



# PRECISION BOILERS



## FPS VERTICAL FIRETUBE STEAM BOILER

### DESIGN ADVANTAGES

The PRECISION Model FPS Vertical Firetube Steam Boiler features the traditional firetube design in the vertical configuration with an underfired power burner. In addition to the simplicity of the 4-piece design, the Model FPS includes many advantages over other vertical configured boilers such as larger water volume and steam chest which reduce cycling and improve overall efficiency, easier sludge cleanout, standard "off-the-shelf" burners, and the proven firetube reliability. An integral feedwater preheater eliminates "cold water shock" problems characteristic of some fixed tubesheet designs.

### STRINGENT STANDARDS

- ASME Section IV "H" Code (15psi)
- ASME Section I "S" Code (150 psi)
- CSD-1 Compliance (units > 400,000 BTU)

### STANDARD FEATURES AND ACCESSORIES

- ASME Pressure Vessel w/ National Board Registration
- Seamless Steel Firetubes
- Turbulators for maximum heat transfer
- 4-piece Construction (vent collector + tank + combustion chamber + burner)
- Structural Steel Skid
- 16 Gauge Steel Jacket (square jacket standard)
- High Density Insulation
- High efficiency UL Listed Power Flame power gas, light oil or combination burners
- UL Listed Assembly
- Heat transfer area sized at up to 4.5 sq ft per bhp to obtain up to 84% efficiency
- Main & Auxiliary Safety Shut Off Gas/Oil Valves
- Honeywell Combustion Controls
- Main Gas Regulator and Cock and/or Oil Pump
- Air Proving Switch (gas only)
- Flame Inspection Port

- Tank Inspection/Cleanout Openings (4)
- Internal Feedwater Preheater
- Standard mechanical trim to include:
  - Pressure Control (Off-On)
  - Pressure Limit (Manual Reset)
  - ASME Safety Valve(s)
  - Pressure Gauge with Gauge Cock
  - Feedwater Stop & Check Valves
  - Full-Port Bottom Blowdown Valve(s) (2 on units>100 psi)
  - Combination Float-type Level Control/Low Water Cutoff with Blowdown Valve
  - Water Level Sight Gauge with Blowdown Valve
  - Manual Reset Probe-type Low Water Cutoff w/Pilot Light
  - Surface Blowoff Provision
  - Single Point Utility Connections

### OPTIONAL EQUIPMENT AND ACCESSORIES

- Wide Choice of Burners
- Motorized Gas Valve(s)
- Low-High-Low or Modulating Control
- FM or IRI Compliance
- Fireye Combustion Control
- Outside Air Intake Adapter
- Side or Rear Flue Connection

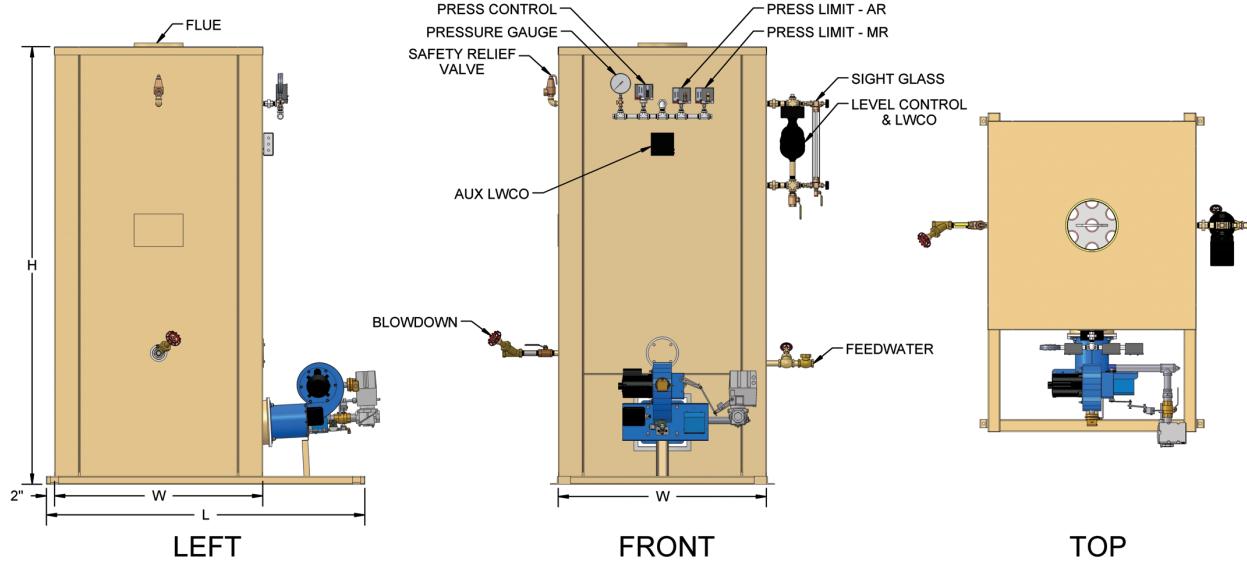
- Automatic Feedwater Solenoid Valve (Installed)
- Automatic Timed Surface Blowoff System (Installed)
- Low Pressure Switch/Alarm
- Auxiliary Float-type Low Water Cutoff
- Vacuum Breaker (Installed)
- Skid Mounted Package with Condensate/Feedwater Tank, Blowdown Tank, etc.



