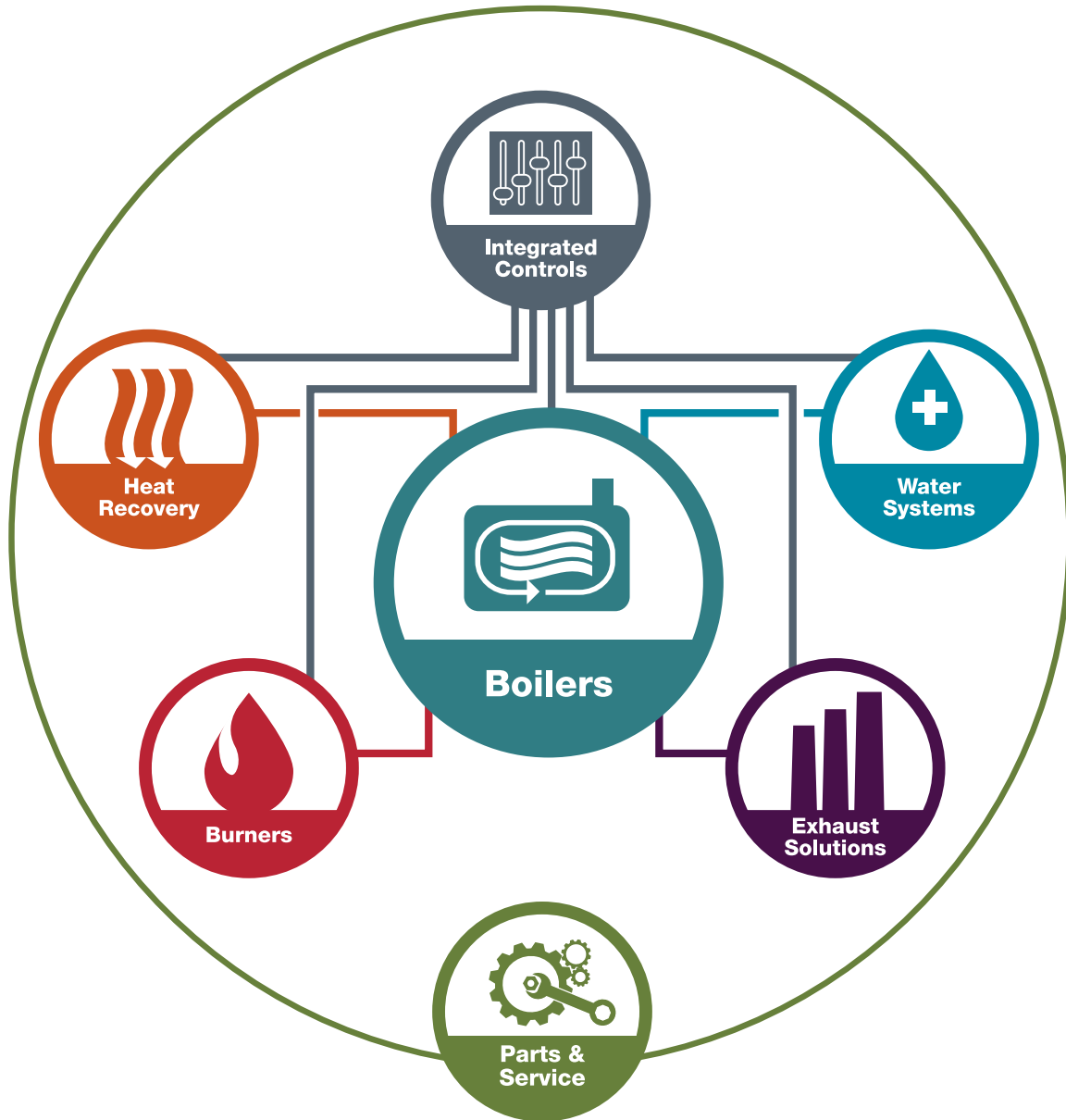




The Power of Total Integration.





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The power of total integration

Only Cleaver-Brooks can offer complete boiler systems, from fuel inlet to stack outlet, that are completely designed, engineered, manufactured and integrated by one company. Other boiler manufacturers rely on equipment from a variety of manufacturers, simply bolted on, jeopardizing compatibility and performance. If you’re looking for the best-quality boiler systems with the lowest emissions and highest efficiencies, you’re looking for Cleaver-Brooks.

A Long-Standing Tradition

The company was founded in 1929 by John C. Cleaver, manufacturing small, portable boilers. Cleaver and Raymond Brooks formed Cleaver-Brooks in 1931 and began producing the world’s first packaged boiler. Through a commitment to research and development and a sound acquisition strategy, today the company is the sole provider of integrated boiler room solutions and is a leading manufacturer of boiler room equipment across all commercial, institutional and industrial markets.

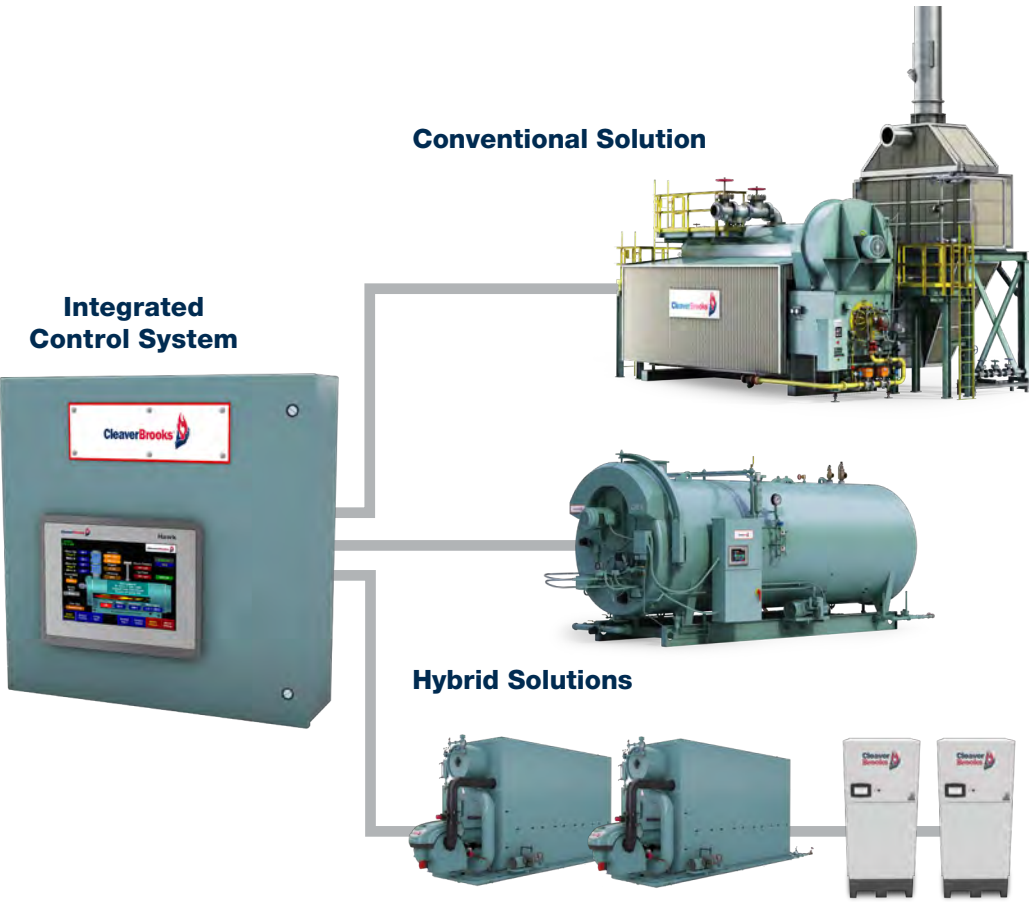
Product Development

When you’re the industry leader, the only way to stay there is to continuously innovate and push the boundaries of what people think is possible. Many of our competitors claim to be innovators, but no one invests more energy and money in research and product development—and achieves greater results—than Cleaver-Brooks. At our dedicated product development center, we continue to develop breakthrough emissions and efficiency technologies for tomorrow’s boilers and burners.

