Sequoia®

Electric High Voltage Immersed Electrode Hot Water Boilers

AERCO.com

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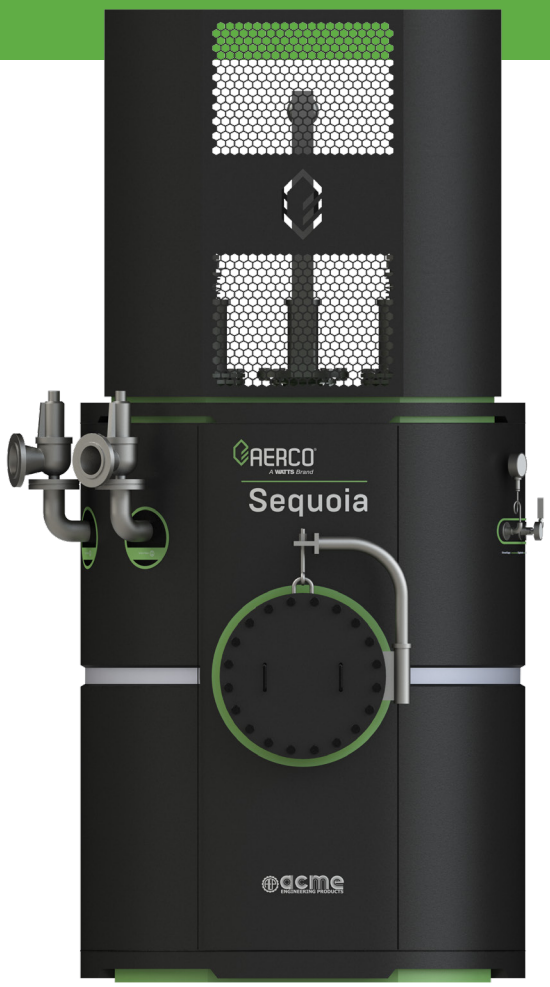
Electric High Voltage Immersed Electrode Boilers

Sequoia is AERCO's high voltage immersed electrode hot water boiler designed for large commercial and industrial applications, including hospitals, universities, and manufacturing plants. Sequoia features long-life, low-maintenance electrodes and has fewer parts to clean and maintain compared with electric element boilers. There are no combustion hazards because there are no flames, fumes, fuel lines or fuel storage tanks. Because it is virtually 100% energy efficient and emission-free, Sequoia provides an ideal solution for applications where building decarbonization or electrification are key considerations.

The boiler is simple to install and even simpler to operate and maintain. The automatic controls provide seamless control over an output range from 10% to 100% (10:1 modulation) to optimize for demand fluctuations.

Available in eight sizes from 2.5 MW to 70 MW (~8,550 MBH to 232,000 MBH) with power voltage from 4.16 kV to 25 kV.



Zero emissions and virtually 100% efficiency

10:1

10:1 turndown ratio

Fast response – 0 to 100% in around 1 minute (hot standby)

Automatic, simple controls

Peak load management

Quiet, reliable operation

Designed for safe operation

Superb warranty

Multiple Benefits and Applications

Meet Electrification and Decarbonization Goals

Quiet, clean, and emission-free with virtually 100% energy efficiency. The Sequoia boiler checks all the boxes for an effective, eco-friendly solution, ideal for building decarbonization or electrification projects. Additionally, challenges that are associated with other energy sources, such as noise, fuel fumes, fly ash and large stacks, are simply non-existent with a Sequoia boiler in place.

Lower Operating Costs

The Sequoia boiler is simple to operate with its automatic controls (PLC), reducing the need for operating and supervisory personnel. Since the boiler heating loop is isolated from the existing heating water system, costs associated with major loop water treatment are substantially reduced. Furthermore, taking advantage of lower energy rates during daily or seasonal off-peak periods can cut the energy bill significantly.

Simplify Installation

Sequoia can match the capacity of large gas or oil-fired boilers (up to 70 MW) while occupying a much smaller footprint. Operating at distribution voltages, electrode boilers eliminate the need for fuel lines, storage and handling equipment, economizers, isolating piping connections, and emission control equipment for significant savings on on capital expenditures as well as space in the mechanical room.

Ensure Safer Operation

There are no combustion hazards with Sequoia as there are no flames, fumes, fuel lines or fuel storage tanks. Nor is there any 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. The unique design of Sequoia improves safety further due to the fact that a grounded pressure vessel and a safety enclosure around the boiler are not required while in operation.

Minimize Maintenance and Improve Reliability

Sequoia is built with long-life, low-maintenance electrodes and has a minimum number of components and electrical controls compared with electric element boilers. The result is fewer parts to clean and maintain and greater reliability.

Many Applications

Ideal for applications with a need for hot process water or large space heating requirements.

