



<b>Standard Specification</b>
<b>ION-SPEC-01</b>

**Standard Specification for Ionic Wall Hung Heating Boiler**  
*Models 299,999 – 500,000 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 299W	299,000	46,000	6.5:1
Ionic CB 399W	399,000	72,000	5.5:1
Ionic CB 470W	470,000	83,000	5.7:1
Ionic CB 500W*	500,000	83,000	6:1

\* The CB Ionic 500W is not suitable for low NOx areas.

Maximum unit dimensions shall be: 22 inches Depth, 18 inches Width and 34 inches Height. Maximum unit weight shall be no more than 187 pounds (dry).

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 87 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 heat exchanger volumes are as follows:

Model	Water Content
Ionic CB 299W	1.77 gallons
Ionic CB 399W	2.19 gallons
Ionic CB 470W	2.74 gallons
Ionic CB 500W*	2.74 gallons

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](http://www.energystar.gov). The BOILER shall be certified for indoor installation.

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 and will operate in a pre-mixed combustion system. A single stage venturi and blow 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 flame sensor.

The control system shall have a factory installed 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 klixon thermal circuit breaker; burner door and rear wall thermal fuse; blocked vent and condensate air pressure switch, and integrated automatic reset low water cut off.

The BOILER design shall consist of a fold out panel with a large 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 for diagnostics via laptop as 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 30 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 or optional 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. The BOILER shall have an optional 0-10V circulator control. A high voltage terminal strip shall be provided for Supply voltage. Supply voltage shall be 120 volt / 60 hertz / single phase on all models. The high voltage terminal strip plus integral relays are provided for independent pump control and safety alarm. The boiler shall have optional high amperage circulator relays.

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 BOILER shall have maximum exhaust vent lengths and maximum combustion air intake lengths per Table 2.

**TABLE 1**

Items	Materials <sup>1)</sup>	Venting System Standards		Warning
		United States	Canada <sup>3)</sup>	
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.
	PVC Schedule 40	ANSI/ASTM D1785		
	Stainless Steel SS	UL-1738		
	Polypropylene PP	-		
Air inlet piping and Fittings 2)	PVC - DWV	ANSI/ASTM D2265		
	Stainless Steel SS	UL-1738		
	Polypropylene PP	-		
Pipe cement	PVC	ANSI/ASTM D2564		
	CPVC	ANSI/ASTM F493		
Primers 4)	PVC/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 158°F (70°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**

<b>Maximum Exhaust Length / Maximum Combustion Air Intake Length</b>			
	<b>CB 299W</b>	<b>CB 399W</b>	<b>CB 470W / 500W</b>
3"	60'/60'	30'/30'	NA
4"	200'/200'	121'/121'	73'/73'
5"	NA	NA	200'/200'
6"	NA	NA	200'/200'

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

The BOILER 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 NOx operation.

## 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

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.