

**THERMIFLIC®  
GAS-FIRED  
HOT WATER  
BOILER**

## TRUST THE P-K THERMIFIC GAS-FIRED, HOT WATER BOILER FOR THE HIGHEST EFFICIENCY IN A COMPACT PACKAGE...

The P-K Thermific gas-fired, hot water boiler features state-of-the-art design: A radial-fired burner surrounded by a concentric vertical heat exchanger with integral finned copper tubes. This unique design enables the boiler to operate at an A.G.A. certified thermal efficiency of 85%. The P-K Thermific boiler produces the highest thermal efficiency level that a non-condensing gas-fired boiler can achieve.

Whether the P-K Thermific boiler is operating continuously or intermittently, it does not produce highly corrosive condensate in either the heat exchanger or vent system. This prevents maintenance problems and extends the boiler's service life.

The quality and integrity of the P-K Thermific boiler are backed by over 120 years of P-K heat transfer experience and our solid reputation for producing reliable products.

### ...IN A COMPLETELY PACKAGED DESIGN...

The P-K Thermific boiler is completely packaged, including burner and controls, pre-wired and mounted in a totally enclosed cabinet. It is readily installed and requires only five connections: gas, electric, vent (standard insulated or double-wall "B" vent) and water supply with return.

The boiler is encased inside air-tight double metal walls with air space between them to provide effective insulation. The result is that the outer wall is only slightly warm to the touch without need for refractory or insulation. This allows the boiler to be installed on combustible floors.

### ...WITH A 10-YEAR GUARANTEE!

**Patterson-Kelley guarantees the P-K Thermific boiler heat exchanger against thermal shock for TEN YEARS when it is installed as a closed-loop, forced-circulation hot water boiler.**

## OPERATING COST COMPARISON

The P-K Thermific Boiler vs. a conventional boiler

The P-K Thermific Boiler			BTUH Input @ 75%	Annual Gas Savings*
Series	BTUH Output	BTUH Input		
700	595,000	700,000	793,333	\$1,015
1000	850,000	1,000,000	1,133,334	\$1,450
1200	1,020,000	1,200,000	1,360,000	\$1,741
1500	1,275,000	1,500,000	1,700,000	\$2,176
1700	1,445,000	1,700,000	1,926,667	\$2,466
2000	1,700,000	2,000,000	2,266,667	\$2,900

\*Savings are based on the P-K Thermific boilers 85% thermal efficiency and the average 75% thermal efficiency obtained by most boilers operating 1,600 hrs./yr. with gas costing .68/therm.



## THE SMALL SIZE PRODUCES BIG OUTPUT!

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The P-K Thermific boiler is so compact that even the largest model can be moved through a 30" doorway. This makes the boiler relatively easy to install. More importantly, these boilers, rated at 2,000,000 BTU, can replace larger boilers through the installation of multiple units in a modular configuration.

## THE BURNER/HEAT EXCHANGER IS THE KEY TO EFFICIENT PERFORMANCE.

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The radial-fired, fan-assisted burner with a screen-type diffuser fits vertically into the circular heat exchanger. This vertical burner/heat exchanger design produces a higher thermal efficiency than is possible with any conventional horizontal gas-fired boiler.

Flame distribution is controlled by the pre-calculated free area of the screen. The fuel mixture is controlled by calibrated injection ports and an adjustable air shutter to produce a clean-burning blue flame. The burner can be quickly and easily removed from the exchanger for cleaning or inspection.



## THE UNIQUE TUBE CONFIGURATION PROVIDES A HIGH HEAT TRANSFER RATIO.

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Integral finned copper tubes, arranged vertically with removable cast iron cylindrical headers, comprise the heat exchanger section. This unique tube configuration provides a high heat transfer ratio and a fast response to load requirements. Since the finned tubes completely surround the burner, ambient losses are eliminated. All the hot gases are forced over the tubes, maximizing heat transfer and thus producing the high efficiency.



