



V

**CLEARFIRE®**

**HIGH EFFICIENCY, COMMERCIAL STEAM BOILER  
9.5-60 HORSEPOWER**

# HIGH EFFICIENCY, LOW EMISSIONS STEAM BOILER IN A COMPACT FOOTPRINT

The Cleaver-Brooks compact, gas-fired ClearFire<sup>®</sup>-V vertical boiler is designed specifically for the requirements of the commercial market and is available in sizes ranging from 9.5 to 60 boiler horsepower at 150 psig design pressure and 60 psig minimum operating pressure.

## ClearFire<sup>®</sup>-V 9.5-60 HP

### Features

**Maximum fuel savings** with AluFer tubes, full burner modulation and high-turndown via variable-speed blower

**Small footprint** with vertical design

**High efficiency**, up to 85% reducing greenhouse gas emissions

**Easily-tuned**, zero-governor, premix burner

**Reliable operation**, with no dampers or linkages

**Advanced combustion design** eliminates need for flue gas recirculation and provides low emissions (< 20 ppm NOx and less than 10 ppm CO)

**ModBus (RS 485) communications**

**Ultra quiet operation** less than 70 DBA

**Reduced electrical energy consumption** with single-phase power -115V

Direct spark ignition

Low gas supply pressure less than 14" W.C.

UL Listed (Natural Gas)

Controls are CSD-1 Compliant

**Simplified operation/installation**

Standard atmospheric chemical feed pump

Installed boiler feed pump contactor



# The Integrated Advantage

- 1 Auxiliary low water cutoff
- 2 CSD-1, XL GAP compliant
- 3 LWCO and pump control water column
- 4 Operating and high limit controls
- 5 Single point power connection for electrical and controls
- 6 Handholes for water side inspection
- 7 Sealed combustion option
- 8 Modulating low NOx burner assembly for maximum operating efficiency and low emissions
- 9 Large steam space for quality steam
- 10 Fiber mesh fecralloy burner designed to premix air and fuel for optimal combustion
- 11 Thermal insulation with stainless steel casing
- 12 Patented AluFer tubes for increased heat transfer
- 13 Small stack outlet



# OPTIMIZE YOUR STEAM SYSTEM

## Patented AluFer® heat transfer technology



Patented AluFer Tubes®

The internationally patented AluFer tube is the technology behind the advanced heat transfer design. The tube is constructed from an inner (fireside) aluminum alloy finned surface, die-fitted within an outer steel tube, providing exceptional heat exchange characteristics.

- Thermal conductivity of the AluFer insert is significantly greater than that of carbon steel.
- Internal finned surface of the AluFer tube enlarges the heat exchange surface are three-fold.
- Inner surface of the tube is divided into ten flow channels to create maximum turbulence and heat transfer.

## Heat exchanger and burner

The ClearFire-V boiler has a high-quality, steel combustion chamber with AluFer tubes. The single-pass downfire arrangement ensures the maximum heat exchanger effectiveness and provides an inverse efficiency characteristic, making the ClearFire-V most efficient at reduced firing rates. The high-turndown, modulating burner minimizes short cycling and allows the boiler to operate at peak efficiency.

## Thermal shock resistance

The single-pass arrangement is designed to inherently minimize thermal stress in the heat exchanger.

## Premix modulating burner operation

The premix burner controls automatically adjust the air and gas mixture to the correct proportions before it enters the burner. A symmetrical, 360° even-temperature heat output is achieved from the burner, providing clean combustion with low NOx emissions. Turndown is up to 5:1 with standard emissions of less than 20 ppm.

## Burner Gas Train

Standard components meet the requirements of cULus, ASME CSD-1, XL-GAP and FM.

- Low gas pressure manual reset
- High gas pressure manual reset
- CSD-1 test cocks
- Manual test valve
- Dual safety shutoff valve
- Gas pressure regulator

Gas train is factory piped and wired on the burner.

## Boiler Trim and Controls

Boiler trim is in accordance with cULus and ASME CSD-1.

- High limit pressure control — manual reset
- Operating limit pressure control
- Combustion air proving switch
- Primary LWCO and pump control
- Manual reset ALWCO
- ASME safety relief valve set @ 150 psig

## ClearFire®-V Options

- Blowdown & feedwater valve assemblies
- Surface blow off controls
- Chemical feed tank
- Integral feedwater system
- Feedwater economizer
- High pressure regulator
- Reuseable air filter
- Sealed combustion for reduced make-up air requirement
- Lead/lag control for multiple boiler systems



## Intelligent, Integrated Controls

The Cleaver-Brooks Falcon is a proven boiler/burner management control that 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.



