

Regardless of whether the furnace is a Polar™ original up draft style or a new EPA Phase 2 high efficiency down draft Gasification unit, the furnace operates on the same principal. In the same style as conventional oil or gas fired boilers, there is a large water jacket with heat tubes that surround and pass through the firebox. Unlike a conventional burner, the Polar furnaces are optimized for efficiently burning renewable, low cost wood, not fossil fuels.

The furnace is designed to maintain the temperature of the water or propylene glycol in the water jacket between 160 and 180 degrees Fahrenheit. There are Aquastats on the furnace that monitor the fluid temperature. When the temperature falls below 160 degrees Fahrenheit, the Aquastat causes a solenoid to open an air damper and a high volume fan moves air through the fire racing the fire to a controlled inferno. The design of the boiler controls the amount of air injected into the fire to maximize the heat transfer from the firebox to the water jacket.

Though there is a great amount of surface area of the water jacket that is in contact with the fire, the fluid in the heat tubes heats more quickly and by convection mixes with the fluid in the rest of the jacket. The controlled burn of the furnace is calibrated to prevent the fluid in the heat tubes running through the firebox from boiling as the temperature of the fluid in the rest of the water jacket rises. By design, the temperature of the water in the jacket rises as quickly as possible, without boiling, until the temperature of the water reaches 180 degrees Fahrenheit. Once the high temperature is reached, the Aquastat turns off the fan and closes the solenoid for the air damper. The fire is squelched and dies to a very low burn.

The dramatic temperature swings of the firebox as the furnace cycles, along with the realities of the physical impacts associated with loading large pieces of fire wood are the main reasons that Polar™ uses real new North American quarter inch ASME SA 516 Boilerplate. This purpose built high carbon steel ensures long life and problem free operation of Polar outdoor wood burning furnaces. No other material is expressly designed for use in the extremely demanding and hostile application of a firebox in an outdoor wood burning furnace. That is why Polar can offer a 25 year limited onsite warranty.