

Date: 12/4/09	Number: 2009-13
Subject: BENCHMARK 2.0 (Nozzle Mix) BOILER 24 MONTH INSPECTION KIT, PART NUMBER 58015-02	
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1. INTRODUCTION

This Technical Service Bulletin provides the procedures to perform waterside and fireside inspections of the Heat Exchangers contained Benchmark 2.0 Boilers equipped with nozzle-mix burners.

The replacement parts required to perform the waterside and fireside inspections on the Benchmark 2.0 (with nozzle-mix burners) are provided in the 24 - Month Inspection Kit (part no. 58015-02) listed and described in section 2.

2. CONTENTS OF 24 - MONTH INSPECTION KIT, PART NO. 58015-02

The items included in the 24 Month Inspection Kits required for Benchmark 2.0 Boilers (with nozzle-mix burners) are listed in Table 1.

Table 1. Benchmark 2.0: 24 Month Inspection Kit, Part No. 58015-02

ITEM	QTY	PART NO.	DESCRIPTION
1	1	GP-122435-S	IGNITER
2	1	123970	FLAME DETECTOR
3	1	123612	EXHAUST MANIFOLD SEAL
4	1	161432	BURNER GASKET
5	1	161433	BURNER RELEASE GASKET
6	1	84017	CONDENSATE TRAP O-RING
7	1	81092	CONDENSATE TRAP ORIFICE GASKET

3. TOOLS, TEST EQUIPMENT & MATERIALS REQUIRED

The items required to perform the inspections, replacements and tests specified in this Bulletin are listed in paragraph 3.1, 3.2 and 3.3 which follow.

3.1 Tools

Common hand tools, plus the items listed below are required:

- Igniter Removal Tool (part no. 123652)
- Small Wire Brush
- Spark Gap Feeler Gauge

3.2 Test Equipment

No test equipment is required to perform the 24 - month inspections include in this Technical Service Bulletin. However, following completion of these inspections, the Benchmark Boiler should be tested using the combustion calibration procedures provided in O & M Manual GF-110 or GF-110T. See paragraph 7.2

3.3 Materials

Expendable materials required to perform the procedures described in this bulletin are not included in the 24 -Month Inspection Kits. These materials may include such items as:

- Pipe joint compound
- Teflon tape
- Cleaning solvents and materials

4. PRELIMINARY INSPECTION PROCEDURES

The detailed procedures required to perform the waterside and fireside inspections included in this Technical Service Bulletin are provided in sections 5 and 6. However, prior to performing the procedures in section 5 and 6, perform the preliminary set-up and disassembly procedures described in the following steps which apply to all Benchmark Low NOx Models covered in this bulletin.

1. At the front panel of the unit, set the **ON/OFF** switch on the C-More Control Panel to the **OFF** position.
2. Disconnect electrical power to the unit by turning off the external circuit breaker.
3. Turn off the external gas supply shutoff valve.
4. Close the water supply and return valves to the unit.
5. Refer to Figure 1 and remove the top and side panels of the unit.
6. With the top and side panels removed, the Benchmark 2.0 burner, heat exchanger and exhaust manifold can be accessed to prepare the boiler for the required waterside and fireside inspections described in sections 5 and 6.

