

High-Capacity Immersed Electrode Boilers

For Demanding Process and
District Heating Applications

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



ELECTRODE
BOILERS TECHNOLOGY BY **acme**



Performance & Benefits

CEJW boilers convert virtually 100% of electrical energy into heat. Automatic load and temperature controls provide stepless regulation of output across the full range from 10% to 100%.

Economical Installation

Operating at distribution voltage, CEJW boilers eliminate the need for fuel supply lines, storage and handling systems, economisers, and emissions control equipment, significantly reducing capital expenditure. When used as electric boilers, there is no need for step-down transformers, further simplifying the installation.

Lower Operating Costs

CEJW boilers are easy to operate. Integrated PLC-based automation minimises the need for operating and supervisory personnel. Water treatment costs are negligible due to the closed-loop VAI isolated system, which is initially filled with water of defined conductivity and quality. Automatic venting ensures complete water filling of the pressure vessel.

In areas affected by restrictions or interruptions in natural gas or where oil prices are high, CEJW boilers offer a cost-effective and reliable alternative heat source. They also allow users to take advantage of lower electricity tariffs during off-peak periods or to handle peak demand fluctuations.

Enhanced Safety

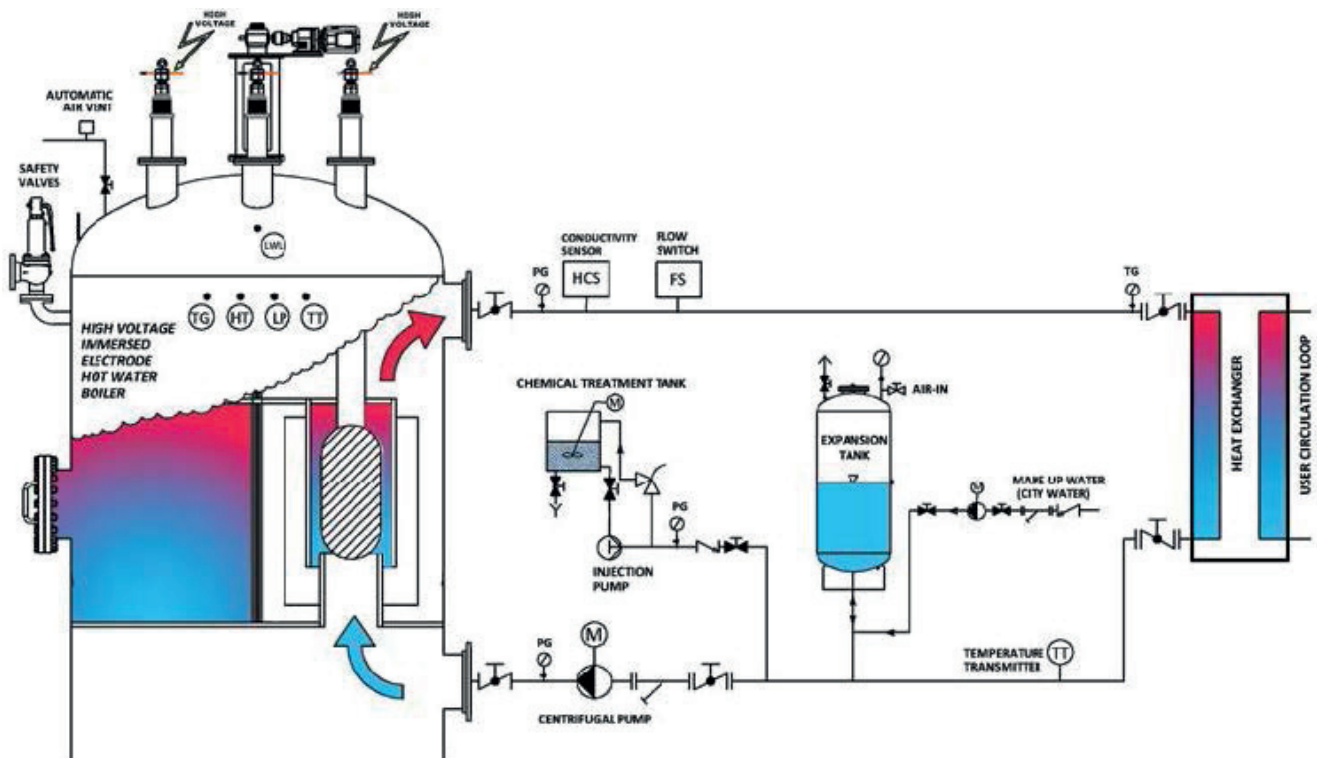
There are no combustion hazards because there are no flames, fumes, fuel lines or fuel storage tanks. There is no low water danger since the current cannot flow without water and there are no problems with heat buildup or electrode burnout even if scaling should occur. Thermal shock is eliminated. Electrically safe due to a grounded pressure vessel. A safety enclosure around boiler is not required and expensive isolating piping connections are not required.

