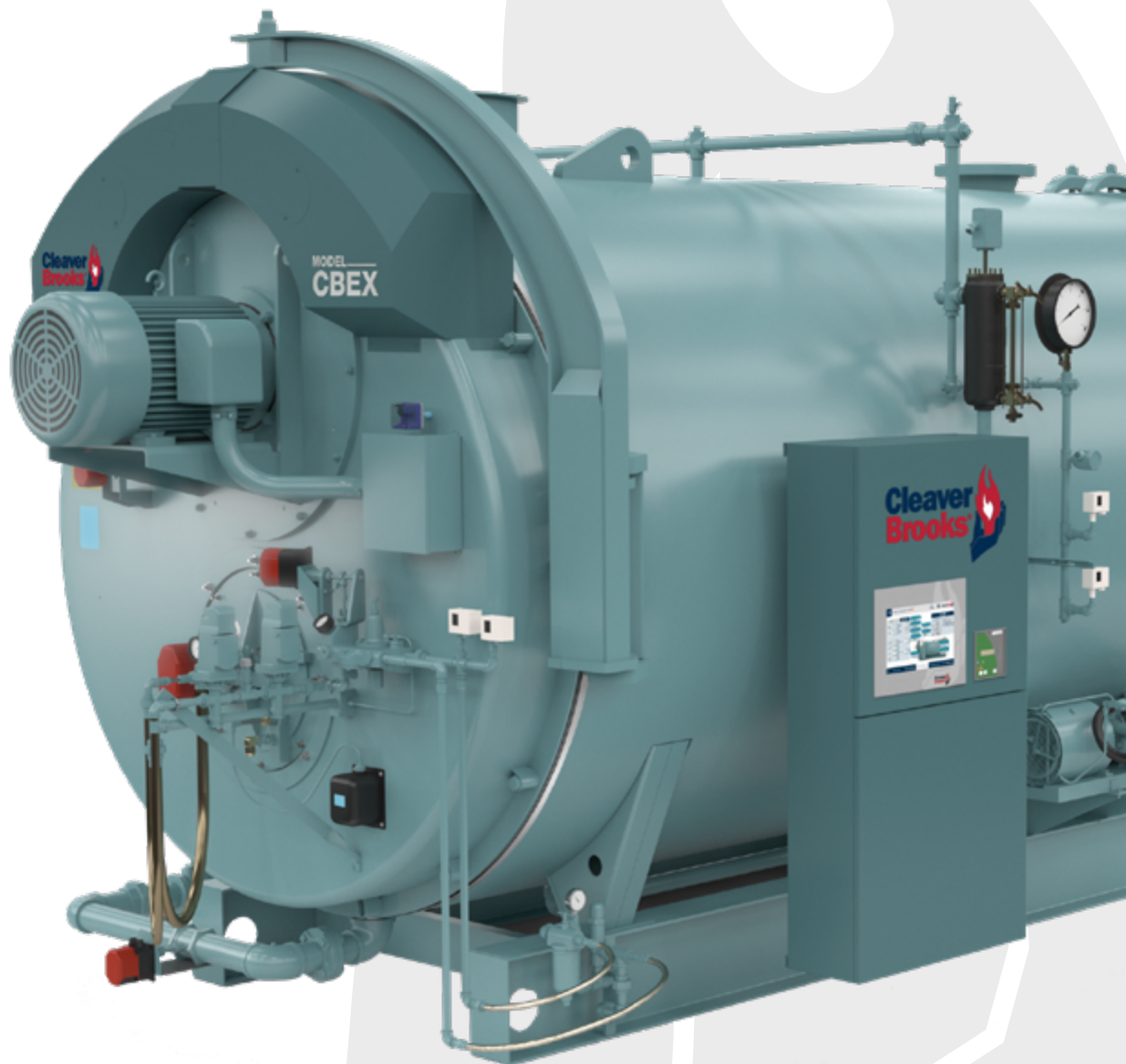


CBEX

**Steam or Hot Water
Firetube Boiler
100 to 2,500 HP**



Lowest Total Cost of Ownership

The total cost of owning any boiler is determined by more than the initial equipment cost. Total cost of ownership includes operating, maintenance, unplanned downtime, and years of service. When choosing the CBEX boiler, you are choosing the lowest total cost of ownership.