**User-friendly Control**

The Cleaver-Brooks Falcon control with integrated lead/lag 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.

- Touch screen graphics
- PID set point control (single boiler and lead lag)
- Configurable lead lag control
- Comprehensive diagnostics/fault history
- Combustion air/draft control interlock
- Night setback
- ModBus (RS485) Communications



## The ClearFire<sup>®</sup>-V has an exclusive advantage of operating more efficiently at reduced firing rates.

The Falcon lead/lag control is uniquely capable of taking advantage of the ClearFire<sup>®</sup>-V's combustion and thermal performance characteristics to sequence and modulate CFV boilers to maximize steam plant efficiency. The Falcon lead/lag control uses the common base load firing rate method to sequence and modulate a multiple-boiler system. This approach optimizes the boilers' operating efficiency while minimizing energy-wasting short cycling. The elimination of short cycling minimizes purge and standby losses, while extending the life and reliability of your boiler system.

# 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
- Standard Skid Solutions to meet your needs
- Eliminate field piping and wiring errors

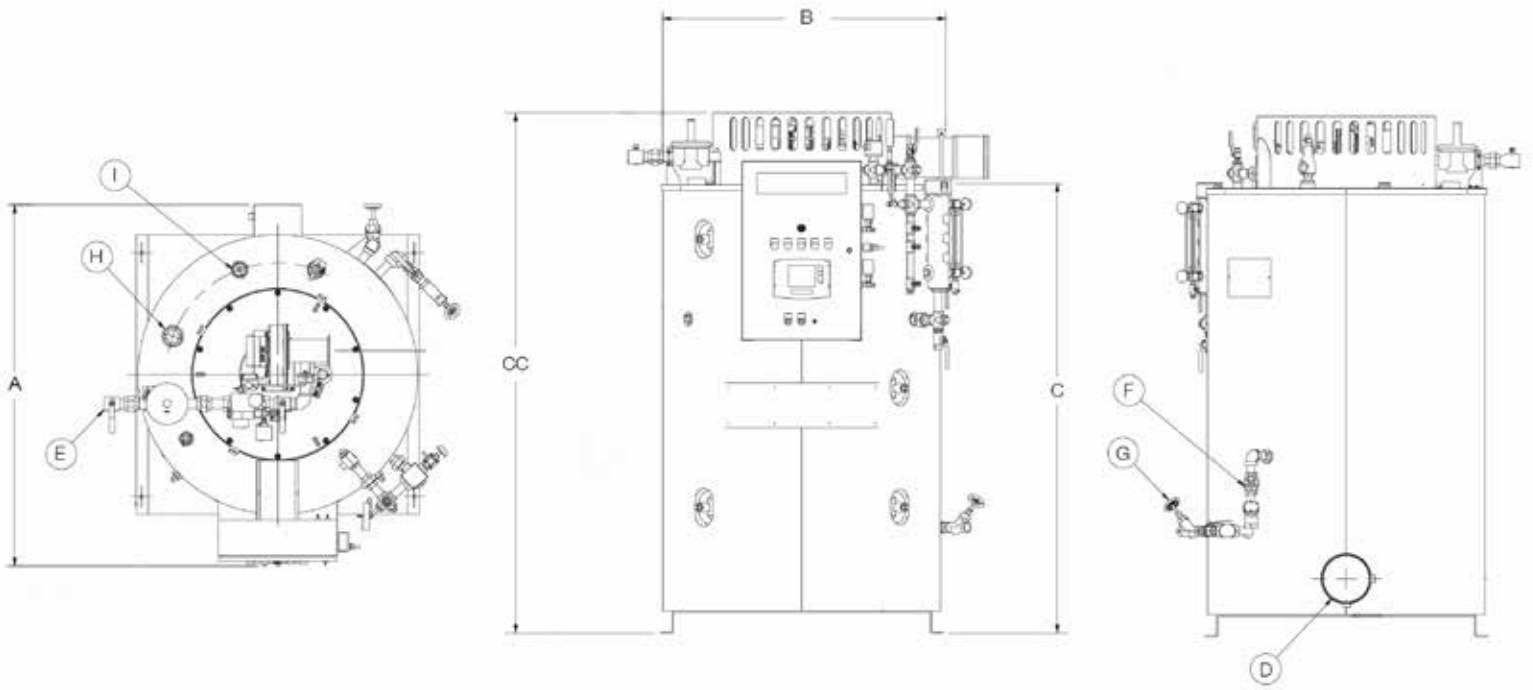


## Maximize efficiency to 87% with an Economizer

The ECF ClearFire economizer is a stainless steel coil tube arrangement using extended heating surface fins to maximize heat transfer. Flue gas from the boiler passes over the coiled tube, which conveys incoming feed water.

