



PRECISION BOILERS

HVJ HIGH VOLTAGE JET ELECTRODE STEAM BOILERS



DESIGN ADVANTAGES

- Higher Efficiency - 99.5% @100% Output (will not decrease over time)
- Zero Products of Combustion
- No Air Permits Required (Frees Up Current Permits)
- Full Modulation (0% to 100%) Output
- Lower Installed Capital Cost (up to 75%)
- Better Steam Quality - 99.9%+ Pure
- Lower Maintenance Cost
- Lower Insurance Cost
- Less Chemical Usage
- Higher Reliability
- More Forgiving to Operator Error
- No Possible Damage from Low Water
- No Chance of "Catastrophic" Failure (i.e. Fireside Explosion)
- No Cold Water Shock
- Few Proprietary Spare Parts

STANDARD FEATURES AND ACCESSORIES

- ASME National Board Registered Pressure Vessel
- Boiler Circulation Pump w /VFD & Mech. Seal
- Heavy Duty Steel Vessel Housing
- Four Inch Fiberglass Insulation
- Control Manifold with Pressure Transmitter, Pressure Gauge, Pressure Limits (AR and MR)
- Low and High Water Alarms
- Control Cabinet Disconnect (w/Lockout)
- Blowdown Valves
- ASME Safety Valves (2)
- Conductivity Control with Low/High Setpoints
- Siemens PLC Control with Touchscreen HMI and Modbus RTU BMS Interface Standard.
- Ammeters, Voltmeter, Level Transmitter etc.
- Water Level Sight Glass
- Standby Electric Immersion Heater
- J-box on Boiler for Single Point Wiring
- By-pass Fedded (for Quick Chemical Addition)
- Standard Trim Ready for Operation
- Arc Reduction System
- Enhanced Controls with Auto Startup / Shutdown