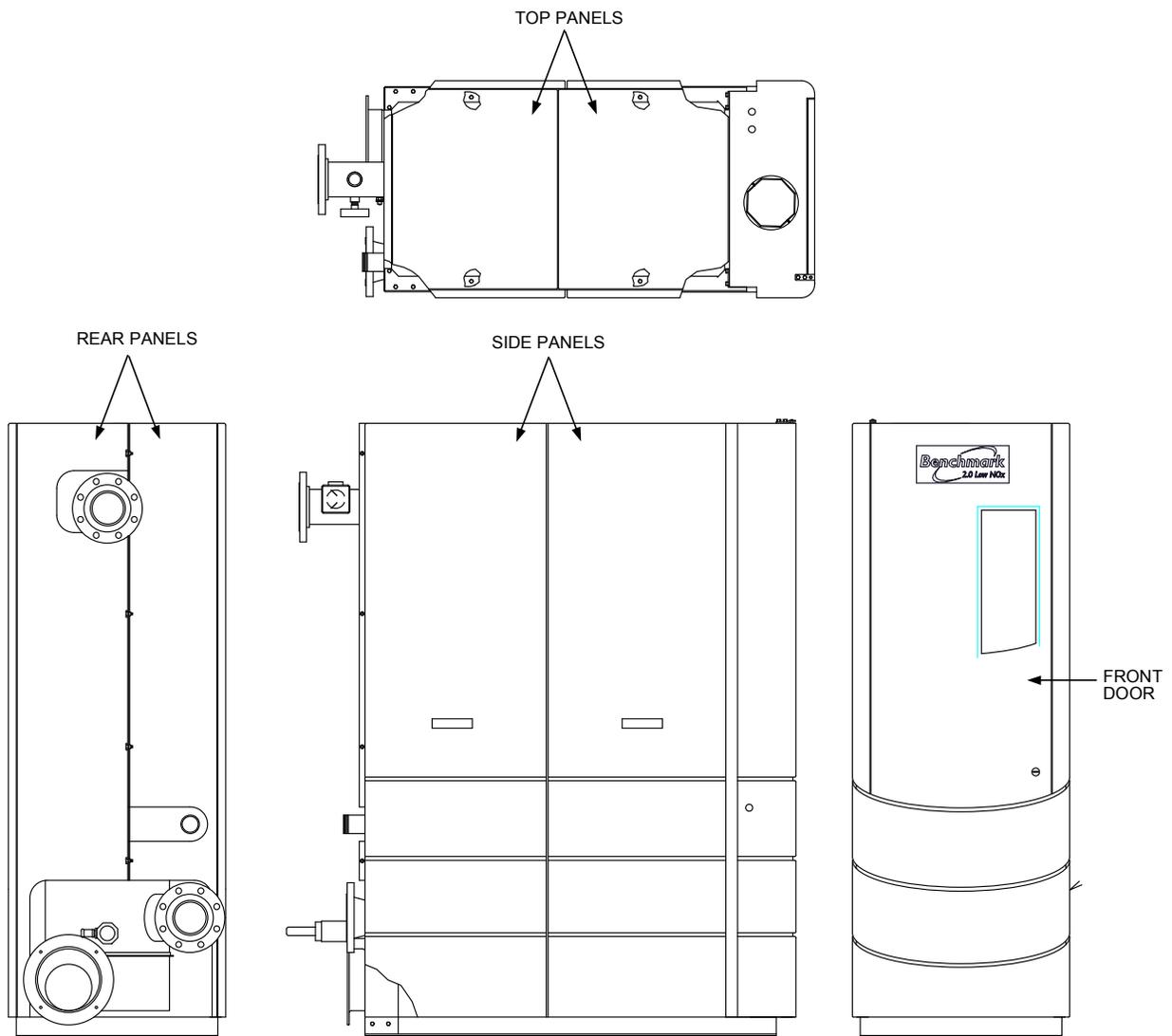


Figure 1. Benchmark 2.0 Boiler

5. WATERSIDE INSPECTION OF BENCHMARK 2.0 HEAT EXCHANGER

Waterside inspection of the heat exchanger is accomplished as follows:

1. Ensure that the preliminary set-up and disassembly procedures in section 4 have been performed to provide access to the heat exchanger of the unit.
2. Allow the unit to cool prior to proceeding.
3. At the rear of the unit (Figure 2), slowly open the drain valve and drain the boiler water from heat exchanger.
4. Open the P&T relief valve, or loosen/remove the shell sensor to allow air to enter the heat exchanger during draining.
5. After the heat exchanger has been drained, remove the 2-1/2 inch access port on the right side of the heat exchanger as shown in Figure 3.
6. If waterside inspection is required by your local inspector, follow the inspector's directions. The interior surfaces of the heat exchanger can be examined using a flashlight. Upon satisfactory completion of the inspection, proceed to step 7.
7. Apply pipe compound to the threads of the access port plug and replace it using a pipe wrench.
8. Close the drain valve at the rear of the boiler.
9. Close the P&T relief valve or reinstall/tighten the shell sensor removed in step 4.
10. Open the water supply and return valves to the unit and refill the heat exchanger.
11. This completes the waterside inspection for the unit.