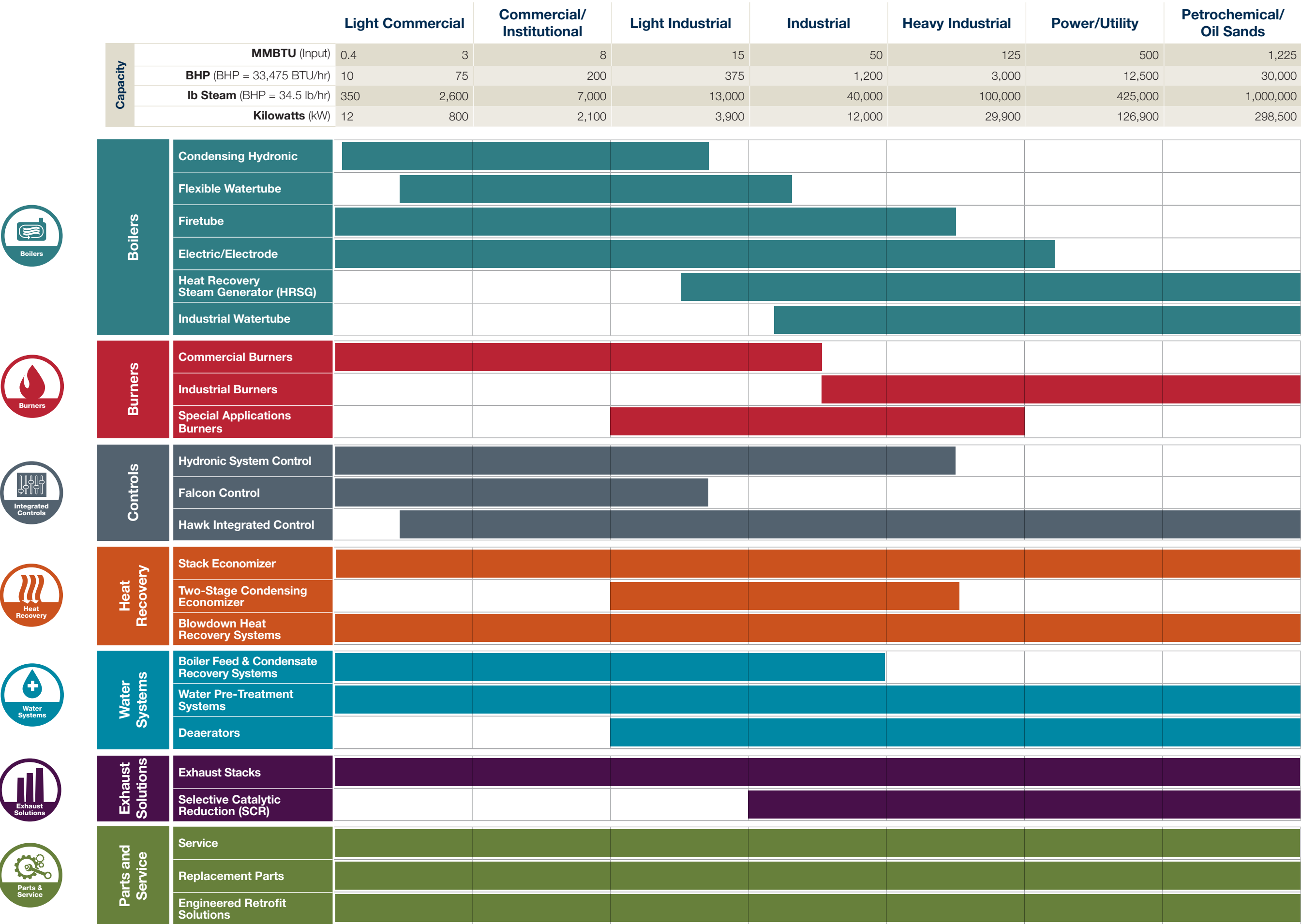
Product Development is driven by four guiding principles – safety, efficiency, reliability and sustainability.

Flexible Solutions

Whether it’s modular systems that divide load among boilers of similar size and type or hybrid systems that combine different types of Cleaver-Brooks boilers for additional flexibility and efficiency, there’s a Cleaver-Brooks solution that can be customized for your needs. Because we manufacture nearly every type of boiler and the integrated controls that make all components work together seamlessly, you can be sure the design is appropriate for your application.

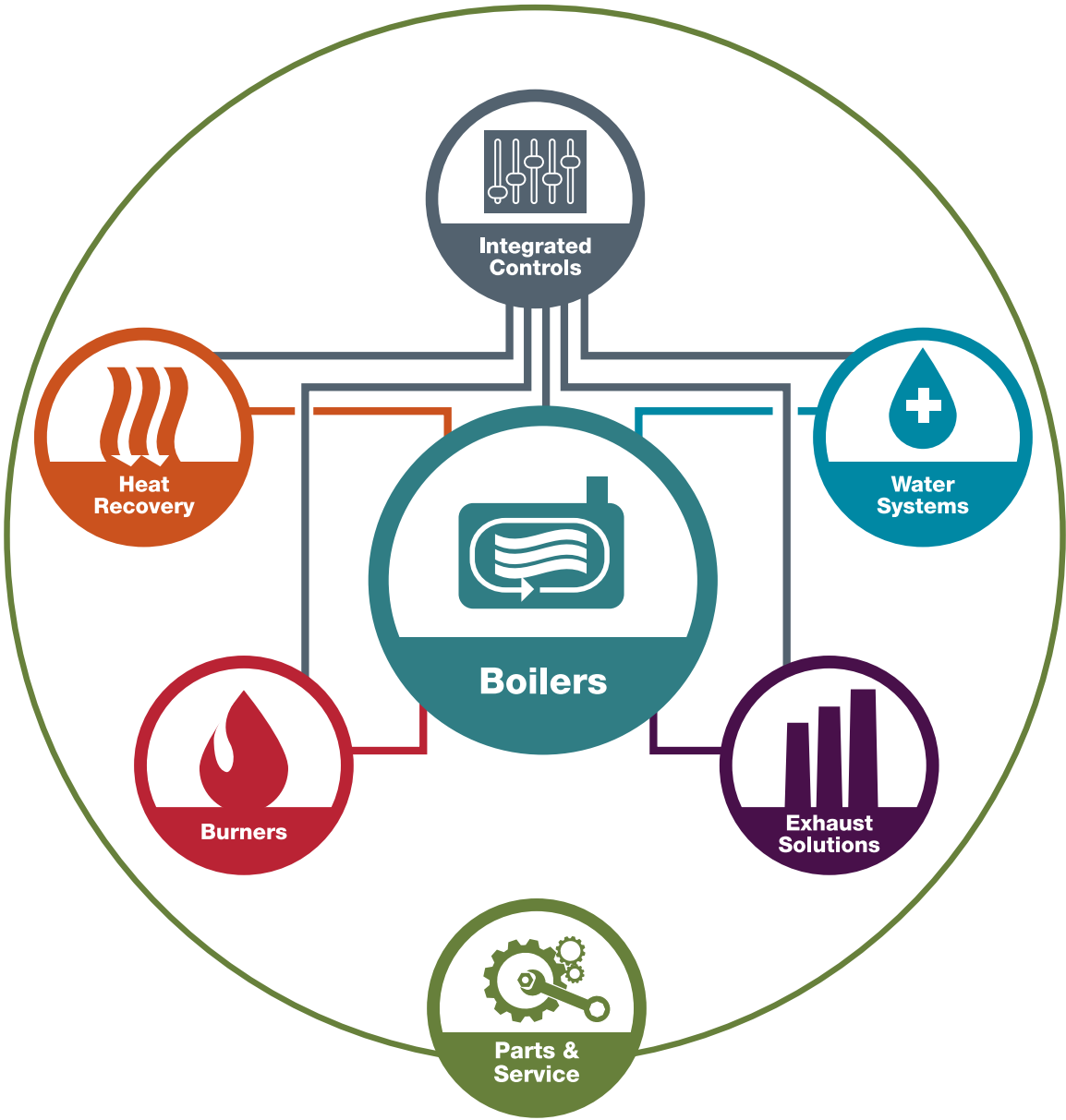


Cleaver-Brooks Solutions Map



Helping businesses run better every day

Cleaver-Brooks sets the bar for industry-leading, energy-efficient, low-emissions products for your boiler room. Whether it's a new boiler installation, from the smallest electric commercial boiler to the largest industrial boiler, or retrofitting your current facility, Cleaver-Brooks fully integrated systems, including boilers, burners, controls and auxiliary equipment supply the most efficient solutions in the world. Only Cleaver-Brooks boiler systems have the power of total integration for your entire boiler room, built in from the ground up.



High efficiency. Low emissions.

Cleaver-Brooks recognizes there is a need for advanced technologies that enable a more energy-efficient and environmentally friendly generation of steam and hot water to meet today's stricter regulations. We are one of only a few boiler manufacturers in the world that has a dedicated product development center. Our center is annually funded with the specific mission of developing efficient and sustainable products.

Efficiency and sustainability are not only environmental priorities, but economical necessities for our customers.

Turnkey conversions and comprehensive upgrade and retrofit capabilities from our world-class engineering staff make it easy to change fuel types, lower emissions, increase boiler efficiency or bring any age system back to the manufacturer's original specifications. Cleaver-Brooks has the solution and dedicated aftermarket team to help you engineer and implement whatever advantage or benefit you may need.

By continuing to develop and encourage greener boiler room solutions, Cleaver-Brooks estimates over the next decade that we will help U.S. companies save billions in fuel and facility costs and prevent more than 100,000 tons of emissions and particulates from entering the environment.

The chart to the right outlines turnkey solutions that can be implemented on virtually any boiler, as an accessory when ordering a new boiler or as retrofit to improve the efficiency of an existing system.