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## OPERATING PRINCIPLES

Air and fuel are pre-mixed and ignited through the radial-fired burner. The closed-loop heat exchanger is designed for counter-flow operation to optimize heat transfer. The flue gas, which does not condense, exits through the vent, which can be a standard insulated or double-wall "B" vent. A pressure stack is not required.

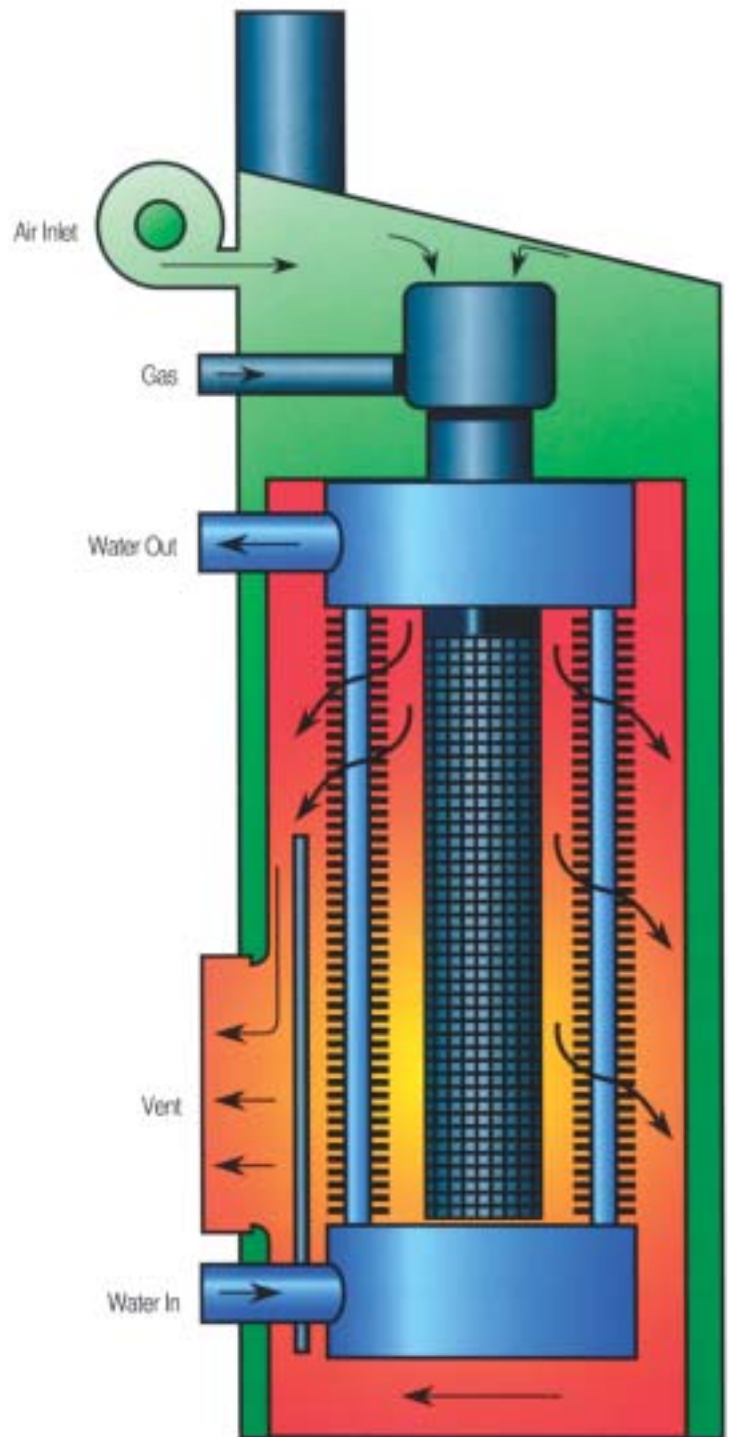
## OPERATING SEQUENCE

When heat is required (as indicated by water temperature), the operating temperature control switch signals to the micro-processor-based flame safe-guard programmer. The programmer energizes the blower motor and the air-flow differential pressure switch, providing a specific prepurge time. This allows the boiler to purge any residual gas.

