CleaverBrooks®

Electrode Boilers

Steam Models To 10,000 BHP

A Cleaver-Brooks Sustainable Solution

Decarbonizing Energy One Electrode Boiler at a Time

Electrode boilers are one of many products that Cleaver-Brooks offers to help meet your sustainability goals of decarbonization, emissions reduction and energy efficiency. Because they utilize electricity as a fuel source, electrode boilers deliver maximum output with no local emissions.

Helping to achieve sustainability goals, our electrode boiler solutions can:

- Reduce or eliminate dependency on fossil fuels up to 100%
- Leverage renewable energy sources to increase process efficiency to nearly 100%
- Eliminate 17.7 metric tons of annual CO_2 emissions per boiler horsepower (24/7/365)

Electrode boilers meet the strict performance and sustainability criteria required to earn the Cleaver-Brooks Sustainability Seal. Find out more at cleaverbrooks.com/sustainability

Features / Advantages

For areas affected by allocations or interruptions of natural gas and costly oil supplies, Electrode boilers provide a dependable source of steam for companies that want to reduce their carbon output by phasing out fossil fuels. In addition to providing a clean alternative to fossil fuels, users can take advantage of lower energy rates during daily or seasonal off-peak periods.

Clean alternative to fossil fuels and lower energy rates

- **Zero Local Emissions** – 100% emission-free and well suited for decarbonization or site-emissions-reduction projects
- **No Combustion Equipment Required** – Reduces installation costs by eliminating the need for gas/oil piping, combustion air supply and exhaust stack.
- **Flexible Fuel Supply** – Electricity is readily available from several sources, including renewable sources such as wind, solar and hydroelectric power.
- **High Efficiency** – Nearly 100% efficient at all operating points.
- **Full Modulation and Infinite Turndown** – Use only the amount of electrical energy required in response to system demand.
- **Quiet Operation** – No noise from a combustion fan and burner.
- **Rapid Response Time** – Full steam output achieved on demand.

With Cleaver-Brooks expertise, quality comes standard

- Pre-piping at the factory for peace of mind and ease of installation
- Integrated, single-source controls solution
- Allen-Bradley PLC control standard

Why Choose our Electrode Boilers?

- **Durable and Reliable** – All steel construction, 25kV rated insulators and Allen-Bradley PLC controls ensure the best durability in the industry.
- **Quality and Consistent Manufacturing** – Each packaged unit is quality tested in an ISO-certified shop and certified in accordance with stringent (c)UL standards.
- **25kV Ready** – Our electrode boilers can connect directly to a 25kV power source without needing a power transformer station.
- **Ease of Startup** – Each electrode boiler is pre-assembled at a Cleaver-Brooks packaged boiler factory prior to shipment. Our customers benefit from single-source responsibility, pre-configured controls, and the power of Cleaver-Brooks total integration and commitment to customer success.

Markets

- **Healthcare**
- **Food Processing**
- **Campus Heat**
- **Chemical**
- **Government**
- **Mining**
- **Utilities**
- **Breweries/Distilleries**
- **Pulp/Paper**

Switch to electrode boilers during hours when electricity is cheaper than fuel.

Rely on a quick response to swinging loads and variable production cycles.

Count on consistent product temperature control and operational reliability.

Compact, Quiet and Highly Efficient

Standard Features

Boiler

- ASME code vessel
- Heavy-duty steel internal construction
- Medium voltage safety cage
- Fiberglass insulation, 2”
- ASME pressure relief valves
- Heavy-duty steel jacket

Trim

- Steam back-pressure valve
- Centrifugal-type circulating pumps
- Advanced conductivity sensors and controls
- PLC for pressure, power, and level controls
- Main low-water, high, and auxiliary high-high cutoff
- Pilot lights

Electrical Equipment

- 25kV rated insulators
- Current transformers and power metering
- Electrical pre-heat assembly
- Hydraulic ram assembly for modulation
- Primary connection lugs and insulators
- VFD pump motor starters

Our electrode boilers feature an intuitive touchscreen control that has a built-in ability to control multiple boilers, enable time of day boiler scheduling to avoid demand charges. It is also compatible to enable remote monitoring and offers control and trending through Building Management System integration.