Lower-Emissions Solutions		Energy-Efficient Solutions	
Add Flue Gas Recirculation (FGR) Can be added to almost any boiler to reduce the formation of NOx emissions		Fuel Conversions We can engineer a fuel conversion on your existing boiler system to switch to or between less expensive fuel options	
Upgrade Controls Advanced controls can be added or upgraded on any boiler to hold emissions as low as possible every day		Upgrade Controls Advanced controls can be added or upgraded on any boiler to keep your boiler operating at peak efficiency every day	
Burner Upgrade Burners should be upgraded every 10–12 years to bring your combustion system up to date with the lowest-emissions technology available		Burner Upgrade Upgrades ensure burners have the highest turndown and modulation technology available to prevent energy loss from boilers cycling in low fire	
Boiler Replacement If your boiler is 15–20 years old, it often makes the most sense to replace your boiler system with the latest emissions technology available		Add Heat Recovery Any boiler can benefit from a heat recovery system, which recovers waste exhaust heat and uses it to heat a cooler water source, such as boiler feedwater	
Add Selective Catalytic Reduction (SCR) Can be added to boiler systems to achieve emissions requirements that are lower than the best available boiler and combustion technology		Boiler Replacement If your boiler is 15–20 years old, or oversized, a new, higher-efficiency or right-sized boiler system often makes the most financial sense	

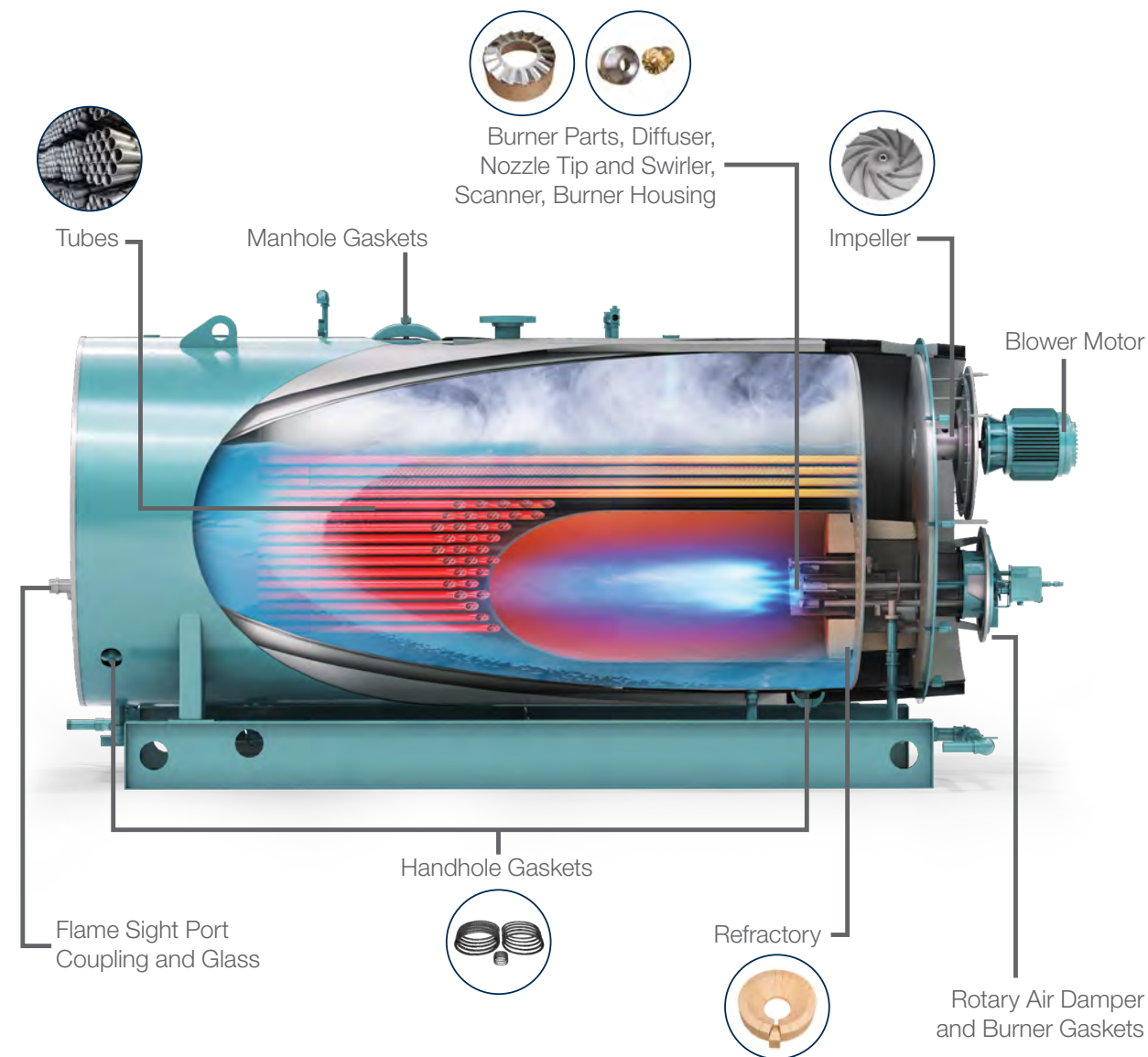


GENUINE PARTS, UPGRADES AND MAINTENANCE

Cleaver-Brooks offers the highest-quality genuine parts, service and upgrades, backed by unparalleled expertise, helping you maximize savings, performance and efficiency. Whether for a Cleaver-Brooks boiler or a boiler from another manufacturer, we have the parts and maintenance solutions to keep your boiler system operating safely and reliably at peak efficiency. We offer expertly engineered upgrade solutions to lower fuel usage and lower emissions for all boiler systems. And with the largest, most experienced representative distribution in the boiler industry, no one provides better service and support in more locations.

Genuine Parts

No matter what component of your boiler system needs a part, every part you need is available through Cleaver-Brooks Genuine Parts. Each part we offer is engineered and manufactured specifically to your equipment's original specs. In addition, each part is backed by the highest-quality standards of Cleaver-Brooks. We have over 4,000 items in stock and immediately available for shipment from our authorized representatives or visit parts.cleaverbrooks.com.



Service and Maintenance Support



Nothing is stronger than our commitment to our customers long after the sale. We have a dedicated network of 1,500 CBRA Representatives throughout the world whose goal is to provide the best products and service, before, during and after the sale. Visit cleaverbrooks.com to find your nearest representative.

Training

Cleaver-Brooks is committed to helping you maximize the safety and performance of your boiler room. We offer comprehensive, in-depth training programs at the Cleaver-Brooks Boiler House in Milwaukee, WI, and can also orchestrate custom on-site programs at your facility. For your convenience, we also offer online, self-paced courses. Visit cleaverbrooks.com/training to find an upcoming training program that's right for you.

Upgrades and Retrofits

We live in a world where technology is always advancing. Your current boiler system may benefit from a burner retrofit, controls upgrade or supplemental heat recovery equipment to change fuels, increase efficiency and reduce emissions. To see how your current boiler system can benefit from an upgrade, contact your authorized Cleaver-Brooks representative.

Partner with the Experts in Boiler Plant Optimization™

We provide the resources and tools you need to maintain your boiler plant's efficiency. With our **Boiler Plant Optimization (BPO)** programs, we can assist with a variety of methodologies to create a successful roadmap to improve and address any site-specific issues. We partner with you to inspect and evaluate the four cornerstones of successful plant operation: Safety, Efficiency, Reliability, and Sustainability.



SAFETY



EFFICIENCY



RELIABILITY



SUSTAINABILITY

INDUSTRIAL WATERTUBE BOILERS

Cleaver-Brooks offers the industry’s widest range of natural circulation watertube steam generators. Every aspect of our system is designed for maximum efficiency, reliability and low emissions. Every furnace utilizes an innovative welded-membrane wall design backed by more than 80 years of experience. And Cleaver-Brooks is the only manufacturer with refractory-free boiler wall construction, including the burner throat.

CBCW Pre-Engineered, Fired Watertube Boiler 10,000 to 225,000 lb/hr

With almost 90 years of industry knowledge, Cleaver-Brooks can provide truly customized Industrial Watertube boiler solutions quickly without the costs typically associated with a fast-track customized order. We’ve pre-engineered 17 different configurations based on the most popular customer requirements and applications. All you need to do is identify key performance parameters and choose options on your CBCW boiler system. Because of the work we’ve already done, Cleaver-Brooks can deliver a solution tailored to your specifications faster than ever before.

Cleaver-Brooks makes all the components.

The watertube boiler, burner, state-of-the-art combustion controls and all of the accessories are designed, engineered and manufactured by Cleaver-Brooks, guaranteeing the highest quality and superior total cost of ownership.

Seamless integration of components.

Because Cleaver-Brooks designs and manufactures every part, they work together seamlessly for maximum efficiency and minimum emissions.

A complete boiler package and still customizable.

From the air inlet to the stack outlet and the feedwater inlet to the steam nozzle outlet, Cleaver-Brooks conveniently provides everything you need to effectively operate the boiler system.

Layout and configuration drawings make planning easier.

