

High-Voltage JET-Type Electrode Boilers

For Steam Production

- ▶ Industrial Plants
- ▶ Mining Operations
- ▶ Power Plants for District Heating
- ▶ Process Industry



ELECTRODE
BOILERS TECHNOLOGY BY **acme**



Performance & Benefits

Exceptional Heating Efficiency

The CEJS High Voltage Electrode Steam Boiler is engineered for maximum thermal performance, with measured heating efficiency of 99.49% and lifetime efficiency consistently maintained at $\geq 98\%$.

Proven Technology

Backed by extensive operational experience, ACME's CEJS boiler is a field-proven solution trusted for high-reliability steam production in demanding applications.

Flexible and Scalable Integration

The system design is straightforward and easily integrated into existing infrastructure. Boiler capacities range from 2 MW to 65 MW, with operating pressures from 75 to 500 PSI (5–40 bar).

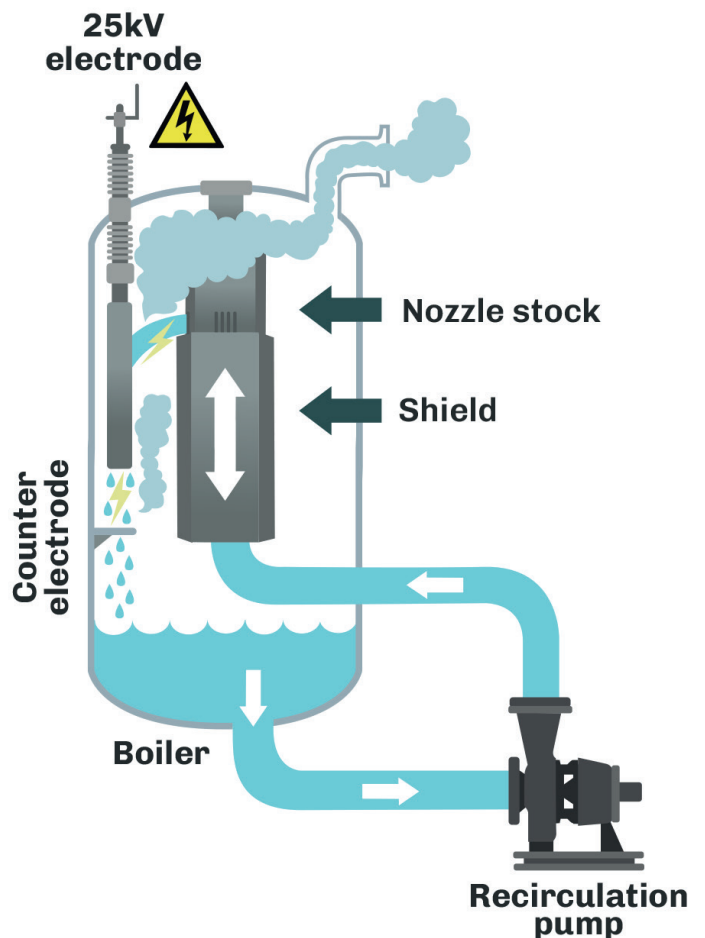
Simplified Operation

The boiler is fully controlled via a PLC-based control panel, enabling precise, user-friendly operation and automation.

Built-In Safety by Design

The CEJS system offers a unique combination of high efficiency, simple integration, and intrinsic safety—making it a high-performance solution for modern steam generation.

- No low-water hazard: current cannot flow without water
- No overheating or electrode burnout, even in scaling conditions
- Thermal shock is eliminated
- Grounded pressure vessel ensures electrical safety
- No safety enclosure or costly isolating piping required





Features

- Capacity range: 2,000 to 65,000 KW
- Electric Power Supply Voltage : 4160 to 25000 V
- Maximum Operating Temperature for Standard Models: 250 °C
- Operating pressure: 5 to 40 bar
- Power Feeds (Current Passage) assembled and certified for 42000 V and 16 bar for any operating voltage
- Fast Response: 0 to 100 % capacity in:
Hot State: 1 minute
Cold to Hot state : 15 to 25 minutes (depends on the size)
- Economical even for capacities between 2 to 6 MW
- Simple controls
- Can be added to existing systems and suitable for optional water storage facilities
- Ability to take advantage of low off-peak electricity rates and demand swings
- Also available as a superheated steam boiler

How CEJS Jet Boilers Work

Jet-Based Heating Principle

The CEJS boiler system uses a recirculation pump to draw water from the lower section of the boiler and deliver it through a riser pipe to the nozzle assembly. Water is sprayed through jets onto an electrode target plate, forming an electrical current path and generating heat. The remaining water flows through a nozzle plate to the counter-electrode, establishing a second current path.

Dynamic Output Control

Boiler output is regulated by a vertically adjustable control sleeve, which diverts water flow based on real-time steam pressure and load demand. A standby heater reduces start-up time, and a feedwater regulator maintains optimal water level within the vessel. An automatic demand control system ensures energy-efficient performance while preventing electrical overload. The boiler is safely shut down by stopping the recirculation pump.