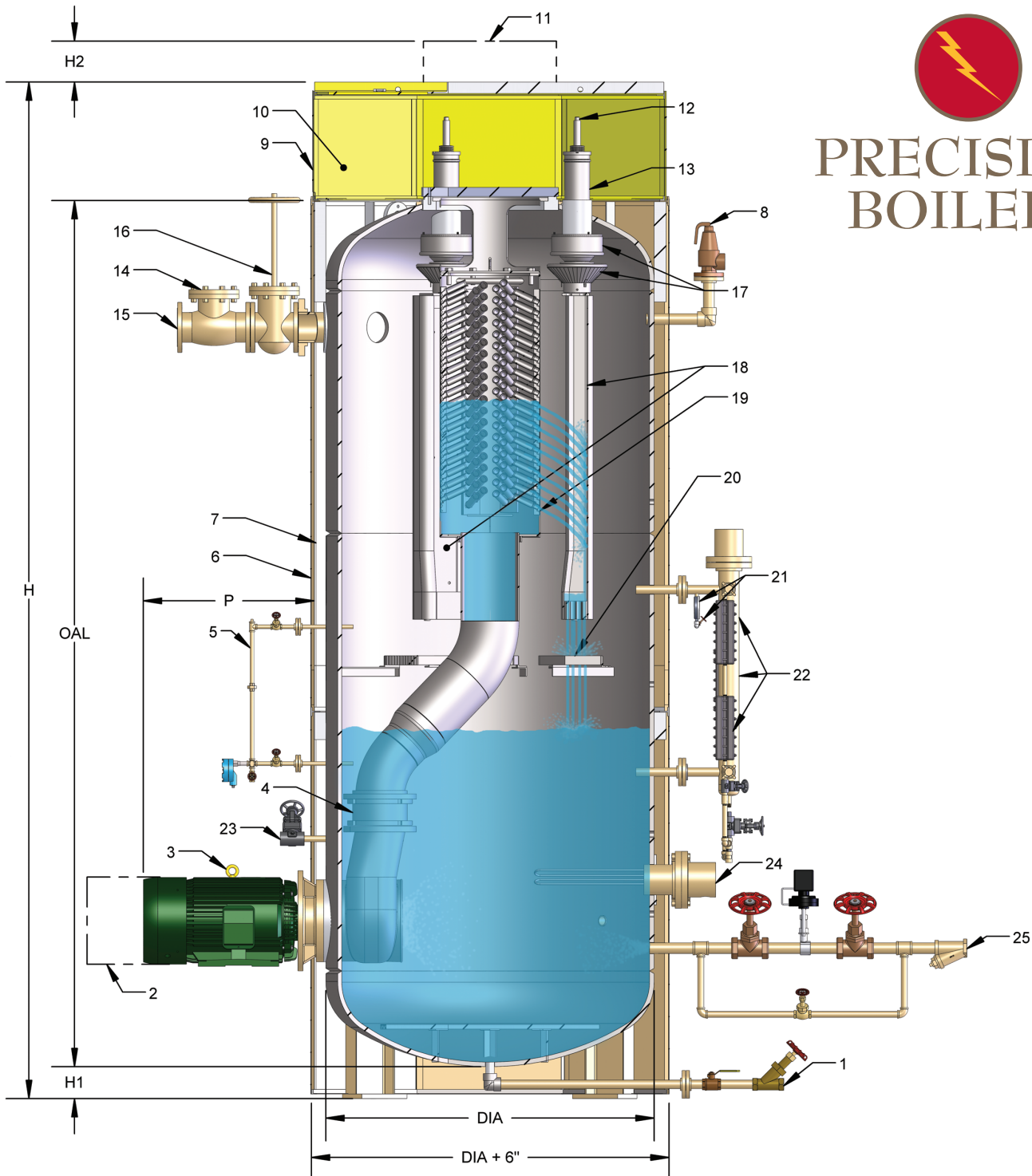
OPTIONAL EQUIPMENT AND ACCESSORIES

- Allen Bradley PLC w/ Touchscreen
- Utility Trim (no brass or bronze)
- Interface with other Building Management Systems
- Switchgear for High Voltage
- Platform for Access to Valves and HV Cage
- Jib Crane for Electrode Installation / Maintenance
- Startup Spare Parts Kit
- Steam Standby Heater Bundle and Control Valve
- Interface with Utility for KW Limiting

- Startup and Commissioning Services
- HOT WATER - SYSTEM AVAILABLE
The Precision Electrode Boiler can easily be used to produce hot water for heating or domestic use. Combined with a heat exchanger and deaerator this system can provide almost instantaneous hot water for any purpose. Contact Precision Boilers to get details on this zero emissions way to produce hot water.



PRECISION BOILERS



- 1 - Blowdown Valves
- 2 - Pump Removal Clearance
- 3 - Circulation Pump w/VFD
- 4 - Check Valve
(for multiple pumps only)
- 5 - Conductivity Cell
- 6 - Sheet Metal Enclosure
- 7 - Insulation
- 8 - Safety Valves (2)
- 9 - Electrode Terminal Enclosure

- 10 - Conduit Entrance Panel
- 11 - Header Removal Clearance
- 12 - Conductor Rod
- 13 - High Voltage Insulators
- 14 - Back Pressure Regulator
- 15 - Steam Outlet
- 16 - Non-Return Valve
- 17 - Insulator Shields
- 18 - Electrode/Strike
Plate Assembly

- 19 - Nozzle Header Assembly
- 20 - Counter Electrode
- 21 - Pressure Manifold & Gage
- 22 - Water Column & Gage
- 23 - Surface Blowoff
- 24 - Standby Heater
- 25 - Feedwater Valve w/Bypass
- 26 - Manhole