Cleaver-Brooks is committed to maximizing efficiency. With the CBCW, a complete package of technical documents is now available at the time of quote. With drawings accessible so quickly, you can plan and manage your work up to 8-12 weeks faster than with a traditional system.



CUSTOM SERIES 10,000 to 1,000,000 lb/hr

The widest range of natural circulation watertube boiler designs for industrial, institutional, power and superheated process applications, available to less than 5 ppm NOx.

Cleaver-Brooks offers the industry’s widest range of natural circulation watertube steam generators, and every aspect of our system is optimized for maximum efficiency, reliability and low emissions. We also offer supporting controls systems, heat recovery, exhaust stack solutions and complete aftermarket parts and service. Our uniquely engineered integration encompasses the entire boiler room and is designed to deliver the optimum in efficiency and environmental sustainability. Every industrial watertube furnace utilizes an innovative welded-membrane wall design backed by more than 80 years of experience. Cleaver-Brooks is the only manufacturer with refractory-free boiler wall construction, including the burner throat.



D-Style
10,000 to 500,000 lb/hr
Shop-assembled with the complete boiler package.



O-Style
10,000 to 500,000 lb/hr
High power in a symmetrical, compact and portable design.



A-Style
10,000 to 500,000 lb/hr
Large capacity in a small footprint.

ELEVATED DRUM

200,000 to 500,000 lb/hr

Up to 250 T/H of steam in field-assembled modules, engineered to have the lowest installed cost. No refractory on waterwalls and burner throat means lower NOx emissions and reduced maintenance. It's a complete, Cleaver-Brooks single-source solution for integrated boiler, burner and controls.



FORCED-CIRCULATION OIL SANDS STEAM GENERATOR

150,000 to 500,000 lb/hr

A steam generator with up to 250 T/H of steam, less than 2% blowdown with evaporator water and 99.5% steam purity. Tolerates substantial upsets in water quality, heat flux and flow. It features modern, water-cooled walls and optimized, heat-transfer surfaces, reducing its footprint and weight by 50%.



Patent Pending

HEAT RECOVERY STEAM GENERATORS

With state-of-the-art, customized, packaged heat-recovery steam generators for gas-fired turbines from 1 to 100 MW, Cleaver-Brooks is a leading global provider of natural circulation packaged and modular HRSG products for gas turbine, process exhaust, incinerator exhaust and hot water generation. We have extensive experience customizing systems for your specific application. Our systems can increase efficiency for large-scale industrial applications such as thermal oxidizers, incinerators, FCCUs, thermal oil heaters, economizers and air heaters.

MODULAR

500,000+ lb/hr

Cleaver-Brooks' Modular HRSGs are designed to accommodate exhaust gas flows greater than 400,000 lb/hr. The Modular HRSG is designed for maximum shop assembly which minimizes field erection time and costs. We offer natural circulation designs for minimal parasitic power consumption and reduced maintenance of rotating equipment present in assisted or forced circulation systems. Our expert engineering teams review every aspect of the custom design and incorporate proven design features across all product lines.



MAXFIRE®

10,000 to 500,000+ lb/hr

A packaged steam generator featuring an integrated boiler/burner/control package with an NATCOM ultra-low-NOx duct burner. With capacities up to 250 T/H of steam, the MaxFire is a highly efficient steam solution capable of meeting single-digit NOx and CO emissions requirements.



SLANT-VC

10,000 to 150,000 lb/hr

A compact, natural circulation steam generator tailored to applications with gas-side inlet temperature less than 1,750°F. Single pressure design with integral steam drum and single pass design for lower gas-side pressure drop. Flexible installation results from multiple gas flow options to fit the plant layout. Accommodates CO/SCR to meet stack emissions and available to less than 2 ppm NOx.



Additional Products

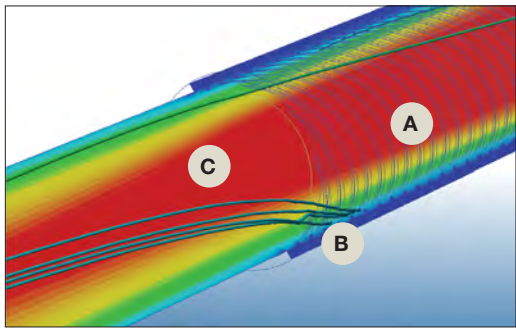
MaxFlow Hot Water Generators

CBEX FIRETUBE BOILERS

For decades, engineers have been trying to build a better and more efficient boiler system, but it took Cleaver-Brooks to challenge the status quo and reimagine what is possible. Since Cleaver-Brooks is the only company that manufactures every component of the boiler system, we were able to design a completely new system from the ground up, incorporating our EX technology. It can only be described as a quantum leap in firetube design, with the highest operating efficiency and lowest possible NOx ever achieved.

DESIGN ADVANCEMENT ONE: Optimizing the tubes for better heat transfer

Computational Fluid Dynamics (CFD) modeling allows us to optimize the extended surfaces of the spiral heat transfer tube, where 30% to 40% of the boiler's heat transfer takes place. This proprietary design increases heat transfer by 85% compared to a traditional bare tube.



CFD model of an advanced heat transfer tube.

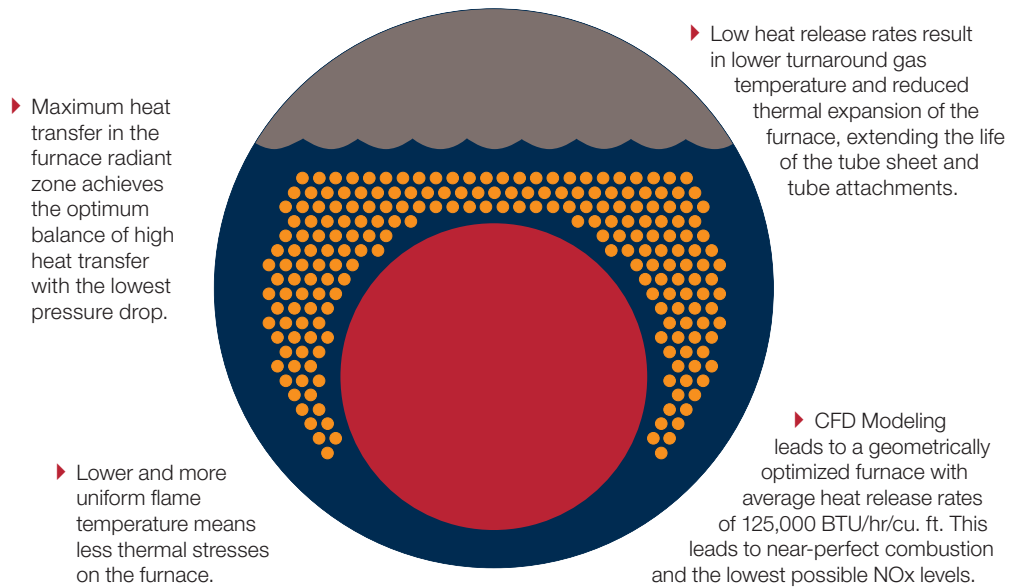
- A. The number of ribs, angle of the ribs and height and width of the ribs have been optimized for peak tube performance.
- B. Improved tube profile utilizes 100% of the tube diameter for heat transfer.
- C. Increased surface area and a complex boundary layer separation reattachment phenomenon result in better heat transfer.

DESIGN ADVANCEMENT THREE: Integrating the burner and controls

Ultimately, the performance of a boiler is based on the ability of the burner, boiler and controls to work together. Controlling the CBEX is the Cleaver-Brooks Hawk, an integrated control system embodying precise boiler/burner management and safety with logic-based ancillary devices and functions. The Hawk keeps your boiler and burner consistently operating at peak efficiency with the lowest possible emissions, regardless of changes in environmental conditions.

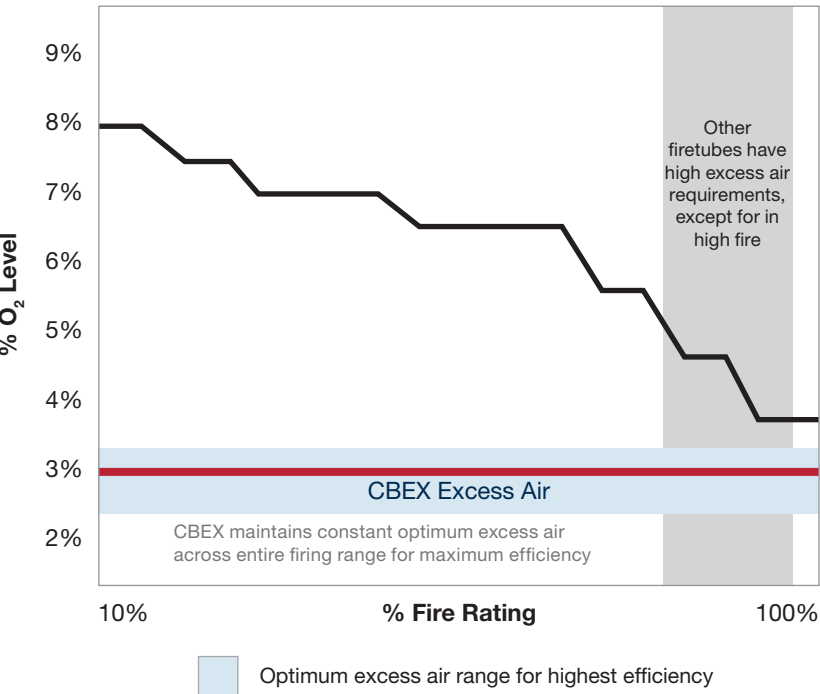
DESIGN ADVANCEMENT TWO: Optimizing the geometry of the furnace for near-perfect combustion

With the tubes optimized, they could transfer more heat in less space. We then used this space to optimize the geometry of the furnace, where the remaining 60% to 70% of the boiler's heat transfer occurs for low heat release rates and near-perfect combustion.