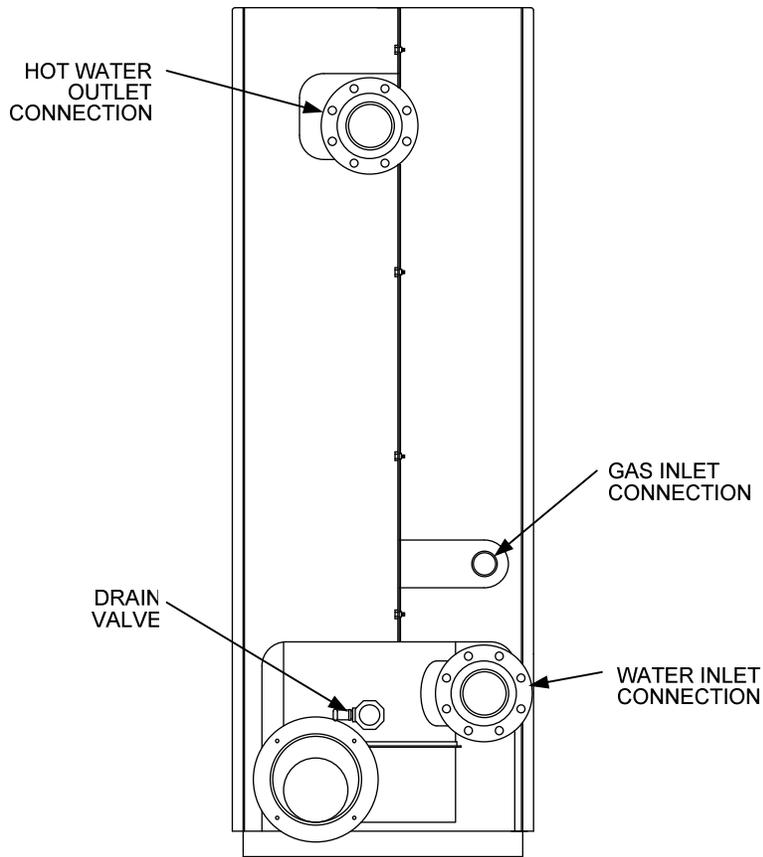


Figure 2. Benchmark 2.0LN (VFD Design) - Rear View

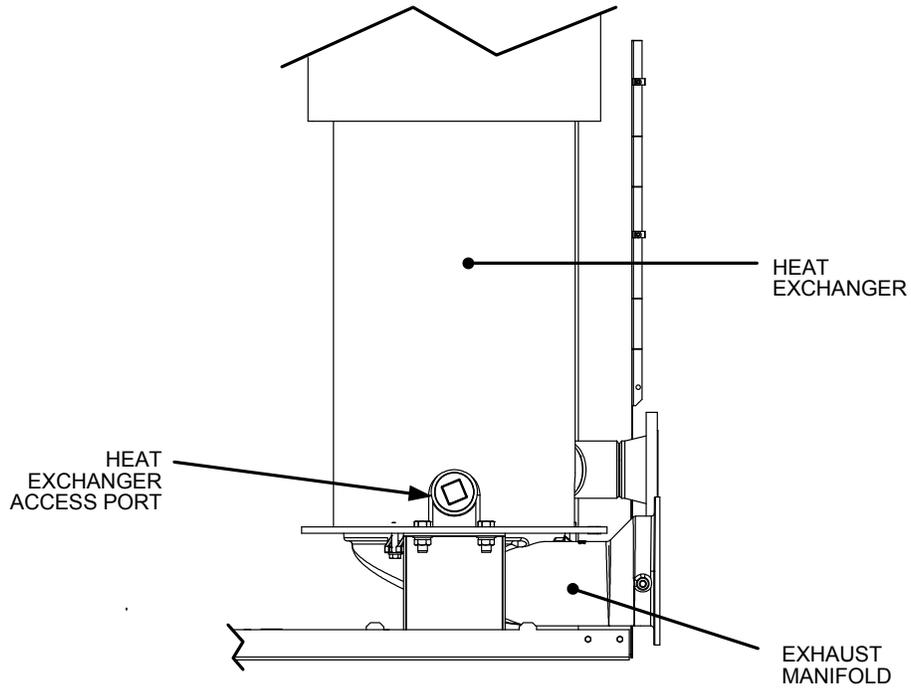


Figure 3. Benchmark 2.0 - Partial Right Side View

6. FIRESIDE INSPECTION & COMPONENT REPLACEMENTS

Benchmark 2.0 heat exchanger fireside inspections include removal of the burner and exhaust manifold assembly of the boiler. In addition, the 24 - Month Inspection Kit includes the recommended replacement parts for annual maintenance which should also be performed at this time. Therefore, the procedures in this section are organized as follows:

Fireside Inspections:

- Burner Inspection
- Exhaust Manifold Inspection

Annual Maintenance Replacements:

- Burner Component Replacement
- Condensate Trap Component Replacements

The procedures for the above inspections and replacements are provided in the following paragraphs,

6.1 Fireside Inspection of Benchmark 2.0 Heat Exchanger

Perform the fireside inspections of the nozzle-mix burner and exhaust manifold using the procedures in paragraphs 6.1.1 and 6.1.2, respectively.

6.1.1 Benchmark Burner Inspection

The burner assembly is located at the top of the heat exchanger as shown in Figure 4. Inspect the burner as follows:

1. Ensure that the preliminary set-up and disassembly procedures in section 4 have been completed.

WARNING

THE BURNER ASSEMBLY MAY BE EXTREMELY HOT. TO AVOID BURNS, ALLOW IT TO COOL SUFFICIENTLY BEFORE ATTEMPTING TO REMOVE IT FOR INSPECTION.

