

IMPORTANT-PLEASE NOTE  
PLEASE SUBSTITUTE THE TERM  
"THERMAL FLUID"  
FOR THE WORD "WATER"  
IN THESE INSTRUCTIONS

**GENERAL BASIC INSTALLATION INSTRUCTIONS**  
**DIRECT FIRED HOT WATER BOILERS**  
**PARKER BOILER CO.**

For a proper installation and in order to receive the best in operating life and efficiency from your Parker Hot Water Boiler, it is essential to follow the Manufacturer's Minimum Standards and all the Requirements of State and Local Codes. Before installing the Boiler carefully review these General Basic Installation Instructions, the specific Installation Instructions and the Installation Drawings as these instructions illustrate the Recommended Installation Procedure.

**CAUTION:** ALL INFORMATION ON THESE SHEETS IS IMPORTANT. Failure to give all factors proper consideration may result in an unsafe and inefficient installation. Manufacturer's Recommendations are a Minimum Standard for Satisfactory Installation. The installation must also follow all Safety Codes including the ASME Boiler and Controls Codes, National Fuel Gas Code (NFPA 54/ANSI Z223.1), National Electric Code (NFPA 70), Uniform Codes and other applicable National, State, Local and Servicing Gas Supplier Codes. Only trained and qualified personnel should install, startup, operate, adjust, repair or maintain this boiler equipment.

Parker Boilers are equipped with Code required safety controls, which will automatically shutdown boiler when unsafe conditions are sensed. Customer must provide adequate supervision when service interruption or freeze-up presents a problem. Boilers, tanks, pumps and piping in areas subject to freezing conditions must be drained or protected. All Hot Water System components including the expansion tank must be rated for a pressure at least equal to the Boiler Maximum Allowable Working Pressure. If a hot water storage tank is used, it must be equipped with a safety relief valve. A Combination Temperature and Pressure type is recommended for domestic or potable water supply heating.

**I. SELECTION OF A BOILER:**

THE FOLLOWING FACTORS SHOULD BE GIVEN VERY CAREFUL CONSIDERATION IN SELECTION OF THE BOILER:

(1) SIZE OF THE BOILER: The Boiler must be of adequate capacity to handle the maximum hourly load of the particular application, plus radiation losses. It is considered good practice to install a Boiler of sufficient capacity to handle future expansion requirements or to allow space for an additional future Boiler. On critical or large installations, it is recommended to install two or more Boilers, each sufficient size to handle the minimum load so that the operation is not interrupted when one of the Boilers is being serviced. If the load is not definitely known, it is advisable to consult the boiler manufacturer or competent personnel to determine the load.

(2) APPROVED TYPE QUALITY BOILER:

The Boiler should be a quality, approved Boiler, manufactured and furnished in full compliance with the Safety Requirements of the A.S.M.E. Code. The Boiler selected should be safe, efficient and easy to maintain to provide economical and reliable service. The Parker Bent Water Tube is highly recommended as it provides one of the safest, most economical and long life systems that is easy and inexpensive to maintain.

(3) TRIM AND CONTROLS:

The Boiler should be equipped with fully automatic controls to provide automatic and safe operation. All Trim and Controls should comply with Local Code, the State Safety Orders, the A.S.M.E. Codes and Underwriters' Laboratories. A flame safeguard, operating control, high limit, low water cutoff and dual safety shutoff fuel valves are considered essential on all Boilers.

(4) PROPER BOILER SPECIFICATIONS:

The complete Boiler Specifications should be thoroughly reviewed for the proper temperature and working pressure required, the most economical fuel available and proper electrical requirements.

**II. INSTALLATION AND OPERATING PERMITS:**

Before installing the Boiler be certain that all Permits for the installation and operation of the boiler have been taken out and installation conditions approved by the Building Inspection Jurisdiction. Permits are usually required on the Boiler and Utilities including Gas, Electrical, Water, Vent and Plumbing Connections. Some States and Cities require a Field Inspection by a State or National Board Commissioned Boiler Inspector and a "Permit to Operate" issued before the Boiler is placed in service. Heavy Penalties and Unsafe Conditions may result when these Permits and Inspections are not obtained from the Inspection Jurisdiction. If Local Codes or Insurance Carrier require additional or special controls, the boiler manufacturer should be consulted so that the equipment can be furnished as required.

