



CEJS SERIES

ELECTRODE BOILERS

4.16 - 25.0 kV • 188,000 LBS/HR

NO LOCAL EMISSIONS, FAST RESPONSE

HIGH VOLTAGE ELECTRODE STEAM BOILER

CEJS Series

- Cleaver-Brooks and Acme Therm design High Voltage Jet Type Electrode Steam Boilers for direct connection from 4.16 to 25 kV supply circuits (3 PHASE - 4 wire, grounded neutral).
- Converts all of the electrical energy input into heat for efficiencies of up to 99.9%!
- Ratings from 2 to 56 MW (at various operating pressures) and up to 188, 000 lbs. per hour
- 100 psig to 450 psig operating pressures with up to 500 psig design pressure available
- Shop assembled and pre wired mounted control panel package simplifies installation and reduces cost.
- Integrated Hawk ICS controls allow for digital metering, data logging and facility control via remote web access.
- Substantial final cost savings through the elimination of the step down transformers if used at 25 kV or other high voltage lines. This reduction saves installation of stepdown transformers along with the associated labor costs.



Control Sleeve Intercepts Jets to Modulate Capacity

How the Model CEJS works

Electrode boilers utilize the conductive and resistive properties of water to carry electric current and generate steam. An alternating current (a.c.) flows from an electrode of one phase, through neutral, to an electrode of another phase using water as the conductor.

Since the water has electrical resistance, this current flow generates heat directly in the water itself.

The more current (amps) that flows, the more steam produced. 100% of the electrical energy is converted into heat with no stack or heat transfer losses.

Water from the lower part of the boiler is pumped by the circulating pump (1) up the collection pipe (2) to the nozzle stock (3). The water is forced through the jets of the nozzle stock to strike the electrode plate (4) creating an electrical current path (R1). The unevaporated water flows from the electrode through the nozzle plate (5) to strike the counter electrode (6), creating a second current path (R2).

Control of the boiler output is accomplished by raising or lowering the control sleeve (7) which diverts the water from the covered jets directly back to the lower portion of the boiler. The control sleeve is moved hydraulically by the control cylinder (10) which, in turn, is positioned by the electronic processor boiler pressure and load control system. This control system will hold steam pressure and match boiler output to steam requirements.

The stand-by heater (14) is used to maintain pressure at a pre-set level in order to reduce start up time. A proportioning feed water regulator (not shown) maintains a constant water level in the boiler. A load monitoring system prevents the electric demand from exceeding boiler capacity and enables the boiler to be manually set at levels lower than its full MW rating.

The boiler may also be controlled by an electronic demand control system. To shut off the boiler simply stop the circulation pump.



Exposed Jets Striking Electrode



The Advantages

High Voltage Electrode Steam Boilers offer proven advantages:

High efficiency and low operating cost

Converts 100% of the electrical energy input into heat. Rapid response achieves full load within one minute from hot start. Automatic load and pressure controls provide stepless control over the full output range, from 0 to 100% to match output to system requirements.

Simple to operate and maintain, all electrical energy is converted into heat. Automatic controls reduce the operating personnel requirements. No complex pollution or combustion control equipment to operate and maintain.

No local emissions

Because the electrode boiler uses electricity instead of fossil fuels to convert energy, no local greenhouse gasses are produced, also eliminating the need for a stack.

Economical installation

Shop assembled and pre wired package eases of installation. Because fuel lines, storage and handling equipment, economizers and emission control equipment are not required, savings on capital expenditures can be significant.

Fossil Fuel Independence

For areas affected by allocations or interruptions of natural gas and costly oil supplies, electrode boilers provide a dependable source of steam. Offers a clean, easier to use alternative to fossil fuels. Allows users to take advantage of lower energy rates during daily or seasonal off peak periods.

Safer operation

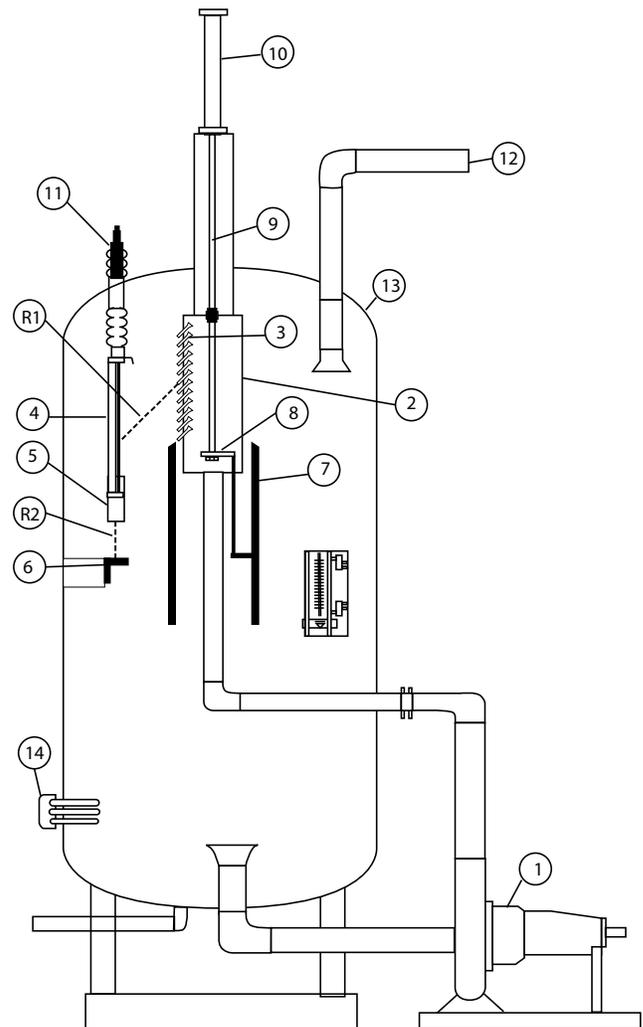
No combustion hazards because there are no flames, fumes, fuel lines or storage tanks. No low water danger since the current cannot flow without water. And no problems with heat buildup or electrode burnout even if scaling should occur. Thermal shock is eliminated.