CBEX Technology delivers the highest part-load efficiency on the market, achieving the lowest operating costs in real world applications. The CBEX is the result of decades of boiler engineering expertise, providing the safest and most reliable system.

Cornerstones

Every piece of Cleaver-Brooks equipment is developed and manufactured with these in mind.



Safety



Efficiency



Reliability



Sustainability

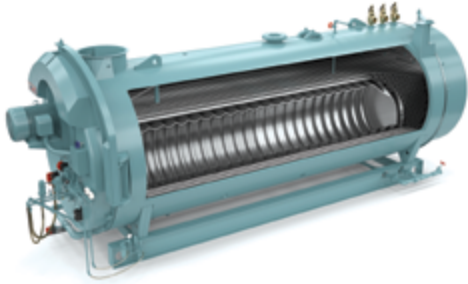
Through a commitment to research and development, Cleaver-Brooks is the sole provider of integrated boiler/burner/controls solutions and is a leading manufacturer of boiler room equipment across commercial, institutional, and industrial markets. Many of our components are specifically engineered, ensuring that Cleaver-Brooks high-quality products deliver superior performance.



Efficiency Driven by Technology

Many attributes make the CBEX the most unique and technologically advanced firetube design. Our EX technology provides for a revolutionary boiler system, featuring the lowest emissions, optimal combustion and superior operating efficiency from low to high fire.

Furnace Designed for Optimal Combustion



The larger furnace area in the CBEX allows for lower heat release rates, resulting in reduced thermal stresses within the furnace and a longer lifespan. The furnace dimensions have also been optimized to allow for the lowest emissions possible without SCR.

Burner and Controls Package



With technology in mind, Cleaver-Brooks designed a burner and controls package for a single-source, factory-tested setup to ensure that your boiler will operate at peak efficiency with the lowest-possible emissions. Our research, design and testing result in a reliable and safe boiler system for your plant.

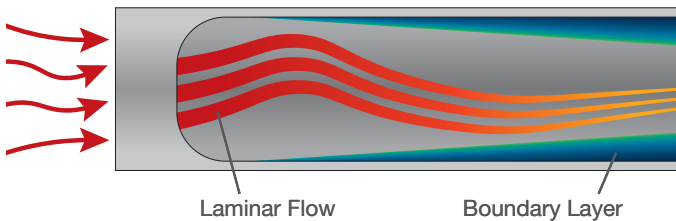


Advanced Heat Transfer Tube

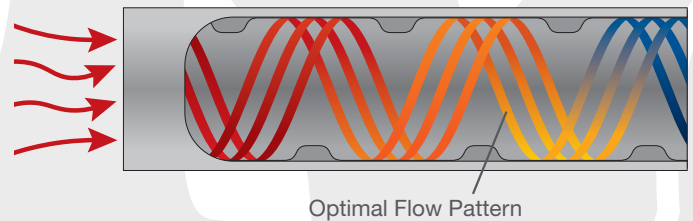


With the use of advanced engineering methods, Cleaver-Brooks designed the EX tube technology to increase heat transfer up to 85% over traditional boiler tubes. This allows for optimal furnace design and help produce the lowest possible emissions.

Typical Straight Boiler Tube



Cleaver-Brooks Advanced Heat Transfer Tube



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

Hawk Integrated Controls System

The Hawk Control, which serves as the brain of the EX system, enables you to run your boiler safely and efficiently.



- ▶ Completely integrated boiler/burner control is fully tested during development
- ▶ Automatically tunes boiler for changes in environmental conditions
- ▶ Combustion air fan vibration monitoring
- ▶ Linkageless control eliminates single-point control hysteresis
- ▶ Optional VSD control reduces fan horsepower load
- ▶ Advanced emissions controls with NOx trim option
- ▶ Unlimited options for system customization and optimization
- ▶ NFPA and UL® compliant for maximum safety
 - Return to Pilot functionality for immediate ignition
 - Hawk water level control, draft control, third fuel option
 - Integrated deaerator and Master Panel controls



Industry Leading Interface

The Hawk is the most powerful boiler control systems available in the industry. Its user-friendly interface features:

- ▶ Highest resolution screen on the market
- ▶ Intuitive navigation
- ▶ Built in maintenance manual
- ▶ E-mail and text alerts

Prometha® IoT-Connected Boiler Solutions

Prometha collects critical data and provides actionable insights, making boiler optimization and troubleshooting simple.

