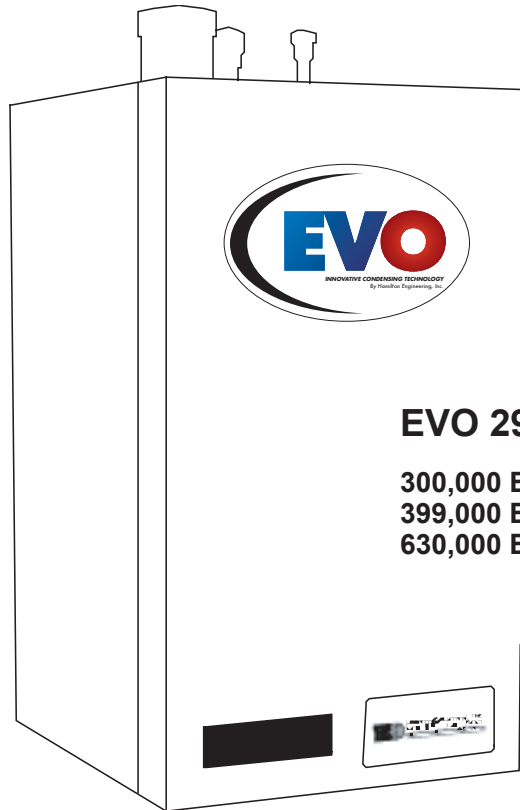


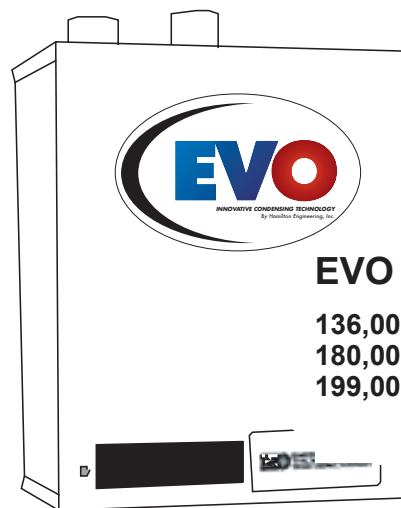
ADDENDUM TO LIT91127 & LIT91146

EVO 129-599 REQUIRED MAINTENANCE PROCEDURES



EVO 299-599

300,000 BTU/hr
399,000 BTU/hr
630,000 BTU/hr



EVO 129-199

136,000 BTU/hr
180,000 BTU/hr
199,000 BTU/hr



WARNING

These appliances MUST be installed by a properly licensed individual in the City and State which the unit is being installed. All start up adjustments and subsequent service work must be done by a similarly licensed contractor or a factory trained service individual. Failure to comply could result in loss of warranty and or severe personal injury, death and or substantial property damage.

INTRODUCTION

All high efficiency condensing appliances will require more regular maintenance (cleaning) than their non-condensing counterparts. Failure to do so may result in damage to the appliance that is not covered under warranty. Failure to follow all of the instructions contained in this manual may also cause premature product failure that may not be covered under warranty.

Periodic maintenance should be performed at least once a year by a qualified service technician to ensure that all the equipment is in safe, efficient operation. **Failure to do so may eliminate warranty coverage.** In the first year of operation, it is highly recommended that inspections of all connection points and the combustion chamber be done at three month intervals, any signs of fouling or leaks must be thoroughly investigated immediately as failure to do so may void warranty. Assuming no cause for excessive fouling is found, then the period of months from initial start up that it was found that cleaning was required, shall become the required future minimum cleaning interval, but at no time should it exceed 12 months. The owner **MUST** make necessary arrangements with a qualified heating contractor for proper maintenance of the heater. Installer must also inform the owner that the lack of proper care and maintenance of the heater may result in a hazardous condition and lack of warranty coverage. The installer should discuss the contents of the User's Information Manual with the owner.

