

PORTAGE & MAIN

Est. 1973

OUTDOOR WATER FURNACE

WOOD GASIFICATION ~ OPTIMIZER 250

Also approved for installation inside outdoor buildings



EPA Phase Two
Qualified

**HIGHLY
EFFICIENT
SCOTCH MARINE
TUBE HEAT
EXCHANGER**

*Burns ALL types
of dry seasoned wood!*

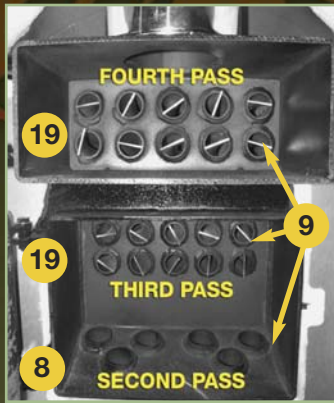
**PORTAGE & MAIN
OUTDOOR WATER FURNACES**

*"Innovators...
not imitators!"*

Watch the gasification action video at
www.portageandmainboilers.com

WOOD GASIFICATION ~ OPTIMIZER 250

Scotch Marine Design
Multi-Pass Heat Exchanger
(back view)



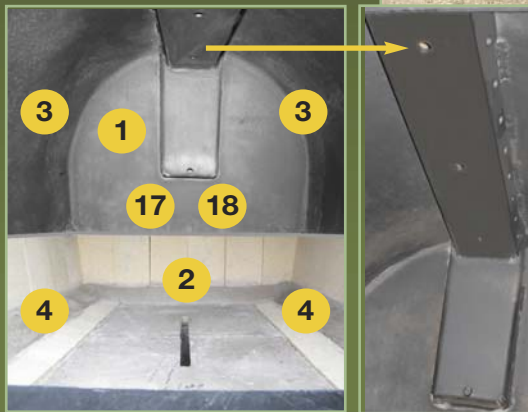
4TH PASS: is through a second set of ten 1.5" tubes. Optimal heat has been extracted before the gases exit the stack.

3RD PASS: gasses travel through ten 1.5" horizontal tubes.

2ND PASS: is up six 2" vertical tubes which are easy to access and clean (with supplied brush).

1ST PASS: is from the front of the reaction area to the back of furnace where the return water enters allowing for maximum heat transfer.

Rounded firepot



Extensive amount of heavy duty pre-cast heat-treated refractory brick

Air injection ports



Reaction Door & Reaction chamber

Excellent engineering, Environmentally friendly!
Efficiencies of 94%! CSA UL Certified - EPA Phase Two Qualified



The Wood Gasification Unit – Optimizer 250 uses the wood gasification process to produce highly efficient combustion in the furnace's primary burn and reaction chambers. Wood in the firepot burns from the bottom up, drying the top layer of wood in the firepot. Gases and exhaust are forced into the lower burn pre-cast heat-treated refractory brick-lined chamber where gases are burned at temperatures of 2000°F. plus. Temperature variation is based on fuel type, burn rate and other conditions.

The extensive pre-cast heat-treated refractory brick lining of both burn chambers, produces and absorbs the chamber's high burn temperatures required for consistent gas combustion. This significantly reduces emissions, prevents creosote build up and minimizes ash build-up in the unit. Maximum heat extraction is achieved as the exhausting air travels the full length of the burn chamber, up through the vertical pass of six 2 inch tubes before passing through ten 1.5" horizontal tubes with turbulators then reversing through a second set of ten 1.5" horizontal turbulated tubes before passing out the stack. These multiple tubes running through the water jacket heats the water quickly and efficiently. Water gets up to temperature faster with this design. This was the most efficient design of boilers 150 years ago and still is today. Optimal heat extraction saves both the work and the cost involved with wood.

The Optimizer 250 incorporates the existing features of the conventional Portage & Main unit - longevity, reliability and efficiency and adds these great features with the Optimizer 250:

