

BETE®

ENGINEERED
SPRAYING SOLUTIONS
FOR

FLUE GAS DESULPHURIZATION



ASSOCIATED ELECTRIC • FELDMUHL • CENTRAL ILLINOIS PUBLIC SERVICE • KOREA ELECTRIC PC • CENTRAL LOUISIANA ELECTRIC • HOOGOVENS • KENTUCKY UTILITIES WESTFALEN • VIRGINIA POWER • TURKISH POWER AUTHORITY • PUBLIC SERVICE OF INDIANA • LIN-KOU • PHILADELPHIA ELECTRIC • SJARKOPOL • TEXAS UTILITIES AMAGER • SALT RIVER PROJECT • BANDIRMA • JACKSONVILLE ELECTRIC WEISWEILER • COLORADO UTILITIES • CAYRIHAN • LOUISVILLE GAS ELECTRIC KW POCERADY • NORTHERN STATES POWER • KARNAP • LAKEHEAD UTILITIES KALICHEMIE • GREAT RIVER ENERGY • BEXBACH • BASIN ELECTRIC • BRODECHT KANSAS CITY POWER & LIGHT • BAYAN ELECTRIC • FGD RIHIMAKI • GAZIYER P & L FGD BANSHAN • COLUMBUS POWER OHIO • RANDERS • INDIANAPOLIS POWER & LIGHT FUSINA • MICHIGAN SO. CENTRAL • LAMBTON • MONTANA POWER • NORTH MEN MONONGAHELA • MUSCATINE POWER & WATER • HKW MÜNSTER • POWER KW FRIMMERSDORF • PLAINFIELD VALENTE • FGD BEIJING • CHINA ELECTRIC CO-OP • MATSUURA • ANTONIA ELECTRIC CO-OP • HEILBRONN • NEW BRISWICK POWER • RIVERVIEW POWER • HOUSTON POWER • POWER

PERFORMANCE THROUGH ENGINEERING

At BETE we are more than just a spray nozzle supplier. Since 1950, we have been a leader in spray nozzle design, introducing technological innovations that have reduced nozzle plugging, improved spray pattern distribution and lengthened nozzle life while increasing system reliability and efficiency. Our success is rooted in understanding our customers' business and an unparalleled ability to respond quickly and effectively to their fluid process challenges

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PERFORMANCE THROUGH ENGINEERING

BETE A PIONEER OF SPRAY NOZZLES FOR THE FGD INDUSTRY

The FGD process requires nozzles that are guaranteed to function over prolonged periods of time in the harsh conditions brought upon by factors such as pH and chloride concentrations. Since our first FGD nozzle deliveries to TVA in 1972, we have been using our extensive experience to develop products and solutions that address the unique and challenging demands of the FGD market. The result is a broad line of standard nozzles and an unparalleled ability to design, manufacture and deliver custom nozzles that meet your specific needs and help optimize your system performance.

The patented BETE spiral nozzle was installed in approximately 70% of the wet scrubbers commissioned in the U.S. by 1980.

Even today, this is still the most efficient atomizer of any direct pressure nozzle and has been designed to accommodate high flow rates while minimizing pressure requirements (over 400 gpm per nozzle at pressures as low as 6 psig) and maintaining excellent atomization.

To address changing market conditions we have introduced many innovative nozzle designs, from our tangential hollow cone nozzle (TH) in the 1980s, to the dual orifice tangential hollow cone (DTH) and tangential full cone (TSC) of today. Few nozzle companies have the experience base we do, as our nozzles are installed in over 100,000 MW of generating capacity across the world.

Our innovations have revolutionized FGD systems in facilities around the globe. Whether you're enhancing existing systems or designing new FGD systems, the BETE team can help develop the right solution to achieve optimum performance in your facility.



*Designed specifically for wet scrubbers, the **BETE DTH** uniformly distributes slurry vertically up and down, providing superior spray coverage to any single orifice nozzle.*



Absorber Nozzles



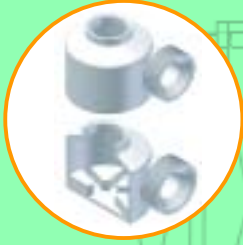
DTH
Dual Hollow Cone



TH
Single Hollow Cone

Specifications

5-20 psi (0.34-1.38 bar)
200-600 gpm (755-2271 L/min)
90°, 120°



TSC
Full Cone



ST
Finest Atomization, Full Cone
Low Pressure

Mist Eliminator Wash Nozzles



NC
Plastic, Full Cone



MaxiPass™
Plastic & Alloy, Full Cone
Clog Resistant, Maximum Free Passage

Specifications

20-35 psi (1.38-2.41 bar)
2-20 gpm (7.5-08 L/min)
90°

Emergency Quenching Nozzles



TF
Efficient Gas Cooling
Full Cone



MaxiPass™
Plastic & Alloy, Full Cone
Clog Resistant, Maximum Free Passage

Specifications

TF
40-150 psi (2.76-10.34 bar)
1-20 gpm (3.75-80 L/min)
90°-120°

MaxiPass™
20-40 psi (1.38-2.76 bar)
1-20 gpm (3.75-80 L/min)
90°-120°



Innovative & Unique Laboratory Facilities

At the BETE Spray Laboratory our goal is to maximize our customers' scrubber performance by surpassing all design requirements.

