

***Owner's Manual***  
***for***



***PennStoker***

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# Installation

## PLACEMENT

Stove should be situated on a hard surface such as concrete. Use the individually adjustable legs on the boiler to level the stove. Follow all local codes and ordinances relating to required distances from walls and ceiling. Keep sufficient room for plumbing and wiring. Position the stove as close to the chimney as possible.

## HOOK-UP TO CHIMNEY

Keep horizontal stove pipe to a minimum. If the chimney thimble is higher than flue collar on the stove, come out the back of the stove with a tee and angle up to the thimble using adjustable elbows. Approved stove pipe materials are 22 gauge galvanized or 316 grade stainless steel. Other grades of stainless or lighter gauges of galvanized will not hold up to the coal gases. The stove can be set on blocks if necessary.

## PLUMBING

The cold water returns are at the bottom of the boiler and the hot water supplies are at the top. The return pipe and the supply must 180° from each other to achieve proper internal boiler circulation. A loop with a constantly operating circulator must be installed (007 Taco or its equivalent) between a top fitting and its 180° counterpart at the bottom. An injection style loop is recommended. An appropriately sized expansion tank must be installed in the system. The boiler water capacity is 20 gallons.

Approved pipe must be used in the installation process. This includes copper, steel and certain kinds of plastic. Do not use rubber hose. If using plastic, make sure it has a vapor barrier and sufficient temperature rating to handle 240°F water. Failure to follow this spec will void the warranty. Supply and return piping should be no less than one inch in diameter. In radiant floor heat applications, install a mixing valve(s) between the supply and return lines to modulate floor water temperature. Air bleeders should be installed at the highest points in the system. You can never use too many air bleeders. It's better to put in extra than not enough.

## PRESSURE RELIEF VALVE

A pressure relief valve must be installed in one of the ¾" fittings on the boiler. Use a down spout to direct any expelled water to the floor. Failure to do this could result in serious injury.

## PRESSURE GAUGE

A back mounted pressure gauge should be installed in one of the ¾" fittings on the boiler.

## ELECTRICAL

The PennStoker is shipped prewired and only needs 120VAC from a 20 amp breaker dedicated to the boiler. Follow all applicable federal, state and local codes and ordinances. Wire line voltage into the control panel main power switch. This is the yellow disconnect switch on the side of the control panel. There is a circuit in the control panel to wire a circulator into. We recommend that this be used for the loop circulator. Carbon monoxide detectors should be installed throughout the building.

## DOMESTIC HOT WATER

An indirect hot water heater is recommended for domestic hot water. This should be treated as a separate zone in the heating system. Make sure a mixing valve is installed either in the boiler-to-water heater circuit or in the potable water circuit. Domestic hot water temperature must not exceed 160°F. Follow water heater manufacturer's instructions for installation and maintenance of the water heater.

## SAFETY AQUASTAT

A single aquastat that makes on temperature rise should be installed using one of the 3/4" fittings on the boiler. This should be set at 200°F and should operate one of the heating circuits in the house. This will prevent over-firing of the boiler and eliminate the damage that can be associated with this malfunction.

## CHIMNEY, FLUE AND DRAFT CONSIDERATIONS

Adequate chimney and draft conditions are critical to the proper operation of all coal burning equipment. Let's first look at some ideal objectives and practical operating ranges, then take a look at some basic chimney design considerations to help achieve these objectives.

### TEMPERATURE OBJECTIVES

Naturally, the first and foremost function of the chimney is to safely carry the products of combustion from the stove and vent them safely to the atmosphere. To accomplish this task, the chimney must operate with relatively high internal temperatures while maintaining reasonably cool external temperatures so as not to pose a kindling threat to adjacent materials or structures. Proper internal operating temperatures are fundamental in maintaining good draft. However, they can be difficult to achieve. Much of this will be determined at the time the chimney is constructed.

Ideally, a chimney should not be hotter than 350°F at a point where the flue gases enter and not cooler than 250°F at the point where they are discharged to the atmosphere. A properly constructed chimney will contribute significantly to these objectives.

### DRAFT OBJECTIVES

Draft is the negative pressure (vacuum) within the chimney and is caused by the lighter-than-air column of hot gases there attempting to rise. Another contributing factor to draft is the aspirating effect of wind blowing across the top of the chimney. These aspirations cause fluctuations in the amount of draft and, since they are neither constant nor dependable, they are somewhat undesirable but nevertheless present and must be coped with. Therefore a constant, reliable draft is another of the primary functions of the chimney.

Draft is measured in "inches of water column" with special equipment designed for the purpose. Your dealer will be able to help you determine the draft characteristics of your chimney or refer you to someone who can.

Ideal draft = .05 to .06 inches of water column.

Practical operating range = .04 to .07 inches of water column.

Draft less than .04 inches of water column can cause:

1. Smoking conditions when the stove door is opened
2. Reduced BTU output
3. Slow fire build up in response to load demands
4. Hard to start fires

Low drafts can be corrected with draft inducers of various sorts. However, these problems are best corrected through chimney modification and/or reconstruction. Consult your local chimney repair service or ask you dealer for recommendations.

