



Standard Specification

ION-SPEC-03

Standard Specification for Ionic Floor Standing Heating Boiler
Models 1,250,000 –4,000,000 Btu/Hr

The BOILER shall be an IONIC model _____(NG/LP) having a modulating input rating of _____ Btu/Hr, and output of _____ Btu/Hr and shall be operated on natural gas/L.P.G. The boiler shall be capable of the following performance:

Model	Maximum Input	Minimum Input	Turndown
Ionic CB 1250F	1,250,000	156,000	8:1
Ionic CB 2000F	2,000,000	236,000	8.5:1
Ionic CB 3000F	3,000,000	420,000	7.2:1
Ionic CB 4000F	4,000,000	500,000	8:1

Model	Height	Width	Depth	Weight (lbs.)
Ionic CB 1250F	47	55	34	992
Ionic CB 2000F	47	68	34	1213
Ionic CB 3000F	59	79	46	1984
Ionic CB 4000F	59	96	46	2314

The BOILER heat exchanger shall bear the ASME "H" stamp for 160 psi working pressure, it shall be National Board listed and bear a CRN. The BOILER shall have a maximum operating pressure of 160 psi. The BOILER shall have a fully welded, stainless steel, water tube heat exchanger. Multiple pressure vessels in a single enclosure are not acceptable. There shall be no banding material, bolts, gaskets or "O" rings in the pressure vessel construction. The condensate collection basin shall be constructed of welded stainless steel. The complete heat exchanger assembly shall carry a ten (10) year limited warranty*.

The BOILER shall be certified and listed by L.C under the latest edition of the ANSI Z21.13/CSA 4.9 test standard for the U.S and Canada. The BOILER shall comply with the energy efficiency requirements of the latest edition of ASHRAE 90.1 and the minimum efficiency requirements as defined by the Department of Energy in 10 CFR Part 431 incorporating the test standard AHRI 1500-2015. The BOILER shall operate at a minimum of 95% Combustion and Thermal Efficiency as registered with AHRI. The boiler shall be Energy Star certified and listed with www.energystar.gov. The BOILER shall be certified for indoor installation (NEMA 1) and outdoor installation (NEMA 4X).

The BOILER shall be constructed with a steel jacket assembly, primed and pre-painted on both sides. The combustion chamber shall be sealed and completely enclosed, independent of the outer jacket assembly, so that integrity of the outer jacket does not affect the sealing capability. A burner/flame observation port shall be provided for observing the burner flame and combustion chamber. The burner shall be constructed of high temperature resistant stainless steel with a woven metal fiber mesh surface and will operate in a pre-mixed combustion system. A single stage venturi and blower system shall be used with a negative pressure gas valve to ensure precise control of the fuel/air mixture across the entire modulating range. The combustion system shall be capable of modulating the input within the boilers' published turndown ratio without the loss of combustion efficiency. The flame will be ignited by direct spark ignition with constant ionization monitoring via a separate flame sensor.

The control system shall have a factory installed full text display for boiler set-up, boiler status, and boiler diagnostics. All components shall be easily accessed and serviceable from the front top and side of the jacket; all service shall be able to be completed from the front of the boiler without the removal of the side jacket panels. The BOILER shall be equipped with a temperature/pressure gauge; high limit temperature control with manual reset; ASME certified pressure relief valve set for 50 psi (standard) supply and return temperature sensors, pressure sensor, flue gas temperature sensor, burner door manual reset clixon thermal circuit breaker; blocked vent and condensate air pressure switch, and integrated manual reset low water cut off, flow switch and a manual reset high/low gas pressure switch.

The BOILER design shall consist of a large colored touch screen display and a backlit LCD screen with easy-to-read full text information, programming, and errors. Multiple levels of password security, outdoor temperature reset, two level frost protection, pump exercise and overrun, domestic hot water priority time control, selectable priority for domestic hot water or heating, and short cycle protection as standard. A PC port connection is standard. Several data logging capabilities including, but not limited to time and date error logging, days of operation, burner runtime, successful and failed ignition attempts, flame failures and 48 recorded errors, as well as hours until next service.

The BOILER shall have a built-in Cascade to sequence and rotate while maintaining modulation of up to 16 boilers without utilization of an external controller. The internal Cascade function shall be capable of lead-lag, efficiency optimization, front-end loading, and rotation of lead boiler every 1-5 days, settable by the installer. The control includes an emergency mode to allow the lag boilers to function independently from the lead boiler should the lead boiler lose power or have sensor failures and if the communication cable between any of the boilers is damaged or disconnected. The control is equipped with Modbus communication as standard and BACnet connection is optional.