How it Works

Key Features

- Immersed electrode hot water boilers
- Eight standard sizes from 2.5 MW to 70 MW*
- Pressure vessel, ASME (Section I or IV) design, CRN/U stamp pressure vessel registration
- 4160V to 25,000V power supply voltage range
- 360ºF maximum operating temperature
- 200 psi maximum operating pressure
- Complete, assembled power feeds tested and certified for 16 bar (300 psi) and 42 KV
- Boiler actuator and capacity control system
- Large 24" (DN 600) manhole
- Sheet metal jacket and 100 mm (4”) ceramic fiber thermal insulation
- Safety cage surrounding high voltage connections
- Pressure safety valves
- Manual drain (initial fill-up) valve
- Automatic air vent / air separator

Instruments and Controls

Sequoia features a free standing control panel with a pre-programmed electronic processor (PLC) and HMI on the panel for simplified, automatic control. Other features include:

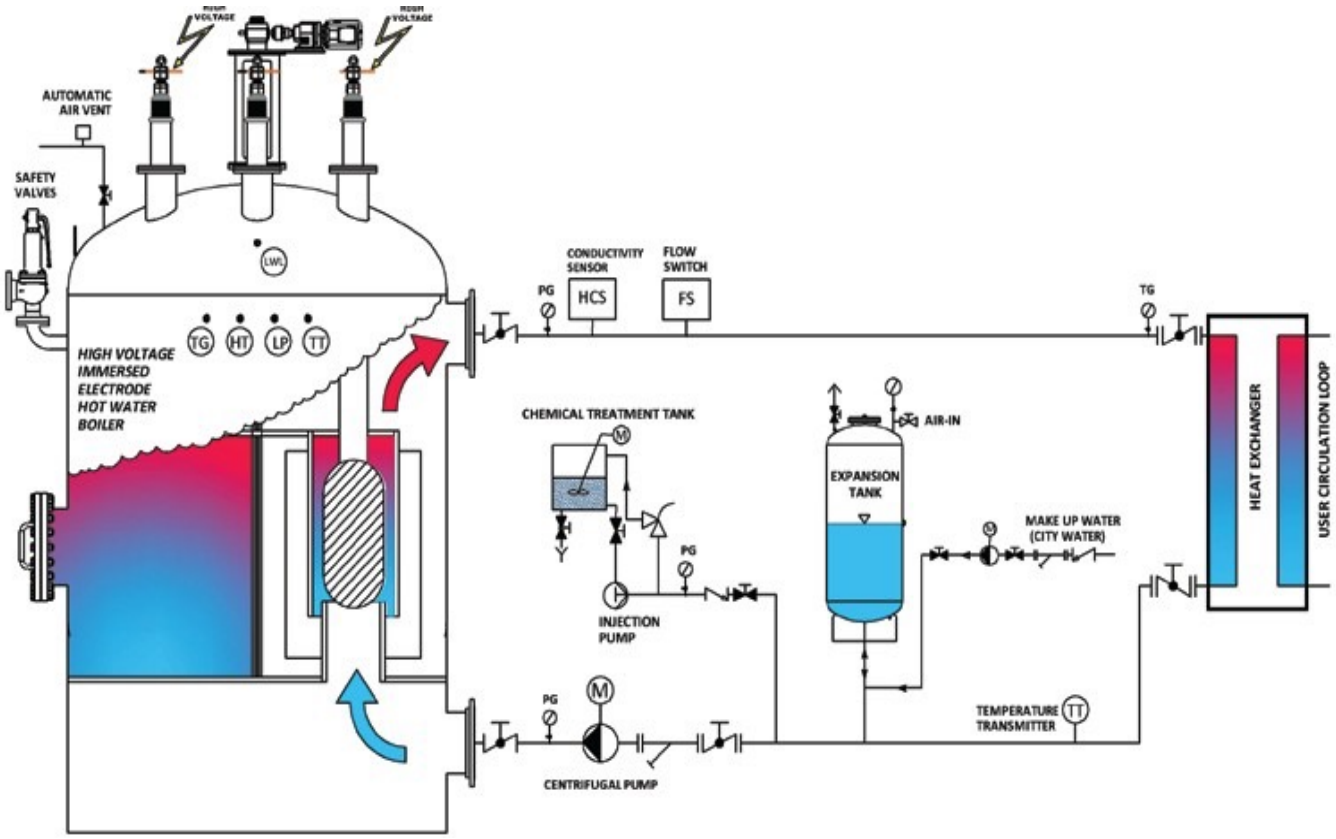
Conductivity controller and sensor | flow switch | temperature transmitters | high temp and low water sensors | pressure and temp gauges | proximity sensors | remote supervision (optional)

How it Works

The Sequoia hot water boilers operate in a closed loop (see figure, next page) which is filled with water at the selected conductivity which must periodically be surveyed.