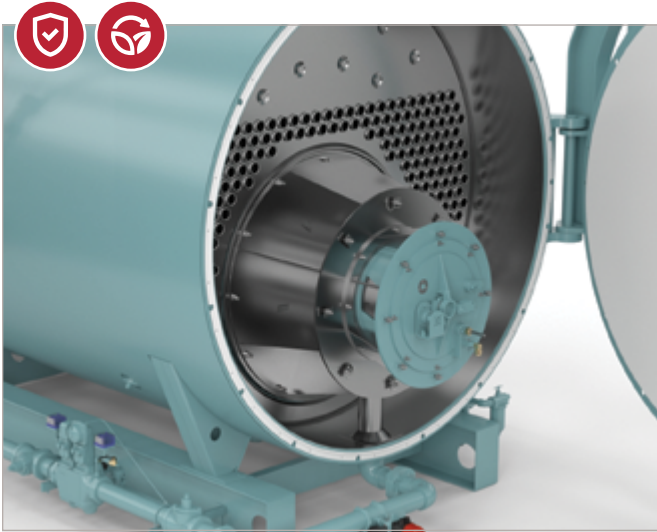
With Prometha, you can:

- ▶ Access boiler insights from anywhere, 24/7/365
- ▶ Increase operational efficiency
- ▶ Lower total cost of ownership
- ▶ Prevent or reduce unplanned downtime



Exclusive Burner Technology

CBEX boilers are available with the Cleaver-Brooks exclusive Integral burner or our large capacity external jet burner. No matter which burner, you can sleep easy knowing Cleaver-Brooks tests every single boiler and burner combination at our research and development facility to ensure the highest performance and reliable, repeatable operation. We are so confident in the reliability of our Integral burner that Cleaver-Brooks is the only manufacturer to offer an extended burner warranty as standard.

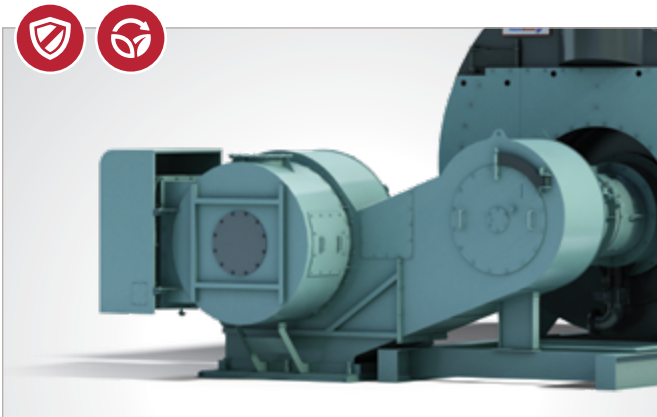


100 to 1,200 HP

Integral Burner

- ▶ Reliable performance
- ▶ Long lifespan
- ▶ Quiet operation
- ▶ Small footprint
- ▶ Easy maintenance
- ▶ Up to 10:1 turndown
- ▶ <5 ppm NOx emissions solutions available

Cleaver-Brooks exclusive integral burner technology has led the industry for more than 60 years.



1,300 to 2,500 HP

Large Capacity Burner

- ▶ System-matched, packaged burner
- ▶ Small footprint in large capacities
- ▶ <9 ppm NOx emissions solutions available
- ▶ Versatile blower configuration

Designed and tested with our largest-capacity boilers, ProFire jet burners deliver the highest levels of performance and reliability.



LNO Series Integrated Burner

The LNO (low NOx and oxygen) series features a unique flame pattern enabling the burner to operate with low emissions and low excess air levels throughout the turndown range. Advanced technology allows the LNO series to offer sub-5 ppm NOx, low CO emissions and 15% excess air up to 5:1 turndown.

