

High efficiency down draft Gasification units from Polar™ in essence turn the fire upside down. In a traditional fire, fresh air is blown into the fire, the wood burns and the exhaust gasses move to the top of the firebox and out the chimney. The gasification technology works by pulling the smoke and gasses through the bottom of the fire and reburning the gasses to create the heat. In a traditional Polar™ outdoor furnace, there is a fan on the door that blows into the fire. On the Polar™ Gasification units, the fan is at the chimney and pulls the exhaust gasses through the furnace.

On a Polar™ Gasification furnace, the firebox is more like a hopper than a firebox. Firewood is loaded from a door on the upper half of the furnace. The firewood in the hopper/firebox sits on a floor that is made of fire bricks. Unlike a conventional furnace, the fire does not spread and ignite all of the firewood in the hopper/firebox. Rather, the fire burns only at the base of the stack of wood in the hopper/firebox because it is sucked down through the floor of the hopper/firebox.

During normal operation, when the fluid in the water jacket falls below 160 degrees Fahrenheit the Aquastat on the water jacket causes the furnace to turn on. The air damper opens allowing fresh air into the hopper/firebox. The fan on the chimney runs pulling the combustion air through the stack of wood and the smouldering fire at the base. There are apertures between the bricks on the floor of the hopper/firebox that allow the gasses from combustion to be pulled through the floor.

As the combustion continues during the call for heat from the furnace, the fire from the base of the stack of wood in the hopper/firebox that is pulled through the floor causes the fire bricks in the floor to become super heated to around 2000 degrees Fahrenheit. The gasses that are being pulled through the floor are ignited by the catalytic heat of the floor and virtually complete combustion of the wood and exhaust gasses is achieved. It is as a result of this simple, but ingenious technology that Polar has achieved EPA Phase 2 certification with greater than 86% combustion efficiency for their gasification units.

The exhaust from the gasification process then passes through a series of heat exchanger baffles at the base and back of the water jacket in the unit. The process of heat transfer from the exhaust air to the fluid in the water jacket is so efficient that Polar™ can safely position the suction fan at the chimney of the furnace because the temperature of the exhaust air passing through the fan on the chimney is less than 500 degrees Fahrenheit.

Once the Aquastat in the firebox senses that the fluid temperature in the furnace is 180 degrees Fahrenheit, it causes the suction fan to turn off and the fresh air damper to close. The fire is squelched to a low burn and the heating cycle of the furnace stops. During the idle cycle of the furnace, only a small wisp of smoke is seen at the chimney because very little air is allowed into the unit for combustion.

All Polar™ down draft Gasification units feature an ingenious automated heat tube cleaning mechanism that eliminates the typical shutdown, disassembly, brushing and sweeping of other Gasification units. With a simple push and pull of a conveniently located cleaning handle, the heat tubes are cleaned even when the furnace is in service. As well, to ensure long service life,

Polar™ employs a false wall design in the wood hopper. This false wall eliminates condensation caused by pre-drying the wood in the hopper and the potential for corrosion that rises from condensate mixing with ash in the base of the unit.

Attention to detail and operator comfort are important components in the design of the Polar™ outdoor wood burning furnaces. The Polar™ furnace employs a switch on the main cabinet access door that causes the fan to suck air from the firebox/hopper during loading of the furnace regardless of whether or not the furnace is calling for heat. When the main cabinet door is opened, the fan will prevent smoke from escaping from the firebox/hopper while the operator is loading the furnace. Once the furnace is filled and the door is closed, the furnace returns to normal operation. There is also a courtesy light that illuminates the front of the furnace when the furnace is being loaded at night.