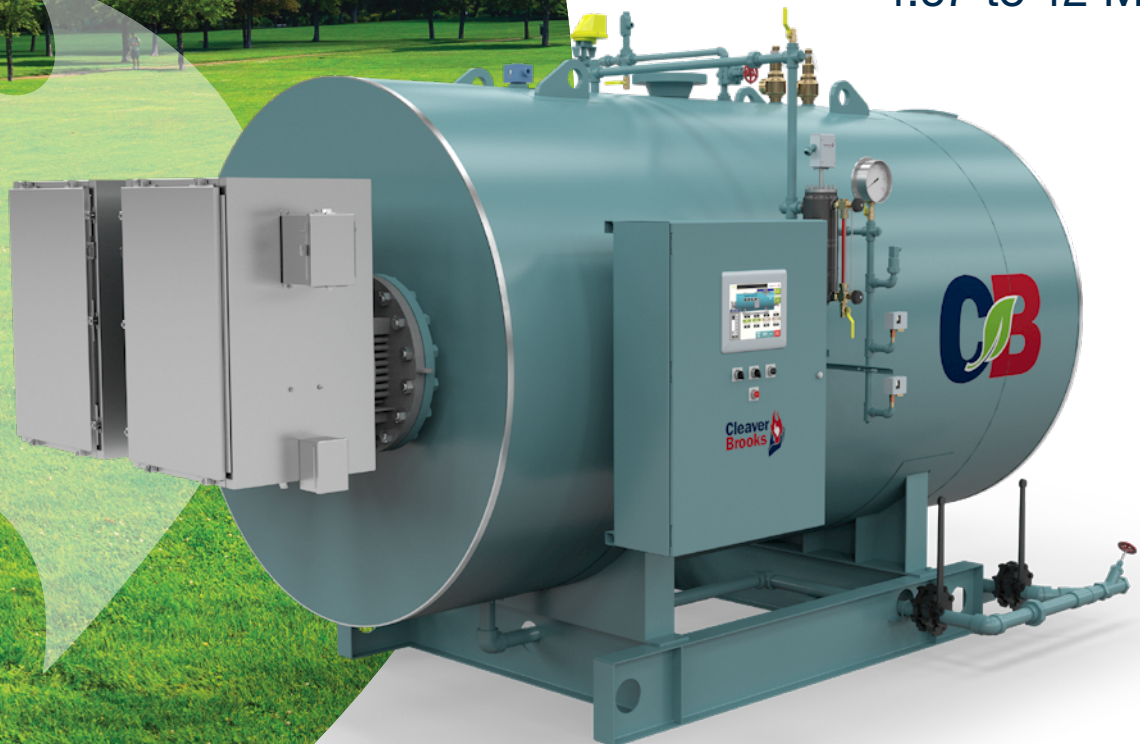


MVR

Medium Voltage Electric Resistance Boiler

Steam or Hot Water
1.67 to 12 MW



Electrifying Heating Systems Without Compromise

Decarbonizing boiler plants requires solutions that are both practical and scalable. Electric boilers eliminate on-site emissions and enable facilities to transition away from fossil fuels while maintaining reliable hot water and steam production.

Electric boilers provide a clean, reliable alternative to combustion-based systems:

- » **No Combustion Equipment** – No fuel piping, combustion air, or exhaust stack
- » **Zero On-Site Emissions** – Supports decarbonization and emissions-reduction goals
- » **Renewable Ready** – Operates on grid, on-site generation, or stored energy sources to support electrification strategies.
- » **High Efficiency** – Nearly 100% efficient at all operating points
- » **Quiet Operation** – No burner or fan noise
- » **Low Maintenance** – Fewer moving parts and no combustion system upkeep

Why the MVR?

The Cleaver-Brooks MVR medium voltage electric boiler extends these benefits to large-capacity applications, where electrical infrastructure constraints often limit electrification.