### **III. BOILER ROOM AREA AND BOILER BASE:**

Consult with Local Codes for Boiler Room and Fire Resistive Separation if required and refer to Paragraph IV. The Standard Boiler is not recommended for outside installation without providing the required protection from weather and drafts. An approved floor sump or drain must be provided in the Boiler area to accommodate safety relief valves, boiler drains and leaks from any source. Floors should be properly planned and graded to the floor sump or drain to prevent water damage.

When Boiler Rooms are necessary, two access doors are always recommended and normally required. The larger door should be adequate to permit the Boiler to be moved in and out without disassembly. Location of the Boiler Room should be selected as conveniently near the load as possible with all installation factors considered. Do not install the boiler in any location where flammable liquids or vapors are likely to be present or drawn. Keep the area around the boiler free of combustible materials, gasoline, paint, thinner, solvents and other flammable liquids and vapors.

BOILER MUST BE INSTALLED ON A NON-COMBUSTIBLE FLOOR preferably of concrete and properly designed to support the required weight and to protect against any Fire Hazard. Combustible floors require an Approved Fire-Proof Base, consult Manufacturer. Do Not install on wood, carpet, vinyl tiles, black-top or on concrete with wood or electrical conduit imbedded or directly underneath without consulting Manufacturer for an approved base.

### **IV. BOILER CLEARANCES:**

MINIMUM UL LISTED BOILER CLEARANCE TO COMBUSTIBLE CONSTRUCTION (Atmospheric Nat. Gas Only): Cabinet Sides and Rear: 12"; Cabinet Top: 48"; Single Wall Chimney Connector for Models with Barometric Damper: 12"; Single Wall Vent Connector for Models with Draft Hood: 6"; Hot Water Piping: 1".

MINIMUM UNLISTED BOILER CLEARANCE TO COMBUSTIBLE CONSTRUCTION (Unlisted & Power Burner Models): Cabinet Sides and Rear: 18"; Cabinet Top: 48"; Single Wall Chimney Connector for Models with Barometric Damper: 18"; Single Wall Vent Connector for Models with Draft Hood: 18"; Hot Water Piping: 1".

RECOMMENDED CLEARANCE FOR ACCESS: Boiler must also be installed with adequate clearance for Maintenance, Repair and Inspection Access. Passageways and Inspection Doors: 18"; Controls: 24"; Boiler Control Panels: 30" Additional space may be required by the Local Inspection Jurisdiction.

### **V. AIR SUPPLY:**

The Boiler requires fresh air for safe operation and must be installed so there are provisions for adequate combustion and ventilation air. In confined rooms (rooms whose volume is less than 50 cu.ft. per 1000 BTU aggregate input) or unconfined boiler rooms of tight construction, two permanent air openings shall be provided, one within 12" of the top and one within 12" of the bottom of the boiler room.

AIR SUPPLY FROM OUTSIDE BUILDING: If the boiler room is confined or the building is of tight construction, openings shall be provided that communicate freely with outdoors. The two openings should have a total free area of 1 sq.in. For each 1000 BTU of input if attached to horizontal ducts; or a total free area of 1/2 sq.in. for each 1000 BTU if attached to vertical ducts or connected directly through an outside wall. Consideration should always be given to the blocking effect of louvers in determining total free area. Wood louvers may be assumed to have 20-25% free area and metal louvers and grills to have 60-75% free area.

AIR SUPPLY FROM INSIDE BUILDING FOR CONFINED ROOMS: The two openings should have a total free area of 2 sq.in. for each 1000 BTU of input communicating directly with an unconfined space with adequate infiltration.