Feedwater preheated in this fashion reduces the need for a steam feedwater heater, resulting in efficiencies of up to 87% in non-condensing applications.





## ClearFire®-V Boiler Dimensions and Ratings

Boiler Horsepower	9.5	10	15	20	25	30	40	50	60
<b>Dimensions – inches</b>									
Overall Length (A)	45	45	45	53	53	61	61	70	70
Overall Width (B)	33	33	33	40	40	48	48	57	57
Clearance Height (C)	74	74	74	73	79	76	81	82	88
Overall Height with Trim (CC)	85	85	85	85	91	86	95.5	100	106
<b>Connections - inches</b>									
Stack Nominal OD (D)	6	6	6	6	6	8	8	10	10
Gas Connection (E)	1	1	1	1	1	1 1/4	1 1/4	1 1/2	1 1/2
Feed Water (F)	1	1	1	1	1	1	1	1 1/4	1 1/4
Bottom Blowdown (G)	1	1	1	1	1	1	1	1 1/4	1 1/4
Steam Outlet (H)	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	3	3
Surface Blowoff (I)	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
<b>Steam Boiler Weights in lbs</b>									
Normal Water Weight - 150#	730	730	710	1,195	1,365	1,840	2,050	2,715	3,090
Approx. Shipping Weight	1,950	1,950	2,000	2,540	2,780	3,540	4,030	5,280	5,740
<b>Power Requirements (115VAC, 60 Hz, single phase)</b>									
Blower Motor Size (Watts)*	335	335	335	335	335	335	750	1,200	1,200
<b>Ratings**</b>									
Rated Capacity–Steam (lbs-steam/hr from 212°F)	328	345	518	690	863	1,035	1,380	1,725	2,070
Efficiency %	84.2	84.2	83	83.5	84	83	85	83.4	84.1
Output (1,000 Btu/hr)	318	335	502	669	837	1,004	1,339	1,674	2,008
Input (1,000 Btu/hr)	378	398	605	802	996	1,210	1,575	2,007	2,388
Fireside Heating Surface (sq.ft.)	65	65	84	128	159	165	258	312	388
Turndown/Modulating Firing Rate	4:1	4:1	4:1	4:1	4:1	4:1	5:1	5:1	5:1

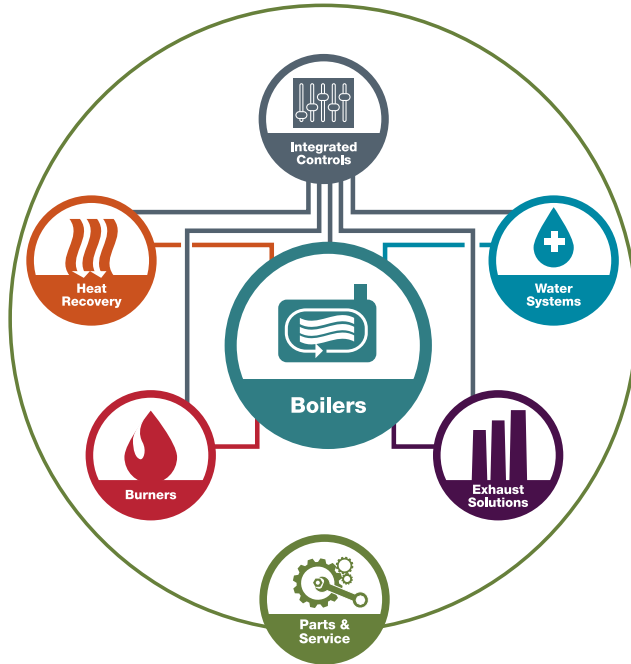
Notes:

\* For altitudes above 1500 ft., contact local Cleaver-Brooks authorized representative for verification of boiler and blower motor size.

\*\* All Ratings from 0 psig and at 212°







# Total Integration goes far beyond boilers.

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 condensing boiler 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.



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