Proven, Mature Technology

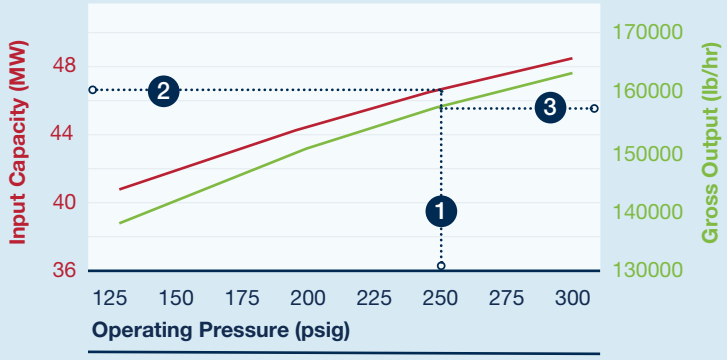
Using proven designs developed more than 100 years of successful electrode boiler operation, Cleaver-Brooks MVE electrode boiler continues to be the most reliable electrode boiler in the industry.

Capacity by Voltage

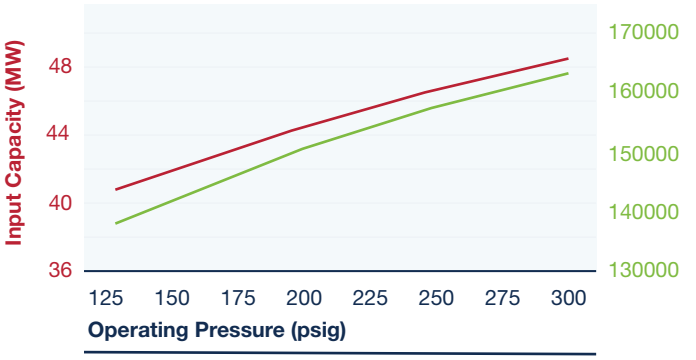
As voltage and operating pressure increase, an electrode boiler becomes capable of converting more power (MW) to convert into heating capacity (lb/hr steam).

How To Use Chart To Find Maximum Gross Output:

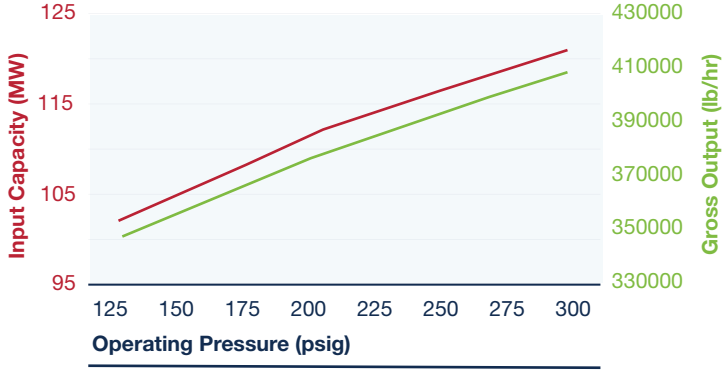
1. Start with boiler operating pressure as 250psig.
2. Find Maximum MW: Using a straight edge, stop at the red line and look to the left-hand axis. Maximum input MW is approximately 46.5MW.
3. Find Maximum Capacity: Using a straight edge, stop at the green line and look to the right-hand axis. Gross maximum output is approximately 157,000 lb/hr.