A motorized drive system is used to interpose a concentric insulating shield between the electrode and the neutral counter electrode. The more direct the exposure between neutral counter and the electrode, the greater the current draw (amperage) and more hot water is produced. As the insulating shield is moved between the electrode and neutral electrode, the current path length and output is changed. Hot water is generated in the space between the electrodes and neutral counter electrodes and escapes into the vessel. The insulating shields can be used to turn the boiler output down to about 10%, or a 10:1 turn down ratio.

*Equivalent to 8,550 MBH and up to 232,000 MBH



Simplex or duplex **circulation pumps** move the water in the loop. The flow of each pump is determined by the cooling requirements of the electrodes to minimize wear and tear for extended lifespan. Air-cooled pump skids include TEFC motors, usually at building voltage controlled from the System Control Panel. Pressure loss in the loop determines the head of the pump at the required flow.

The **heat exchanger** is a stainless-steel plate type construction with standard steel plates individually removable on rod. The primary circuit design method is to pump flow and heat transfer of boiler heating capacity. Secondary circuit water heats building, plant or storage facilities by transferring the heating boiler capacity.

All boilers require adequate water quality as determined by conductivity, pH, softness and chemical content. Sequoia comes with a **chemical dosing system** equipped with a mixer and an injection pump to add chemical to heating loop water.

Accessories and Warranty

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
- Water treatment equipment including reverse osmosis and water softeners
- Thermal storage tanks can be incorporated as part of the heating system to store the hot water produced during periods of low demand and low cost and use it at an advantageous time; AERCO can provide storage tanks up to 3,000 gallons

Electrical Requirements

Sequoia boilers require power be supplied from a 3-phase, 4 wire solidly grounded wire system, or from isolating transformers arranged to provide such a system. The boiler shell and cage must be grounded to the building steel and ground mat. Appropriately-sized circuit switchgear and cabling may be required.

Warranty

All our Immersed Electrode Boilers are conditionally warranted for the lesser of one year in operation or 18 months after shipment against defects in workmanship and material. Consult AERCO's standard published limited warranty terms and conditions for complete warranty information.

Specifications and Dimensions

Model	Voltage (kV)	Power (kW)	# Power Feeds	Diameter x Height (inch)	Thickness (inch)	Dry Weight of Vessel (lbs)	Weight with Accessories (lbs)
CEJW-6	4.16-10	2500	3	66 x 165	1/2	3,804	4,184
	13.8	7000	3	72 x 165	1/2	4,200	4,620
	25	7000	3	108 x 165	3/4	10,116	11,127
CEJW-10	13.8	11000	3	90 x 185	5/8	7,726	8,498
	25	11000	3	108 x 185	3/4	11,551	12,706
CEJW-15	13.8	17000	6	90 x 208	5/8	8,723	9,595
	25	17000	6	108 x 208	3/4	12,986	14,285
CEJW-20	13.8	22000	6	108 x 228	3/4	11,551	12,706
	25	22000	6	120 x 228	7/8	15,384	16,922
CEJW-30	13.8	33000	6	108 x 230	3/4	14,565	16,022
	25	33000	6	120 x 230	7/8	19,291	21,220
CEJW-40	13.8	45000	6	114 x 267	3/4	20,876	22,964
	25	45000	6	120 x 267	7/8	25,802	28,382
CEJW-60	13.8	60000	9	144 x 267	1	32,393	35,633
	25	60000	9	150 x 267	1	34,121	37,533
CEJW-68	13.8	68000	9	144 x 267	1	32,393	35,633
	25	68000	9	150 x 267	1	34,121	37,533

Horizontal Units available in CEJW-6 and CEJW-10- please consult with factory for these sizes.

Other Sequoia Models

Sequoia S

Immersed Electrode Steam Boiler

- **Up to 99.5% Efficiency:** Converts nearly all electrical input into usable steam
- **10:1 Turndown Ratio:** Electronically modulated output for precise demand matching
- **Zero Onsite Emissions:** No combustion, fuel, or flue systems required
- **Fast Steam Availability:** Full output in 30–40 minutes from cold, 1 minute from hot start
- **Direct-to-Distribution Voltage:** Operates at 4.16–25 kV without step-down transformers
- **Wide-range Capacities:** From 2 MW to 70 MW and up to 300 psi steam output

Sequoia J

Immersed Electrode Steam Boiler

- **Up to 270,000 lb/hr Steam Output:** Supports high-pressure applications up to 500 psig
- **99.9% Efficiency:** Converts nearly all electrical energy into usable steam
- **Zero Combustion, Zero Emissions:** Ideal for decarbonization and clean energy goals
- **Direct High-Voltage Operation:** Connects to 4.16–25 kV, 4-wire systems
- **Compact, Low-Maintenance Design:** Jet-type electrode system reduces footprint and upkeep

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Heating and Hot Water Solutions

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