Beyond standard electric boiler benefits, the MVR is well suited for:

- » High-capacity applications (up to 12 MW)
- » Facilities with existing medium voltage distribution
- » Projects constrained by electrical infrastructure limits



Our electric boilers meet the strict performance and sustainability criteria required to earn the Cleaver-Brooks Sustainability Seal. Visit cleaverbrooks.com/sustainability to learn more.

The Medium Voltage Advantage

Large heating loads demand large amounts of electrical power. At low voltage, this results in very high current, which drives costly and time-consuming upgrades to switchgear, conductors, and distribution systems. The MVR operates at 4,160V, allowing it to connect directly to existing medium voltage infrastructure and avoid these limitations. By operating at medium voltage, the MVR delivers:

- » Higher capacity – Supports large heating loads with fewer units and simpler system design.
- » Lower Full-Load Amps (FLA) – Reduces electrical current requirements compared to low-voltage boilers.
- » Reduced Electrical Infrastructure Costs – Smaller conductors, reduced conduit sizes, and lower-rated overcurrent protection.
- » Simplified Integration – Connects directly to medium voltage distribution commonly found in large facilities, eliminating the need for a step-down transformer.
- » Increased Efficiency – Lower I²R losses compared to high-current, low-voltage systems.
- » Practical Long-Distance Distribution – Enables more economical power delivery across large campuses and industrial sites.

Approach	Challenge	MVR Solution
Low Voltage Boilers (480/600V)	High current, large feeders, expensive infrastructure	Operates at 4,160V to significantly reduce current
Step-Down Transformers	Added cost, footprint, and losses	Direct connection to medium voltage systems
Electrode Boilers	Different operating principles and water chemistry requirements	Familiar resistance heating with standard boiler operation

The MVR enables electrification of large loads without the infrastructure penalties of low-voltage systems.

Standard Design, Yet Configurable

The MVR's core design elements have been pre-engineered for consistency across the series, with several options available for selection at the time of order. Additional customization to meet unique project needs is possible based on engineering evaluation.

Hot Water or Steam

The MVR is available in either hot water or steam configurations, allowing the same platform to support a wide range of heating and process applications.

- » **Hot Water:** Hydronic heating systems and high-temperature applications
- » **Steam:** Process loads, sterilization, humidification, and plant utilities

Standardized Capacity Options

The MVR is offered in pre-engineered input power increments from 1.67 to 12 MW, allowing faster configuration and more predictable delivery compared to fully custom designs.

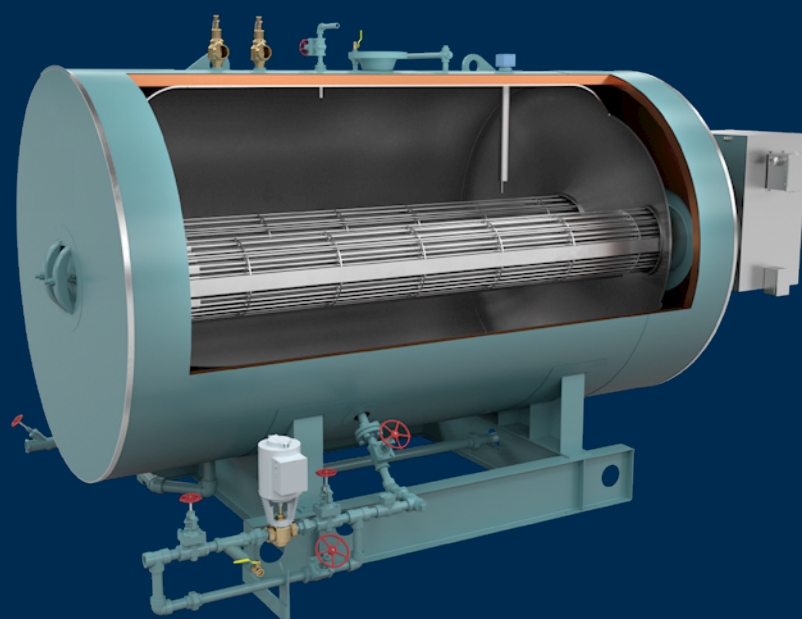
Input Power (MW)	1.67	2.0	2.5	3.34	4.0	5.0	6.0	6.68	8.0	10.0	12.0
Hot Water Capacity (MBH)	5,698	6,824	8,530	11,397	13,649	17,061	20,473	22,793	27,297	34,121	40,945
Steam Capacity (lb/hr) From and at 212°F	5,873	7,033	8,791	11,362	14,066	17,583	21,100	23,491	28,133	35,166	42,199

Standardized Design Pressures:

The MVR is also offered with pre-defined design pressure rating options to match system requirements while maintaining a consistent, code-compliant and proven design platform.