After the purge is complete and correct air flow is established, the programmer powers the ignition transformer and the gas pilot is spark-ignited. When the pilot flame is detected by the UV sensor, a signal is sent to the programmer which then opens both main gas valves. The main burner ignites and the pilot is de-energized. When the desired water temperature is reached, the operating control switch opens and the programmer closes both main gas valves.

When the water temperature is reduced by the load on the system, the operating temperature control switch will close again. This sequence recycles automatically to the start of the cycle provided that the limits on water flow and gas pressure are met.

Lo Hi Lo operating controls are provided on the 1500, 1700 and 2000 series boilers. This provides two position modulation with an enforced low fire start. This solid state operating temperature control, including an LCD digital display, assures more accurate temperature control when the boiler must follow a varying system load.



## QUIET OPERATION

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The P-K Thermific boiler operates quietly and below OSHA standards. Examples of applications are found inside hospitals, libraries, churches, nursing homes, penthouse equipment rooms, schools and other commercial real estate applications.

## MODULAR INSTALLATION MAKES THE P-K THERMIFIC IDEAL FOR RETROFITTING.

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The boiler's compact, modular design allows multiple units to be installed in tandem, in small areas, to meet virtually any heating load. This is especially advantageous in replacing a large boiler in an inaccessible location. Each boiler operates independently, retaining its own high thermal efficiency resulting in a high turn-down ratio for the system.

## DESIGN CERTIFICATION

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The P-K Thermific boiler is A.G.A. design-certified as a non-condensing, Category I boiler for natural gas. The boiler is constructed and stamped in accordance with ASME Code Section IV for 160 psig at 250°F. The P-K Thermific boiler is also CGA (Canadian Gas Association) approved.

## EACH BOILER IS FIRE-TESTED BEFORE SHIPMENT.

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A critical part of our Quality Assurance Program is that each P-K Thermific boiler is fully fire-tested before shipment. A fire-Test Report, which includes fuel-air settings and combustion test results under full load conditions, is provided with each boiler. An Installation Guide is also supplied. It provides instructions on installation, start-up procedures, lighting and shutting down the boiler as well as basic instructions for operation and maintenance.

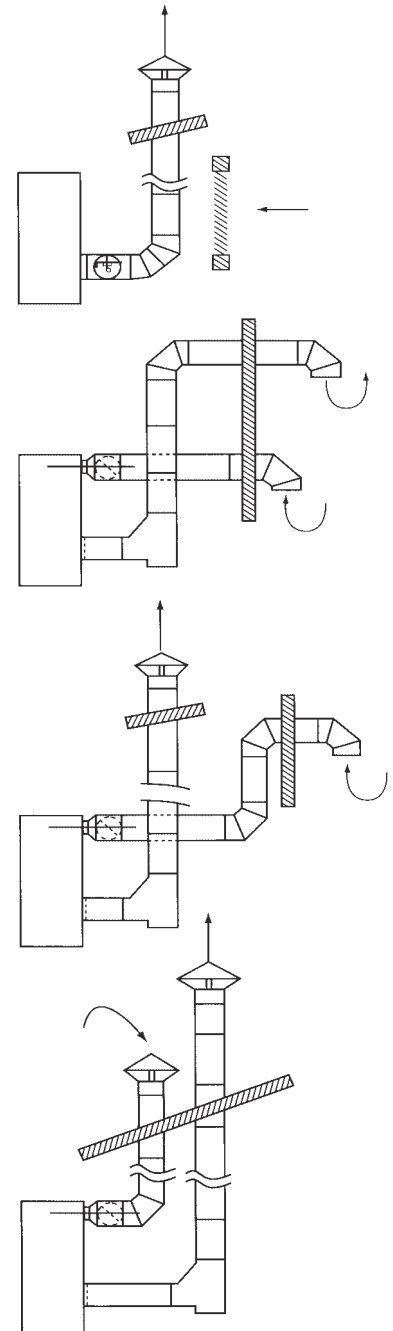
## START-UP POLICY

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Factory-authorized start-up service is provided for each P-K Thermific boiler to assure its proper operation. This service includes inspecting the boiler installation and combustion system for optimum performance under local conditions. Personnel are instructed on the operation and maintenance of the equipment.