Waterback or Dryback Configurations

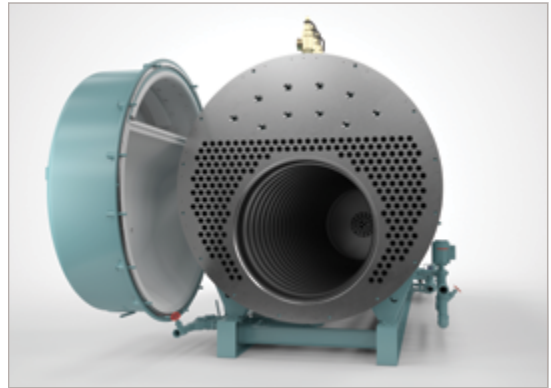
Offered in a two-pass, waterback or dryback design, the CBEX boiler package is engineered for long life, highest fuel-to-steam/water efficiency, maximum safety and lowest emissions. Its quiet operation, ease of maintenance and flexibility to add desired options further enhances the package.

Waterback



- ▶ Less refractory maintenance at rear of boiler
- ▶ Water-cooled rear turnaround
- ▶ Limited rear clearance area required

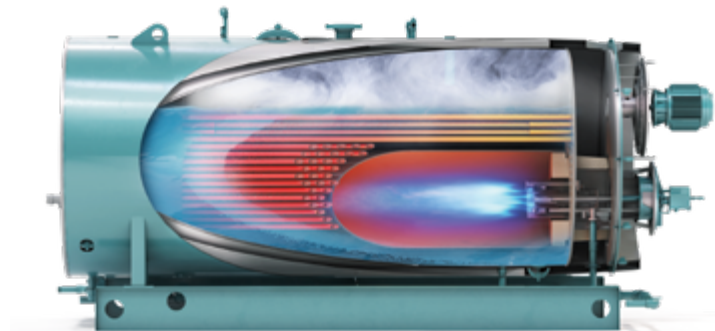
Dryback



- ▶ Simple vessel design
- ▶ Easy tube access from front or rear of boiler
- ▶ No confined space access required

Versatile Vessel Design

The optimized pressure vessel design allows for reduced thermal stresses, leading to longer boiler life and maximized operational efficiency.



Reliable and Consistent Manufacturing

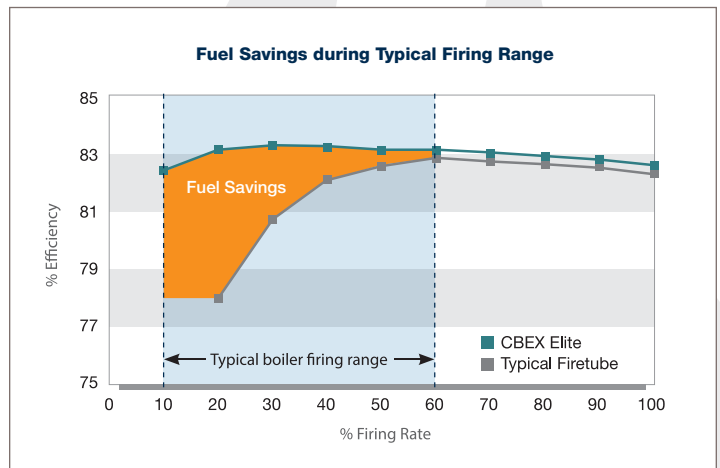
As a single-source expert provider, we control the manufacturing process of the burner, boiler, and controls, delivering consistency, reliability, and repeatability in all products.

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.



Industry Leading Boiler — Backed by Cleaver-Brooks

Only Cleaver-Brooks can offer the performance guarantees and enhanced warranties on every CBEX boiler because we design, manufacture, and test every part of every boiler to our exacting standards.