- » **Hot Water:** 160 psig (ASME Section IV)
- » **Steam:** 150 or 250 psig (ASME Section I)

Additional pressures may be available based on application requirements and engineering evaluation.



Built for Long-Term Success

The MVR is designed for commercial and industrial boiler plant installations where performance, high capacity and electrical infrastructure are key considerations. It combines Cleaver-Brooks' proven pressure vessel design with integrated medium-voltage heating elements, controls, and power panels to deliver a reliable, durable, and long-lasting solution. A maintenance-friendly layout with accessible components supports efficient service, helping minimize downtime and reduce total cost of ownership.

Top-mounted, centerline layout of piping, controls, and instrumentation

NEMA 4 enclosure for termination to heating elements

Horizontal

pressure vessel:

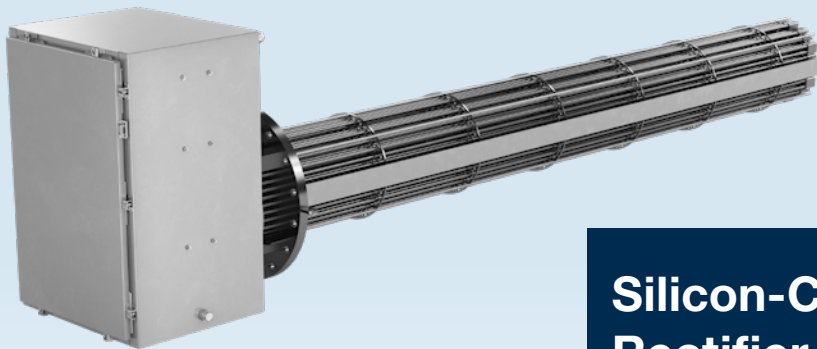
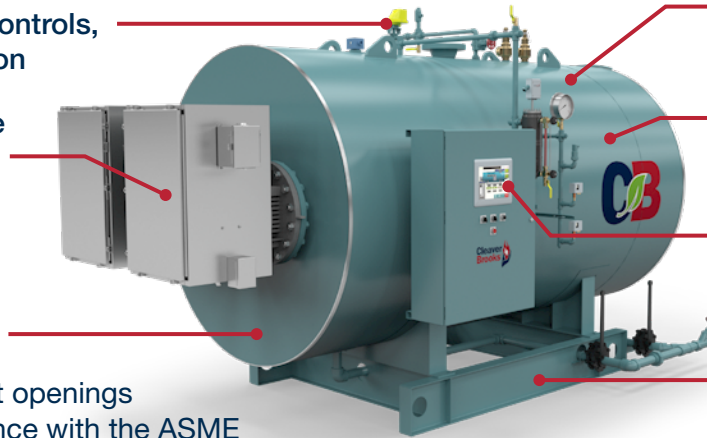
- Carbon steel
- Welded heads
- Flanged element openings
- Built in accordance with the ASME Boiler and Pressure Vessel Code

18-gauge steel jacket with enamel finish

Insulated with 2-inch mineral-fiber insulation

UL508A rated control panel

Similar footprint to C-B Firetube boilers makes it well-suited for retrofits



Heating Element

- Watt density <75 W/in²
- Spider inserts to mechanically secure elements in place
- Incoloy 800 sheathing
- Pre-installed spare heating elements
- Stand-off design to reduce end seal temperature and extend life

Silicon-Controlled Rectifier (SCR)