THE BENEFITS OF EX TECHNOLOGY

EX technology provides for a revolutionary boiler system that features the lowest emissions, most robust combustion and best thermal efficiency across all operating ranges. Compared to existing models, the CBEX attains the highest fuel efficiency in lower firing ranges. It also emits fewer air pollutants than any firetube system on the market today.



Highest Operating Efficiency of any Firetube: 10:1 turndown while maintaining 3% O₂ across the firing range

To achieve the best operating efficiency, boiler engineers strive to maintain the lowest excess air throughout the firing range. Maintaining low excess air translates into higher efficiency. The CBEX Elite is the only firetube to achieve 3% O₂ across the entire 10:1 turndown range,* making it the most efficient firetube boiler ever built. The high operating efficiency paired with the high turndown rate means the boiler cycles less, minimizing the purging of energy caused by boiler cycling.



*At 30 ppm NOx on select models

Lowest Possible NOx: Sub-5 ppm without SCR†

The optimized furnace in the CBEX provides lower heat release and near-perfect combustion. This, combined with the Hawk integrated control system, reduces emissions to unprecedented levels. Prior to the development of the CBEX, sub-5 ppm NOx without Selective Catalytic Reduction had never been achieved.

†Select models

Quick Steam Up

With the smaller footprint and lower water volume, the system heats up 20% quicker than traditional firetube models.

Smaller Footprint and Weight

By optimizing the heat transfer of both the tubes and furnace, the CBEX requires less heating surface to achieve the same BTU output as traditional firetubes, while maintaining the highest possible efficiencies. As a result, the CBEX on average has a 15% smaller footprint and weighs 20% less than traditional boilers.

Extended Pressure Vessel Life

The temperature is more uniform in an optimized furnace and reduces the turnaround gas temperature. This lowers the stresses on the furnace and second-pass tube attachments, extending the life of the tube sheet and attachments. As a result, Cleaver-Brooks offers an industry-leading, 15-year pressure vessel limited warranty.

▶ Learn more about the revolutionary technology behind the CBEX at cleaverbrooks.com/cbex

CBEX ELITE

Delivering the best efficiency and emissions control in the world.

The CBEX Elite firetube boiler, featuring new EX technology, is a completely integrated boiler, burner, control and heat recovery system. Every core component has been designed and built by Cleaver-Brooks to work together, resulting in the most efficient and lowest-emission firetube system ever built.

CBEX ELITE

100-1,200 HP

Exclusive Cleaver-Brooks integral burner

- Best operating efficiency** of any firetube ever built
- Completely integrated** boiler, burner, controls and optional heat recovery system
- Minimum excess air** 3% O₂ across the operating range with 10:1 turndown*
- Ultra-low NOx** can meet 5 ppm without Selective Catalytic Reduction (SCR)*
- 15% reduction in footprint** versus traditional firetubes

*select models



CBEX ELITE

1,300-2,200 HP

The highest-capacity packaged firetube available



CBEX PREMIUM

Get EX advantages with a packaged burner.

The CBEX Premium also includes our revolutionary EX technology, along with a completely integrated boiler and burner system. Extraordinarily efficient and capable of meeting very low NOx requirements, the CBEX Premium provides a high-value solution with next-generation engineering. Add available heat recovery and controls for a completely integrated experience.

- EX technology** provides a high-value solution
- Completely integrated** boiler and burner system
- High-efficiency,** next-generation firetube
- Can meet 9 ppm NOx** and low emissions requirements
- Smaller footprint** than traditional firetubes

CBEX PREMIUM

100-1,200 HP

High-value packaged firetube solution



CLEAVER-BROOKS CLASSIC FIRETUBE LINE

Of course, Cleaver-Brooks continues to manufacture traditional firetube boilers in a number of popular styles and sizes, including the CBLE, 4WI, ICB, CBL, 4WG and Ohio Special. These boilers, while not incorporating EX technology, are still held to the exacting standards we apply to all our products.



CBLE

Classic dryback firetube with integral burner

125–800 HP
7 ppm – 60 ppm NOx

4WI

Classic wetback firetube with integral burner

100–800 HP
7 ppm – 60 ppm NOx



Full Classic Line					
CBLE	4WI	4WG	CBL	Ohio Special	
Classic dryback firetube with integral burner	Classic wetback firetube with integral burner	Classic wetback firetube with packaged burner	Large capacity wetback with packaged burner	Wetback and dryback models available with integral or packaged burner	
125–800 HP	100–800 HP	100–800 HP	900–1,800 HP	100–225 HP (wetback)	260 HP (dryback)
7 ppm – 60 ppm	7 ppm – 60 ppm	9 ppm – uncontrolled	9 ppm – uncontrolled	uncontrolled	30 ppm

FLEXIBLE WATERTUBE

1.5 to 25.0 MMBTU



The FLX Watertube is available to less than 9 ppm NOx. It features a non-welded tube attachment for easier tube replacement. The package includes a ProFire® burner for a completely integrated and engineered solution from a single source. Removable, sectioned side panel design permits full access to all tubes. The FLX boiler is also available with a Premix burner option for both steam and hot water applications.

ELECTRIC AND ELECTRODE BOILERS

12 kW to 56 MW

Cleaver-Brooks Electric and Electrode Boilers are designed for commercial processes to heavy-duty industrial uses. They serve as either a primary or supplementary source of both steam and hot water. The immersion-element electric boilers and high-voltage, jet-type electrode boilers are up to 99.9% efficient, quiet, flame-free, safe and emissions-free.

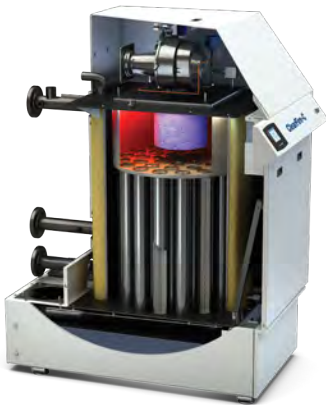
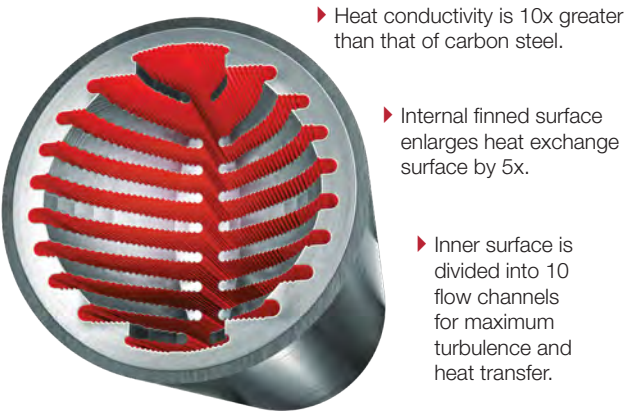


CLEARFIRE® HYDRONIC AND STEAM BOILERS

Cleaver-Brooks line of ClearFire boilers offers a completely integrated solution with heat exchanger, premix burner and energy management controls. The ClearFire line of boilers includes hydronic models available from 500 to 12,000 MBTU for both condensing and non-condensing systems, and 10 to 60 HP steam boilers to fit almost any application.

DESIGN ADVANCEMENT ONE: ALUFER® Firetubes

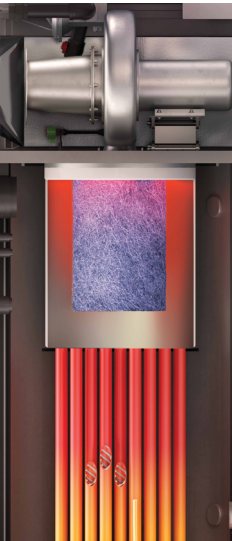
Our patented ALUFER firetubes are constructed from an inner (fireside) aluminum alloy-finned surface, die-fitted within an outer duplex stainless steel (condensing) or steel (steam and near-condensing), providing exceptional heat exchange characteristics. The corrosion-resistant properties of the ALUFER firetube assure long life and reliability of the boiler.



DESIGN ADVANCEMENT TWO: Heat Exchanger

Every aspect of the true counterflow firetube design is engineered to ensure the maximum efficiency and robust construction for reliability and longevity.