An inspection should cover, at a minimum, the following areas:

- Download and review operating hour data and fault history
- Inspect all fittings, controls and connections for leaks, damage, or fouling
- Fire side:
 - Heat exchanger
 - Burner and ignitor
 - Burner door and rear wall insulation
- Drain system components:
 - Hoses & clamps
 - Trap assembly
 - Condensate neutralizer
- Test all safeties and operating controls
- Water side temperature rise (ΔT) test

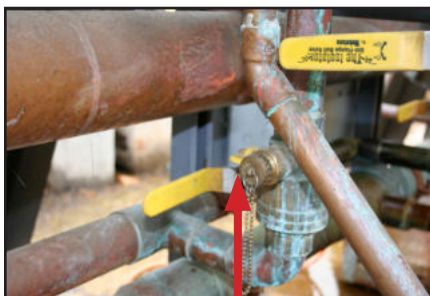
DATA DOWNLOAD

Always retrieve fault history and power on hours from the control board first, using your laptop or PDA and the SIT cable and software. Be sure to use the proper version software and communication cable, then save the file and name appropriately for future reference. Should the servicing contractor not have the proper software, cables, and training to do this, have them contact the factory or their local distributor.

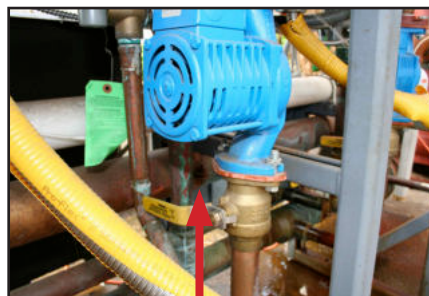
INSPECTION AND CLEANING (photos illustrating each step follow sets of instructions)

Caution: Before removing the door of the appliance, switch off the electrical power supply to it.

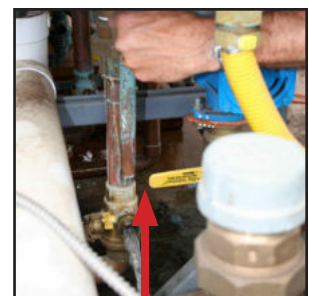
- Remove the front cover and check the sensors, flow switch, all pipes, lines and connections, and the heat exchanger (top, bottom) for traces of water and water leakage.
- Inspect the top of the casing and/or the top of the appliance for water leakage or traces of water from the air supply pipe or the air vent (if applicable).
- Inspect the flow switch; the appliance must first be drained by closing the inlet and outlet valves on each appliance. Then, by opening the drain on the ball valve and the relief valve, the appliance will drain.



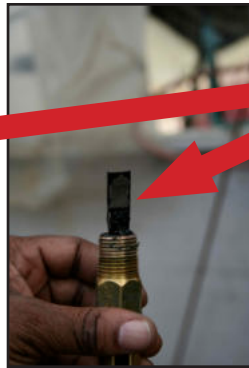
Isolation and drain
valve appliance outlet



Isolation valve for pump
& appliance outlet



Relief valve - check operation
and open to drain unit



FLOW SWITCH:

Check paddle for fouling and free movement by spring!

- Dismantle the burner unit: remove the (6) 6mm nuts (with a 10mm socket), the ignition cable, the power and speed control plugs, and the ground wire from the fan, and remove the burner/fan unit from the heat exchanger and cabinet.

- After the burner door is removed, it should be thoroughly inspected before being put back into service. There are two gaskets on the burner door; the first is the inner rope gasket, which is permanently affixed to the burner door. If this gasket is completely compressed (having no sealing ability), the door must be replaced. The second gasket is on the perimeter and is made of rubber; this gasket is easily replaced, and comes as a standard part of a maintenance kit (and should always be replaced during the annual maintenance procedure. **Note: Over-tightening the M6 nuts may cause the threaded rods on the front of the heat exchanger to break! If excess resistance is encountered when installing a M6 nut, discard that nut and use one of the spares shipped with the unit. The maximum torque for assembling a burner door nut is 3.7 ft-lb or 44.4 in-lb. Use a torque wrench suitable for this torque range to tighten the nuts.**