Drafts greater than .07 inches of water column can cause:

1. Excessive fuel consumption
2. Stove temperature override
3. High stack temperatures.
4. Hard to manage stove temperatures

High drafts can be corrected with a barometric draft control. Consult your dealer.

# CHIMNEY CONSTRUCTION

## BASIC FACTS TO CONSIDER

1. Chimney must have proper height. (See section on "Height").
2. Eliminate bends and obstructions in chimney.
3. Seal all air leaks and cracks.
4. Maintain smooth interior surface in chimney.
5. Chimney should be insulated. (See section on "Location and Insulation").
6. Allow only one stove or furnace per flue. If your chimney has only one flue and more than one heater is required, another chimney should be built.

## HEIGHT

The chimney must be tall enough to produce adequate draft. "Effective chimney height" must be a minimum of twenty feet. "Effective chimney height" is measured vertically from the point where the flue gases enter the chimney to the point where they are discharged to the atmosphere. The top of the chimney must be at least two feet above any object within ten feet (horizontally) of the chimney.

## INTERNAL SIZE

The chimney inside should be properly sized to fit the stove connected to it. A rule of thumb is - 125% of the cross sectional area of the collar outlet leaving the stove = suitable cross sectional chimney area.

Example: Collar outlet size of stove is 8". This is a cross sectional area of 50.27 sq. in. X 125% = 62.83 cross sectional square inches required in the chimney. The common size flue liner most closely meeting this requirement would be the 10"X10" O.D. which is approximately 8"X8" I.D. or approximately 64 sq. in.

## LOCATION AND INSULATION

Chimneys constructed up through the inside of a house will generally have better operating temperature characteristics than those built on the outside, because of their warmer ambient temperatures. This can be further improved by pouring insulation such as vermiculite in the space between the flue liner and chimney block and also between the webbing of the blocks. Stainless steel insulated chimneys can also meet the qualifications required for a satisfactory chimney.

Specific chimney building applications can be many and varied. For more complete details on proper chimney construction, consult your local library for a book on the subject and your local building inspector for local codes governing their construction in your area.

# Operation

## CONTROL SETUP

The control panel comes preset for continuous operation. If any adjustments need to be made, call your PennStoker dealer for assistance.

## GETTING STARTED

Fill the coal hopper with coal (if equipped). Turn the main power switch to the “ON” position and the flip the toggle switches on the front to “COLD START” and “ENABLE” respectively. Adjust the dial to “5”.

## STARTING THE FIRE

Open the access door located just above the ash door. Place some newspaper and some kindling on the grates and light. **DO NOT USE LIGHTER FLUID, GASOLINE, KEROSENE OR OTHER SUCH SUBSTANCES. SERIOUS INJURY OR DEATH COULD RESULT.** Place small handfuls of coal on the burning kindling to get coal started. Adjust the dial to “10”. Continue to feed the fire this way until the coal gets down from the hopper. Once the coal fire has been established, close access door and monitor water temperature. Once it has reached 130°F, flip toggle switch to “RUN” position, and the boiler will take care of itself from there.

## ADJUSTMENTS

Adjustments can be made to the rate and amount of feed and amount of combustion air. These adjustments should be made with the help of qualified, trained personnel. Do not attempt to change the settings without calling your dealer.

## FUEL TYPE

The PennStoker is only designed to burn anthracite (hard) coal. The small boilers should use rice coal. The big ones can burn buckwheat. Do not use pea coal or any type of soft coal, i.e. bituminous or lignite. Only use good quality coal.

## ASH CONTENT AND REMOVAL

Ashes should be removed on a regular basis whenever the ash pan gets full. The ashes should not contain un-burnt coal. They should be able to be easily broken apart and crushed. If equipped with automatic ash removal system, ashes should be augered out every day.

# Maintenance

## CLEANING

The heat exchanger should be cleaned every month or as often as is necessary to maintain good efficiency and draft. The frequency will be somewhat determined by the type of coal used. To clean, allow fire to drop to low burn. Open access door on the very top of the boiler. Using a pair of welder's gloves, remove baffles from the fire tubes and clean with an industrial vacuum. Brush out the tubes and replace the baffles. Remove the plug from the bottom of the tee at the stove pipe on the back of the boiler and brush out pipe. Clean chimney once a year.

## SHUTTING STOVE DOWN

Flip the toggle switch on the front of the control panel to "INHIBIT". Allow the fire to burn out. Do not use water to attempt to put out the fire. If this shut-down is for the summer, remove all the ashes and clean off the grate. Follow the instructions in the section "CLEANING". Spray WD-40 or another type of moisture repellent on the fire tubes, around the top of the heat exchanger, and on the grate. This will keep moisture from collecting inside the boiler causing corrosion.

# Troubleshooting

Fire won't stay burning.

- a. Increase amount of feed at hopper
- b. Use better quality coal
- c. Increase demand
- d. Adjust settings

Un-burnt coal in the ashes

- a. Decrease amount of feed at hopper
- b. Adjust settings

Carbon monoxide emission

- a. Check chimney for poor draft
- b. Remove one of the baffles