DESIGN ADVANCEMENT THREE: Modulating Premix Burner



The Modulating Premix Burner and linkageless control automatically adjust the air/gas mixture for low emissions and optimum turndown. A symmetrical, 360° even-temperature heat output is achieved from the burner, providing clean combustion with ultra-low NOx emissions of less than 20 ppm as standard and capabilities to less than 9 ppm.

DESIGN ADVANCEMENT FOUR: Integrated Falcon Control

The Cleaver-Brooks Falcon boiler/burner management control with integrated lead/lag optimizes the boiler room's operational efficiency, while delivering precise temperature control to meet heating demands.

The core of the system is an intuitive operator interface, featuring integrated burner sequencing, trending, flame safety, modulation, diagnostics and lockout, ensuring your boiler system operates reliably and at peak efficiency. Falcon control enables communication to facility energy management systems.



ClearFire®-LC 8,000 to 12,000 MBTU less than 9 ppm NOx

Along with the ALUFER® tubes, the ClearFire-LC combines our exclusive spiral tube design featured in our proven EX technology to deliver the highest-capacity condensing boiler available. Bringing these proven technologies into a large-capacity counter-flow arrangement, along with unmatched heating surface per BTU, allows you to use fewer boilers to meet an applications capacity.

CONDENSING HYDRONIC

ClearFire®-CE 500 to 6,000 MBTU

The ClearFire-CE is a compact, high-mass firetube boiler, ideal for use in primary-variable-flow systems. It features dual returns, enabling maximum operating efficiencies in a variety of system applications. The patented Alufer(R) tube design, along with industry-leading burner technology and intelligent controls help the CFC-E boiler achieve up to 99% efficiency.

FULLY CONDENSING



ClearFire®-H and -CBT 10 to 60 HP

The same top-of-class efficiency as the ClearFire hydronic models, but in a compact steam boiler package. Our patented ALUFER heat transfer technology and water-cooled design eliminate classic refractory. Engineered to perform in a wide array of applications.

STEAM



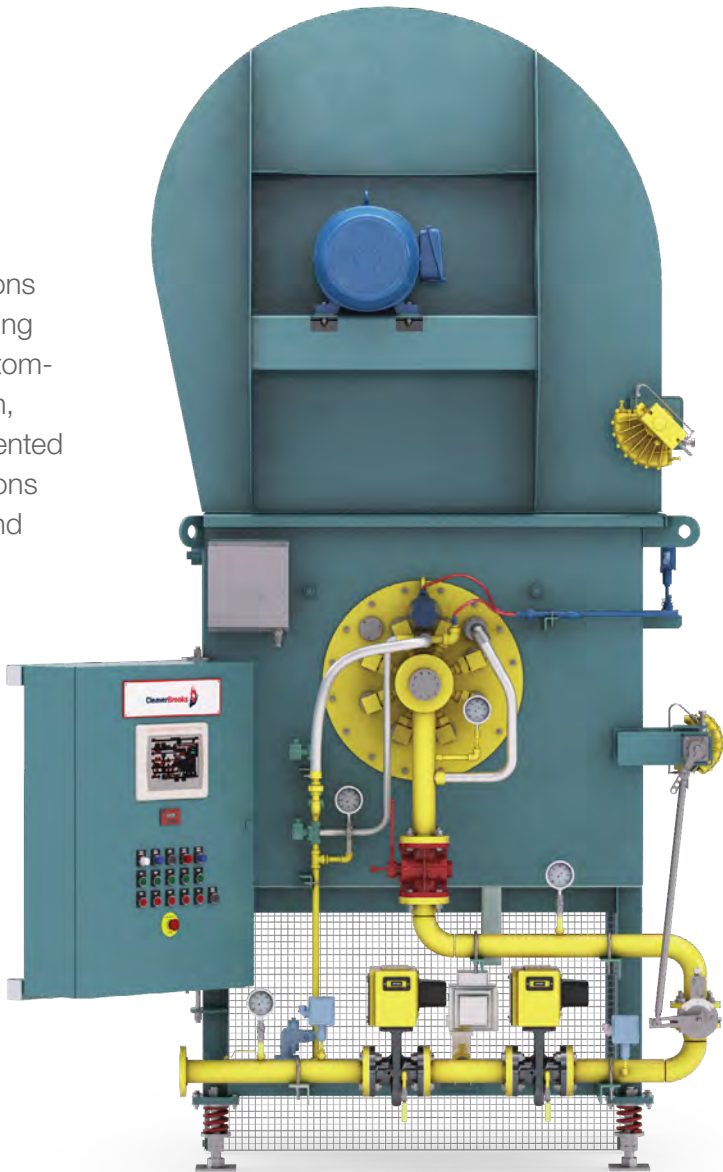
BURNERS

With a range of burners for virtually any system, the Cleaver-Brooks burner is the benchmark of the industry. Ultra-low NOx, CO, VOC and PM emissions are easily obtainable with the correct burner match. Our commitment to engineering the finest, most durable components provides a robust burner built to exacting specifications and unmatched fit and finish. With an engineering audit, we can determine an appropriate burner retrofit to improve the efficiency and emissions of your current system.

NATCOM Industrial Burners 10 to 600 MMBTU

The world's highest-efficiency, lowest-emissions burner, available to less than 7 ppm NOx. Using Computational Fluid Dynamics (CFD) we custom-design burners for each furnace configuration, ensuring seamless integration and unprecedented performance. Single or multiple fuel applications available for Industrial Watertube, Firetube, and Packaged boilers.

- Burner Accessories**
- Fuel Trains
 - Windboxes
 - Fans and Dampers
 - Burner Management Systems (BMS)
 - Combustion Control Systems (CCS)



Custom Burners
for industrial, petrochemical and oil sands markets.

Specialty Burner Systems
for special process applications, including alternative fuel firing.

Utility Burners
for large, field-erected utility boilers.

Duct Burners
for cogeneration and combined cycle applications.

ProFire® Commercial and Industrial Burners 1.3 to 180 MMBTU

Cleaver-Brooks comprehensive line of burners ensures that we have a burner for any application, industry or need. ProFire burners are available in either low or ultra-low emissions, and are available to less than 9 ppm NOx.

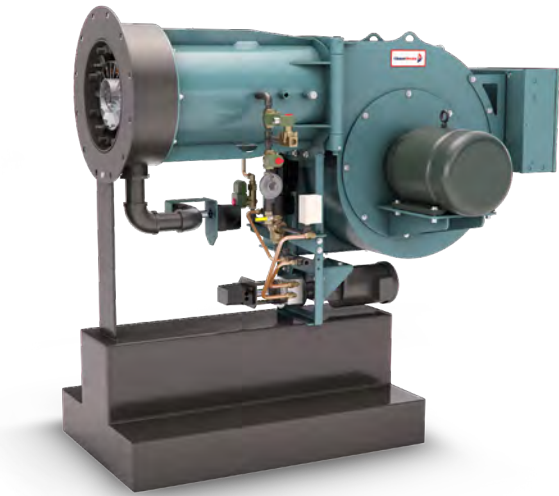


MTH-Series
8.4 to 42.0 MMBTU
Designed for process heating applications; achieves low NOx without FGR.



V-Series
1.3 to 16.8 MMBTU
Commercial boiler burners with uncontrolled or low-NOx.

XL-Series
33.6 to 180 MMBTU
Large-capacity burners with uncontrolled, low-NOx or ultra-low-NOx.



E-Series
2.5 to 63.0 MMBTU
Cutting-edge technology that features uncontrolled, low-NOx, or ultra-low-NOx.





CONTROLS

The brains of any integrated boiler system is the control, and without it, you simply aren't getting the most efficient performance out of your boiler room. Cleaver-Brooks completely integrates controls into the boiler systems for the absolute highest efficiency, but virtually any system can benefit from the addition of a control. Retrofit your existing boiler system with the latest control technology to increase efficiency for reduced energy usage and the lowest achievable emissions.

HAWK CONTROLS

The Hawk is a state-of-the-art, integrated boiler room management system. It is designed to achieve the most efficient and economical performance from your boiler room. Also ideal for retrofit applications, it delivers reliability, safety and efficiency with a seamless, easy-to-use, human-to-machine interface.

- ▶ Parallel positioning
- ▶ O₂ trim
- ▶ Integrated variable speed drive (VSD) programming
- ▶ Linkageless connections
- ▶ Fully metered options
- ▶ Multiple communication protocols



HYDRONIC SYSTEM CONTROL

A PLC-based boiler sequencing and modulation control for hydronic heating applications. Works seamlessly with condensing and non-condensing boiler groups for hybrid applications using independent PID loop control to optimize boiler operation based on unique characteristics of each boiler group.



LEVELMASTER

Water level controls are critical to the safety of your system. The user-friendly interface allows for easy management of low-water cutoff and pump control, and helps make this control the safest available on the market today.

WATER SYSTEMS CONTROLS

Engineered to work seamlessly with other Cleaver-Brooks boiler system controls, our packaged water controls monitor and manage all your system's water-related touch points, including pumps and levels.

