

HIGH-EFFICIENCY STEAM SOLUTIONS

Cutting-Edge Technology



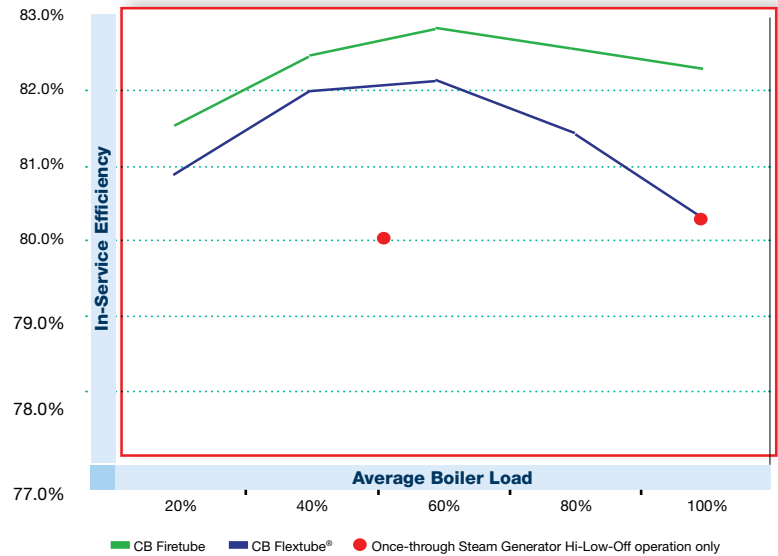
Best System Operating Efficiency on the Market

TRULY THE BEST SYSTEM OPERATING EFFICIENCY ON THE MARKET

Fuel-to-steam efficiency is important, but it does not take into account on/off cycling, purge losses, and other system variables. What really matters is system operating efficiency—the amount of fuel you have to use to produce the needed steam. Some refer to this as “in service” efficiency, but don’t define it.



System Operating Efficiency with Standard Economizer
250 HP, 125 lbs Steam, Gas Firing



In-service efficiency calculations are based on normal industry practices. Efficiencies for specific applications may vary, depending on boiler-burner design and how it is applied to meet the load profile.

Integration

When designing boiler systems, Cleaver-Brooks engineers design the heat exchanger, burner and controls to work together so you can be sure you are attaining the highest system operating efficiencies and lowest emissions possible, whether ClearFire®, Firtube, or Watertube.

The Key to Fuel Reduction Starts with the Best Heat Exchanger

The core heat transfer technology used in the ClearFire boiler is our patented AluFer® tube. The tube is constructed from an inner (fireside) aluminum alloy finned surface, die-fitted within an outer carbon steel tube, providing exceptional heat exchange characteristics.

Our exclusive extended surface spiral tube design, offered on select firtube models, allows us to optimize the fuel to steam efficiency up to 85% compared to a traditional bare tube. For our Flextube boilers, 5 gas passes are standard for effective heating surface without the use of baffles or non-working heat transfer surfaces.

Quick Steam

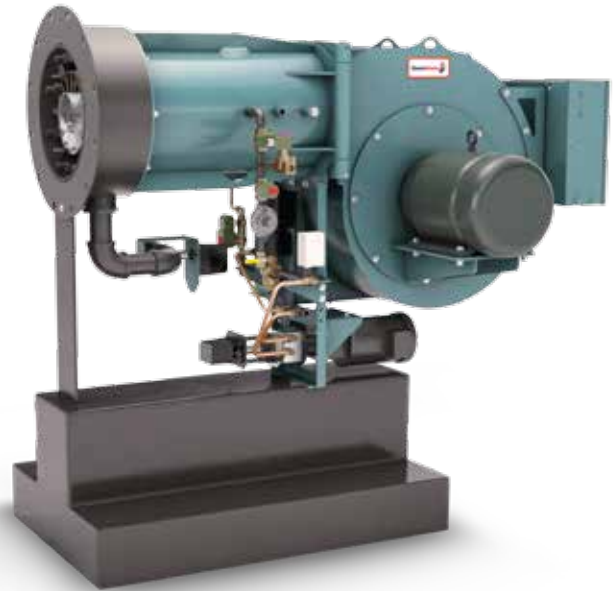
Boiler manufacturers often talk about their products’ ability to produce “quick steam in five minutes.” Our flextube boilers are steaming in four minutes, but most steam systems beyond the boiler connection cannot handle steam flow that quickly. To prevent dangerous water hammer, a typical safe warm-up time for a cold steam system is 1 psi per minute.

Some applications do require steam quickly, while others have load swings that require additional steam at just the right moment. Just having quick steam may not be the answer—frequently, steam capacity or turndown is really what is desired.

High Turndown and Full Modulation

From our watertube to our firetube boilers, the boilers we build have integrated Cleaver-Brooks burners that are fully modulating with high turndown. Other manufacturers may tell you that you don't need turndown, but the fact is that every steam application benefits from it.