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HIGH VOLTAGE JET (HVJ) ELECTRODE STEAM BOILERS

High Capacity, Compact, Vertical Design, With 800-50,000 kW

TECHNICAL DATA

Model Number	Normal Rating (kW)**			Normal Rating PPH**			Dimensions (inches) @ 13.2 kV						Weight (lbs)***	
	4160V	6.9kV	13.2kV	4160V	6.9kV	13.2kV	Dia.	OAL	H	H1	H2	P	Ship	Operate
HVJ-114*	800	1680	3000	2700	5600	10000	60	136	166	6	6	30	10000	13800
HVJ-120*	1200	2400	4200	4000	8000	14000	60	146	176	6	14	30	10500	14900
HVJ-128*	1700	3400	6000	5700	11300	20000	60	156	186	6	24	30	11000	15600
HVJ-132*	1900	3800	6800	6300	12700	22600	60	166	196	6	29	36	11800	16400
HVJ-138*	2300	4600	8200	7700	15300	27300	60	176	206	6	36	36	13000	17800
HVJ-228	3400	6700	12000	11300	22300	40000	72	190	221	7	24	32	16000	23200
HVJ-232	3800	7600	13600	12700	25300	45300	72	200	231	7	28	32	16800	24500
HVJ-238	4600	9200	16400	15300	30600	54600	72	215	246	7	36	32	18000	27100
HVJ-328	5100	10100	18000	17000	33600	60000	84	200	233	7	22	32	23000	38000
HVJ-332	5700	11200	20000	19000	37300	67000	84	210	243	7	27	32	24000	39500
HVJ-338	7100	7100	25000	23600	46600	83000	84	210	243	7	32	32	27000	40000
HVJ-428	6800	14000	24000	22600	44600	80000	96	198	231	7	38	32	30000	47000
HVJ-432	7600	13400	27000	25300	50300	90000	96	209	242	7	43	32	31000	49000
HVJ-438	9300	15100	33000	31000	61600	110000	102	229	262	7	51	32	34000	57000
HVJ-538	11900	23500	42000	39600	78300	140000	108	234	267	7	51	36	42000	70000
HVJ-638	14200	28000	50000	47300	93200	167000	120	234	267	7	51	32	52000	82000

RATINGS AND DIMENSIONS

HVJ Model		External Circulation Pumps						Internal Circulation Pumps									
		114	120	128	132	138	228	232	238	328	332	338	428	432	438	538	638
Nominal Rating	MW	3	4.2	6	6.8	8.2	12	13.6	16.4	18	20	25	24	27	33	42	50
	PPH Steam	10,000	14,000	20,000	22,600	27,300	40,000	45,300	54,500	60,000	67,000	83,000	80,000	90,000	110,000	140,000	167,000
Configuration	No. of Electrodes	3	3	3	3	3	6	6	6	9	9	9	12	12	12	15	18
	Qty @ HP	1@10	1@15	1@20	1@20	1@20	1@40	1@50	1@60	1@60	1@75	2@50	2@40	2@50	2@60	2@75	3@60
	VFD HP	15	20	25	25	25	40	50	60	75	100	50	50	50	75	100	75
Feedwater	Flow (gpm)	20	28	40	45	54	80	90	108	120	134	166	160	184	220	280	334
Tank Capacity	Operating (gal)	475	550	575	600	650	900	1075	1150	1700	1800	1425	2100	2300	2900	3500	3800
	Flooded (gal)	1475	1650	1725	1850	2000	2450	2575	2800	3800	4100	3800	5200	5600	6800	8000	8800
Standby Heater	Rating (kW)	30	30	30	30	30	36	40	40	60	60	60	90	90	90	120	120
	Time Req'd (hrs)	9	10	8	9	10	8	9	10	15	15	13	12	13	16	15	16
Connection Sizes (Inches)	Steam Output	3F	4F	6F	6F	6F	6F	6F	8F	8F	8F	8F	8F	10F	10F	2@8F	2@10F
	Feedwater	1	1-1/4	1-1/2	1-1/2	1-1/2	2	2	2	2-1/2F	2-1/2F	2-1/2F	2-1/2F	3F	3F	3F	4F
	Bottom Blowdown	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2	2	2
	Surface Blowoff	3/4	3/4	3/4	3/4	3/4	1	1	1	1	1	1	1-1/4	1-1/4	1-1/4	1-1/2	1-1/2
	Air Release	1	1	1	1	1	1	1	1	1	1	1	1-1/4	1-1/4	1-1/4	1-1/2	1-1/2
Riser Pipe	6	6	8	8	10	10	12	12	12	12	14	12	10	12	12	14	12
Weight (Lbs)	Tank***	7,000	8,000	9,000	10,500	12,000	16,000	17,000	18,000	21,000	22,000	25,000	28,000	29,000	30,000	34,000	42,000
	Circ Pump	N/A	N/A	N/A	N/A	N/A	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
	Nozzle Header	175	250	350	400	475	750	800	850	1,500	1,500	1,500	2,200	2,400	2,600	3,000	3,600

*External ANSI pump used. **Ratings are for peak operation at 150 psi with 220F feedwater. ***Weights are for 175 psi design pressure.

Check local codes for compliance with minimum clearances. Dimensions shown on drawings and in tables are for reference only. Precision Boiler reserves the right to change dimensions without notice due to product improvements and/or product/trim options ordered. Due to the nature of welded construction, Precision Boilers, Inc. is not responsible for rough-in work that does not allow for adjustments during final installation of the product. Rough-Final pipe runs to and from the boiler and flange connections should be made after the boiler is in place.