In hot climates additional ventilation should be provided to maintain reasonable temperatures in boiler room. Always leave adequate clearance around the base and legs of the Boiler so that air freely enters the combustion area. Be certain that additional air supply is provided if there are exhaust fans or other equipment installed which draw air from the boiler room. Air supply should be provided from a non-hazardous and clean source so that no flammable vapor, lint or dust is admitted to the boiler room. The Boiler air supply must be isolated from any source of corrosive chemical fumes such as perchlorethylene, chlorine, etc. Consult Local Code or Manufacturer for any unusual conditions.

### **VI. VENT:**

#### **A. COMBUSTION VENTS:**

The proper Boiler Venting System is required to assure the necessary draft for efficient combustion and to develop a positive flow adequate to convey all products of combustion safely to outside atmosphere above the building. All venting must be in conformity with accepted engineering practices, to the Manufacturer's Minimum Standards, and in compliance with the Local Code in every respect. All Vent Systems should be installed in a safe workmanlike manner, properly supported and joints secured to prevent leakage. Never drill holes or screw metal screws into double wall vent. DO NOT SUPPORT THE WEIGHT OF THE VENT ON THE BOILER.

**VI. VENT - Continued**

The Boiler Vent should preferably be circular and of metal, installed to Local Code Specifications for Vent Material and all Installation Conditions. Do not reduce vent size or connect more than one appliance to a single vent unless in compliance with good safe accepted practices and with approval of the Building Inspection Authority. The Main Vent should run straight up from the Boiler and if horizontal runs are necessary, these should be as straight and direct as possible with a minimum rise of at least 1/4" per lineal foot. Long horizontal runs are not recommended and must not exceed 75% of the vertical height of the vent above the connector. Proper vent clearance must be provided from any combustible material, wall openings or exit way. In cold climates, outside vents must be properly insulated.

The Draft Hood or Barometric Damper must be installed directly on the Boiler Vent Outlet as shown and in the same room with the Boiler. Do not terminate vents near windows, doors, ducts, air conditioning or air supply fans which might pick up flue products exhausted from the boiler room and return them into the building, causing a serious health hazard to occupants. An unrestricted full size vent cap should be installed on the top of the stack to protect from wind and rain.

When installation conditions require special vents or draft inducers, the design and safety controls should be approved by Competent Combustion Personnel. When a draft inducer is required, always install a suitable draft switch and wire this into the boiler control circuit to prevent the boiler from firing unless the draft is proven. If a draft inducer is used, the boiler requires a positive pressure type chimney from the outlet of the inducer to the termination. In planning the vent installation, carefully review these Instructions and consult with the Building Inspection Authority on the Local Code for the Required Approval.

These are the Manufacturer's Recommended Minimum Standards but all installation materials and conditions must conform to the Local Code Requirements and good safe engineering practices for the particular installation.

**(1) VENTS FOR ATMOSPHERIC GAS FIRED BOILERS WITH DRAFT HOODS:**

SEE BELOW:

**(2) CHIMNEYS FOR BOILERS WITH BAROMETRIC DAMPERS**

**(2) CHIMNEYS FOR BOILERS WITH BAROMETRIC DAMPERS:**

**ALL BOILERS EQUIPPED WITH BAROMETRIC DAMPERS MUST BE CONNECTED TO SUITABLE CHIMNEYS.** These Boilers may be classified as Residential-Type, Building Heating or Low Heat Appliances with flue gas temperatures below 600°F. A UL Listed Factory Built Chimney (Minimum Residential Type or Building Heating Appliance Type for Negative Pressure) should be installed in accordance with the Manufacturer's Instructions. Chimney connectors shall be galvanized steel minimum 22 GA thru 12" diameter, 20 GA thru 16" diameter, and 16 GA over 16" diameter. The chimney must terminate at least 3 feet above the roof and 2 feet above any part of the building within 10 feet. When a chimney extends through any story above that in which the boiler is located, including drop ceilings and crawl spaces, it should be enclosed within continuous non-combustible construction of the appropriate fire resistive rating with a minimum 12" clearance for access. If a single wall metal chimney is used it should be steel minimum of 10 GA. Support for this type chimney should be independent of building construction with the load transferred to the ground. Single wall metal chimney installed through a combustible roof or wall must be guarded at the point of passage with the required ventilated metal thimble or the combustible material cut away to provide not less than 18" clearance (12" UL Listed Atmospheric Gas Fired Models) on all sides of the chimney. The Red Stops on the Barometric Damper should be removed on gas fired boilers but must remain in place on all oil and combination fired boilers. When a Flue Gas Spillage Switch is furnished on gas fired boilers it is pre-wired but must be properly mounted above the damper as described on a separate bulletin. On all jobs, particularly high altitudes or restrictive vent conditions, it is advisable to call in Competent Combustion Personnel to make a Complete Combustion Test for setting of draft to obtain best efficiency and safety. Draft should be set for best combustion efficiency as low as possible without the presence of CO or Smoke in the flue gas.