Complete burner, door & fan assembly removed for inspection

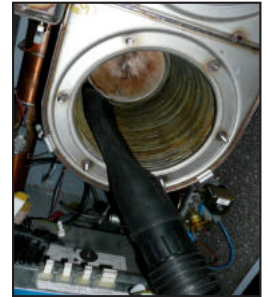


- Remove and inspect the rear fiberboard. If any resistance is encountered with the removal of the screw securing the fiberboard in place, do not exert undo force; break the fiberboard out to provide access to the screw. Apply penetrating oil to the screw, let it sit, then remove. See photos below for details. Replace only after cleaning procedure. Use a new fiberboard if moisture has fouled it or if there is any physical damage preventing it from protecting the rear wall, such as cracks or warping. Warped fiberboards will allow the back wall to overheat, this could lead to a breach of the back wall. This will also cause a loss of efficiency and a rise in stack temperature. **Note: Failure to replace front and rear fiberboard when damaged may result in irreparable damage to the appliance!**



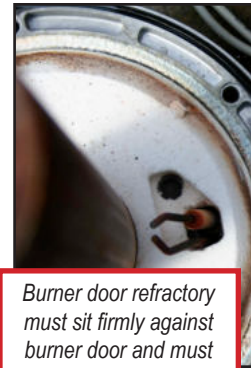
Both of these must be replaced!

- Check the fire side of the heat exchanger: only clean loose residue from the heat exchanger coil, use a vacuum cleaner and nylon brush, and do not push the residue between the openings of the coils if at all possible, as this may impede the flow of the products of combustion.
- Use inspection mirror to check all heat pass spaces between coils, and using a short, thin putty knife or strip of stainless steel, remove all debris. **These passages MUST be free and clear for proper heat transfer to occur.** Rinse well all loose debris that was pushed down to the bottom of the condensate collection tray.
- It is recommended to only use clear water to rinse any remaining residue away – the water will automatically flow to the condensate drain point.
- If surface or coil gap fouling still exists after the above measures have been taken, the use of a non-acid based cleaning solution, such as Fernox F3, is acceptable. Rinse entire heat exchanger thoroughly after cleaning procedure is complete.



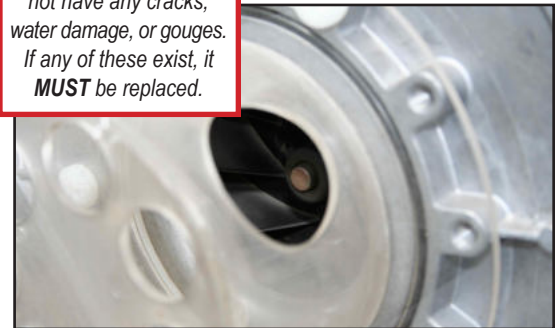
(See complete cleaning instructions on page 53-55)

- Check the distance from the electrode to the burner; there should be a 3/8" gap in between the two. If the existing electrode pins must be adjusted for proper gap, caution must be exercised, as they will likely be brittle from exposure to the flame; try to bend them as close to the burner door insulation as possible using two pair of pliers; one to support the rod, and one to bend with. New electrodes will be less susceptible to breakage during adjustment. The metal surface of the electrodes should also be carefully cleaned with emery cloth.



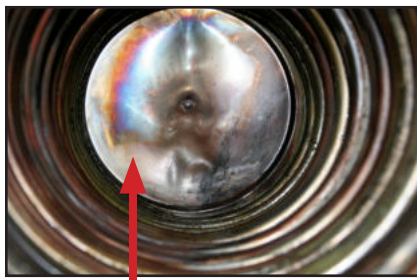
Burner door refractory must sit firmly against burner door and must not have any cracks, water damage, or gouges. If any of these exist, it MUST be replaced.