Performance Guarantee:

- ▶ Efficiency
- ▶ Emissions
- ▶ Steam Quality
- ▶ Turndown

Enhanced Warranties:

- ▶ CBEX Pressure Vessel
- ▶ Integral Burner

*See website or contact your local representative for detailed information

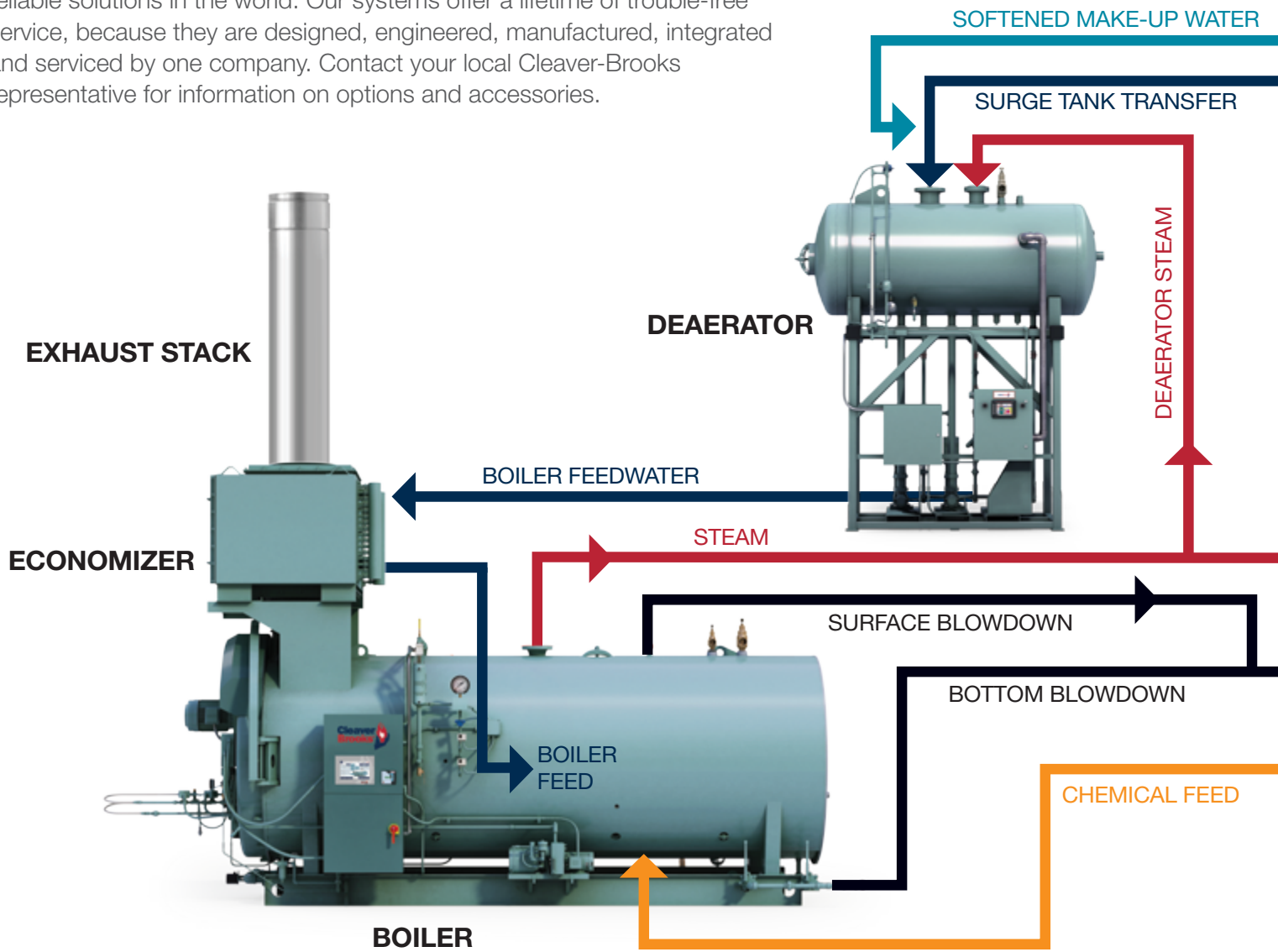


“I like the CBEX because of its rated efficiency. It is very easy to work with, and like all Cleaver-Brooks products, it is well-made and well-designed.”

