

| Jamie's Notes BW9 Igniter Failures

Possible causes are the following:

- 1- Firing rate was not verified when the boiler was installed. (Overfiring leads to premature igniter failure)

The nominal manifold pressure for sea level firing rate for both Natural Gas and Propane is 2.5 inches Water Column. Refer to the Installation Instructions for the correct firing rate at a specific altitude above 2000 ft.

- a- Remember to cover the regulator adjustment screw or put the regulator adjustment cap back on when taking manometer readings. A water column manometer is preferred over a spring-loaded gauge. Clock the meter if necessary.
  - b- If a combustion analysis is performed, the readings should be taken when the water temperature is at 170 to 180 degrees F. There is a capped port below the inducer motor assembly for drawing combustion samples. Remember- a combustion analysis is only as good as the instrument calibration and the age of the O<sub>2</sub> and CO<sub>2</sub> sensors on electronic instruments. Each of these sensors has a limited life and should be replaced at the interval specified by the instrument manufacturer.
    - i. O<sub>2</sub> @ 180 degrees F, 4%  
O<sub>2</sub> @ 60 to 100 degrees F, 6%
    - ii. CO<sub>2</sub> @ 180 degrees F, 11%  
CO<sub>2</sub> @ 60 to 100 degrees F, 8.5%
    - iii. CO @ 180 degrees F, 20 to 50 ppm (nominal)  
CO should never be above 100 ppm at other steady-state operating temperatures. Run boiler for at least 10 minutes before taking CO readings
- 2- Boiler short cycling may cause premature failure of the integrated boiler control (IBC) and igniter. Short cycling may be due to boiler oversizing, multiple zone systems with several zones that have very small heat loads, improperly adjusted thermostat heat anticipator, pressure switch or aquastat settings.
    - a- The differential on the boiler aquastat is factory set for a 20 degree differential. In typical residential systems the differential should be at least 20 degrees to prevent short cycling.
    - b- Verify that the aquastat left the factory set for a 20 degree differential. If the cut-out temperature has been changed, verify that the differential remains set for 20 a degree differential. The adjustment dial is hidden

under the cardboard inside the aquastat where the wiring connections are made and the scale goes from 5 degrees to 30 degrees.

- c- Short cycling on pressure switch may be due to one of several issues. Incorrect firing rate, incorrect vent sizing/installation or re-circulation of flue gases into the combustion air intake pipe. Early model BW9-100 had a pressure switch set to open at 1.17 inches of water column. Models produced after week 27 of 2001 had the set point lowered to 1.00 inches of water column.
  - d- Each size BW9 has a pressure switch with unique set points. Verify that the correct switch is installed on the boiler.
- 3- Flame impingement on the ceramic portion of the igniter will accelerate igniter failures. This is indicated by an open igniter where the heating element is not cracked. A similar failure mode could also be due to a failure of the nickel plating process that bonds the wires to the element inside the ceramic. The plating and bonding process used in the igniters was improved with boilers produced in 2002.
- a- Check for scorching or burn marks on the ceramic portion of the igniter. This is an indication of flame impingement on the igniter. All of the situations above can contribute to flame impingement on the ceramic portion of the igniter.
  - b- Replace the failed igniter with the 438-00-013 igniter, which is a different length (shorter) than the 438-00-014 igniter originally used on the BW9-100. All boilers produced since the 4<sup>th</sup> quarter of 2002, should have the shorter igniter.
  - c- Insure that the igniter is the correct length. Measure the distance from the mounting flange to the end of the ceramic housing, not the tip of the element. The correct length should be about 2-3/4 inches.
  - d- Use care in removing and replacing the igniter. To aid in igniter removal, perform the following steps:
    - i. Loosen the five nuts that hold the burner assembly to boiler.
    - ii. Loosen the burner assembly from the boiler. This will de-compress the gasket around the igniter.
    - iii. Remove the screws that hold the igniter in place, then slowly withdraw the igniter from the burner assembly.

- iv. Install the new igniter and gasket included with the igniter and carefully insert the igniter into the burner assembly.
  - v. Reverse the remaining steps to complete the igniter installation.
  - vi. Check the burner flame through the observation port. When the igniter is properly installed there should be no contact between the burner flame and the ceramic housing.
- 4- Supply voltage to the boiler over 125 VAC can cause accelerated failure of the IBC control and or the igniter.
  - a- A voltage check should be recorded by disconnecting the molex plug of the igniter. The voltage should be no higher than 130 VAC during igniter warmup period.
  - b- Verify the grounding of the boiler. This should be accomplished by a dedicated ground wire from the grounding bus bar in the service panel to the boiler and wire nutted to the green wire located inside the 4x4 box on the side of the boiler. Wire that has a metal covering (Armorflex, Greenfield, etc.) should not be using the metal covering as the ground. There should be 3 wires (L1, L2, Ground) from the service panel to the boiler.
- 5- Debris stuck on the inlet air baffle (PVC shavings, grass, lint, etc.) may create a low oxygen level in combustion which will reduce igniter life. The inlet air baffle should be cleaned when the boiler is serviced at least once a year.
  - a- Check for dirt, PVC shavings on the inlet air baffle.
  - b- If PVC shavings are present on the inlet air baffle the technician should check the bottom of the mixer casting for shavings as well. If any PVC shavings are found in the mixer casting or on the air baffle, the burner should be removed and inspected. If shavings from PVC pipe have been introduced into the inside of the burner there will be a hard black film in the bottom of the burner from the melted PVC. At this point the burner will have to be replaced.
- 6- Vent/air intake systems that are incorrectly sized (length too long or pipe size too small) may cause the same low oxygen condition.
  - a- Refer to the vent tables in the Installation Instructions
- 7- Incorrect vent/air intake termination can recirculate combustion products back into the air intake of the boiler sending saturated combustion air back into the boiler causing poor combustion and moisture, which may promote igniter failure.

- a- Remember: Wind currents or other obstructions can cause re-circulation. Heavy ice formations on vent terminations is an indicator of re-circulation of flue gases.
  - b- Refer to the vent termination information in the Installation Instructions or the Concentric Vent Termination kit.
- 8- Air leakage into the boiler. If the clean-out panel is loose and air enters around the panel, combustion oscillations (pulsation) could occur. This could also occur if air leaks in around the igniter.
- a- Verify that the gasket of the clean-out panel is in place and the screws that secure the clean-out panel are tight.
  - b- Verify that the igniter gasket is in place. When replacing an igniter, use the new gasket included with the igniter.