Note: Do not make any adjustments or cleaning with the electrode still mounted to the burner door, as damage to refractory may result!

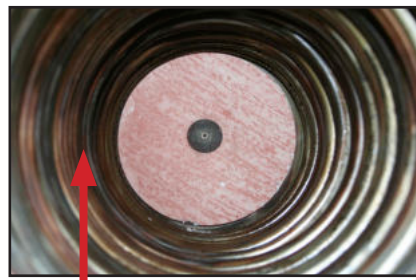


- Dismantle the air gas mixing plate or chamber on the suction side of the fan and check for fouling. If required, clean the fan blade wheel and the air gas mixing box.

- Reassemble the burner chamber, making sure there is no moisture on any of the fireside components.



Cleaned heat exchanger - prior to rear wall installation



Cleaned heat exchanger - after rear wall installation



Burner & door assembly - prior to fiberboard installation

TESTING

The following steps require the power supply be turned back on; extreme caution must be exercised when performing service with the power supply on and the door off.

- When turning the appliance back on, listen for significant noises from the fan and pump. Also, inspect for leaks at the pump connections.
- Press the reset button from the home screen to access the sensor readings, and record each reading, making sure that all sensors and thermometers are reading the same, with the heat off.
- Fire the appliance on maximum output for 5 minutes, in order to check the ΔT from the inlet sensor to the outlet sensor.
 - If the ΔT reading is out of design range by more than 10% or there is an E6 error on the display, refer to coil cleaning instructions below. Record ΔT to track any increases from one year to the next.

Model	BTU/hr. Input	Minimum Hydronic Flow	ΔP at Minimum Flow Rate - ft. of head
HWH 79	80,000	2.23	3.3
HWD 79	80,000		
HWH 129	136,300	3.64	3.5
HWD 129	136,300		
HWH 179	186,600	5.06	3.3
HWD 179	186,600		
HWH 199.1	199,999	5.63	3.5
HWD 199.1	199,999		
HWH 299	300,000	8.45	4.9
HWD 299	300,000		
HWH 399	399,999	11.31	3.5
HWD 399	399,999		
HWH 599	630,000	17.74	4.9
HWD 599	630,000		
HWH 1499	1,500,000	42.13	5.2
HWD 1499	1,500,000		
HWH 1999	1,999,999	58.45	5.2
HWD 1999	1,999,999		

Hydronic Pipe Size	Design ΔT Hydronic @ 95% efficiency	
	$^{\circ}F$	$^{\circ}C$
1"	34.6	19.2
1"	58.9	32.7
1"	53.7	29.8
1"	57.6	32.0
1.5"	51.8	28.8
1.5"	43.2	24.0
1.5"	45.3	25.2
2.5"	46.3	25.7
2.5"	46.3	25.7

DHW Pipe Size	Design ΔT DHW @ 97% efficiency	
	$^{\circ}F$	$^{\circ}C$
1"	23.5	13.1
1"	40.1	22.2
1"	36.6	20.3
1"	39.2	21.8
1.5"	35.3	19.6
2"	29.4	16.3
2"	30.9	17.1
2.5"	31.5	17.5
2.5"	31.5	17.5

- Fire the appliance on maximum output, and measure and adjust the CO₂ percentage as required.
- Fire the appliance on minimum output, and measure and adjust the CO₂ percentage as required.
- If there are an unusual number of F5 or F6 faults or if combustion is off significantly, gas supply pressure must be verified at static (no load) and full building load conditions.
- See Table 3-3, Page 17 for specific settings.
- Inspect intake and exhaust screens at the termination point for signs of contamination (i.e. leaves, twigs, etc).
- A differential pressure (ΔP) reading should be taken across the exhaust and inlet air connection points of each appliance to confirm that it is below the maximum shown below.

NOTE: The inlet air pressure should be negative.