Maximum Capacity 13.2kV



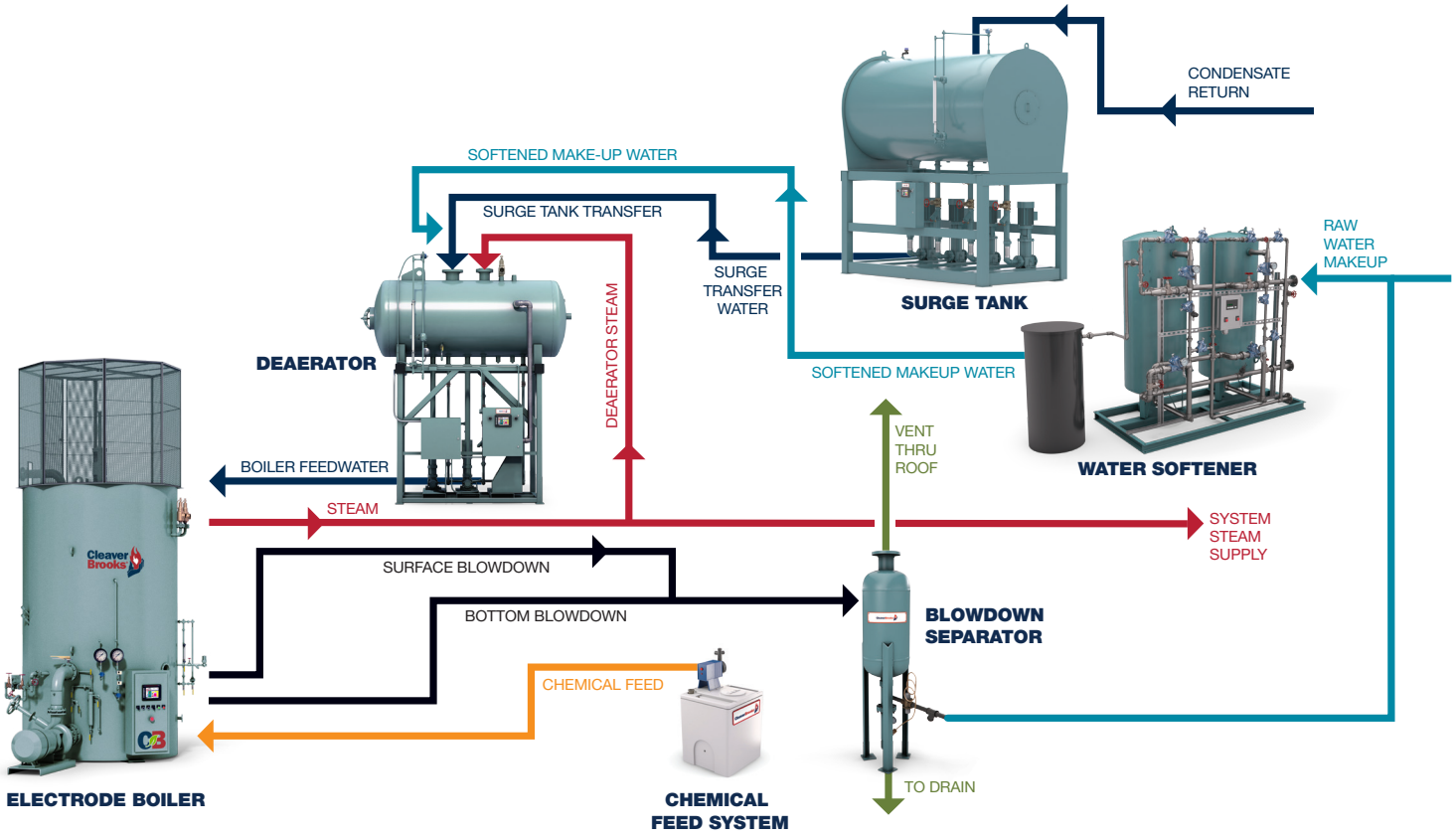
Maximum Capacity 25kV



* Gross output assumes 99.5% boiler efficiency and 227°F feedwater supply. *Alternate voltages available between 13.2 and 25 KV.
* Operating pressure up to 450 psig available. Contact Cleaver-Brooks for maximum capacities on higher operating pressures.

Take Optimization to the Limit

Cleaver-Brooks offers complete system integration that 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 about options and accessories.



Advanced Controls

- Hawk boiler controls
- Prometha® IoT Solutions
- Advanced deaerator controls
- Host Panel

High-Pressure Condensate Systems

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

Surge Tanks

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

Deaerators

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

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 create scale within boilers
- Ensures long equipment life

Blowdown Separators and Tanks

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

The power of total integration.

The **Power of Total Integration** is how Cleaver-Brooks delivers the world's broadest range of integrated, sustainable boiler plant solutions. In addition to our products, this includes our global representative and service network, training resources, and trusted expertise that add significant value to your Cleaver-Brooks investment.

Click or scan the QR code with a smartphone camera to access Electric and Electrode resources

CleaverBrooks®

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