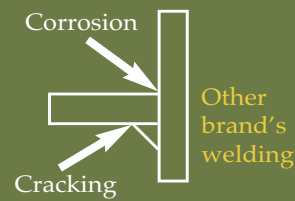
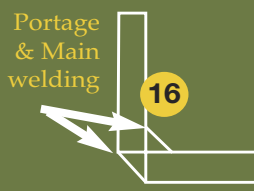
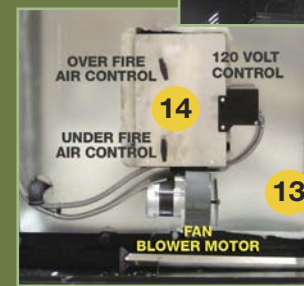
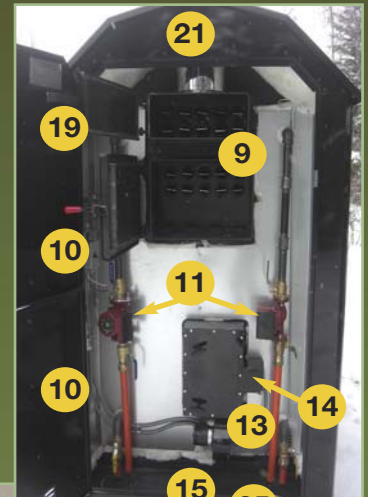
1. Rounded firepot with Over Under Air. Air is injected above the fire with air injection ports along the full length of the firepot. Air rolls gently down the sides of the firepot going under the fire, giving a super clean turbo burn with no creosote and no one-spot burning. Both air ports are adjustable.
2. Extensive amount of heavy-duty pre-cast, heat-treated refractory brick in target area. The total base is 4" thick heat-treated pre-cast refractory brick.
3. Water jacketed, the fire chamber has extensive amount of pre-cast, heat-treated refractory brick and water cooled sides.
4. Fire chamber has 9" high heavy-duty pre-cast, heat-treated refractory brick all around.
5. Large pre-cast heat-treated refractory brick reaction chamber to withstand the gasification process heat and to assist in re-ignition.
6. Pre-cast heat-treated refractory brick combustion nozzle.
7. Secondary combustion/reaction chamber bottom is a pre-cast heat-treated refractory brick lined unique target area. Heat/gases are directed towards the front, heavily insulated, refractory brick lined heavy duty doors where it reverses 180 degrees back and up through the second pass tubes.

TURNING GREEN INTO GOLD

& KEEPING THE GREEN IN YOUR POCKET!

Original, undisputable optimal designed, classic named Portage & Main Outdoor Water Furnaces lead the industry in high efficiency, dependable, long lasting, engineered products, with proven technology that has stood the test of time for over 150 years.

8. All extreme heat areas are pre-cast heat-treated refractory brick lined or water cooled. Water cooled lower reaction area behind the refractory brick allows for maximum heat transfer into the water jacket. This is where the intense heat from gasification process is extracted.
9. Large area of heat recovery with extensive water covered heat extraction surfaces. The scotch marine multi-pass tube heat exchanger, which is a time tested and proven design, consists of six 2" vertical tubes and 20 full length 1.5" horizontal tubes with turbulators inside.
10. Easy, convenient access to the large pump install area is provided by the two back hinged doors, insulated with fiberglass reflective high quality insulation. These doors have lockable paddle type latches.
11. Protected behind the doors are aquastats and blower. Simple digital controls allow the operator to accurately regulate the furnace's heat output as controls are programmable to within one degree (Johnson Control). No temperature creeping to boiling point. High limit safety aqua stat controls can be remotely mounted in the home/building easily. Double pump hook-up is shown. Extra pump hook-ups can be tied in. Pumps not included.
12. CSA approved high quality capacitor run bearing motor.
13. Motorized 120 volt gasketed flapper air shut off. Trouble free air control, no wires to burn off or solenoid to give trouble.
14. Adjustable primary and secondary air. Motor fan switch and electrical control box.
15. Return water enters low to pick up intense heat.
16. All parts are laser cut for precision fitting which allows the bevel to be accurately filled with strong double pipeline (Boiler style welds). Welding inside and outside takes more time but is worth it as it results in stronger total penetration welds, which help prevent weld corrosion, cracking and pin hole leaks.
17. Rounded top firepot has air introduced along the full center length of the firepot top. This prevents one spot violent burns.
18. Firepot and heat exchanger are made of 1/4" W44 cold rolled steel which eliminates the problems associated with stainless steel. W44 cold rolled steel has the same corrosive resistant properties as boiler plate and is noted for being a very "uniform" steel that is easy to shear, break and is welder friendly. Inside water jacket is made of 1/4" cold rolled steel. Outside water jacket is made of 3/16" cold rolled steel.
19. Convenient, easily accessible, insulated, or refractory brick lined doors have adjustable latches and adjustable heavy duty hinges using of 3/8" hardware. They make the cleaning of fire tubes and ash removal easy. Heavy-duty charge door, insulated with Roxull insulation to 2,200 degrees F, is at a convenient, easy loading height. The safety latch doors seal with top quality industrial core gasket giving a long-lasting, positive seal.
20. Easy to read, convenient float water level indicator has no sight glass to fog or discolor or electrical to give problems.
21. Chimney comes out of the furnace below water level. This prevents stack corrosion.
22. Powder coated finish on the one-piece roof has no trims to rust or deteriorate. Top quality mirror-like paint on the rest of the furnace.
23. Furnace is very well insulated using R20 quality insulation which will not break down, crack, separate, burn or cause rust on the outside of the unit.
24. "PORTAGE & MAIN" is proudly stamped on every unit.
25. Base floor insulated with high temperature Roxull insulation to 2,200 degree F.
26. NO additional insulated water storage tanks are required to extend heating period of the Optimizer 250 therefore NO additional costs are incurred.



Digital Aqua Stat Controls

Portage & Main Outdoor Water Furnace WOOD GASIFICATION UNITS

Optimal Designed, and Manufactured for Optimal Efficiency and Operation Ease

What it means for you!