**VI. VENT - Continued**

(a). ATMOSPHERIC GAS FIRED MODELS: With full size chimney installed to proper height never less than 5', a minimum draft of not less than .02 to .04" W.C. negative pressure should be experienced below the barometric damper.

(b). POWER BURNER MODELS: With full size chimney installed to proper height, never less than 12', a minimum draft of not less than .04 to .06" W.C. negative pressure should be experienced below the barometric damper.

**B. CONTROL & VALVE VENTS:**

On certain Systems, the gas pressure regulator and other gas components require separate vent lines to outside atmosphere. These controls are Marked when vents are required and they must be piped full size outside the building to a Safe Point of Discharge away from all personnel, ignition sources and air intakes. Gas pressure regulators above 1" size (above 3/8" size for medium or high pressure gas service) must be piped outside.

Controls requiring atmospheric vents such as gas pressure switches and gas pressure regulators that are not equipped with integral vent limiters, must be piped outdoors to a safe point of discharge. Do not vent into combustion chamber. A means must be provided at the termination point to prevent a stoppage of the line by foreign material, moisture, or insects. In the event of diaphragm rupture, gas will be discharged from vent.

Atmospheric vent lines must not be connected to any gas vent, bleed or relief line. Atmospheric vent lines, when manifolded, shall be connected to a common vent line having a cross sectional area not less than the area of the largest vent line plus 50 percent of the areas of all the additional vent lines.

NORMALLY OPEN FUEL VENT VALVE (if furnished) is sized in accordance with the following chart of nominal pipe sizes:

FUEL LINE SIZE:	<u>Up to 1-1/2"</u>	<u>2"</u>	<u>2-1/2 to 3"</u>	<u>4"</u>
VENT LINE SIZE:	3/4"	1"	1-1/4"	2"

During installation, remove plug and pipe this valve out of building to a safe point of discharge in outside atmosphere. Vent Line is to be run full size out of building with no traps. Vent piping shall terminate away from all windows, doors and building air inlets. A means must be provided at the termination point to prevent stoppage of the line by foreign material moisture, or insects. This vent line must be run separate from atmospheric control vent lines such as gas pressure regulator and gas pressure switches. NOTE: Some gas will be discharged from the normally open fuel vent valve during normal operation. Valve should be tested frequently for any sign of leakage.

**VII. SAFETY RELIEF VALVE:**

The discharge drain outlet must be piped full size independent of all other piping without any shut-off valves. Safety Relief Valve Drain may be larger than valve inlet size and must always be piped full size. Install piping with sufficient flexibility to allow for free expansion and properly support so there is no strain on the Safety Relief Valve Body and Piping. Pipe to a safe point of discharge to prevent any possibility of personal injury and within 18" from the floor or into an open receptacle protected by a Splash Shield. If discharge cannot be piped to a completely Safe Location in the boiler room, such discharge should be piped outside the room to a Safe Location. If piped upwardly a drain line should be provided at the low point to keep this line drained. Secure the piping so it cannot rise to cause personal injury when Safety Relief Valve discharges. If piping is a considerable distance, install a union near the Safety Relief Valve Outlet for convenience of changing valve when required.

**VIII. PIPING:**

PIPING IN GENERAL: Use only Code Approved pipe, fittings and valves. The maximum temperature rating for malleable fittings is 350°F for Class 150 and 550°F for Class 300.