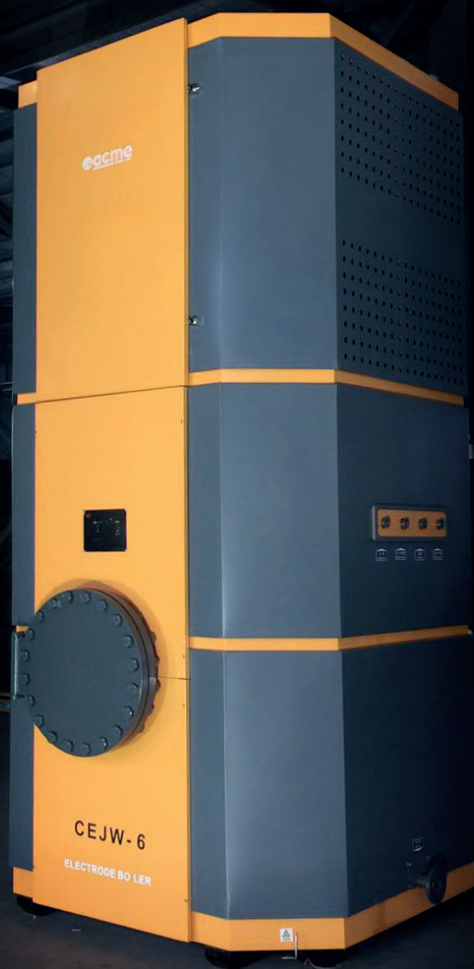
Minimal Maintenance

As no combustion occurs, there are no flames, exhaust gases, fuel lines, or storage tanks. Current cannot flow without water, eliminating the risk of low-water operation. Even under scaling conditions, there is no risk of overheating or electrode burnout. Thermal shock is eliminated, and the grounded pressure vessel ensures electrical safety. There is no need for a safety enclosure or costly isolating pipework.

Environmentally Friendly

With no combustion, CEJW boilers operate quietly, cleanly, and without emissions. Common issues associated with traditional energy sources—such as noise, fumes, fly ash, and tall exhaust stacks—are entirely eliminated.





Features

- Capacity range: 2,500 to 68,000 KW
- Electric Power Supply Voltage: 4,160 to 25,000 V
- Maximum Operating Temperature for Standard Models: 180 °C (360 ° F)
- Operating pressure: 3 to 14.5 bar
- Power Feeds (Current Passage) assembled and certified for 42,000 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
- Immersed electrode high voltage steam boiler (CEJWS) and superheated steam boiler also available

How the CEJW Model Works

The CEJW operates with the vessel flooded with water at the selected conductivity. A motorised drive system is used to position a concentric insulating counter-electrode between the main electrode and the neutral counter-electrode.

The more direct the exposure between the neutral shield and the active electrode, the greater the current draw (amperage), and the more hot water is produced. As the insulating shield is moved between the electrodes, the current path length and resulting output are adjusted. Hot water is generated in the space between the electrodes and the neutral counter-electrodes and is released into the vessel.

The Insulating Shields Can

- reduce boiler output to approximately 10% (when the power supply interrupted)
- provide a 10:1 turndown ratio.

The closed-loop hot water system is filled with water at a selected conductivity level, which is periodically monitored. The boiler's capacity can also be adjusted by varying the conductivity.

CEJW heating loop components for standard models

Boiler

The CEJW boiler system is engineered to meet the highest industry standards for safety, reliability, and performance. The pressure vessel is manufactured in accordance with CE/PED certification (design code EN 13445), ensuring full compliance and operational peace of mind.

The key features of the advanced boiler unit provide a safe, efficient, and low-maintenance solution tailored to industrial applications.

- Fully assembled and certified power feed connections, tested for operation at 41 bar and 42 kV
- Precision control via integrated boiler actuator and capacity control system
- Easy access for inspection and maintenance through a DN600 manhole
- Durable sheet metal cladding and thermal insulation for energy efficiency and personnel safety
- Safety cage around high-voltage connections and multiple safety valves
- Manual drain valve for initial filling and automatic air vent for efficient de-aeration

Circulation Pump

Available as simplex or duplex configurations. Pump capacity is matched to the electrode cooling requirements, ensuring long electrode life. The pumps are typically supplied with TEFC motors and mounted on air-cooled skids, using standard building voltage.

Heat Exchanger

Completes heating system loop including boiler and pump. Plate type construction with standard steel plates individually removable on rod. Primary circuit design method is to pump flow and heat transfer of boiler heating capacity. Secondary circuit water heats building, plant or storage facilities transferring heating boiler capacity.

Expansion Tank

Expansion tank based on total water content of the loop and its operating pressure.

Electrical

- Ground terminals
- Ground Fault Detection Relay
- Power feeds connection busbars
- Electrodes

Chemical Feed Water Tank and Injection Pump

All boilers require adequate water quality as determined by conductivity, pH, softness and chemical content. The type and degree of water treatment will be determined by local water quality, type of boiler, nature of operation, and quantity of raw make-up water required. Chemical Treatment tank equipped with a mixer and an injection pump to add chemical to heating loop water.

Instruments and Control

- Free standing control panel
- Pre-programmed electronic processor (PLC) and HMI on the panel
- Conductivity sensor to continuously monitor and control the conductivity of the Heating Loop Water
- Flow switch to continuously monitor the circulation pump water flow and interrupt the power in case of no water
- Two Temperature transmitters to control the maximum operating temperature and the boiler capacity
- Low water level
- High Temperature sensor
- Pressure/Temperature gauges
- Proximity Sensors for shield traveling limits and position
- Remote Supervision (optional)

Accessories

- Isolating valves for boiler, heat exchanger and centrifugal pump
- Piping for the loop
- Y strainer, located on the pump suction pipe
- Filling water system, connected to the Expansion tank includes pump, Y strainer, check valve and isolating valves.

Five Reasons to Choose a High Voltage Boiler

1 Output Comparable to Fuel-fired Boilers

Recent developments in high voltage electrode boiler technology enable output levels up to 68 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

Immersed 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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