## DIRECT VENT/ SEALED COMBUSTION

Flexible capabilities include conventional venting as well as A.G.A./C.G.A. – certified direct vent/ sealed combustion with length of 100 equivalent feet for either intake or exhaust.



# CAPACITIES AND DIMENSIONS

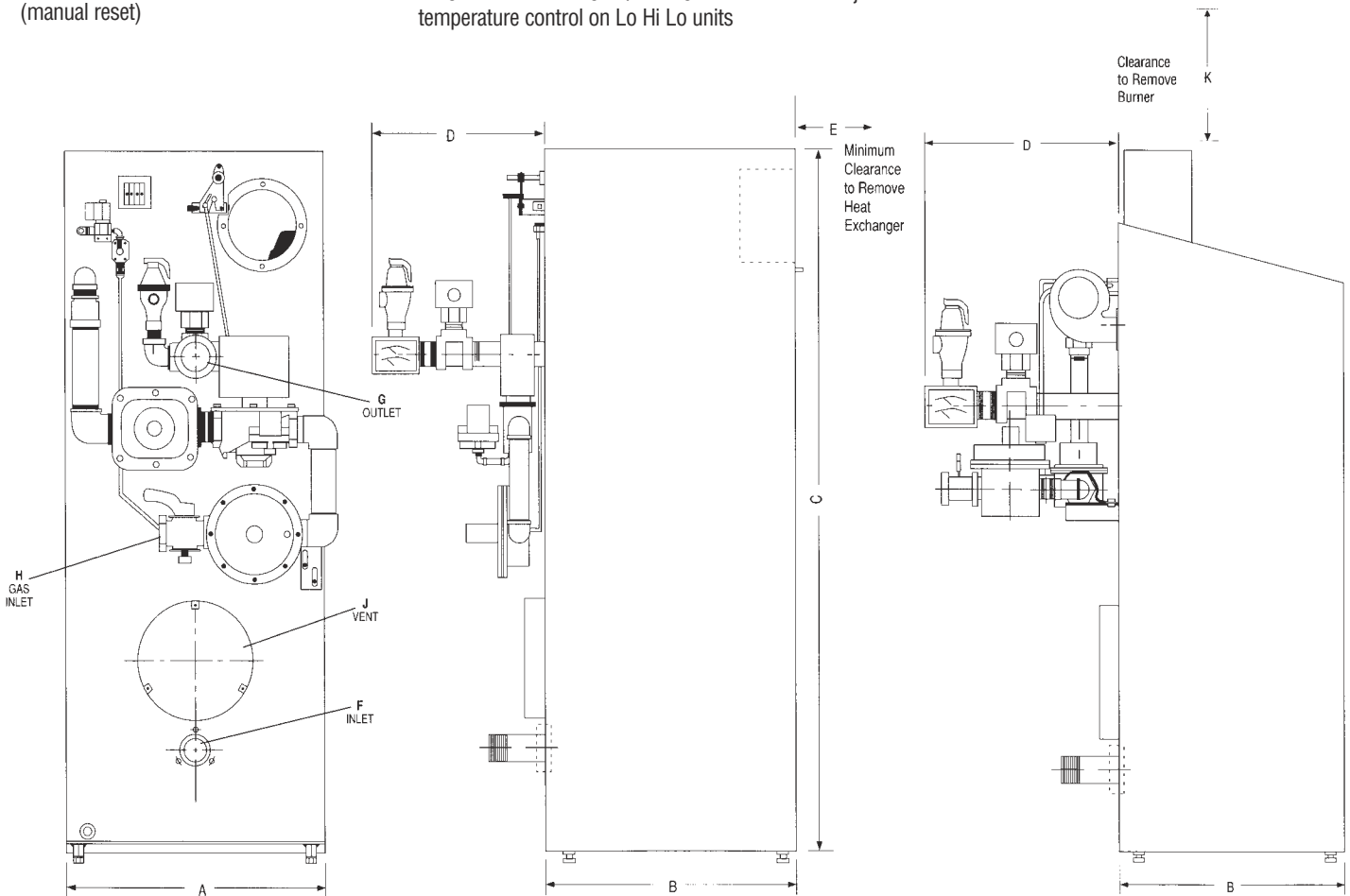
Series	BTU Input	BTU Output	Boiler H.P.	A	B	C	D	E	F MPT	G FPT	H FPT	J	K
700	700,000	595,000	17.7	19 5/8	21	55 7/8	14 1/2	24	2	2	1 1/4	10	18
1000	1,000,000	850,000	22.8										
1200	1,200,000	1,020,000	30.1										
1500	1,500,000	1,275,000	38.0	25 5/8	26 1/4	67 3/4	15 1/2	24	2 1/2	2 1/2	2	12	24
1700	1,700,000	1,445,000	43.2										
2000	2,000,000	1,700,000	48.2										