BOILER DRAIN: A Drain Valve must be installed on the lower header at the opening provided (Item 17D). Connect to safe drain receptacle (see Paragraph III) for draining Boiler or flushing when necessary. Since the Boiler is designed for closed system heating, it should be flushed and drained only periodically when dirty. Any unnecessary loss of treated water from the Boiler System can be detrimental to the life of the Boiler and System piping unless carefully controlled.

**WARNING: ALL PIPING MUST BE SECURED SO THAT IT CANNOT COME LOOSE DURING BOILER OPERATION. DO NOT STAND ON OR APPLY ANY STRAIN TO PIPING, CONTROLS AND VALVES.**

**IX. UTILITIES:****(1) FUEL SUPPLY:**

Do not use this boiler with any other fuel than the one listed on the nameplate. Provisions must be made for adequate fuel supply, proper size fuel lines, proper size gas meter and correct gas pressure if required. Refer to the correct Specification Sheet (D-201-I through D-205-VI) for the BTU Input, gas pressure required and G.P.H. oil required. It is essential that the correct type fuel to specification and an adequate fuel supply be provided to assure efficient operation, proper boiler operating capacity and safety. All fuel piping must conform to the Local Code Requirements. Piping must be securely braced and fittings must always be clean and free of excessive pipe joint compound, Teflon tape and cutting and threading burrs and chips. Pressure test fuel piping in accordance with national and local codes. Never pressure test a fuel line with the Boiler connected as this may cause damage. Before firing the Boiler, be sure that all controls, valves and piping are tight and did not come loose in shipment. Use a soap-and-water solution to check for fuel leaks. Never use a match or open flame. Check that all test plugs on the fuel line are securely in place before firing and after making all adjustments. **ONLY QUALIFIED BURNER SERVICE PERSONNEL SHOULD START-UP, ADJUST OR SERVICE THIS EQUIPMENT.**

On Gas Fired Boilers one Upstream Gas Cock is furnished and an additional Gas Shutoff Cock (not furnished) is required to be installed near the Boiler. A drip leg should be installed at low point on the gas line just before connecting to the Boiler controls. Gas lines should be cleaned out before connecting to the Boiler. Before starting the boiler, open the cabinet inspection door and make certain that all burners and the pilot are securely in place and properly positioned.

**A. NATURAL GAS:** Natural Gas Burners are satisfactory for use on Natural Gas Fuel, 950 to 1150 B.T.U. content per cubic foot with .65 specific gravity. The Manufacturer should be notified of any change in pressure or fuel specifications that are not Standard so that the burner will be properly furnished for best operating efficiency and safety. The Gas Company should be notified before installation so that proper gas facilities can be provided.

(a.) **NATURAL GAS WITH ATMOSPHERIC BURNERS:** A pressure of 7" to 14" W.C. is recommended at the Gas Inlet for Models below 5 Million BTU Input (larger sizes require 10-14" W.C.). The Gas Pressure Regulator furnished will reduce pressure to 4" W.C. required at the burner orifice for the proper Boiler rating. On inlet pressures exceeding 14" W.C., the proper high pressure regulator must be ordered or field installed. On inlet pressures below the above values, the Factory should be consulted.

Proper flame should be blue, approximately 1-1/2" above burner head with a slight orange tip. Orifice in burner spuds are drilled for best efficiency at the B.T.U. rating and gas pressure furnished. If combustion is not proper, call Gas Company Engineer or Factory Representative for regulation.

(b.) **NATURAL GAS WITH POWER BURNERS:** A pressure of 7 to 14" W.C. up to 2500 MBTU or 12 to 27.7" W.C. for larger sizes is recommended at the Gas Inlet. Each Boiler is marked with the appropriate manifold gas pressure. The gas pressure regulator furnished should be adjusted so the manifold gas pressure will not exceed this setting.

**B. LIQUID PETROLEUM GAS (L.P.G.):** The burner may be furnished for Liquid Petroleum Gas (Butane or Propane) firing when so specified. Provisions should be made with the Gas Supplier for the proper capacity, pressure requirements and pressure regulator when required.

The Local Requirements for installation of the tank and supply lines should be properly investigated prior to installation and fully conform to Code Requirements. The Manufacturer should be furnished Gas Specifications with the Order.