Jeff Carter
Bell's Brewery
Kalamazoo, MI

Take Optimization to the Limit

Cleaver-Brooks complete system integration produces the most efficient, reliable solutions in the world. Our systems offer a lifetime of trouble-free service, because they are designed, engineered, manufactured, integrated and serviced by one company. Contact your local Cleaver-Brooks representative for information on options and accessories.



Advanced Controls

- ▶ Hawk boiler controls
- ▶ Prometha IoT Solutions
- ▶ Advanced deaerator controls
- ▶ Master panel

Exhaust Solutions

- ▶ Draft calculations and design
- ▶ Single-source solution
- ▶ UL-listed products

Stack Economizers

- ▶ Non-condensing
- ▶ C2X-HE – 94% efficient
- ▶ Condensing

High-Pressure Condensate Systems

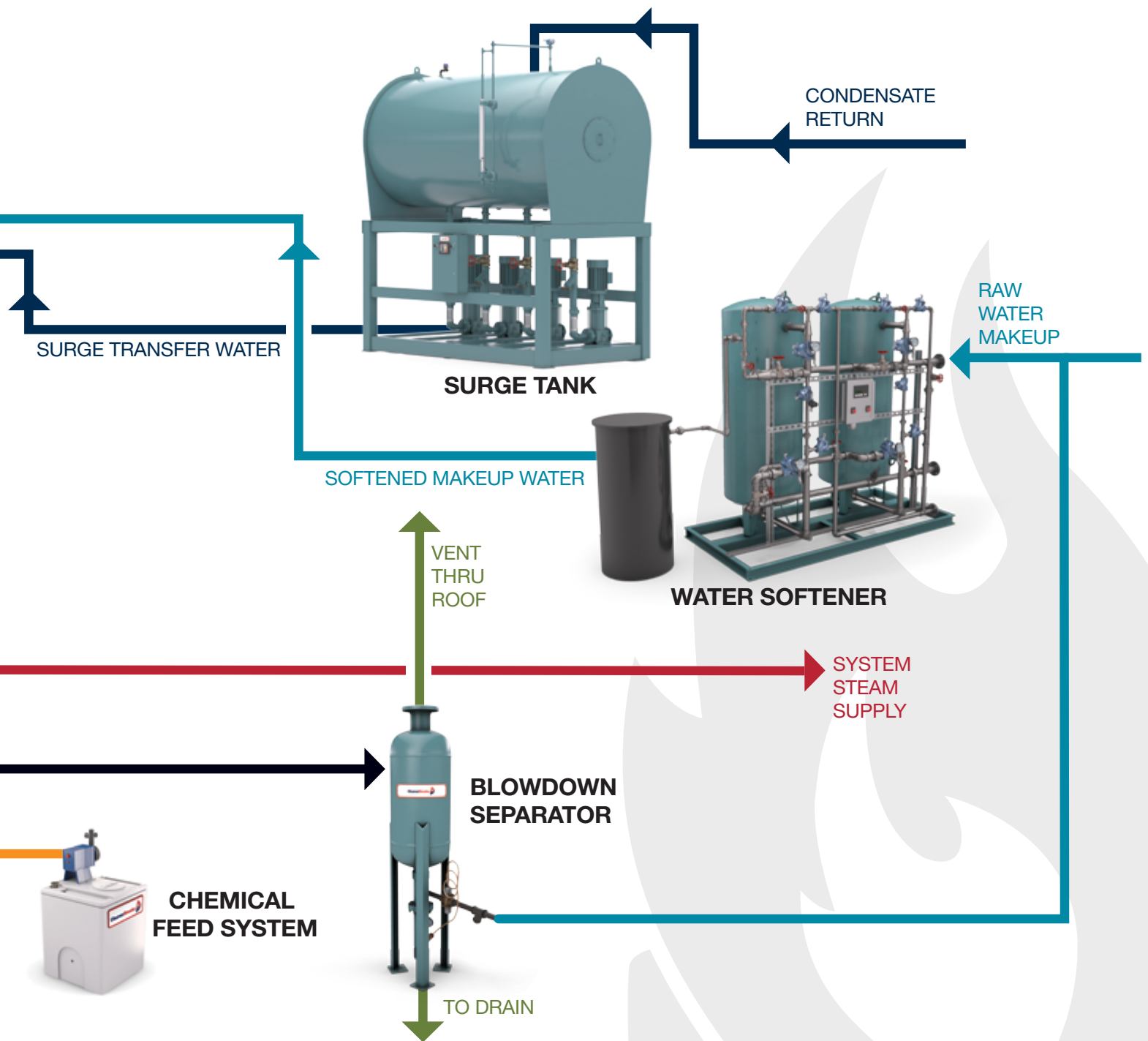
- ▶ Improves overall system efficiency
- ▶ Integrated controls for high-pressure operation