Proven Technology, Engineered for Reliability

ACME has manufactured CEJS high-voltage jet boilers since 1980, offering custom-engineered solutions with robust design features. The CEJS range supports outputs from 6 MW to 53 MW and operates at voltages up to 25 kV (3-phase, 4-wire). All standard power feeds are equipped with internal and external insulators and quartz tubing, rated for 25 kV regardless of actual operating voltage.

Precision and Efficiency in Every Component

The jet nozzles are fitted with guide vanes for accurate flow direction. Reversible, enclosed target plates prevent splashing and reduce the risk of short circuits. The CEJS offers stepless capacity control from 0% to 100% and can reach full load from hot standby in under one minute. Operation at high water conductivity minimises blowdown frequency and improves thermal efficiency.

Superheated Steam Option

The CEJS boiler is also available in a superheated steam version to meet demanding process requirements.

CEJS components

Boiler

The CEJS high-voltage jet boiler uses water's electrical resistance to produce steam with near 100% efficiency. The system is inherently safe, as current flow stops automatically with low water level. There are no hot surfaces beyond steam temperature, reducing risk of overheating and minimising maintenance. PED-compliant pressure vessels and CE-marked components ensure full regulatory compliance.

Circulation Pump

A recirculation pump drives water from the boiler base to the nozzle system, forming a jet stream towards the electrode target plate. Flow rate is designed to match cooling requirements and load conditions. Pump skids are typically air-cooled and equipped with TEFC motors.

Feed water system

Feed water system consist on feed water tank, pump and control valve. The feed water tank stores and preheats water before it enters the boiler and also removes dissolved gases. The feed water pump delivers water from the tank into the boiler at high pressure. It must overcome the boiler pressure and ensure a steady, reliable flow based on steam demand. The control valve regulates the flow of feed water into the boiler. It receives signals from level sensors in the boiler and adjusts the flow to maintain the correct water level, ensuring safe and stable boiler operation.

Electrical

- High-voltage power feeds with quartz tubing
- Internal and external insulators rated to 25 kV
- Ground terminals and grounded pressure vessel for safety
- No safety cage or isolating pipework required
- Simple electrical control via integrated PLC system

Chemical Feed Water and Injection Pump

Water conductivity and pH are adjusted through chemical dosing. The system includes a chemical feed tank with integrated mixer and injection pump to maintain optimal boiler water quality and minimise scaling.

Instruments and Control

- Free-standing control panel with PLC and HMI
- Conductivity sensors for continuous monitoring
- Flow switches for circulation verification and safety shutdown
- Dual temperature transmitters for output and safety control
- High temperature and low water level protection
- Pressure/temperature gauges
- Proximity sensors for moving parts
- Optional remote supervision

Accessories

- Isolating valves for boiler, pump and exchanger
- Loop piping and Y-strainer (on pump suction side)
- Filling system with pump, check valve and strainer
- Manual drain and automatic air vent
- Safety valves included as standard



Five Reasons to Choose a High Voltage ElectrodeBoiler

1 Output Comparable to Fuel-fired Boilers

Recent developments in high voltage electrode boiler technology enable output levels up to 53 MW, equivalent to those of large gas- or oil-fired boilers. The system requires significantly less physical space, increasing layout efficiency.

2 Lower Operating Costs

Electrode Boilers operate without the need for combustion or flue gas treatment systems, reducing complexity and ongoing operational expenditure. Utilisation of off-peak electricity tariffs further enhances cost efficiency.

3 Economical Installation

As the system operates directly at distribution voltage, there is no requirement for fuel supply infrastructure, on-site storage, or combustion-related auxiliary equipment. This reduces both initial capital investment and installation time.

4 Minimal Maintenance Requirements

The electrode heating loop consists of few moving parts or control systems. Its design isolates the boiler from the process water circuit, making the system less sensitive to variations in water quality and reducing maintenance intervals.

5 Environmentally Neutral Operation

The absence of combustion eliminates emissions, noise, and by-products such as fly ash or odorous fumes. There is no requirement for flue stacks or emission control units, resulting in a cleaner and quieter installation with minimal environmental impact.

Reinventing Energy

We don't just improve energy solutions — we redefine how energy is understood, produced, stored, and used. We challenge conventional energy models through deep expertise and by introducing smarter, cleaner, and more sustainable technologies. We deliver high-quality, future-ready solutions that enable our customers to achieve their energy efficiency targets and overcome the challenges of the energy transition. Together, we are building a greener future.

Reshape Energy

We develop next-generation energy systems that support the transition to net-zero with CO₂-free electrode steam and hot water solutions. Our sustainable technology portfolio includes immersed and jet-type boilers, as well as superheaters.

Restore Energy

We offer advanced energy storage, backup power, and hybrid systems designed for flexibility and resilience. Solutions include battery energy storage (BESS), standby generators, and integrated hybrid configurations.

Reform Energy

We modernise existing infrastructure through retrofit and grinding solutions, enabling a shift to cleaner fuels and circular practices. Our offering includes conversions of oil and gas boilers to biofuels and efficient fuel preparation systems.

Repair and Maintain

We provide full lifecycle services — from spare parts and maintenance to remote support. Our Finland-based warehouse and 24/7 technical service ensure reliable operation of systems across Northern Europe.

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