CEJS SERIES

A.E.P. Thermal is offering an ACMETHERM 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).

- Ratings from 2000 kW to 65000 kW (at various operating pressures)
- 100 psig to 500 psig operating pressures available
- Do not require step-down transformers if used at 25 KV or other H.V. line voltages
- Simplified electrical installation through elimination of a number of components
- Substantial final cost savings through elimination of step-down transformer, wherever possible, structure, components and associated labour costs.
- Backed by prompt and comprehensive assistance at all levels.
Operating principles of electrode boilers

Electrode boilers utilize the conductive and resistive properties of water to carry electric current and generate steam. An a.c. current flows from an electrode of one phase, through neutral, to an electrode of another phase using the 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 heat (BTU's) generated and the more steam produced. 100% of the electrical energy is converted into heat with no stack or heat transfer losses.

Design features of Electrode Boilers

The Model CEJS High Voltage Electrode Steam Boiler, is the proven leader with more hours of operating experience over a wide range of applications. The CEJS electrodes are vertically mounted around the inside of the pressure vessel which enables the CEJS to produce maximum amounts of steam in a minimum amount of floor space.

The CEJS operates at existing distribution voltages, 4.16 to 25 kV with exceptional efficiency—up to 99.9% efficient! Models are available to produce steam in capacities to 270,000 pounds per hour. Pressure ratings range from 75 psig to 500 psig. All CEJS boilers are designed to A.S.M.E. Boiler and Pressure Vessel Code, and are certified and registered pressure vessels.

How the Model CEJS works

Water from the lower part of the boiler is pumped by the circulation 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 system requirements.

The stand-by heater (14) is used to maintain water temperature at a pre-set level in order to reduce start up time.

A proportioning feedwater 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 kw rating. The boiler may also be controlled by an automatic demand control system.

To shut off the boiler simply stop the circulation pump.

Model CEJS cross sectional diagram

LEGEND:

1. Circulation pump
2. Collection pipe
3. Nozzle stock
4. Electrode plate
5. Nozzle plate
6. Counter electrode
7. Control sleeve
8. Control linkage
9. Control cylinder rod
10. Control cylinder
11. Insulator
12. Steam outlet
13. Boiler shell
14. Stand-by heater
R1 Current path
R2 Current path
High Voltage Electrode Steam Boilers offer proven advantages...

High performance
Converting 100% of the electrical energy input into heat. Rapid response achieves full load within 15-20 minutes from cold start, 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.

Economical installation
Fuel lines, storage and handling equipment, economizers and emission control equipment are not required, saving on capital expenditures.

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

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.

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

Pollution-free
Without combustion, the operation of the CEJS boiler is quiet, clean and emission free. Problems associated with other energy sources—noise, fuel fumes, fly ash, large stacks—do not exist for ACMETHERM Boilers.

KW RATINGS AND STEAM OUTPUT

<table>
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<th>MODEL NUMBER</th>
<th>MAX KW at 125 psig</th>
<th>LBS/VAPOR/HR de 212°F</th>
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<tr>
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NOTE: At the same MW rating, dimensions change with supply voltage and pressure, but can be adapted to space availability. Exact dimensions on request.
STANDARD EQUIPMENT FOR MODEL CEJS

**Mechanical**
- Pressure vessel, A.S.M.E. design, CRN - pressure vessel registration certificate
- Manhole 14 x 18 inches
- Sheet metal jacket and thermal insulation
- Boiler circulation pump
- Water column and sight gauge
- Cage surrounding high voltage connections

**Plumbing**
- Steam valve, stop and check
- Back pressure regulating valve, pneumatic
- Safety valve(s)
- Surface blowdown valves
- Chemical feed fitting
- Modulating feedwater valve, pneumatic, with stop valve and check valve
- Flow control valve for conductivity sampling line
- Boiler blowdown valve(s)
- Boiler vent line
- Sample cooler

**Electrical**
- Neutral terminal
- Electrode terminal enclosures
- Electrodes
- Circulation pump motor and motor starter
- Ground terminal
- Stand-by heater

**Control**
- Free standing control panel
- Pre-programmed electronic processor
- Shield position indicator
- Boiler pressure gauge
- System pressure gauge
- Operating pressure control
- High pressure limit
- Water level controller, pneumatic
- Back pressure controller, pneumatic
- High and low water cut-offs

**Optional Items**
- Supply circuit protective relays
- Supply circuit switchgear
- Special valves
- Special instrumentation
- Chemical feed systems
- Steam separators
- Water treatment equipment
- Higher steam pressures
- Superheater
- Separator
- Deaerator
- Feed water system
- Blowdown tank
- Heat-exchangers, steam to water or water to water
- Heat recovery systems

**Shipping**
Models CEJS series

The unit must be laid down for shipment requiring some disassembly. Valves, trim, water column, water level controller, electrodes and circulation pump will be removed for shipping and require field installation. Unit may then be field connected to feedwater, blowdown, and steam lines, electric power and control panel.

**Water Treatment**

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.

It should be noted that the conductivity of the boiler water, alkalinity, pH and chemical content increases as steam is generated. This can normally be controlled by automatic surface blowdown of the boiler.

Most water supply systems are suitable for use with Sulzer Electrode Boilers when supplied with proper water treatment. A complete water analysis must be furnished to A.E.P.-Thermal for review in order to assure proper water quality.

**ACMETHERM Electrode Boilers for every application**

These Electrode Boilers have unlimited application possibilities wherever a need for process or space heating steam exists. A partial list of possible uses includes:
- Office and apartment buildings
- Hospitals, schools, hotels, motels
- Restaurants and food processing
- Clothing and textiles plants
- Industrial plants
- Plastic and chemical plants
- Utilities
- Power plants

**Electrical requirements:** CEJS boilers are designed for use on 3-phase, 4-wire grounded neutral systems ONLY and require a neutral be connected to the boiler shell. The boiler shell and cage must be grounded to the building steel and ground mat.

**Guarantee:** All our Electrode Boilers are guaranteed for one year against defective workmanship and material. Guarantee limited to replacement of defective parts only, when returned, prepaid, to the factory. Copy of guarantee available on request.

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The information in this bulletin is a general description of the units. All specifications are subject to change without notice. Installation, maintenance, operating and any other instructions furnished with the equipment must be carefully followed by installers, owners and users.