The BOILER control system shall have a PWM and standard 0-10V output signal to control a variable speed circulator (to be offered by the manufacturer) to optimize the delta T across the heat exchanger through the entire modulation range. The BOILER control system shall have multiple controls operation modes including, but not limited to enable/disable with single setpoint temperature, outdoor reset with warm weather shutdown, night setback and boost

function, constant circulation with outdoor reset, constant circulation with permanent heat demand. The BOILER control system shall have the control operation mode with the ability to receive a 0-10V input signal to control its modulation rate. The BOILER control system shall have the control operation mode with the ability to receive a 0-10V input signal to control its setpoint temperature.

The BOILER shall be equipped with two terminal strips for electrical connection. A low voltage connection board with connection points for safety and operating controls, i.e., system temperature sensor, domestic hot water tank temperature sensor, domestic hot water aquastat, outdoor temperature sensor, thermostat contacts, remote enable/disable contacts, Modbus, cascade connection, PWM circulator control, low water cut off, gas pressure switches, and external universal safety contacts. A high voltage terminal strip shall be provided for Supply voltage. Supply voltage shall be 120 volt / 60 hertz / single phase on models 1250F-3000F. To connect three phase 208-240V circulators, you need to supply this voltage to the boiler. The 4000F requires a supply of 480 V which will require the use of 480 V three phase or 277 V single phase circulators. The high voltage terminal strip plus integral relays are provided for independent pump control and safety alarm. The boiler shall have two contactors for external circulators and a third available as an accessory.

The BOILER shall be suitable for positive pressure both balance and unbalance venting systems. The BOILER shall be capable of either direct vent installation or for installation using indoor combustion air, a category IV venting system with indoor combustion air per Table 1. The BOILER shall be capable of venting with both vertical and horizontal terminations. The BOILER shall require approved venting systems and materials that must be installed following the manufacturer's instructions in the BOILER Installation and Service Manual. The boilers air intake can be drawn from the rear or the side of the boiler attaching directly to the venturi. The BOILER shall have maximum exhaust vent lengths and maximum combustion air intake lengths per Table 2.

TABLE 1

Items	Materials ¹⁾	Venting System Standards		Warning
		United States	Canada ³⁾	
Flue piping and Fittings	CPVC Schedule 40	ANSI/ASTM F441	All venting material in Canada must be ULC S636 approved.	All Vent and Air-Inlet materials installed on gas fired appliances in CAN/US must meet the Standards listed in this table. Failure to comply may result in fire, serious injury or death.
	Stainless Steel SS	UL-1738		
	Polypropylene PP	UL-1738		
Air inlet piping and Fittings 2)	PVC - DWV	ANSI/ASTM D2265		
	Stainless Steel SS	UL-1738		
	Polypropylene PP	UL-1738		
	CPVC	ANSI/ASTM F493		
Primers	CPVC	ANSI/ASTM F656		

Notes:

1) PVC venting (exhaust and air-inlet) is not permitted within the Closet/alcove of a Closet/alcove installation.

2) The air-inlet does not require high temperature pipe material. Check applicable local codes for acceptable materials.

3) Use only vent gas material suitable for flue gas temperatures of 194°F (90°C) or higher.

4) All primers must be colored in a contrasting color so that inspectors can easily verify by the residual color on the pipe near the joints that the primer has been used.

TABLE 2

Maximum Exhaust Length				
	CB 1250F	CB 2000F	CB 3000F	CB 4000F
8"	150"	115"	N/A	N/A
10"	N/A	N/A	150"	N/A
12"	N/A	N/A	N/A	150"

TABLE 3

Maximum Combustion Air Intake				
	CB 1250F	CB 2000F	CB 3000F	CB 4000F
8"	150"	115"	N/A	N/A
10"	N/A	N/A	N/A	N/A
12"	N/A	N/A	150"	150"

The BOILER shall be suitable for use with approved propylene glycol up to a maximum concentration of 50%.

The BOILER models 1250 and 2000 shall have been certified and listed to meet the requirement of the South Coast Air Quality Management District (SCAQMD) rule 1146.2 in California for low NO_x operation. The BOILER models 3000 and 4000 shall be capable of low NO_x operation and shall require field certification for low NO_x.

STANDARD APPROVALS

The BOILER shall be constructed in accordance with the following code requirements as standard equipment. Manufacturing of special models to meet the below code requirements is not required.

- CRN Approval in Canada
- Massachusetts Board Approval
- NEMA 1 & 4X

Note: Due to the large disparity in CSD-1 interpretation in across the US and Canada, please confirm to the factory all controls required by the authority having jurisdiction in your area.