Deaerators

- ▶ Pre-heats boiler feedwater
- ▶ Removes dissolved gases
- ▶ Improves lifespan and efficiency of boilers

Surge Tanks

- ▶ Collects and stores condensate
- ▶ Reduces makeup water and chemical usage



Chemical Feed Systems

- ▶ Chemicals treat the boiler system to maintain peak efficiency and reliability
- ▶ Variety of options available depending on system specifics

Duo Tank Systems

- ▶ Combines spray-type deaerator and surge tank
- ▶ Simplifies installation

Water Softeners

- ▶ Removes minerals that will create scale within boilers
- ▶ Ensures long equipment life

Blowdown Separators and Tanks

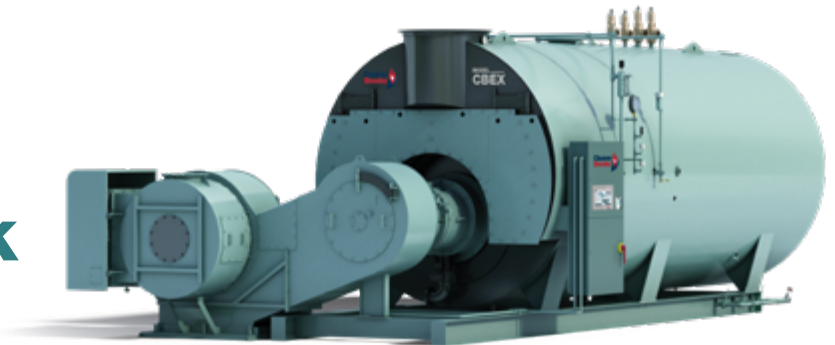
- ▶ Cools blowdown water to safe temperature for discharge to drain
- ▶ Required by code for most steam systems

CBEX Dimensions and Ratings

CBEX Waterback

Boiler Output (HP)	100	125	150	200	250	300	350
Boiler Output (pph @ 212 °F)	3,450	4,313	5,175	6,900	8,625	10,350	12,075
Overall Length (30 PPM System)	167"	176"	180.5"	203.5"	233.5"	243.5"	255"
Overall Width	81"	81"	86"	86"	94"	94"	105"
Overall Height	81.5"	81.5"	87"	87"	101.5"	101.5"	113"
Steam Outlet (125 psig OP, 300# fig.)	4"	4"	4"	4"	6"	6"	6"
SRV Outlet (150 psig)	1.5"	1@1.5", 1@1.25"	1@1.5", 1@1.25"	2@1.5"	1@2", 1@1.5"	1@2", 1@1.5"	2@2"
Flue Outlet	16"	16"	16"	16"	20"	20"	24"
Shipping Weight (lbs)	10,650	11,180	12,520	13,900	17,960	18,540	23,970
Operating Weight (lbs)	17,200	18,070	20,530	22,960	29,580	30,730	43,310
Flooded Weight (lbs)	19,100	20,060	22,790	25,485	33,445	34,810	47,635

