



# CE

**CLEARFIRE®**

**HIGH-MASS CONDENSING FIRETUBE BOILER  
750 TO 2,000 MBH**

# Energy Savings and Environmental Benefits

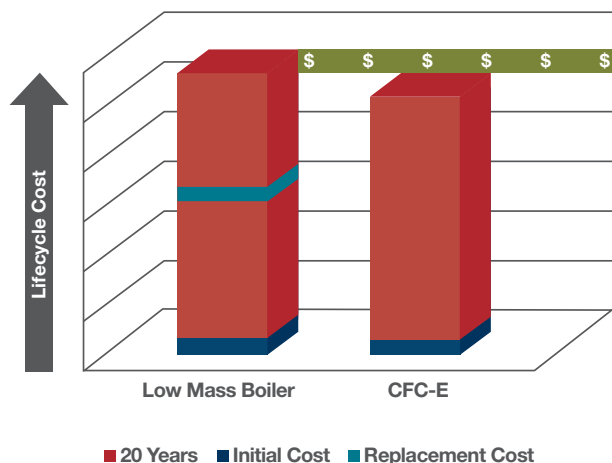
Due to its highly effective heating surface area and true counter-flow heat exchanger arrangement, the ClearFire®-CE (CFC-E) is designed to function at maximum efficiency in all operating conditions. Its self-regulating, fuel-air ratio control and ECM variable-speed combustion air blower help keep emissions, noise level and energy use to a minimum.

## Efficient, Low-Flow Tolerant Design

The high-mass, large-water-volume capacity of the ClearFire®-CE, coupled with its single-pass, robust firetube heat exchanger, enables it to tolerate low-flow occurrences and variable-flow conditions. The high-mass design also correlates to a low-waterside pressure drop, reducing pumping energy requirements and operating costs.

## Easy Operation and Maintenance

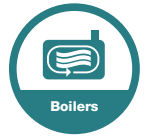
- Intelligent, integrated controls that are simple to operate
- Burner design maintains consistent fuel-air ratio with minimal tuning
- Hinge-mounted burner with gas-assist lift for easy access
- Quick fireside access for routine maintenance and inspections



## Enduring Lifespan, Minimal Cost

The ClearFire®-CE is built to last and engineered to perform in the most-efficient, energy-saving manner to keep operating and maintenance costs low. When used in condensing systems, the CFC-E delivers the lowest total cost of ownership.

# Exceptional Performance with System Engineering Flexibility



The ClearFire®-CE condensing boiler leverages the advantages of a primary-variable-flow system in a small footprint, offering system flexibility and true operational efficiency without compromise. The enhanced AluFer® firetube heat exchanger powers your heating system like never before.

We made it straightforward for you to incorporate a CFC-E condensing boiler into a retrofit design or a new construction project. There are no flow limitations to consider, and optimum efficiency can be achieved without the need to satisfy multiple-boiler design constraints.

## Engineered to Optimize System Operational Efficiency and Reliability

- Dual temperature returns increase condensing in the boiler and raise efficiency by 6%+
- High  $\Delta T$  capability boosts condensing potential and operating reliability
- Large-water-volume pressure vessel with low pressure drop eliminates flow restrictions and reduces system pumping energy
- Highly effective fireside heating surface leads to superior operating efficiencies up to 99%
- Integrated lead-lag control intelligently sequences and modulates up to eight boilers
- Duplex stainless steel construction with an industrial-base design
- Emissions less than 20 ppm NOx

## Energy Savings – Enabled for Primary-Variable-Flow Pumping

The ClearFire®-CE is a large-mass firetube boiler with a high  $\Delta T$  capability to maximize condensing potential. The CFC-E is ideal for high-efficiency, primary-variable-flow pumping systems and can withstand a wide range of flow conditions.



## Easy to Install

The ClearFire®-CE fits through a standard doorway, and the side casings can be removed easily for passage through tight-access areas. All of its components are fully integrated, pre-programmed and factory-tested for plug-and-play operation.