A.G.A. design-certified for natural gas. ASME certified for 160 PSIG, Section IV, National Board Registered C.G.A. approved for installation with "B" vent.

Please see submittal drawings for complete details.

## STANDARD FEATURES

- Pressure-temperature gauge
- Water flow switch
- ASME pressure relief valve
- Two diaphragm main gas valves on Series 700, 1000 and 1200
- Two motorized main gas valves on Series 1500, 1700 and 2000
- Main gas pressure regulator (14" W.C. max. inlet)
- Low gas pressure switch (manual reset)
- Main gas cock
- Solenoid pilot gas valve
- Pilot gas pressure regulator
- Pilot gas cock
- Interrupted spark-ignited pilot
- Flame safe-guard programmer
- Hi-limit temperature control with manual reset
- Operating temperature control
- Programmable 2-stage operating temperature control on Lo Hi Lo units
- Differential air proving switch
- Radial-fired power burner
- Integral, finned copper water tubes
- Adjustable inlet air shutter
- Blower assembly with "C" frame motor
- Diagnostic annunciator
- 16-gauge (min.) steel outer cabinet
- 16-gauge aluminum inner cabinet
- Baked epoxy finish
- Adjustable levelers



## SPECIFICATIONS Patterson-Kelley Thermific Boilers

(note: tailor ( ) items to meet project specifics)

Supply \_\_\_\_\_ gas-fired, hot water boiler(s), P-K Thermific Model \_\_\_\_\_, as manufactured by Patterson-Kelley. The boiler shall be American Gas Association and Canadian Gas Association approved and shall not release any condensate during operation.

The boiler shall be designed for operation with natural gas (propane) and have an American Gas Association and Canadian Gas Association certified input of btu/hr operating at a thermal efficiency of 85%. The boiler shall be constructed and stamped in accordance with Section IV of the ASME Code of low pressure heating boilers with a maximum water working pressure of 160 psi. Form H-3 Manufacturer's Data Report for Water Tube Boilers shall be provided.

The boiler shall have \_\_\_\_\_ sq. ft. of heating surface. Tubes shall be 7/8" I.D. finned copper, installed vertically and rolled into top and bottom collectors. Tubes shall be straight without bends. "V" baffles between tubes are not acceptable. Heat exchanger shall have a minimum of three passes with removable cast iron headers.

The heat exchanger shall be guaranteed against thermal shock for ten years when the boiler is installed as a closed-loop, forced-circulation hot water boiler. The gas burner shall be the radial-fired, fan assisted type and constructed of steel. The burner shall utilize a screen-type diffuser to produce a full 360° flame pattern.

Fuel-air mixture shall be controlled by multiple calibrated brass orifices and a venturi core equipped to measure air-flow rate to the burner. Both orifices and venturi core must be capable of being replaced without requiring removal of the burner from the boiler. (Boilers shall be low-high-low firing type (low fire to be 60% of high fire rate). Both gas and air volume must be varied to maintain proper combustion at both low and high firing rates.)