Vertically Mounted

Vertically mounted around the inside of the pressure vessel enables the CEJS to produce maximum amounts of steam in a minimum amount of floor space.

Minimal maintenance

The absence of excessive temperatures and burnout assures long operating life. Electrode boilers have a minimum number of components and electric controls. With fewer parts and no fuel residues, cleaning and maintenance requirements are reduced. Simple control systems provide maximum reliability.



Design Features

The CEJS operates at existing distribution voltages, 4.16 to 25 kV with exceptional efficiency- up to 99.9%! Models are available to produce steam in capacities to 188,000 pounds per hour. Operating pressures available from 100 psig to 450 psig with up to 500 psig design pressure available. All CEJS boilers are designed to ASME Boiler and Pressure Vessel Code, and are certified and registered pressure vessels.

Specifications

Model No.		4.16 kV	6.9 kV	11 kV	13.2 kV	20 kV	25 kV
CEJS 400	lbs/hr @ 125 PSI	3,350	6,700	11,100	13,500	16,800	17,800
	lbs/hr @ 250 PSI	3,200	6,400	10,500	12,800	16,000	16,900
	Max Megawatts	1.0	2.0	3.3	4.0	5.0	5.3
	Vessel OD (in.)	72"	72"	72"	72"	96"	108"
	# of Electrodes	3	3	3	3	3	3
CEJS 600	lbs/hr @ 125 PSI	5,050	10,100	16,800	20,200	25,200	26,900
	lbs/hr @ 250 PSI	4,800	9,600	16,000	19,200	23,900	25,600
	Max Megawatts	1.5	3.0	5.0	6.0	7.5	8.0
	Vessel OD (in.)	72"	72"	72"	72"	96"	108"
	# of Electrodes	3	3	3	3	3	3
CEJS 900	lbs/hr @ 125 PSI	7,550	15,100	25,200	30,300	37,800	40,300
	lbs/hr @ 250 PSI	7,200	14,300	23,900	28,800	35,900	38,300
	Max Megawatts	2.25	4.5	7.5	9.0	11.25	12.0
	Vessel OD (in.)	72"	72"	72"	72"	96"	108"
	# of Electrodes	3	3	3	3	3	3
CEJS 1200	lbs/hr @ 125 PSI	10,100	20,200	33,600	40,400	50,400	53,800
	lbs/hr @ 250 PSI	9,600	19,200	31,900	38,400	47,900	51,100
	Max Megawatts	3.0	6.0	10.0	12.0	15.0	16.0
	Vessel OD (in.)	72"	84"	72"	72"	96"	108"
	# of Electrodes	3	6	3	3	3	3
CEJS 1800	lbs/hr @ 125 PSI	15,100	30,200	50,400	60,600	75,600	80,600
	lbs/hr @ 250 PSI	14,300	28,700	47,900	57,600	71,800	76,800
	Max Megawatts	4.5	9.0	15.0	18.0	22.5	24.0
	Vessel OD (in.)	84"	84"	84"	96"	108"	120"
	# of Electrodes	6	6	6	6	6	6
CEJS 2400	lbs/hr @ 125 PSI	20,150	40,300	67,200	80,800	100,800	107,500
	lbs/hr @ 250 PSI	19,200	38,300	63,800	76,800	95,800	102,100
	Max Megawatts	6.0	12.0	20.0	24.0	30.0	32.0
	Vessel OD (in.)	96"	96"	84"	96"	108"	120"
	# of Electrodes	6	6	6	9	6	6
CEJS 3000	lbs/hr @ 125 PSI	25,200	50,400	84,000	101,000	126,000	134,400
	lbs/hr @ 250 PSI	23,900	47,900	79,800	96,000	119,700	127,700
	Max Megawatts	7.5	15.0	25.0	30.0	37.5	40.0
	Vessel OD (in.)	96"	96"	96"	108"	120"	120"
	# of Electrodes	6	6	9	9	9	9
CEJS 3600	lbs/hr @ 125 PSI	30,200	60,500	100,800	121,200	151,200	161,300
	lbs/hr @ 250 PSI	28,700	57,500	95,800	115,100	143,600	153,200
	Max Megawatts	9.0	18.0	30.0	36.0	45.0	48.0
	Vessel OD (in.)	108"	108"	108"	108"	120"	120"
	# of Electrodes	9	9	9	9	9	9
CEJS 4200	lbs/hr @ 125 PSI	35,300	70,600	117,600	141,400	176,400	188,200
	lbs/hr @ 250 PSI	33,500	67,100	111,700	134,300	167,600	178,800
	Max Megawatts	10.5	21.0	35.0	42.0	52.5	56.0
	Vessel OD (in.)	108"	108"	108"	108"	120"	120"
	# of Electrodes	9	9	9	9	9	9
CEJS 5000	lbs/hr @ 125 PSI	N/A	N/A	140,100	168,300	N/A	N/A
	lbs/hr @ 250 PSI			133,100	159,900		
	Max Megawatts			41.7	50.0		
	Vessel OD (in.)			108"	120"		
	# of Electrodes			9	9		



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