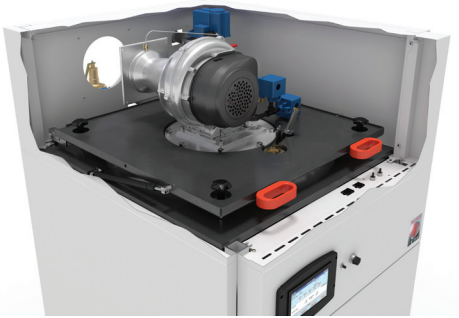


# Industry-Leading Technological Advancements

Cleaver-Brooks is known for engineering innovative boiler room solutions, and the development of the ClearFire®-CE is no exception. The high-mass, true counter-flow firetube heat exchanger is at the heart of delivering superior system operational efficiency.

## Proven Low-Emissions Premix Burner

The self-regulating, gas valve/venturi system, combined with ECM variable-speed blower technology, delivers the lowest energy consumption – true linear-modulation control with optimum turndown for hydronic systems. Standard, ultra-low emissions with premix surface combustion and high operational efficiency make the ClearFire your “greenest” solution.



## Inherent “O<sub>2</sub> Trim”

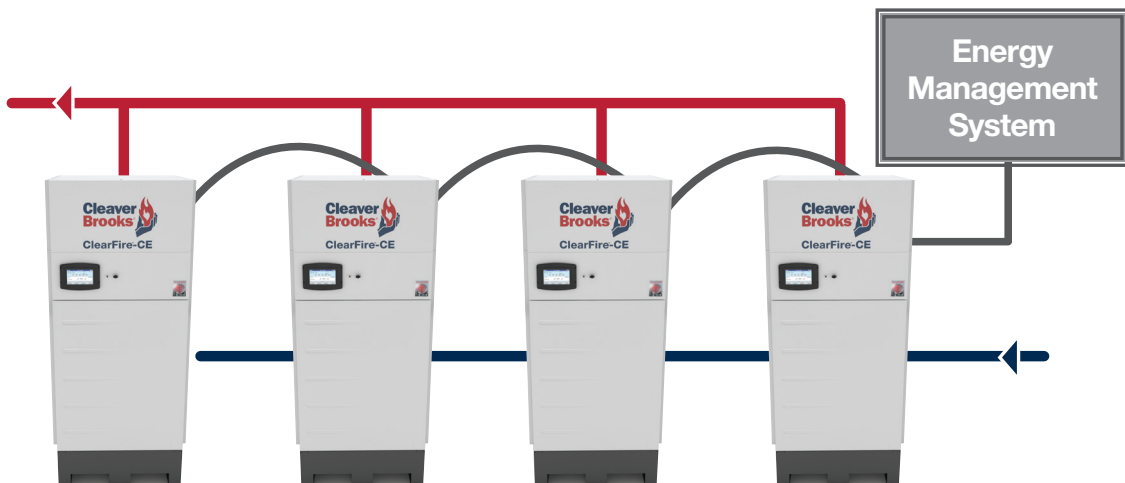
While other manufacturers add mechanical devices and controls to monitor and correct for changes in combustion performance, the ClearFire® burner achieves this through the use of a gas valve/venturi system that automatically adjusts for combustion air density changes. This results in consistent fuel-air-ratio performance without additional actuators and controls.



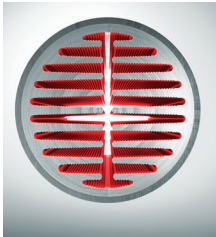
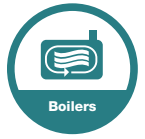
## Effective, Intelligent Control Strategies

The ClearFire®-CE features the Cleaver-Brooks Falcon control that has a built-in ability to control lead-lag, outside air reset, automatic isolation valves, primary pumps and BMS integration, enabling seamless design and functionality.

For systems requiring a more comprehensive control strategy, we offer the Hydronic System Control (HSC), engineered to handle a mixture of condensing and non-condensing boilers found in a hybrid system.



# Innovative Heat Exchanger Design Maximizes Efficiency



Patented AluFer® Tubes

## AluFer® Firetube Technology

The ClearFire®-CE utilizes the proven AluFer® firetube technology that consists of a duplex stainless steel tube die-fitted with an inner (fireside) aluminum-alloy-finned extended heating surface. This design provides unmatched heat transfer and condensing characteristics and delivers excellent corrosion resistance while keeping water treatment requirements simplified.