CBEX Waterback with Jet Burner



Boiler Output (HP)	1300	1400	1500	1600	1800	2000	2200
Boiler Output (pph @ 212 °F)	44,850	48,300	51,750	55,200	62,100	69,000	75,900
Overall Length	385"	404"	413"	410"	424"	410"	424"
Overall Width	131"	131"	131"	207"	207"	213"	213"
Overall Height	145.5"	145.5"	145.5"	158"	158"	162"	162"
Steam Outlet (125 psig OP, 300# fig.)	10"	10"	12"	12"	12"	12"	14"
SRV Outlet (150 psig)	2@4"	2@3", 1@4"	1@4", 2@3"	2@4"	2@4", 1@3"	3@4"	2@4", 1@3"
Flue Outlet	36"	36"	36"	42"	42"	44"	44"
Shipping Weight (lbs)	65,424	69,672	71,435	78,667	83,445	92,706	99,133
Operating Weight (lbs)	106,744	113,501	116,827	130,978	137,242	155,801	162,820
Flooded Weight (lbs)	118,485	125,985	129,678	145,385	152,340	172,940	180,730



400	500	600	700	800	900	1000	1100	1200
13,800	17,250	20,700	24,150	27,600	31,050	34,500	37,950	41,400
268"	271.5"	287.5"	298"	307"	330.5"	335.5"	369.5"	385"
105"	112"	112"	119"	119"	133"	133"	133"	133"
113"	122"	122"	130"	130"	147.5"	147.5"	147.5"	147.5"
6"	8"	8"	8"	8"	10"	10"	10"	10"
1@2.5", 1@2"	1@2.5", 1@2"	2@2.5"	2@2.5", 1@2"	2@2.5", 1@2"	3@2.5"	3@2.5", 1@2"	3@2.5", 1@2"	4@2.5"
24"	24"	24"	24"	24"	32"	32"	32"	32"
24,710	29,300	30,900	38,500	39,450	51,900	54,200	57,300	58,850
44,360	49,360	52,520	63,550	65,320	87,700	90,200	94,500	97,500
49,240	55,945	60,025	70,735	72,785	97,725	100,120	104,895	108,225



CBEX Dryback

Boiler Output (HP)	250	300	350	400	500	600	700	800
Boiler Output (pph @ 212 °F)	8,625	10,350	12,075	13,800	17,250	20,700	24,150	27,600
Overall Length (30 PPM System)	230.7"	241.4"	253.8"	259.4"	260.9"	288.5"	290.6"	300.2"
Overall Width	93.4"	93.4"	93.4"	104.3"	110.1"	110.1"	110.6"	110.6"
Overall Height	103"	103"	103"	115"	118"	118"	118"	118"
Steam Outlet (125 psig OP, 300# flg.)	6"	6"	6"	6"	8"	8"	8"	8"
Steam Outlet (10 psig OP, 150# flg.)	12"	12"	12"	12"	12"	12"	12"	12"
SRV Outlet (150 psig)	1@2", 1@1.5"	1@2", 1@1.5"	2@2"	1@2.5", 1@2"	1@2.5", 1@2"	2@2.5"	2@2.5", 1@2"	2@2.5", 1@2"
SRV Outlet (15 psig)	2@2.5"	1@2.5", 1@3"	2@3"	2@3"	2@3", 1@2.5"	3@3"	3@3", 1@2.5"	4@4"
Flue Outlet	20"	20"	20"	24"	24"	24"	24"	24"
Shipping Weight (lbs)	16,968	17,865	19,635	25,374	29,111	31,374	34,284	35,118
Operating Weight (lbs)	26,346	27,779	29,466	42,300	43,477	47,768	49,007	50,419
Flooded Weight (lbs)	30,208	31,860	33,790	47,179	50,063	55,273	56,193	57,883



The power of total integration.

- Boilers
- Burners
- Controls
- Heat Recovery
- Water Systems
- Exhaust
- Rental Boilers
- Modular Skids
- Remote Monitoring
- Preventive Maintenance
- Field Service and Projects
- Installation
- Spare Parts Programs
- Commissioning
- Service Agreements
- E-commerce
- Retrofit and Renewal
- Risk Management
- Operational Optimization
- Education and Training
- Design, Application Assistance
- Webinars, Virtual Learning
- Thought Leadership
- Data/Analysis/Insights
- Engineering Support
- Best Practices
- Certified Sales, Service Professionals

Cleaver-Brooks is the only company able to deliver integrated equipment, full lifecycle services, and expert consultation to all our customers. These three competencies work together as one integrated solution, the sum of which is greater than its parts.

To find a Cleaver-Brooks representative near you, visit cleaverbrooks.com/rebs.



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