# **Boiler Room Venting & Breaching**

## It is Important to Keep in Mind the Following

* All non-condensing boilers are Category I Appliances operate with non-positive pressure (0 to -0.05″ WC pressure at the vent collar).
* s are UL approved for use with Type B venting.
* s can be sidewall vented as long as local and BOCA codes are met.

## Boiler System Venting

Designs of boiler room air flow and the flow of combustion products requires clear understanding of the application objectives, limitations imposed by the boiler room and other equipment, and knowledge of applicable codes. Qualified engineers and designers should be consulted prior to implementing any system. Boiler Systems, Inc. cannot ensure that its equipment, as ordered by the customer, meets local boiler room code.

WARNING: Failure to properly design, install, and maintain boiler systems may cause excessive levels of CARBON MONOXIDE or FIRE. Design, installation, and operation should only be done by qualified individuals familiar with HVAC systems, burner set-up, and local code requirements.

### Combustion Air Requirements for Boilers

Building Officials and Code Administrators International, Inc. (BOCA) provides performance oriented model codes including provisions on minimum air supplies for combustion. Past BOCA, NFPA, and ANSI requirements have included (in part) the following:

#### Inside Air

Assuming a rate of a least 40 cubic feet per 1,000 BTU/H, additional air is required if the exchange rate is less than 0.5. If so, then two openings are required; one near the floor and a second near the ceiling with at least 1 square inch per 1,000 BTU/H — not less than 100 square inches.

#### Outside Air

Two openings are required, one near the floor the other near ceiling. The openings shall communicate directly outdoors or by ducts. The minimum dimension for air opening shall not be less than the following:

* 1 sq. inch per 4,000 Btu/H input – direct to outdoors.
* 1 sq. inch per 2,000 Btu/H input – via horizontal ducting.
* 1 sq. inch per 4,000 Btu/H input – via vertical ducting or through the wall.
* If unobstructed area, then no storage, free circulation of air.
* Free area – louvered – shall be considered Metal at 75 percent and Wood at 25 percent.

Negative air pressure at the burner air intake can create poor firing. Even though a burner may be Forced Draft, do not assume it can draw the air it requires. Other factors can cause the draft to strongly work against the burner. Excess air requirements for the forced draft burners should be calculated at 14 cu. ft. (±1.5 cu. Ft.) per cu ft of Natural Gas.

Do not allow boilers to operate where the combustion air will carry explosive, flammable, or corrosive (includes compounds of Chlorine, Fluorine, etc.) vapors with it. Check a corrosion guide to see if gasses/vapors are even slightly corrosive to steel. Please note that in some cases flaming them will increase their corrosive nature.

Please ensure that the air intake is not so cold as to freeze a boiler that is not firing.

### Venting the Products of Combustion

When determining the proper method to vent combustion products, the following factors should be considered.

* Fuels to be burned
* Number and size of units
* Building use and construction materials

Side wall venting is acceptable with s when using metal venting and stack. However, the burners do not push the products of combustion away, so the design must create gravity or mechanical convection.

## Boiler System Breeching

The biggest single loss of efficiency in a heating system is typically up the stack, and could represent up to 12 to 20 percent of the fuel cost. So, a proper venting system is critical to efficient operation.

All burners must be set up prior to normal operations, so it is very important to follow the burner manufacturer’s manual. Burner adjustments must only be made by qualified technicians using proper equipment.

### Design Guidelines for Breeching

* Pipe the boilers into the breeching on a rolling offset with the flow of gases toward the stack.
* Do NOT pipe into the bulkhead of a tee.
* Install a barometric damper on each boiler, or at least between the first boiler and the stack.
* A coupling located directly above the boiler or barometric damper facilitates service and cleaning.
* Breaching insulation is optional.
* Stack gases generally lose approximately 2°F per foot of venting.
* also recommends that a coupling be installed on the breeching directly above each boiler and the barometric damper to facilitate service and cleaning.

LOCAL AND/OR BOCA CODE REQUIREMENTS PREVAIL OVER ANY RECOMMENDATIONS BY .

### Other Important Boiler Room Components

In addition to properly sizing a system for the correct heat load, a well-designed boiler room will likely require:

* Compression Tank
* Air/Sediment Tank
* Boiler Room Safety Devices and Equipment
* Feed Water System (Regulator)
* Gas Pressure Reducer/ Regulators
* Ventilation For Combustion Air Based On Local Codes
* System Pump(s)
* Water Treatment (see below for Importance Of Water)

## Boiler System Draft Controls

For proper operation and efficient fuel consumption in oil and gas fired heating appliances, draft must remain constant. When it is, combustion is more complete, fuels are utilized, and money is saved. Draft Controls maintain consistent draft by counteracting the negative forces caused by changes in temperature and barometric pressure, and the effects of wind.

### Draft Inducers/Power Venters

With these devices, draft is increased or created causing fluctuations in airflow through the combustion chamber. These fluctuations can be negated by the use of a barometric draft control located between the draft inducer or power venter and the furnace, boiler or water heater it services.

Use a single acting control for oil and gas fired equipment with a power vented system. A single acting control for oil and a double acting for gas fired equipment with a draft control induced system.

### Power Burners

A power burner is designed so that a fan delivers positive air flow to the combustion chamber. A single acting draft control for oil regulates the over-the-fire draft. A power burner designed to burn natural or LP gas operates in the same manner. While a draft hood (diverter) is often used on gas units fired with an atmospheric burner, a double-acting barometric draft control should be used for furnaces or boilers fired with gas power burners.

### Forced Draft Burners

Forced Draft installed with a stack height in excess of 30′ will probably develop excessive natural draft, reducing the amount of pressure within the furnace or boiler. A barometric draft control will help eliminate this undesirable stack action and permit the unit to be pressurized.

### Dual Fuel Appliances

Burners capable of burning either gaseous fuels or oil should be equipped with a barometric draft control. Field Controls Company suggests using a double-acting control on units where fuels are frequently changed. The double-acting feature is important for gas firing appliances, it allows spillage of combustion products in case of blocked flues or down-drafts. To detect flue gas spillage on dual fuel installation, a Field Thermal Switch is recommended.

### Gas Fired Appliances

Gas fired furnaces and boilers generally require a double acting draft control. Like a single-acting control it opens inwardly to maintain a uniform draft. But, unlike a single acting control, it is also free to open outwardly to spill the products of combustion in case of blocked flues or downdrafts.

National codes often mandate the use of a draft hood. Usage is generally limited to furnaces or boilers designed for use with power burners and incinerators. Draft controls are generally used when oil fired units are converted to gas.

### How Draft Controls Work

Static pressure of the cool air (1) exerts pressure on the outside of the furnace or boiler, the breeching and stack. The pressure difference between the room air and heated gas (air) causes products of combustion (2) to flow (draft) through the unit and rise through the breeching and chimney.

Room temperature air (3) enters through the barometric draft control (4) in the precise amount needed to overcome the excess drafts caused by temperature variations, wind fluctuations and barometric pressure changes.

Combustion of fuel is complete and the process is stabilized. The velocity of combustion gases through the heat exchanger is slowed so more heat is extracted. The unit operates more efficiently, reliably and requires less maintenance.