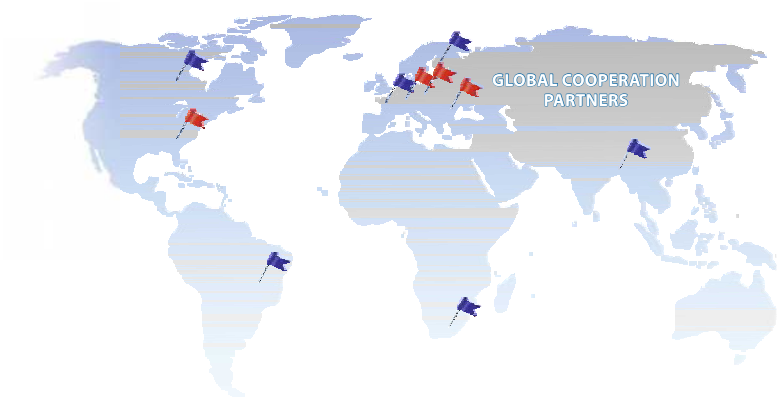
References











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