The trim shall include a combination temperature/pressure gauge and an ASME-rated pressure relief valve set at \_\_\_\_\_ psi. The control system shall be supplied for 120 volts, single phase, 60 hertz. (The burner controls shall be arranged for low-high-low firing, utilizing a solid state, digital operating temperature controller with an LCD display.)

The limit circuit shall also include a manual reset high-limit temperature controller with a field adjustable range of 100°F to 240°F, water flow switch, differential switch to sense air flow to the burner and a manual reset low gas pressure switch.

A probe type, manual reset low water cut off shall be shipped loose for field piping and wiring.

The boiler shall include an interrupted-type pilot system with electronic spark ignition. An ultra-violet flame sensor shall control pilot and main flame. The boiler shall have an A.G.A./U.L. approved microprocessor-based integrated burner flame safeguard control. The control shall have a non-volatile diagnostics memory capable of maintaining operational history such as total cycles, running hours, flame signal, fault history and sequencing status, which can be displayed on an optional digital display. The control shall have a predetermined prepurge cycle, a 10-second pilot trial for ignition and a 10-second pilot flame-establishing period. Control shall be a Honeywell model RM7895C 1020 flame safeguard.

The combustion chamber shall be a minimum 16-gauge and be constructed of corrosion-resistant aluminum. It shall be enclosed in a minimum 16 gauge steel, air-tight outer cabinet with an insulating airspace between the combustion chamber and the outer cabinet. The outer cabinet shall be finished, both inside and outside, with a baked epoxy finish and be equipped with a heat-resistant glass port for observation of the burner operation. The boiler shall be capable of operating at rated capacity with a pressure at the inlet of the boiler gas train of 4" to 14" W.C.

Main gas manifold shall consist of A.G.A./C.G.A. listed and approved manual cock, pressure regulator, separate low gas pressure switch and two separate main safety shut-off valves. Pilot gas manifold shall consist of A.G.A. listed and approved pilot cock, pressure and regulator and solenoid valve. Both manifolds shall be totally accessible for adjustment and servicing without the necessity to remove any sections of the jacket or cabinet assembly. All gas valves shall be 120 volt. (IRI boilers shall include a normally open vent valve and high gas pressure switch. Motorized gas valves on N900 through N1200.) (Lo-hi-lo equipped boilers must be supplied with an A.G.A./C.G.A. listed and approved two-position gas valve actuator and characterized gas valve with linkage to combustion air damper.)

Boiler control panel shall have a diagnostic annunciator, which visually displays each stage of the firing control sequence as well as any safety lockouts in the limit circuits. Temperature set-point adjustments must not be accessible without opening the control panel enclosure.

Boiler must be fully factory fire-tested prior to shipment. Manufacturer shall supply copies of the Fire Test Report, including fuel/air settings and combustion test results.

The entire boiler shall be factory assembled and fire-tested, requiring either a double-wall or an insulated type "B" vent. Boiler shall not require any type of special stack such as AL29C. The boiler shall be A.G.A./C.G.A. approved for use with a "B" vent. Boiler shall be A.G.A./C.G.A. certified for installation on combustible floors without additional parts or modifications. A barometric damper must ship with each boiler for field installation in vent piping.

Boiler start-up must be by a factory trained and certified technician.

### Sealed Combustion/ Direct Vent Option

The boilers must be certified by A.G.A./C.G.A. for direct vent/sealed combustion. No air from the mechanical room/building shall be utilized for combustion air or vent dilution air.

Provide the boiler with sealed air intake with a direct duct to outside air. The boiler shall accept and air intake duct with a maximum of 100 "equivalent" feet in length. Termination fittings on the boiler must be supplied by the boiler manufacturer.

An interlocked air tight damper must be provided in the duct, which will open on "call for heat" and drive closed when the firing cycle is completed to prevent any potential damage from sub-freezing temperatures.

The boiler shall be installed with a sealed venting system (see venting specification) that will not permit room air to infiltrate (barometric dampers or draft hoods are not acceptable). The boiler must be certified to accept a venting system with a maximum of 100 "equivalent" feet.

Materials of construction for the air intake and venting systems must comply to the boiler manufacturer's A.G.A. and/or C.G.A. certification.



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