MODEL	AIR PRESSURE (ΔP)	MODEL	AIR PRESSURE (ΔP)
HW129	< .6" wc	HW399	< 1" wc
HW179	< .96" wc	HW599	< .86" wc
HW199.1	< .68" wc	HWH 1499-1999	< .8" wc

Try to keep the measuring hose flat with the inner wall of the pipe. Use a small opening to insure you are measuring static pressure and not velocity pressure

Measured pressure

Use of a static pressure tip for measurement is also recommended

P (1, 2, 3) A
These will be negative pressures relative to atmosphere

P (1, 2, 3) F
These will be positive pressures relative to atmosphere

Example
P1A = -0.32" wc
P1F = 0.4" wc
Then the total pressure drop is:
 $\Delta P_{total} = -(P1A) + P1F = -0.32 + 0.4 = 0.72" \text{ wc}$

Calculations are done with:

- All boilers at high fire
- Water temperature 160/180°F (gives the hottest flue gasses)
- All readings must be taken with boiler front cover installed

Doing the measurements under these conditions will give the most accurate results. There may be minor differences between appliances.

- A pH test must be performed at the exit point of the condensate neutralizer with litmus paper to test for acidity. pH level should be within 6.6-7.0. If the pH is less than 6.6, replace neutralizing medium.
- Checking the minimum and maximum settings on the display must be performed as a final check.
- All findings and concerns should be discussed with the appliance owner after the inspection is complete.

CONDENSATE TRAP CLEANING INSTRUCTIONS

The condensate trap and entire drain system attached to it (above the neutralizer) should be cleaned at least once every year.

- 1) Turn off the power to the EVO.
- 2) Place a bucket under the condensate trap. Use caution when removing the clean-out cap, as the trap is full of condensate and it may be hot.

- 3) Remove the condensate clean-out cap, and be sure the bucket is under the open drain trap assembly to catch the debris and water.



- 4) Rinse out the clean-out cap in a sink to remove any dirt or buildup that may have accumulated.



- 5) Condensate drain assembly should now be checked for non-restricted flow throughout the entire assembly.



- 6) Reinstall the clean-out cap on the condensate trap.
- 7) Turn on the power to the EVO.
- 8) Make sure the hose from the condensate trap is not submerged too far into the neutralizer, there should be an air gap between the highest level of condensate and the outlet hose from the trap.
- 9) Monitor the condensate drain until flow has been established.

INSTALLATION OF THE BURNER DOOR DURING SERVICING

Proper precautions must be taken when installing the EVO burner door. Faulty installation or using a door in need of replacement risks leakage of combustion products, or further, a damaged heat exchanger that will not be covered under warranty.

Any time the burner door is removed, it should be thoroughly inspected before being put back into service. There are two gaskets on the burner door; the first is the inner rope gasket, which is permanently affixed to the burner door. If this gasket is completely compressed (having no sealing ability), the door must be replaced. The second gasket is on the perimeter and is made of rubber; this gasket is easily replaced and comes as a standard part of the maintenance kit (and should always be replaced during the annual maintenance procedure). To limit risks, the following instructions must be adhered to.