2. Disconnect the lead wire from the flame detector shown in Figure 5.
3. Disconnect the igniter cable from the igniter contactor.
4. Disconnect the combustion air hose from the burner by loosening the hose clamp shown in Figure 5.
5. Remove the four (4) 5/8-11 nuts and bolts from the gas outlet side of the air/fuel valve (Figure 5). DO NOT remove the gas inlet pipe.
6. Remove the six (6) 5/16-16 bolts from the burner flange.

NOTE

The burner assembly is heavy and weighs approximately 25 pounds. Use care when removing the assembly.

7. Remove the burner assembly from the burner flange by lifting it straight up.
8. Inspect the burner and the top of the heat exchanger if required by your local inspector.
9. Following burner inspection, remove and replace the burner release gasket (161433) and burner gasket (161432) provided in the kit.
10. Prior to reinstalling the burner assembly, ensure that the O-ring is properly inserted in the groove on the gas outlet flange of the air/fuel valve.
11. Replace the burner assembly and align it with the tapped holes in the burner flange. Secure the burner to the flange using the six 5/16-16 bolts. DO NOT fully tighten these bolts at this time.

CAUTION

It is imperative that the gas inlet pipe on the burner assembly (Figure 5) be properly aligned with the four bolt holes on the gas outlet flange of the air/fuel valve. Failure to observe this precaution may cause physical damage to the gas inlet pipe resulting in cracks and/or gas leaks.