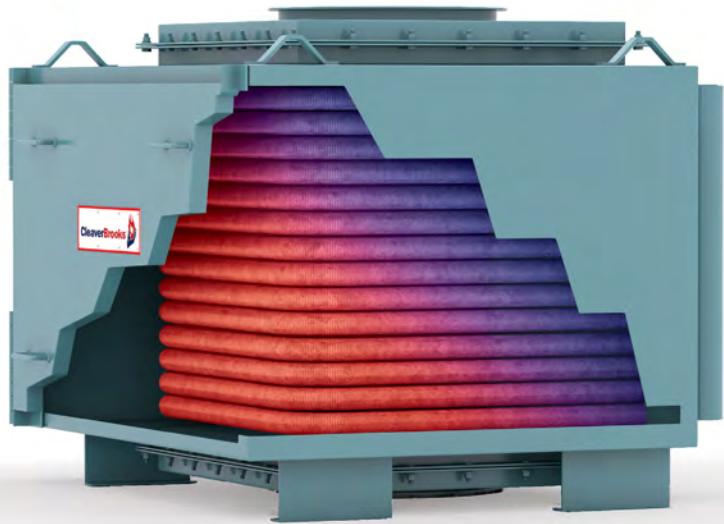


HEAT RECOVERY

Make sure you're not letting any excess energy go to waste with a heat recovery system for your boiler room. Available for steam or hot water applications, heat recovery captures waste heat and can redirect it to preheat boiler feedwater or other water needs, saving fuel costs.

STACK ECONOMIZER

Whether you choose the CRE Rectangular Economizer or the CCE Cylindrical Economizer, you can reduce fuel use and cost by recovering heat from flue gases that would otherwise be wasted. Utilize the heated flue gas to preheat boiler feed water, makeup water or any process flow. The large number of standard models provide dimensional combinations that work in applications with space constraints, while still achieving maximum heat recovery.



TWO-STAGE CONDENSING ECONOMIZER

Save energy dollars and reduce your environmental impact with a two-stage condensing economizer that can raise your fuel-to-steam efficiency up to 90%. The lower section recovers energy by preheating the boiler feedwater. The upper section preheats virtually any cool liquid stream (makeup water, process water, etc.). The upper coil, lower coil, modulating valves, control system and other system components are sized as a system to deliver the maximum possible cost savings.

C2X-HE ECONOMIZER

New technology exclusive to Cleaver-Brooks enables the C2X-HE to be the first two-stage condensing economizer in the industry to achieve up to 94% efficiency. It is smaller and lighter than current two-stage economizer models and is ideal for high-percentage makeup water or process hot water applications.

Additional Products

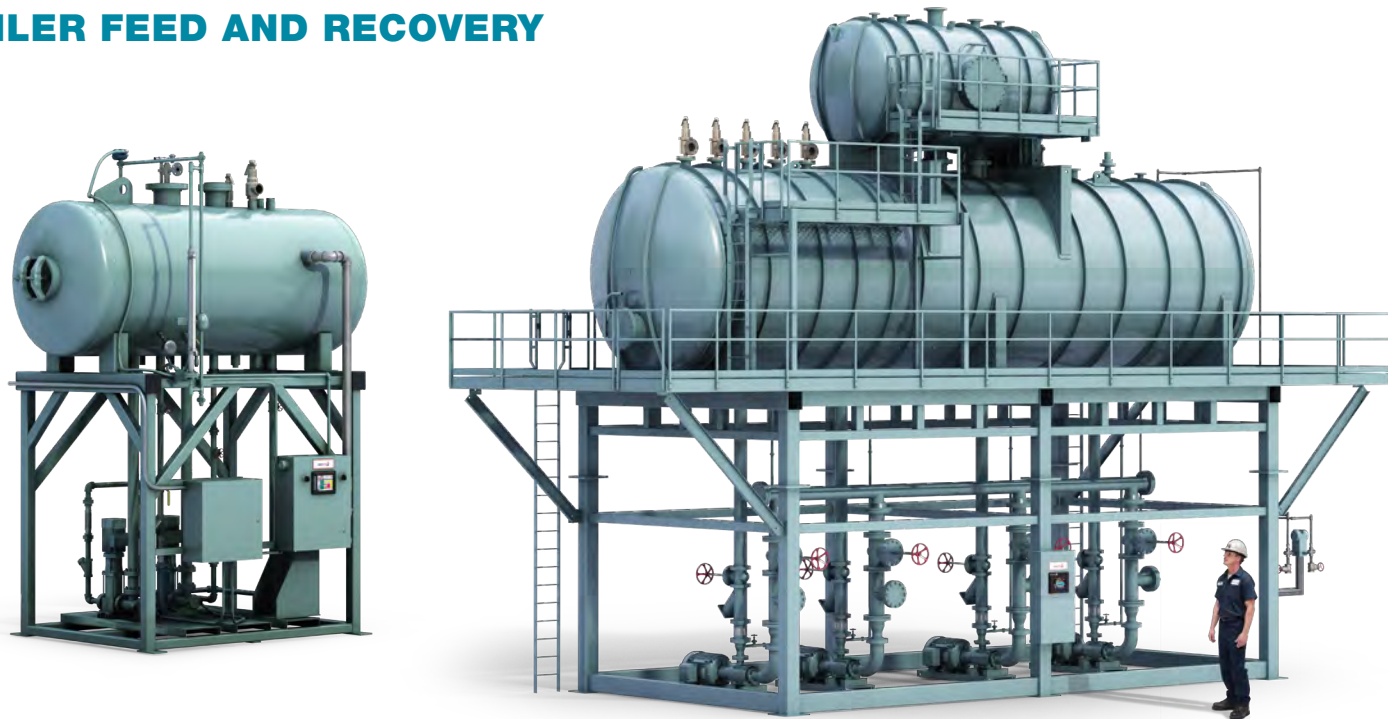
- Blowdown Heat Recovery Systems
- Flash Tank Heat Exchangers



WATER SYSTEMS

Increase the safety, reliability and life of your system with deaerators, surge tanks, feedwater systems and water treatment that can integrate into any system, regardless of size or application.

BOILER FEED AND RECOVERY



DEAERATORS

Our pressurized, low-maintenance systems are designed to remove dissolved oxygen in boiler feedwater and eliminate carbon dioxide. Our deaerators have flexible designs in tray, column and spray tanks styles with vertical and horizontal configurations up to 1,050,000 lb/hr.

DUO TANKS

A deaerator and surge tank combined in several possible arrangements to provide a complete engineered and packaged system. Reduce dissolved oxygen content and carbon dioxide before they have a chance to corrode metal or condensate lines, and save significantly on chemicals and wasted BTUs. The surge tank is utilized to reduce water usage and water treatment costs by recycling condensate that has already been treated.

WATER PRE-TREATMENT

Prevent scale buildup on heat transfer surfaces, help maintain peak boiler efficiency and reduce the need for chemical treatment to control scale. With appropriate water treatment, you can dramatically increase the life of your boiler and maintain its peak efficiency.

Additional Products

Boiler Feed Systems, Surge Tanks, Water Softeners, Reverse Osmosis, Blowdown Separators, Chemical Feed Systems, Sample Coolers



EXHAUST SOLUTIONS

With a full line of chimneys, grease duct and gas venting products that fit our condensing boilers, packaged hot water boilers and steam boilers, Cleaver-Brooks has exhaust solutions for virtually every application. We engineer and produce our exhaust systems to exacting standards quickly and efficiently. Our response times to requests for quotes and plans for standard products are quick and our responses are clear and complete. Our highly automated fabrication leads the industry with its high standard of quality.



- ▶ Exclusive, male/female jointing system reduces installation time and increases structural strength
- ▶ Laser welding
- ▶ Stainless steel and aluminized steel material
- ▶ Full range of accessories

BOILER EXHAUST SYSTEMS

Vent flue gases from gas, liquid and oil-fired boilers with our CBI insulated breeching and stack system. Available from 6 inches to 48 inches, the CBI is ideal for industrial, institutional and commercial applications.

CHIMNEY LINERS

Our CBI and CBH single-wall chimney liner systems are available for use in masonry chimneys to vent Category I, II, III and IV gas- and oil-fired appliances.

SPECIAL GAS VENTS

Our CBH family of special gas vents is well suited for industrial, institutional, and commercial applications. This product is also designed for condensing boiler applications. UL certified Inner wall material available in both AL29-4C and a more economical 316SS.

FREESTANDING STACKS

The best freestanding stacks in the industry, our CBS stacks feature the latest engineering and technology in combustion gas venting. Designed and manufactured to both American and Canadian standard requirements.

- ▶ Factory welded
- ▶ Carbon steel, COR-TEN® steel or stainless steel
- ▶ High-temperature insulation
- ▶ Multiple accessories available upon request



Selective Catalytic Reduction (SCR)

SCR is a proven technology to further reduce NOx emissions on boilers and HRSG systems, achieving up to 95% reduction. Integration of a Cleaver-Brooks burner and SCR will provide operational flexibility, highest efficiency and lowest emissions for any boiler design. Cleaver-Brooks has the expertise and experience to meet your needs.