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**DIMENSIONAL DATA**



NOTE: MINIMUM OF 18" CLEARANCE AROUND BOILER.

**PHYSICAL DATA**

MODEL NUMBER	NOM BOILER HP	RATED INPUT MBTU	NOM OUTPUT PPH*	VESSEL DIMS (IN.)		WATER VOL** (GAL)	OVERALL DIMENSIONS (IN.)			CONNECTIONS (NPT)				FLUE SIZE	BURNER BLOWER HP (GAS)	
				DIA	HEIGHT		W	L***	H	FEED WATER	BLOWDOWN 15PSI	150PSI	STEAM OUTLET 15PSI	150PSI		
FPS-24-06	6	250	210	24	45	52	28	50	80	3/4"	1"	1"	1-1/2"	1"	6"	1/4
FPS-24-09	9.5	400	330	24	54	64	28	50	91	3/4"	1"	1"	1-1/2"	1"	6"	1/4
FPS-24-10	10	420	340	24	57	69	28	50	94	3/4"	1"	1"	1-1/2"	1"	6"	1/4
FPS-31-15	15	630	520	31	48	88	35	57	85	3/4"	1"	1"	2"	1"	8"	1/4
FPS-31-20	20	840	690	31	60	117	35	57	97	3/4"	1"	1"	2"	1"	8"	1/3
FPS-39-20	20	840	690	39	45	128	43	65	80	3/4"	1"	1"	2-1/2"	1-1/4"	8"	1/3
FPS-39-25	25	1,050	880	39	52	156	43	65	89	3/4"	1"	1"	2-1/2"	1-1/4"	10"	1/3
FPS-39-30	30	1,260	1,030	39	60	188	43	65	97	3/4"	1"	1"	3"	1-1/2"	10"	1/3
FPS-46-35	35	1,470	1,210	46	48	196	50	76	83	3/4"	1-1/4"	1"	3"	1-1/2"	12"	1/3
FPS-46-40	40	1,674	1,370	46	52	218	50	76	89	3/4"	1-1/4"	1"	3"	1-1/2"	12"	1/3
FPS-58-50	50	2,110	1,730	58	52	275	62	88	87	1"	1-1/4"	1"	4"FF##	2"	12"	1/3
FPS-58-60	60	2,500	2,050	58	60	332	62	96	95	1"	1-1/4"	1"	4" F	2"	14"	1
FPS-58-72	72	3,000	2,460	58	64	336	62	96	101	1"	1-1/4"	1"	4" F	2"	14"	1
FPS-62-72	72	3,000	2,460	62	56	319	66	106	91	1"	1-1/4"	1"	4" F	2"	14"	1
FPS-62-84	84	3,500	2,870	62	64	378	66	106	101	1"	1-1/2"	1"	4" F	2-1/2"	16"	1-1/2#
FPS-62-100	100	4,200	3,440	62	64	325	66	106	105	1"	1-1/2"	1"	6" F	3" F	16"	1-1/2#

\*From and At 212°F.

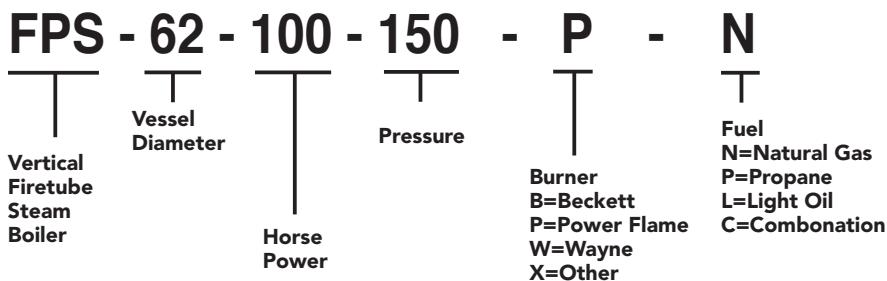
\*\*Actual Operating; multiply by 1.3 to obtain approximate flooded volume