- Fully modulating burners allow only the steam you need to be produced, reducing cycling and purging losses.
- A 100 HP boiler with up to 10:1 turndown can operate down to 10 HP, while still maintaining high efficiency.
- Some boiler manufacturers with “on-off” burner control try to approximate modulation and high turndown, but we have the built-in intelligence to operate optimally throughout the entire operating range for ultimate system operating efficiency.



Intelligent, Integrated Controls

Hawk PLC

The Hawk is one of the most flexible control systems available in the industry. Control options provide easy access to information to the end user's Building Automation System, C-B SCADA and other remote monitoring systems. The Hawk has the ability to monitor and control multiple aspects of the boiler such as fuel usage, and hours of use, O₂ levels, stack temperature, lead/lag sequencing, boiler efficiency, water level, temperature/pressure, hot standby, combustion control and more.



The Hawk's user-friendly interface has robust local HMI trending and data trending, up to 300,000 points, allowing the operator to continually tune the system for optimal performance. You can be alerted by e-mail, text messaging, internal network, or Internet of boiler status and alarms, and this same data can be shared with mobile devices.

Falcon

The Cleaver-Brooks Falcon is a proven boiler/burner management control that is standard on ClearFire boilers, provides an intuitive operator interface featuring integrated burner sequencing, trending, flame safety, modulation, alarms, lockout, and much more, ensuring your boiler system operates at peak efficiency, while providing necessary safety and reliability.

With integrated lead/lag control of up to 8 boilers, the Falcon optimizes the boiler room's operational efficiency while delivering precise temperature control to meet heating demands. The Cleaver-Brooks Falcon can communicate with your building's Energy Management System (EMS), which helps maximize overall system efficiency and simplifies installation and operation.



THE MOST COMPLETE RANGE OF CUTTING EDGE,

Cleaver-Brooks offers the most comprehensive line of cutting-edge steam boilers on the market, with single type of boiler is right for every application. Every application is unique, with its own unique requirements.

**Cleaver-Brooks ClearFire®
Steam Boilers'** compact,
single-pass firetube design
meets the demands of smaller
facilities.

10 - 60 HP



**Cleaver-Brooks Flextube®
Watertube Boilers'** compact,
quick response.

36 - 600 HP



**Cleaver-Brooks wide range of
Firetube Boiler designs** have
long been the workhorse
boiler system of choice.

10 - 2200 HP



HIGH-EFFICIENCY STEAM SOLUTIONS.

the flexibility to develop a solution that maximizes efficiency and lowers life cycle cost. Obviously, no requirements. So Cleaver-Brooks makes the widest range of boilers, to provide the right solution every time.

ClearFire® steam boilers utilize a premix burner and patented AluFer tubes for optimum heat transfer. Combined with integrated operating controls, the package achieves the highest possible operating efficiencies, minimizing fuel operating costs and delivers NOx emissions to 9 ppm. Add an economizer to gain 3-4% boiler efficiency.

- The most fuel-efficient boilers in the industry
- Low emissions come standard
- A boiler quieter than most washing machines—less than 70 dB
- Sealed combustion eliminates need for dedicated boiler room, varies by code
- Integrated lead/lag capability, up to 8 boilers
- Designed for easy access for maintenance

Versatility marks the Model FLX boiler providing steam solutions from 1,200 PPH to 20,000 PPH or hot water solutions from 1.2 to 25.0 MMBTU/hr. With fuel firing on natural gas, propane, digester/bio-gas, or light fuel oil, the package can be online within minutes from a cold start. The FLX can be delivered as a factory-built package ready for installation, or as a field erect package to replace difficult boiler room access projects and replace aging inefficient boilers.

- Fully modulating, up to 10:1 high turndown.
- Very compact design requiring about half the floor space of a traditional firetube
- The Hawk 1000 control comes standard on 300-600 HP
- Higher in-service efficiency than once-through watertube boilers
- Field-erectable. No welding of tubes to drum attachment
- Dry quality steam at 99.5%

The wide range of firetube boiler models allow design flexibility for your steam application. Our advanced firetube boilers can be steaming in 15 minutes and have 10 times the steam capacity of smaller modular boilers. Make sure you have the steam capacity you need, when you need it.

- The most technologically advanced firetubes on the market, with superior heat transfer technology
- Fully modulating, high turndown, integral burner
- Large steam capacity allows rapid response to load swings
- Advanced firetube designs reduce footprint by 25%
- Highest in-service efficiency of any type boiler; optimized firetubes reach efficiencies of close to 90% with optional condensing economizer.