- UL347 and UL347C rated control cabinets
- Zero cross SCR control offers low electromagnetic interference
- Includes safety interlocks
- Available power feeder with high speed protective relay and breaker

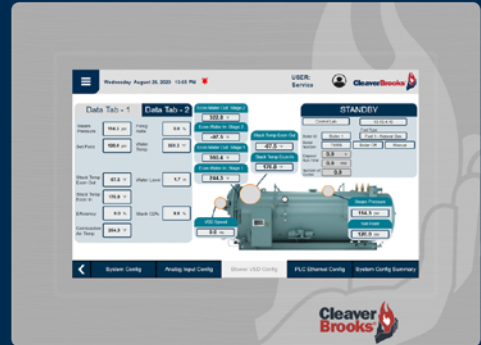


Intuitive, Intelligent Control

The MVR features an advanced unit controller with touchscreen interface, fully integrated into the unit for fast installation and startup.

The MVR unit controller provides:

- » **Time-of-day scheduling** – Automatically adjusts operation based on occupancy schedules, process schedules, or utility rate periods to reduce energy costs.
- » **Outdoor air reset** – Automatically adjusts supply water temperature based on outdoor conditions to improve efficiency in weather-dependent heating applications.
- » **BAS communication via standard protocols** – Integrates the MVR with facility automation and supervisory control systems for coordinated operation, monitoring, and optimization.
- » **Remote monitoring and data trending** – for real-time visibility and historical insight to troubleshoot quickly, reduce downtime, and optimize performance.
- » **Custom programming available.**



SCR Modulation

The MVR utilizes silicon-controlled rectifier (SCR) technology to deliver true linear power modulation, resulting in:

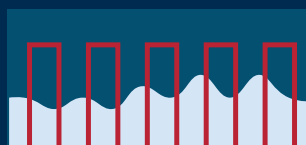
- » Stable control with minimal undershoot and overshoot
- » Continuous power modulation across the operating range
- » Reduced electrical cycling and component wear
- » Minimized power surges
- » Stable operation during low-load conditions

Demand vs. Step Control

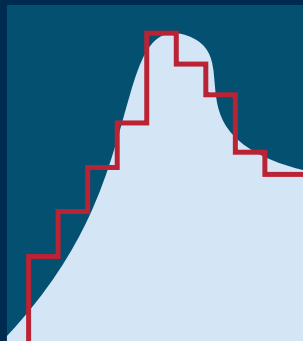
Demand



Step Control



Low Demand



Ramp Up & High Demand

Demand vs. Step Control w/SCR

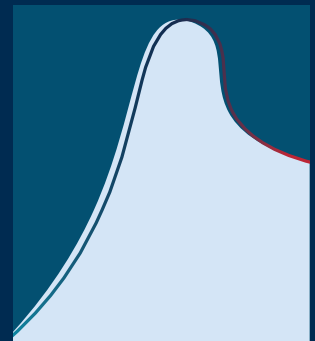
Demand



Step Control w/SCR



Low Demand



Ramp Up & High Demand

Typical Applications

The Cleaver-Brooks MVR medium voltage electric boiler delivers zero on-site emission hot water or steam up to 12 MW, providing a practical, high-capacity decarbonization solution for modern facilities. By connecting directly to existing 4,160V infrastructure, the MVR eliminates the footprint and cost of step-down transformers, making it uniquely suited to handle the rigorous process loads of industrial manufacturing facilities and the expansive heating footprints of universities and campus district energy systems. This high-efficiency design provides

the scalable, continuous performance required by utilities and large commercial operations, while offering the high reliability and uptime essential for critical facilities.

Applications include:

- » Industrial manufacturing facilities
- » Universities and campus district energy systems
- » Utilities and large commercial operations
- » Data centers and high-load facilities





The power of total integration.®

The **Power of Total Integration** is how Cleaver-Brooks delivers the world's broadest range of integrated, sustainable thermal solutions. In addition to our products, this includes Cleaver-Brooks global authorized sales representatives and independent service contractors, 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.



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