- Thermal conductivity is 10 times greater than stainless steel alone
- Provides maximum effective heating surface where it is needed most – on the fireside
- Heating surface area is up to five times greater than other condensing boilers

## Excellent Long-Term Durability

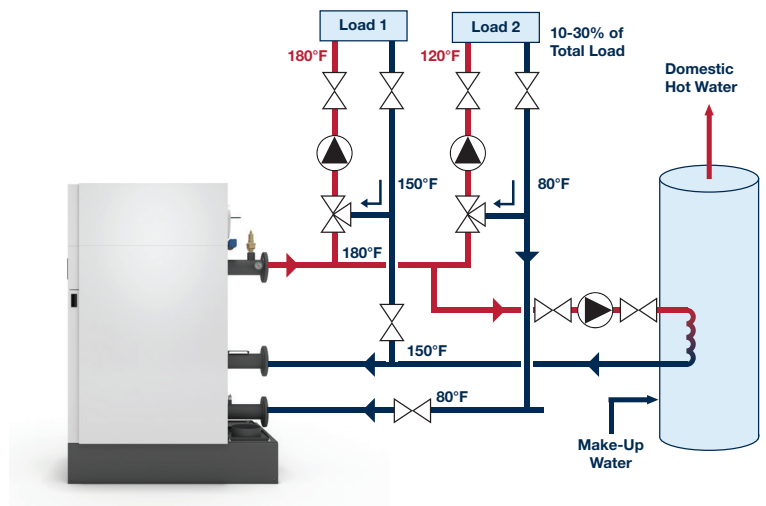
Constructed of duplex stainless steel, the ClearFire®-CE boiler performs well in hydronic systems with a variety of design temperatures. It features excellent corrosion resistance and can withstand thermal shock. With its robust heat exchanger, the CFC-E is built to last twice as long as similar designs and up four times longer than low-mass designs.

We are so confident in our ClearFire®-CE boiler that we offer superior extended, non-prorated warranties, including a 20-year warranty against thermal stress and a 10-year warranty against fireside corrosion.

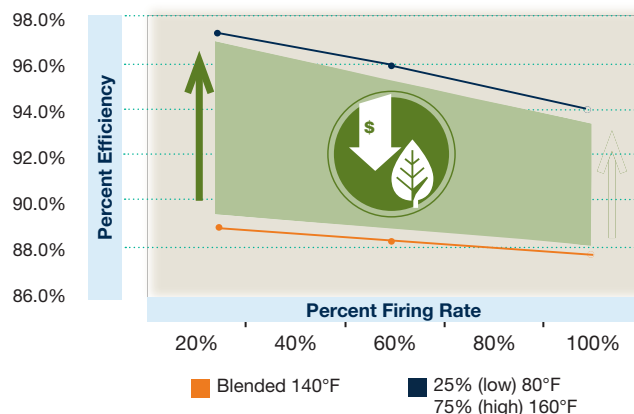
## The Dual-Return Advantage

The dual-return design of the ClearFire®-CE helps it achieve true condensing performance, even in applications with non-condensing temperature heating loops, resulting in a 6%+ increase in system efficiency.