Portage & Main Outdoor Water Furnaces have been producing highly efficient long-lasting furnaces that are simple to operate and maintain since 1973. They have industry's best warranty. The wood gasification process gives optimal high efficiency by extracting heat from the gases and other emissions that are released into the atmosphere in conventional furnaces. This optimally high efficiency gives you optimal benefits and savings all around.

The optimal high temperature burn produces more heat from less wood, lowering wood's fuel price. It takes less wood to give a greater BTU output. The wood in our gasification process produces up to twice the heat than in conventional boilers. It burns cord wood – less processing, costs of cutting and splitting. Saves you both resources and time! It can burn all types of seasoned dry wood so even more savings.

The Optimizer 250 combines the benefits and safety of the conventional furnace (low temperature burn) with added savings and technology of a high temperature burn water furnace to supply heat for your house, greenhouse, pool, shop, business or other buildings.

You are not dependent on fossil fuels with their rising costs.

It is designed for easy operation, low maintenance and, of course, highest efficiency.

The fire tube turbulators inside the round scotch marine tubes keep the hot gases to the perimeter of the tube so it is easily extracted by the water surrounding the tubes. This guarantees maximum

heat transfer to the water will occur. This turbulent heat transfer only occurs with round tubes. It is not possible with rectangular or square pipe as they rely on laminar flow.

The high temperatures of the gasification process eliminate creosote build-up in scotch marine tube heat exchanger.

The Optimizer's front and back fire tube access doors make cleaning out fly ash from the flues a simple and easy task. The front access door for the fire chamber makes this area accessible and easy to maintain ash free.

The Optimizer's full length back access doors make hook up simple.

The Optimizer is installed outdoors which keeps the fire and woodpile away from your home which in many cases lowers home insurance costs. It is also available to be installed inside an outdoor building (shop, barn, etc).

No expensive hot water storage tanks are required.

These design and production elements are beneficial to you and to the environment.

What it means for the environment.

The reports of dwindling fossil fuel supplies and a growing concern for the environment have governments and individuals alike looking for alternative heating options.

Portage & Main Outdoor Water Furnaces' leading edge experience and expertise in alternative energy heating products since 1973 have answered the call

for greater efficiency and less environmental emissions with this wood gasification unit – The Optimizer 250.

The highly efficient Portage & Main Outdoor Water Furnaces have always burnt 1/3 to 1/2 less wood than other boilers. It stands to reason if less wood is burnt, there will be less emissions into the environment. Portage & Main Outdoor Water Furnaces have always incorporated the time tested efficient elements of wood burning into their furnaces.

We have combined the unsurpassed quality of the Portage & Main Outdoor Water Furnaces with the high temperatures of wood gasification, pre-cast heat-treated refractory brick and scotch marine heat extracting tubes to produce an environmentally and friendly, long lasting efficient unit. Now this wood gasification, clean burning model uses even less wood to produce double the amount of BTUs and is virtually smokeless – which means very, very little emissions.

Optimizer 250 Gasification Process-How it works.

The Physics Laws Combustion Stages:

1. Wood burns and boils out moisture.
2. As temperature increases, the wood begins to release volatile gases.
3. These gases are burnt. This is the final stage of combustion which releases the most heat.

Low temperature conventional furnaces cannot maintain the 1300°F plus temperatures required to burn these gases. The Portage & Main Optimizer with high temperature wood gasification chamber maintains 3 stage combustion which produces optimal heat. The very efficient large scotch marine tube design heat exchanger optimally extracts heat into the water jacket. The heated water is circulated to your home's (building) heating system through underground insulated pipes.

Outdoor water furnaces can be used for new building heating or easily integrated into your existing heating system. They can be used with any forced air heat source already installed in a building – with existing electric, gas, or heating oil. A simple fan coil radiator is installed in the furnace plenum and the existing fan blower distributes the heat. The fan blower is now controlled by a new thermostat, leaving the existing system intact for emergency back-up. Heat is distributed evenly throughout the building. You can also use a plate heat exchanger to connect to your existing indoor boiler. Boiler fluids are left intact and ready for emergency backup. You can use a plate exchanger or a sidearm, to produce unlimited domestic hot water.

SPECS: WOOD GASIFIER ~ OPTIMIZER 250

Maximum Furnace Output (BTU/Hour)	up to 300,000
Heating Area, Approx. (sq. ft.)	5,000 plus
Total Width	47"
Total Depth	66"
Total Height	81"
Shipping Weight Approx.	3,030 lbs
Chimney Size	6"
Door Size W x H	18" x 20"
Firebox Volume W x H x L	32" x 26" x 30"
Water Capacity (US gallons)	240
Fire Tubes	(20) 1.5" horizontal, (6) 2" vertical
Maximum Log Length	28"
Limited Warranty	10 years

Comes with ash tray, cleaning tools, firetube brushes, fire tool and certified boiler treatment.

Simply the Best!

North American Portage & Main Outdoor Water Furnace Distributor

HEAT SMART PLUS
R.R. #5, Site #16, Comp #114
PRINCE ALBERT, SK S6V 5R3
1-800-561-0700
www.portageandmainboilers.com

Authorized Portage & Main Outdoor Water Furnace Dealer