\*\*\*Dependent on burner stick-out; Dimension given is for Power Flame burners

# Indicates 3-phase blower (includes stepdown transformer for burner controls)

## Indicates Flanged Connection (150#RF)

**HOW TO SELECT A MODEL NUMBER**





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### CONVERSIONS/EQUATIONS

$KW = \frac{GPH \times \Delta T (\text{°F})}{410} = \frac{LPH \times \Delta T (\text{°C})}{862}$ $KW = GPM \times \Delta T (\text{°F}) \times .146$ $10KW = 1.02 \text{ BHP} = 34 \text{ Lbs Steam/H} = 34,120 \text{ BTU/H}$ $GPH = \frac{KW \times 410}{\Delta T (\text{°F})} \quad \text{Amps (3 phase)} = \frac{KW \times 1000}{Volts \times 1.732}$ $GPH = \frac{BTU/H}{8.33 \times \Delta T (\text{°F})} \quad \text{Amps (1 phase)} = \frac{KW \times 1000}{Volts}$ $BTU/H = KW \times 3412 \quad BTU/H = \Delta T \times 500 \times GPM$ $1 \text{ gal water at } 62\text{°F} = 8.34 \text{ Lbs} \quad 1 \text{ cu ft} = 7.48 \text{ gallons}$ $1 \text{ cu ft water at } 62\text{°F} = 62.4 \text{ Lbs} \quad 1 \text{ ft water} = 0.435 \text{ psi}$ $\text{Enthalpy of water} = \text{Temp (°F)} - 32 \text{ BTU/LB}$	<b>SATURATED STEAM: PRESSURE vs. TEMPERATURE</b> <table border="1"> <tbody> <tr><td>0 psig</td><td>= 0 KPa</td><td>= 212°F</td><td>150 psig</td><td>= 1034 KPa</td><td>= 366°F</td></tr> <tr><td>8 psig</td><td>= 55 KPa</td><td>= 235°F</td><td>175 psig</td><td>= 1207 KPa</td><td>= 377°F</td></tr> <tr><td>15 psig</td><td>= 103 KPa</td><td>= 250°F</td><td>200 psig</td><td>= 1379 KPa</td><td>= 388°F</td></tr> <tr><td>30 psig</td><td>= 207 KPa</td><td>= 274°F</td><td>225 psig</td><td>= 1551 KPa</td><td>= 397°F</td></tr> <tr><td>50 psig</td><td>= 345 KPa</td><td>= 298°F</td><td>250 psig</td><td>= 1724 KPa</td><td>= 406°F</td></tr> <tr><td>80 psig</td><td>= 552 KPa</td><td>= 324°F</td><td>300 psig</td><td>= 2068 KPa</td><td>= 422°F</td></tr> <tr><td>100 psig</td><td>= 690 KPa</td><td>= 338°F</td><td>350 psig</td><td>= 2413 KPa</td><td>= 436°F</td></tr> <tr><td>125 psig</td><td>= 862 KPa</td><td>= 353°F</td><td>400 psig</td><td>= 2758 KPa</td><td>= 448°F</td></tr> </tbody> </table>	0 psig	= 0 KPa	= 212°F	150 psig	= 1034 KPa	= 366°F	8 psig	= 55 KPa	= 235°F	175 psig	= 1207 KPa	= 377°F	15 psig	= 103 KPa	= 250°F	200 psig	= 1379 KPa	= 388°F	30 psig	= 207 KPa	= 274°F	225 psig	= 1551 KPa	= 397°F	50 psig	= 345 KPa	= 298°F	250 psig	= 1724 KPa	= 406°F	80 psig	= 552 KPa	= 324°F	300 psig	= 2068 KPa	= 422°F	100 psig	= 690 KPa	= 338°F	350 psig	= 2413 KPa	= 436°F	125 psig	= 862 KPa	= 353°F	400 psig	= 2758 KPa	= 448°F
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### BURNER OPTIONS

As with all power-fired boilers, the burner is the heart of the unit. PRECISION has chosen as its standard the Power Flame burner for the majority of applications, and either Wayne or Beckett burners as economical choices for low Hp boilers, with other burners available as options. The Power Flame burner is one of the industry's leading burners and is well suited for this application. The FPS boiler's large combustion chamber and generous heat release area have been carefully matched to the burner size to obtain up to 84% efficiency on natural gas, and up to 86% on light oil. The proven Honeywell combustion control system is provided as standard for gas/oil burners, with other systems available as options.