Stack Economizer

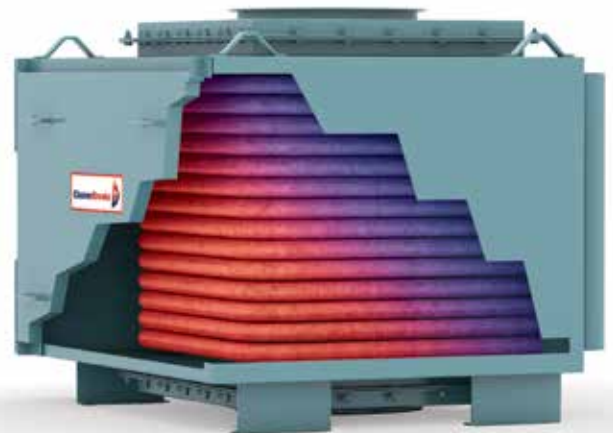
Designed to reduce fuel use and costs by recovering heat from the boiler flue gases, which would otherwise be wasted, to preheat boiler feedwater. Cleaver-Brooks economizers are easily integrated to fit your boiler system, and each is built to our high-quality standards. Multiple economizer design options offer application flexibility, from standard to condensing.

CRE Economizer

The CRE rectangular non-condensing economizer can be utilized on boilers up to 2,200 HP for boiler feedwater, makeup water, hot water, or process applications. Multiple size options are available to optimize space constraints while maximizing heat recovery.

CRE Features:

- Individually removable finned tubes for easy maintenance and tube replacement
- Mounting during installation requires no pressure vessel welds within the shell
- Hinged stainless steel access doors
- Stainless steel internal exhaust gas bypass
- Accommodates all boiler design pressures
- Built-in bypass damper for flue gas temperature control
- ASME “UM” stamp standard, “U” stamp or “CRN” stamp are optional



CRE Economizer

CCE Economizer

The CCE cylindrical non-condensing economizer can be utilized on boilers up to 250 HP for boiler feedwater, makeup water, hot water, or process water applications. Compact/lightweight design fits space constraints while maximizing heat recovery.

CCE Features:

- Compact and lightweight
- High-performance BTU recovery
- Hinged stainless steel access doors
- Stainless steel internal exhaust gas bypass
- ASME construction ensures high-quality design and manufacturing standards



CCE Economizer

Don't Let Water Quality Shut You Down

We recommend your boiler system water supply always be properly treated and Cleaver-Brooks has the equipment you need to keep your system running at peak efficiency. From deaerators to chemical feed systems, water softeners to custom filtration systems, our products are designed to integrate into any steam system.



*Deaerators
From 5,000 to 1,000,000 lbs/hr*



Chemical Feed System



Water Softeners

Single Source Skid Package Solutions

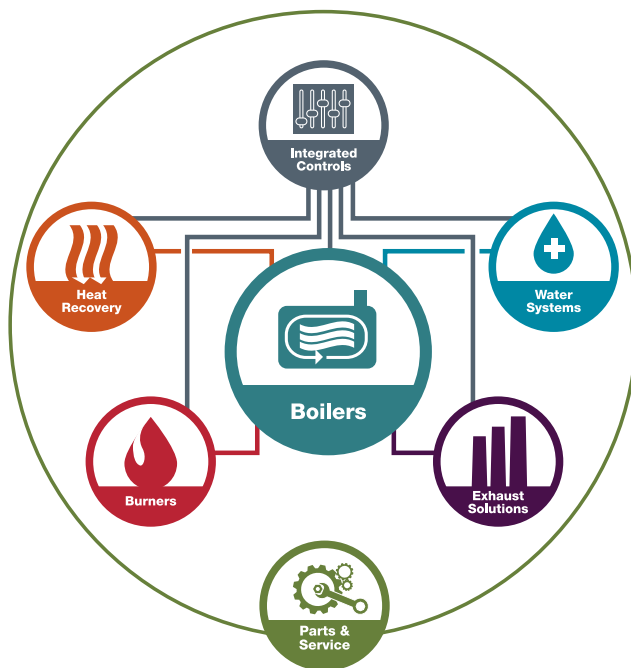
Turn-key steam solution

Cleaver-Brooks offers standard and complete steam boiler system skid-mounted packages in gas and propane fuels. The package includes the steam boiler, feed system, and blowdown separator with optional chemical feed system and water softener. This complete package saves you time installing the system as all that is required is a single-power, gas, steam, and water connection.

Features:

- Single Source Responsibility
- Plug and Play, reduced installation cost
- Eliminate field piping and wiring errors
- Standard Skid Solutions to meet your needs
- Custom engineered systems available to meet almost any system requirement





Total Integration delivers the steam you need.

For more than 80 years, Cleaver-Brooks has built a reputation for innovation in the boiler-solutions industry. We remain committed to introducing technology and products that enable a more energy-efficient and environmentally friendly generation of steam and hot water.

When you come to us for a fully integrated boiler system solution, you can know that each element is created to the highest standards, and all will work together seamlessly to give you a highly efficient and reliable solution for protecting your boiler system. To learn more, please call or visit us online at cleaverbrooks.com.



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