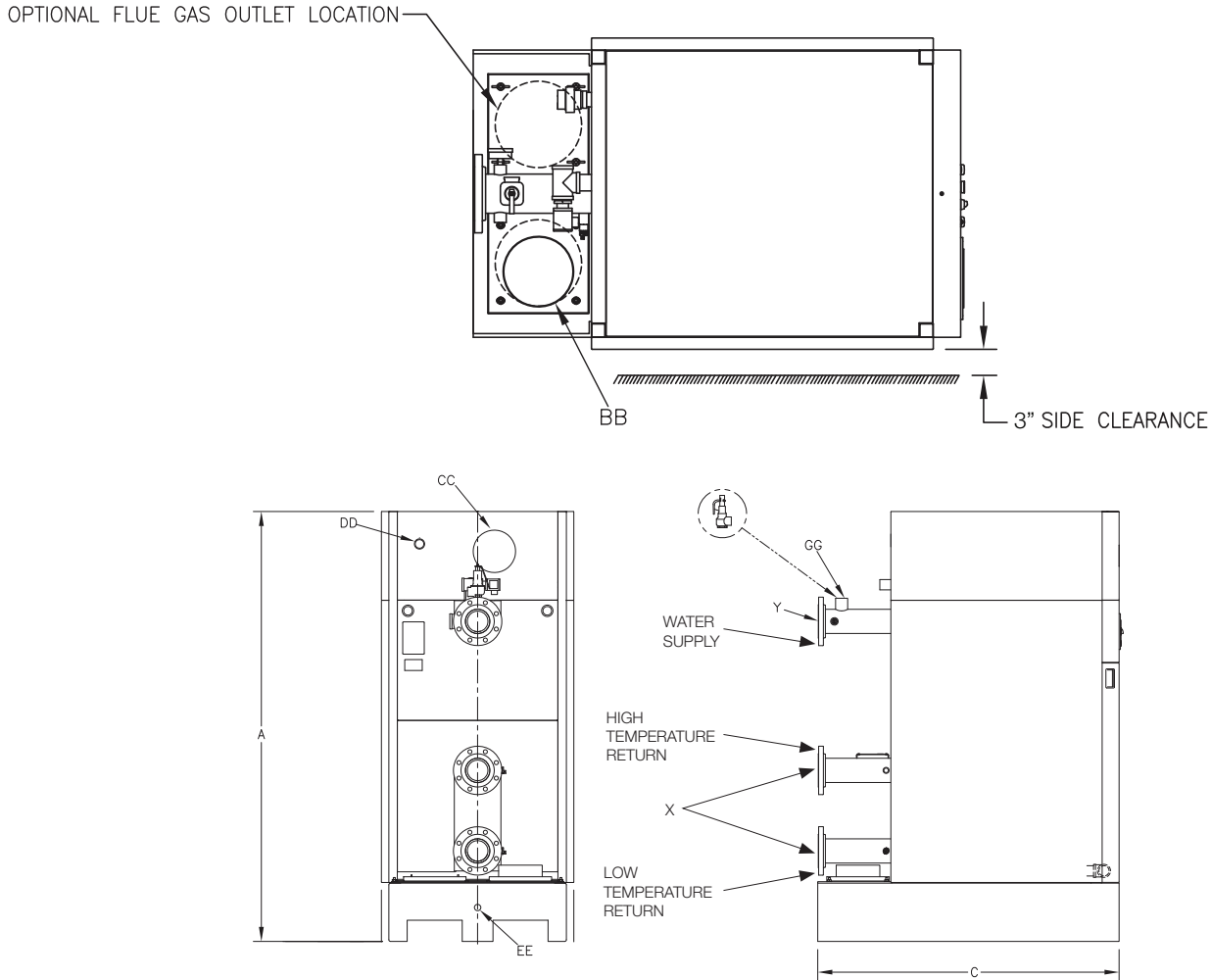
The combination of our true counter-flow heat exchanger and AluFer® firetube design allows you to connect a cold (less than 130°F) return to the lower inlet connection with as little as 10% of the flow rate and to connect a high-temperature (greater than 140°F) return to the upper inlet connection. Contrasted to systems that blend different return water temperatures prior to entering the boiler, the CFC-E's dual returns allow for condensing where it otherwise may not occur, significantly increasing overall system operational efficiency.



Dual-Return High-Efficiency as a Function of Low-Temperature Return Flow Percentage



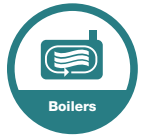
# ClearFire®-CE Boiler Dimensions and Ratings



ITEM	DIMENSIONS (inches)	CFCE-750	CFCE-1000	CFCE-1500	CFCE-2000
		Input Max. (BTU/hr)	750,000	1,000,000	1,500,000
A	Overall Height	78.0	78.0	79.9	79.9
B	Overall Width	34.9	34.9	35.8	35.8
C	Overall Depth	49.4	49.4	56.0	56.0
Q	Casing Height	67.0	67.0	68.9	68.9
CONNECTIONS (inches)					
X	Water Return, 150# RF Flg	2-1/2"	2-1/2"	4"	4"
Y	Water Supply, 150# RF Flg	2-1/2"	2-1/2"	4"	4"
BB	Flue Gas, Nominal OD	6"	6"	8"	8"
CC	Combustion Air (Direct Vent)	6"	6"	8"	8"
DD	Gas Connection, NPT	1"	1"	1-1/2"	1-1/2"
EE	Condensate Drain, FPT	1"	1"	1"	1"
GG	Relief Valve Outlet @ 160# Setting	1-1/4"	1-1/4"	1-1/4"	1-1/4"
RATINGS					
	MAWP (PSI)	125	125	125	125
	MAWT (°F)	210	210	210	210
	Weight w/o Water (Shipping) (lbs.)	1,298	1,396	1,861	2,041
	Operating Weight (lbs.)	2,096	2,136	2,746	2,816



# Options and Accessories



Cleaver-Brooks offers the following accessories for use with the CFC-E condensing boiler. Each option has been engineered to ensure ease of installation and start-up for the entire boiler system. Other options and accessories are available. Please contact your local Cleaver-Brooks representative for additional information.