(a.) **LPG WITH ATMOSPHERIC BURNERS:** On LP Gas a pressure of 1 PSI to 5 PSI is recommended at the Gas Inlet. The regulator furnished will reduce pressure to 18" W.C. required at burner for proper rate. A separate pilot line gas pressure regulator is furnished and should remain set for 11" W.C. at the pilot burner even though 18" is required at the main burner.

(b.) **LPG WITH POWER BURNERS:** A pressure of 12" to 27.7" W.C. is recommended at the Gas Inlet. Each boiler is marked with the appropriate manifold gas pressure. The gas pressure regulator furnished should be adjusted so the manifold gas pressure will not exceed this setting.

**C. FUEL OIL:** Oil burners are standardly furnished for No. 2 light fuel oil, A.S.T.M. Specification D-396, with approximately 141,000 BTU content per gallon. Oil tank installation and connecting lines should be in full compliance with Local Code Requirements. The size of the oil supply tank should be to the advantage of the particular installation in considering the capacity for the most economical quantity purchase and of sufficient storage for the delivery service available.

**IX. UTILITIES - Continued**

A Two Pipe System (suction and return) is recommended on all installations and required on jobs with oil supply tank below burner level. A minimum 3/8" suction line is required up to O-528 size, 1/2" suction line up to Model O-1008, 3/4" suction line size up to Model O-3456 and 1" suction line size Model O-4032 and larger. Increase size of suction line if over 30' long. The return line may be one size smaller. On any suction line exceeding 50' or more than 10' lift, an auxiliary oil pump is required to keep continuous flow of oil circulating through line at all times while boiler is in use. An oil filter must be installed near the burner. If the oil supply inlet pressure is above 3 PSI, a special pressure regulating valve is required. The fuel line connections at the burner should be flexible pipe or copper tubing for service convenience. For proper oil piping details, see the oil burner instructions.

The proper size oil nozzle(s) are furnished for the rated pressure of the burner. Competent trained service personnel should install oil gauge(s) as shown in burner manual to check pressure. Remove gauges when pressure settings are correct to prevent damage to the gauges.

**(2) ELECTRICAL:**

Each Parker Hot Water Boiler is Standardly furnished with the control circuit completely wired and factory fire tested. Field installation requires a main line disconnect switch(es). Use Copper Conductors Only. The main line disconnect switch(es) should be of the circuit breaker or fused disconnect type. The Boiler must be grounded in accordance with the National Electric Code. Do not use gas piping as an electrical ground. Terminals are provided for a remote Operating Control and remote Low Water Cutoff. All electrical connections should be furnished in complete accordance with the Local Code Requirements and must be in conduit. ALWAYS TURN OFF ALL MAIN LINE DISCONNECT SWITCHES AND ALL OTHER SOURCES OF POWER BEFORE WORKING ON ANY ELECTRICAL CONTROLS. The Electrical Service must match the Specifications of the Equipment:

(a). ATMOSPHERIC BURNER MODELS: All Models are standardly furnished for 115 Volt, 60 Hertz, 1 Phase for Boiler Controls. Adequate electrical supply for at least 15 Amps is recommended for the Boiler plus additional capacity as required to handle the Circulating Pump(s). Maximum size overcurrent device for boiler control circuit must not exceed 20 Amps.

(b). POWER BURNERS: Power Gas Fired Models G-432 to G-1920, Oil Fired Models O-432 to O-1296, and Combination Fired Models GO-528 to GO-1920 are standardly furnished for 115 Volt, 60 Hertz, 1 Phase for Boiler Controls and Blower Motor. Larger size boilers require 230 Volt, 60 Hertz, 3 Phase for Blower Motor. A control transformer for the 115 Volt boiler controls will be furnished where necessary. On all Power Burners where a separate oil pump is furnished, an additional line service may be required. NOTE: Special Power Burners, higher elevations, etc. may change electrical requirements. Adequate electrical supply for at least 20 Amps is recommended for each boiler service plus additional capacity as required to handle the circulating pump.