### CONTROL OPTIONS

Off-On control is standard and is quite sufficient for boilers up to 30 Hp. However, boilers rated 35-50 Hp may have better operation with low-high-low burner controls, and 60-100 Hp boilers may be best suited with a modulating control system.

### CONTACT US FOR THESE QUALITY PRODUCTS

- Electric Storage Heaters 125 to 5500 Gallons
- Electrode High Voltage Boilers
- Thermal Storage Systems Space Heating & Domestic or Process Water; Electric, Gas or Steam Fired
- Boiler Feedwater Systems
- Pressure Vessels Water Storage Tanks Flash Tanks Blowdown Tanks
- Unfired Hot Water and Steam Generators
- Deaerators and Surge Tanks
- Steam Superheaters-Electric
- Circulation Heaters-Electric
- Gas or Oil-Fired Vertical Firetube Boilers and Water Heaters
- Gas or Oil-Fired WaterTube Boilers (Flextube Type)
- Chemical Bypass Feeders and Automatic Chemical Feed Systems

**NOTE:** In pursuing our policy of continuous development of products, PRECISION reserves the right to vary any detail in this bulletin without notice.



# PRECISION BOILERS

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### SPECIFICATIONS

Note: Items shown in parentheses () are options

#### 1. GENERAL

Furnish and install as shown on the plans one (1) Precision model FPS-\_\_\_\_ forced-draft, (gas) (oil) (gas/oil) fired, vertical firetube steam boiler rated at \_\_\_\_ boiler horsepower. Boiler shall be designed for a maximum allowable working pressure of (15 psi)(150 psi) and shall deliver \_\_\_\_ lb/hr (F & A 212°F) of steam at \_\_\_\_psi (up to 135 psi) operating pressure. Boiler shall be completely factory assembled and tested, with controls and trim as specified below. Complete package shall be UL Listed and shall carry the Underwriters Laboratories Listing Mark. Units rated at 9.5 boiler horsepower and over shall also comply with ASME CSD-1. Boiler shall be designed for \_\_\_\_V, \_\_\_\_PH, \_\_\_\_HZ electrical supply with single point power connection.

#### 3. PRESSURE VESSEL

Vessel shall be constructed and stamped in accordance with ASME Section IV (15 psi) or Section I (150 psi) and shall be registered with the National Board. Shell and tubesheets shall be fabricated from carbon steel. Tubes shall be 2" OD x 0.105" wall SA178A ERW tubing. Vessel shall be stress relieved (units > 15 psi design) and equipped with inspection openings as required by ASME Code.

#### 3. Combustion Chamber

Combustion chamber shall be fabricated from steel plate, lined with ceramic fiber blanket. Combustion chamber wall and bottom shall be of monolithic construction, formed from high temperature refractory, not less than 4" thick.

Represented in your area by:

#### 4. Burner

Provide forced-draft, flame retention head burner to burn (natural gas) (oil) (gas/oil) with (off-on) (low-high-low) (full modulation) firing rate control. Burner shall be equipped to fire at a maximum input of \_\_\_\_ Btu/hr at an elevation of \_\_\_\_ ft. Blower motor shall be 3450 rpm design with motor starter (units over 3/4 hp). Burner controls shall conform to UL795 (and CSD-1, FM, IRI codes). For electrical supplies other than 120V, the burner shall be equipped with a control circuit transformer.

#### 5. Boiler Controls

Boiler shall be provided with the following controls:

- Properly sized ASME safety valve(s) set at \_\_\_\_psig, manual drain valve and pressure gauge with gauge cock.
- Operating control and manual reset high limit control with siphon manifold; high-low modulating control (where appropriate).
- Automatic reset, float type primary water level control with water level gauge glass and manual blowdown valve; probe type auxiliary water level control with manual reset with pilot light.
- Slow-opening and quick-opening bottom blowdown valves (units > 100 psi).

#### 6. Packaging

Complete package shall be factory assembled and mounted on structural channel support skid. All specified components are to be mounted, piped and wired. Boiler shall be insulated with a minimum of 4 inches of 3/4 pound density fiberglass and housed in a rectangular, 16 gauge enamel painted steel jacket. Jacket temperatures shall not exceed 130°F during continued operation at high fire. Lifting lugs shall be provided to allow rigging of package during installation.

#### 7. Quality Control

Complete packaged boiler shall be manufactured by Precision Boilers in strict accordance with ASME Boiler and Pressure Vessel Code in an ISO 9001 quality system.

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