We achieve this by combining our exclusive technology with a team of knowledgeable and experienced staff who work with you to understand and address your specific challenges.

Technology doesn't stand still, and neither does our spray lab. Utilizing proprietary video imaging, analysis and data processing, the latest generation of our pioneering **Droplet Analyzer** is designed for fast, accurate dynamic droplet size analysis. This remarkably versatile system is capable of in-the-spray measurement of droplets from 2 to over 15,000 microns, allowing us to readily evaluate spray nozzle atomization. Our high speed **Patternator** for liquid distribution measurement is completely integrated with the Droplet Analyzer system, enabling precise measurement of spray coverage, uniformity, density and droplet size.

For our customers, the end result is complete confidence in nozzle performance.

Whether it's a new application or modifying an existing system, the BETE Spray Laboratory can quickly evaluate your requirements and work with you to develop an effective solution that optimizes performance while minimizing your operating costs.

Nozzle Design and Fabrication

BETE's success is built on our understanding of customers' requirements which enables us to provide effective engineering solutions to their most difficult challenges. The design and production of our spray nozzles is a critical part of this success.

To ensure the timely delivery of the unique nozzles required by the FGD market, they are consistently given highest priority from prototyping to production. From engineering concept to **Rapid Prototype**, our staff is dedicated to producing the highest quality nozzles. Using the latest in **3D Rendering Software**, our engineers are able to optimize the nozzle designs, meet customer spray requirements and ensure minimum weight/cost. Our model shop employs ultra-modern multi-axis CNC lathes and machining centers to fabricate prototypes for in-house testing and verification prior to any production runs.

These comprehensive capabilities enable us to develop and design nozzles for the FGD market in a timely manner, provide reliable delivery forecasts and maintain quality standards.





BETE PERFORMANCE THROUGH ENGINEERING

At BETE we provide more than just hardware. We provide decades of experience to address the specific needs of customers. From problem identification and testing through system design, fabrication and installation, BETE Engineering has the expertise you need to solve your system challenges.

BETE Technical Services

Integrated System design: As specialists in fluid flow, BTS can design not only complete stand-alone fluid delivery systems, but also subassemblies that can be integrated into existing processes. For the system design, BTS has experience sizing and specifying fluid equipment including:

- Solenoid valves and pressure regulators
- Balance (flow) orifices and flowmeters
- Pumps: Positive displacement, centrifugal, and air operated diaphragm (AOD)
- Water treatment systems (e.g. reverse osmosis) and filtration

BTS has fielded systems for typical industrial applications such as humidification and material injection, including systems rated for Class 1 Div 1 service. Systems include controls or interface (I/O) as defined by the customer.

Fluid Flow Analysis: Using computer modeling packages, BTS can provide comprehensive piping analysis of both new and existing systems. By developing a hydraulic model, complete pressure drop and flow characterization is possible for piping systems including elevation effects, friction losses and component pressure drop. This can be a valuable tool to determine if the pump/piping/nozzle combination will perform to design or if flow maldistribution exists.

BETE Applications Engineering

BETE is well known for its ability to find creative solutions to difficult spraying challenges. Before you buy just any nozzle, give BETE a call. If it's a common application, our sales reps or customer service personnel will make sure you're aware of the latest developments and recommendations in the field. If it's a new application (or a new twist to an old application) BETE Applications Engineers will put their years of experience to work helping to determine the best way to provide spray coverage and performance you need.

BETE Applications Engineers have built a comprehensive array of Custom Solutions including:

- An innovative manifold design for XA nozzles used to study the effects of ice build-up on airplane wings
- An external mix, full cone air atomizing nozzle for high viscosity spray drying in the pharmaceutical industry
- A pneumatic shut-off for a single fluid nozzle to apply a reference mark to a subassembly

BETE Custom Manufacturing

Approximately half of our products are custom designed and built to satisfy our customers' unique needs. Our facility is equipped with a comprehensive array of CNC equipment capable of manufacturing single parts to runs in the tens of thousands. Our rapid prototype capabilities in conjunction with our foundry allow us to expediently fabricate custom nozzles in nearly any alloy available. Our welding department has decades of experience in unusual alloys and code welds. Overall capabilities include:

- Cast and machined alloy products in stainless steels, cobalt and nickel-based superalloys, plus exotics such as tantalum, niobium, platinum, and others
- Molded and turned nozzles in PVC, polypro, PTFE and others
- Weldments of dissimilar metals such as stainless steel and superalloys and weld overlays of same, experience with lances to 10' and flanges up to 36"
- PMI and radiographic testing, with fully traceable material certifications as required

For custom product manufacture, BETE can provide foundry work on a contract basis, including access to a well equipped pattern shop to satisfy all tooling needs.

At BETE our mission is to provide spraying solutions that exceed customer expectations in every way. Let us put our nozzle expertise to work to create a winning solution for your application.

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