12. While observing the above CAUTION, ensure that the gas inlet pipe is properly aligned with the four bolt holes on the gas outlet flange of the air/fuel valve. When properly aligned, the four 5/8-11 bolts can be easily inserted in the bolt holes. If gas train realignment is required, loosen the support brackets/U-bolts at the upper and lower portions of the gas train as shown in Figure 6.
13. After the gas train is properly aligned, tighten and secure the upper and lower support brackets/U-bolts.
14. Secure the gas inlet pipe to the gas outlet flange of the air/fuel valve using the four 5/8-11 bolts and hex nuts. Fully tighten the bolts and nuts.
15. Next, fully tighten the six 5/16-16 bolts previously installed in step 11.
16. Reconnect and secure the combustion air hose to the burner assembly by tightening the hose clamp (Figure 5).
17. Next, refer to paragraph 6.2 and replace the igniter and flame detector using the items provided in the kit.
18. Following replacement of the igniter and flame detector, proceed to the exhaust manifold inspection procedure in paragraph 6.1.2.

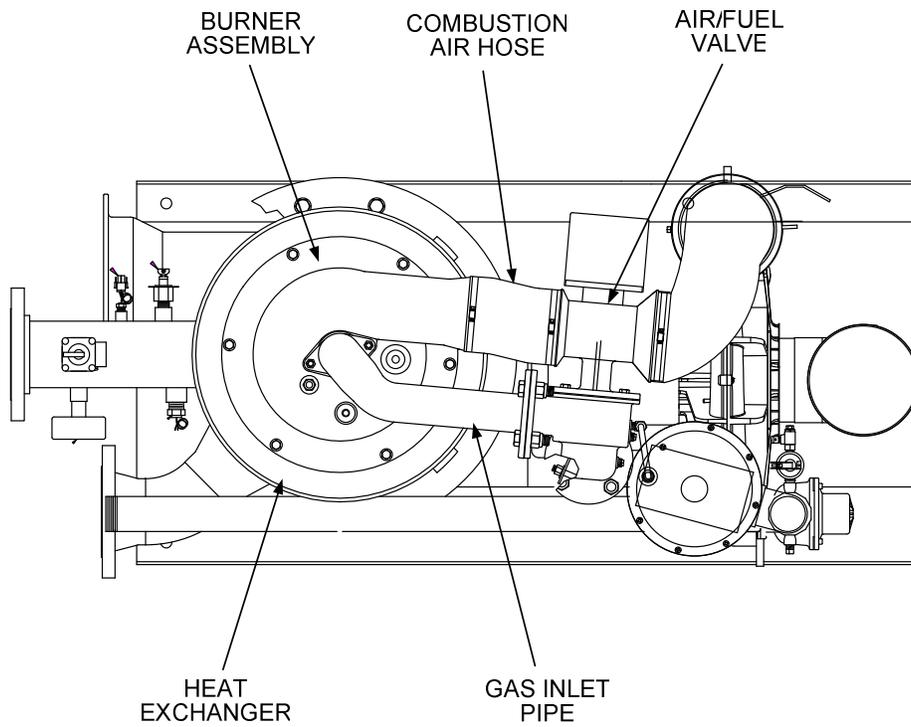


Figure 4. Benchmark 2.0 - Top View

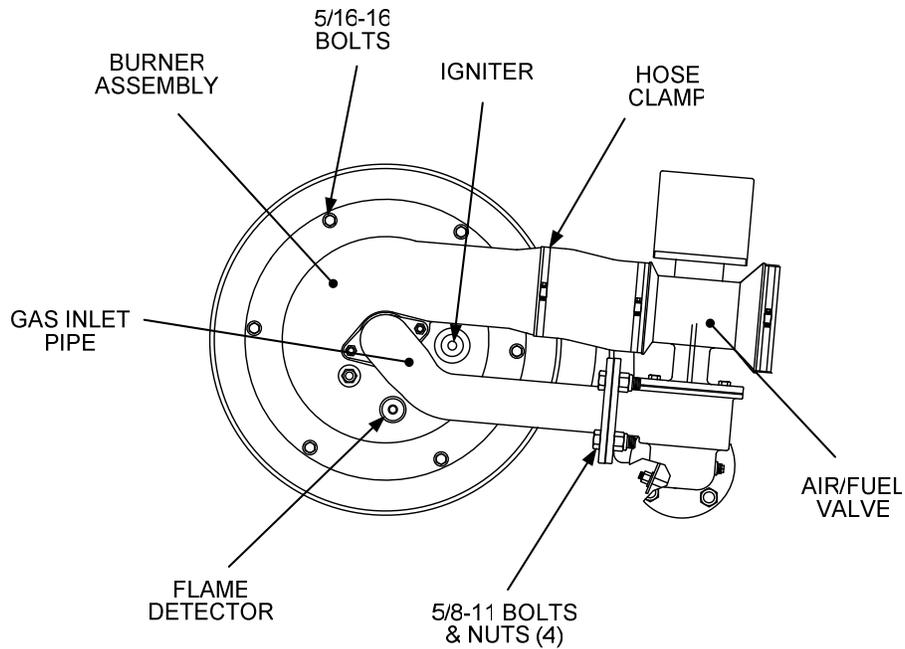


Figure 5. Benchmark 2.0 Burner Assembly Removal

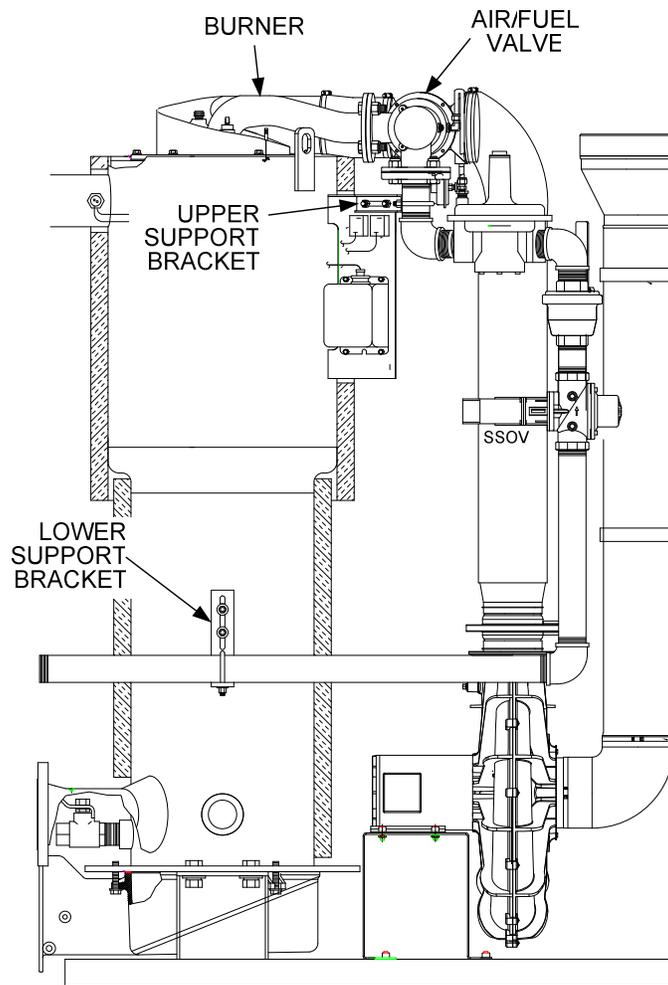


Figure 6. Gas Train Support Bracket Locations

6.1.2 Benchmark Exhaust Manifold Inspections

The exhaust manifold of the Benchmark 2.0 is located at the rear of the unit as shown in Figure 7. Perform the following steps to remove, inspect and replace the manifold from the unit:

1. Disconnect the flue starter section from the exhaust manifold.
2. Disconnect the condensate trap from the 1/2" NPT port on the side of the manifold.
3. Using a 3/4" socket wrench, remove the three bolts securing the exhaust manifold to the heat exchanger (Figure 7).
4. Remove the exhaust manifold and seal from the rear of the unit.
5. Remove the silicone rubber seal from the recess in the flange of the exhaust manifold. Ensure that all seal residue is removed from the flanges of the exhaust manifold and heat exchanger.
6. Inspect and clean the exhaust manifold as necessary.