- 1

Controls
A single integrated system that controls the boiler, burner and SCR. Control the entire system from one simple-to-use HMI.
- 3

Ammonia metering and dilution skid
Three types of ammonia systems available:
 - Anhydrous Ammonia (NH₃)
 - Aqueous Ammonia (NH₃+H₂O)
 - Urea (NH₂)₂CO
- 4

Ammonia injection grid (AIG) and flow conditioning devices
Boiler outlet transition redesigned for best distribution. The AIG is strategically located for proper ammonia injection into the flue gas stream.
- 5

Catalyst reactor
Ammonia mixes with flue gas in the reactor, resulting in a uniform distribution at the inlet of the catalyst bed and thus optimizing its performance. For each application, the catalyst bed geometry is optimized. The highest-quality corrugated catalyst is used with vanadium, titanium or tungsten oxides as active agents.
- 6

Heat recovery
A custom heat recovery system allows flue gas temperatures to be optimized, resulting in the most effective reduction of NOx emissions. Recovering the waste heat of the flue gas with an economizer increases the efficiency of the boiler.
- 7

Structure, platforms, ladders and piping
Complete engineering of all ancillary walkways, structures, etc., is included in our comprehensive integration.
- 8

Exhaust systems
An exhaust system designed specifically for your system, with both installation-ready and freestanding stacks available.



DECADES OF EXPERIENCE

By Application

- Building Heat
- Process Steam
- Industrial Process
- Sterilization
- Humidification
- Waste Heat Recovery

By Market

- Alternative Energy:
 - Ethanol
 - Biodiesel
- Beverage
- Chemical/
Pharmaceutical
- Commercial and
Office Units
- Dairy
- Education:
 - Universities
 - Primary
 - Secondary

Food Processing

Forest Products

Government

Healthcare/Hospital

Institutions

Laundry/Dry Cleaning

Manufacturing

Metal Plating

Petrochemical/Oil Sands

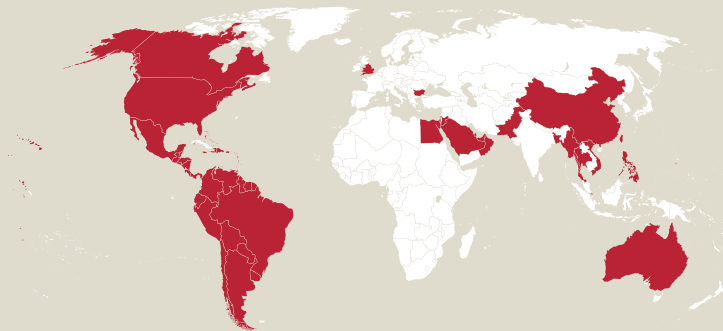
Power/Utility

Rubber/Fiber

Industry-Leading Network



The Cleaver-Brooks Representatives Association (CBRA) is the first and only dedicated alliance of boiler room sales and service representatives in the industry. More than 1,500 CBRA representatives across the globe provide unparalleled, ongoing support — from commissioning your system, to providing genuine parts and turnkey after-sale solutions, to extensive product training and knowledge sharing.



Cleaver-Brooks is the only boiler manufacturer with worldwide representation. Visit cleaverbrooks.com to find your nearest representative.

CORPORATE AND MANUFACTURING LOCATIONS

Corporate Headquarters

221 Law Street
Thomasville, GA 31792
800-250-5883
229-226-3024

Sales Support

11950 West Lake Park Drive
Milwaukee, WI 53224
414-359-0600

Product Development

Cleaver-Brooks Boiler House
3232 W. Lancaster Avenue
Milwaukee, WI 53209

Parts Distribution Center

**221 Law Street
Thomasville, GA 31792
229-226-3024**

Products and Services
Genuine Replacement Parts
Specialty Parts
Spare Parts Lists
Upgrades and Retrofits

Packaged Boiler Systems

**221 Law Street
Thomasville, GA 31792
229-226-3024**

Products
Firetube Boilers
Electric and Electrode Boilers
Integrated Controls

Packaged Burner Systems

**351 21st Street
Monroe, WI 53566
608-325-3141**

Products
Commercial Burners
Industrial Burners

Engineered Boiler Systems

**6940 Cornhusker Highway
Lincoln, NE 68507
402-434-2000**

Products
Industrial Watertubes
Heat Recovery Steam Generators
Waste Heat Boilers

**161 Lorne Avenue W
Stratford, Ontario
Canada N5A 6S4
519-271-9220**

Products
Commercial Boilers
Hydronic Boilers
Flextube® Boilers
Boiler Feed and Recovery
Water Treatment
Heat Recovery

Exhaust Solutions

**545 Fernand-Poitras
Terrebonne, Quebec
Canada J6Y 1Y5
450-625-6060**

Products
Chimneys
Stacks
Venting

**545 Fernand-Poitras
Terrebonne, Quebec
Canada J6Y 1Y5
514-326-2571**

Products
Industrial Burners
Industrial Controls
NATCOM Burners

**Poniente 148 No. 973
Col. Industrial Vallejo
02300 D.F. Mexico
001-52-555-567-3166**

Product
Firetube Boilers

China Manufacturing

**Changshu City
W4-1, Logos Industrial Park,
Tong Zha Road
Changshu Economic &
Technological Development Zone
Changshu City,
Jiangsu Province, P.R. China
+86 512 52988002**

China Sales

**Beijing
Rm.1110, Kuntai International Mansion
No.12 Chaowai Street
Chaoyang District, Beijing 100020
+86 010 58790970**

**Shanghai
12A11, No. 333 Xianxia Road
Changning district,
Shanghai, PRC**

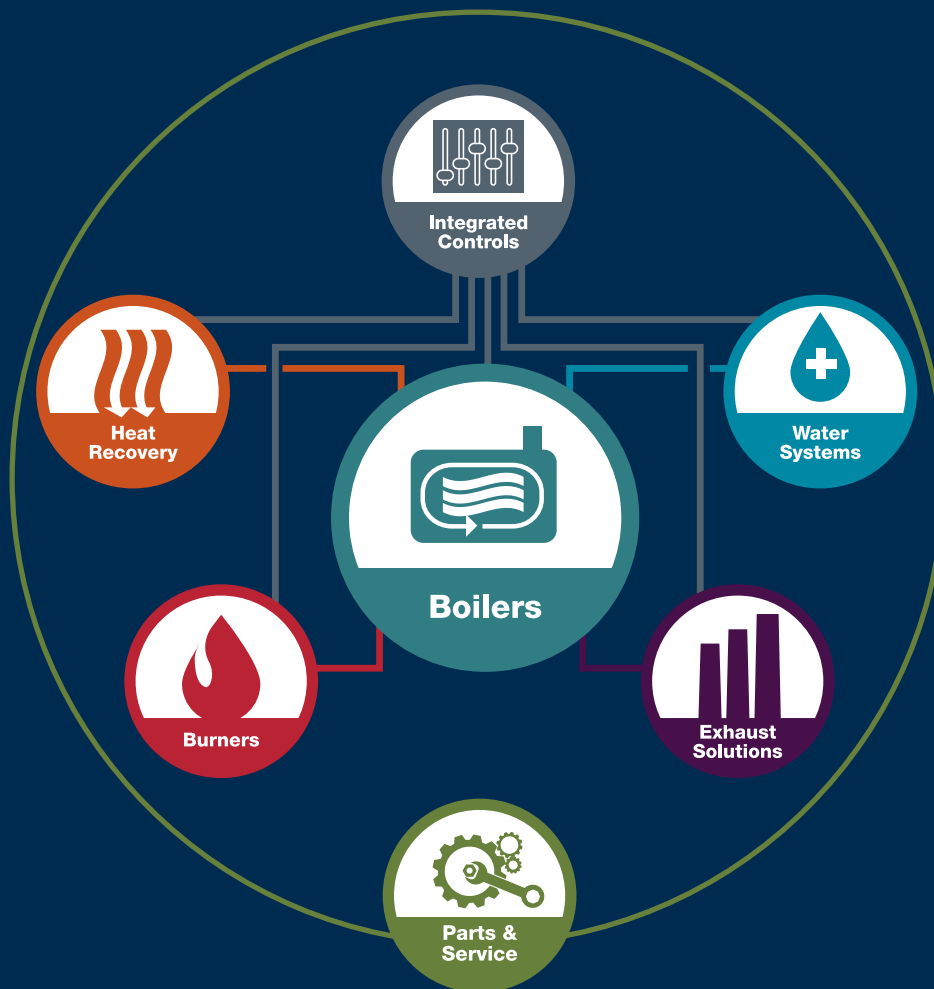
COMPANY AFFILIATIONS

American Boiler Manufacturers Association

Council of Industrial Boiler Owners

Air-Conditioning, Heating, and Refrigeration Institute

Energy Solutions Center



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info@cleaverbrooks.com • cleaverbrooks.com