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SPECIFICATIONS

Provide PRECISION High Voltage Electrode-Type Steam Boilers as manufactured by PRECISION Boilers, Morristown, TN for operation on _____ volts, 3 phase, 4-wire, _____ cycle AC. Boiler shall be rated _____ max KW, shall be designed for _____ psi, and shall be operated at _____ psig nominal steam pressure.

1. General

The boiler shall be built to ASME Code Section I, Part PEB, and shall consist of a pressure vessel having a central column (header) from which water flows through nozzles toward the electrodes which surround the header. Regulation of the boiler output shall be accomplished by controlling the water level in the nozzle header so that a greater or smaller number of nozzles are supplied with water, and thus, a greater amount of water comes into contact with the boiler electrodes. The boiler electrodes shall be located entirely in the boiler steam space so that stopping of the boiler circulation pump will automatically effect boiler shutdown.

2. Boiler Circulating Pump(s)

The boiler circulating pump(s), located inside the pressure vessel for all vessels larger than 60" diameter, shall be mixed-flow centrifugal type rated for continuous duty at the boiler operating pressure and temperature, and shall be designed for compatibility with low NPSH.

3. Electrodes

Boiler electrodes shall be of mild steel construction, with replaceable electrode strike plates, and shall be supported by insulators of high grade porcelain with protective surface coatings to extend the life over standard porcelain insulators. The electrodes shall incorporate dielectric barriers on splash guard surfaces to eliminate spray-induced arcing and increase reliability for long term operation. The insulators on the steam side shall be protected from flowing steam by shields. Critical discharge surfaces of the porcelain shall be conductive, and shorting clips shall be used to bridge all air gaps. Steam leakage paths shall be provided to indicate the condition of the insulator sealing gaskets.

4. Pressure and Load Controls

The boiler control system shall incorporate both pressure control and current load control in the primary control system in a manner which will permit the boiler to maintain the desired steam pressure so long as the steam demand does not exceed a set maximum KW limit; Conductivity of the boiler water shall be monitored continuously and the sensor shall

have isolation capability so normal cell maintenance can be performed with the boiler in operation. A PLC controlled air vent will automatically operate based on KWH calculations for the exhaust of non-condensable gasses that may enter the boiler during operation. The controls will bear an "Industrial Control Cabinet" UL label.

Unless otherwise specified, the control system shall be via PLC with a Touchscreen HMI. The PLC may include a modem and shall also be able to communicate with several standard protocols (such as MODBUS RTU or MODBUS TCP/IP). Check with factory for compatibility with the Customer's DCS/BAS system. System shall be Siemens, or Allen Bradley (AB) at a premium cost.

5. Standard Boiler Accessories

The boiler shall be supplied with the following necessary equipment: water column with drain valve, safety valves, back pressure regulating valve, standby heater, steam stop and check valves, feed-water control valve with 3 valve bypass, sample cooler, circulation pump seal cooling automatic valves, flow switches and flow indicator, manual and auto air vents, blow-down and surface blow-down valves, safety cage with locking mechanism for the high voltage connections.

6. Feedwater Treatment

Feedwater treatment equipment, if needed, is to be furnished by others. Feedwater hardness limits shall be based on a feedwater analysis and the percent of makeup water required. Conductivity required for the water in the boiler to enable full load operation will be in the 1400 to 2500 micromho/cm range. Feedwater conductivity, however, is recommended at less than 100 micromho/cm for efficient boiler operation, unless blowdown losses can be economically recovered via heat exchangers.

7. Manufacturing Expertise

Boiler supplier must be ISO 9001 certified and ASME accredited with National Board Authorization for ASME Section I and Section VIII Division 1. Boiler shall be supplied by a manufacturer that has field installed at least 50 electrode boilers within the last 10 years. A copy of the certificate for ASME and National Board must be provided as well as an electrode boiler reference list with contact information indentified in such a manner as to facilitate verification by the client.

Represented in your area by:

Precision Boilers
5727 Superior Drive
Morristown, TN 37814



PRECISION BOILERS

PHONE: (423) 587-9390
FAX: (423) 581-7749
E-mail: sales@precisionboilers.com
WEB: www.precisionboilers.com