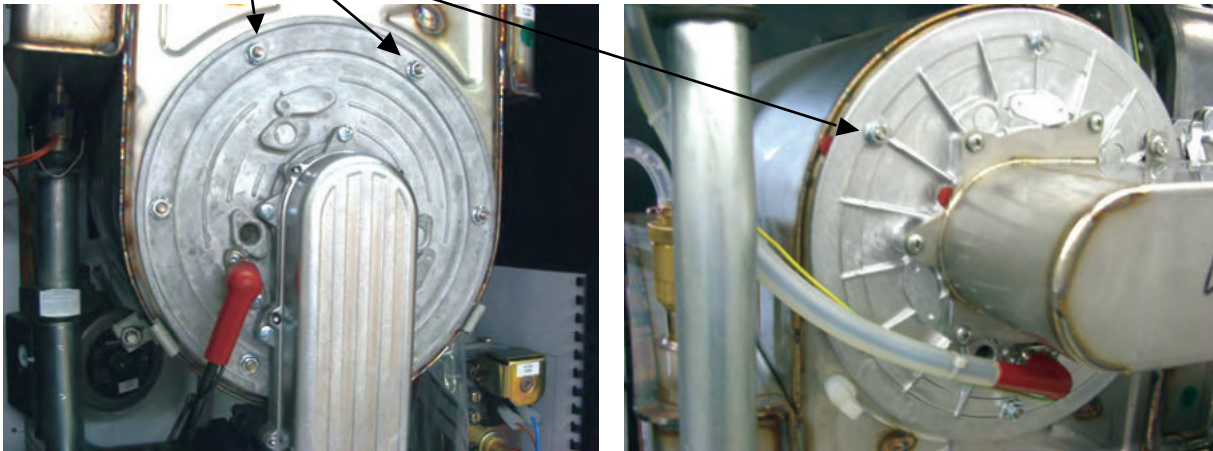
PROPER PROCEDURE

Before installing a burner door, the two gaskets and the burner door refractory must to be checked for damage or deterioration and proper placement (rubber gasket and refractory); once this inspection is completed, the burner door can be mounted with the six M6 nuts. **Please note: Over-tightening the M6 nuts may cause the threaded rods on the front of the heat exchanger to break!** If excess resistance is encountered when installing an M6 nut, discard that nut and use one of the spares shipped with the unit.

The maximum torque for assembling a burner door nut is 3.7 ft-lb or 44.4 in-lb

Use a torque wrench suitable for this torque range, to tighten the nuts.

M6 nuts and thread studs



After starting up the unit:

To limit the risk of leaking combustion products, a leak test of the burner door gaskets with a hand held combustion gas leak detector (sniffer) must be done.

See next page for detailed photos of burner door and gasket conditions.

INSTALLATION OF THE BURNER DOOR DURING SERVICING



New Burner Door



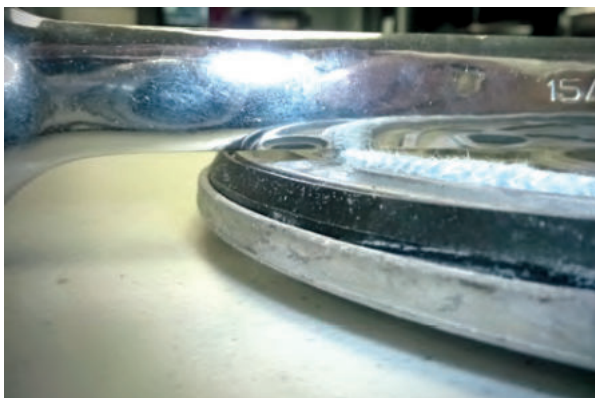
Damaged Burner Door



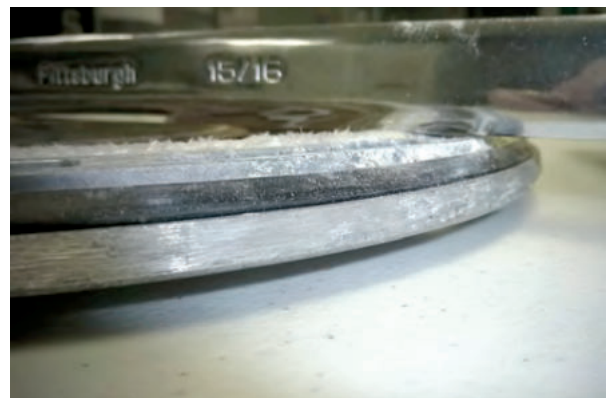
Rope gasket in good condition



Damaged rope gasket—will not seal properly



Rope gasket raised above door surface (good!)



Rope gasket at or below door surface (bad!)