## Cleaver-Brooks Exhaust Solutions



Properly designed venting is necessary for boilers to operate safely, effectively and reliably. Cleaver-Brooks Exhaust Solutions offers UL-listed venting systems made of corrosion-resistant, stainless steel alloys, specifically designed for Category IV condensing equipment. The company-engineered, installation-ready Model CBH for the ClearFire®-CE line of boilers ensures guaranteed draft performance with a given stack design. Detailed layout drawings are available for review and site coordination, as are draft calculations to support layout and sizing.

## Condensate Neutralization Kits



Cleaver-Brooks Condensate Neutralization Kits are effective at neutralizing condensate produced by condensing boilers. The condensate generated is acidic, which can damage the plumbing system and adversely impact the environment. Cleaver-Brooks offers condensate neutralizers in a tube up to 1,000 MBH or a tank up to 8,000 MBH for a variety of boiler and system capacities.

## Automatic Isolation Valves



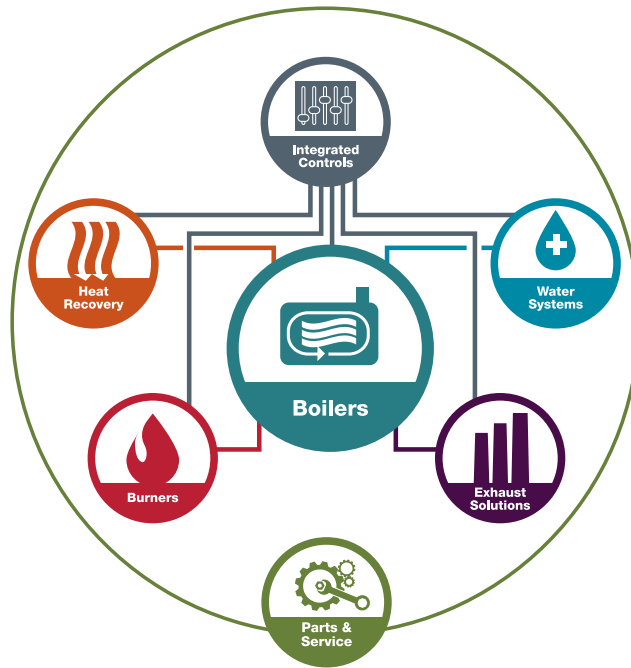
Automatic isolation valves are recommended when designing a variable-flow, primary-only pumping system to isolate idle boilers and prevent mixing in the supply header, as well as to minimize standby losses. The industrial-quality, two-way, ANSI-flange butterfly valve and electric actuator automatically isolate boilers when staged off. The boiler controller drives the automatic isolation valve.

## ProtoNode Gateway Protocol Translator



The Cleaver-Brooks multi-protocol communications gateway supports integration with a variety of BMS languages, including BACnet®, Metasys®, Modbus® and LonWorks®. The ProtoNode Gateway comes with pre-configured mapping for all Cleaver-Brooks control platforms. The Gateway can be mounted in the master boiler control panel or in a separate NEMA 1 enclosure mounted remotely.





# Providing energy-efficient, environmentally friendly boiler room solutions

Cleaver-Brooks is one of only a few boiler room solution providers in the world to operate a dedicated research and development facility. Having pioneered several industry-leading technologies, we remain just as committed today to introducing technology and products that enable a more energy-efficient and environmentally friendly generation of steam and hot water.

We distribute our products through the Cleaver-Brooks Representatives Association, or CBRA, an alliance of independently owned and operated companies that provide boiler room products and service. CBRA companies can be counted on to provide Cleaver-Brooks products and parts, engineering support, customer training, technical service and system maintenance. To find a CBRA representative near you, please visit [cleaverbrooks.com/reps](http://cleaverbrooks.com/reps).



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