7. Replace the exhaust manifold seal (part no. 123612) with the new seal provided in the 24-month maintenance kit. Install the adhesive-backed seal in the recess of the exhaust manifold flange (adhesive side down).
8. Align the exhaust manifold with the lower heat exchanger flange and secure it in place using the three (3) bolts removed in step 3. Alternately tighten the bolts to obtain a uniform seal.
9. Reconnect the flue starter section to the exhaust manifold.
10. Prior to reconnecting the condensate trap, perform the procedures described in paragraph 6.2.3.
11. Reconnect the condensate trap to the 1/2" NPT port on the exhaust manifold.

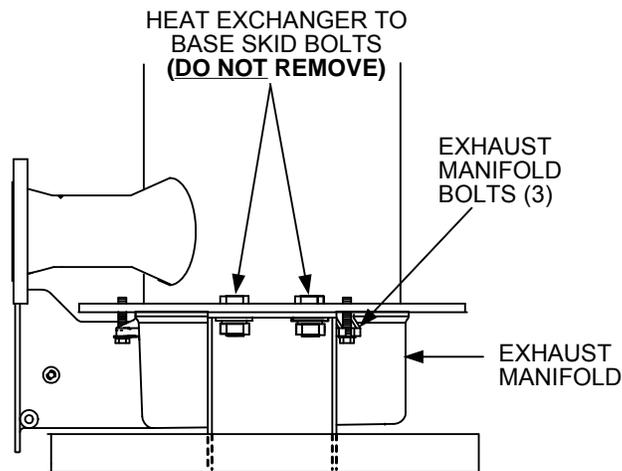


Figure 7. Benchmark 2.0LN Exhaust Manifold Location

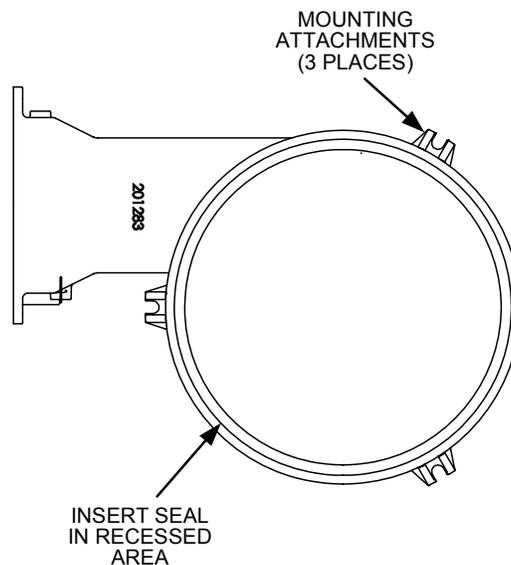


Figure 8. Benchmark 2.0LN Exhaust Manifold - Top View

6.2 Annual Maintenance Item Replacements

The 24-Month Inspection Kit also contains burner assembly components and condensate trap components which should be replaced on an annual basis.

6.2.1 Burner Assembly Component Replacements

The currently installed igniter and flame detector should be replaced using the replacement items provided in the 24 - Month Maintenance Kit.

6.2.1.1 Igniter Replacement

Spark igniter, part no. GP-122435-S is used in all Benchmark Models. Replacement is accomplished as follows:

1. With the igniter cable already disconnected from the igniter, pull out the igniter bushing from the burner shell (Figure 9).
2. Insert the igniter removal tool into the burner shell, where the igniter bushing was removed. Fit the hexagonal end of the tool over the igniter. (see Figure 10).
3. Unscrew the igniter from the burner head. Remove the igniter from the burner shell, by grasping the contact end of the igniter.
4. Using a spark gap feeler gauge, check to ensure that the spark igniter is gapped at 1/8".
5. Prior to installation, a high-temperature anti-seize compound must be applied to the the igniter threads.
6. Refer to Figure 10 and reinstall the igniter in the location shown. Do not over-tighten. A slight snugging up is sufficient.
7. Reconnect the spark igniter cable.

6.2.1.2 Flame Detector Replacement

Flame detector, part no. 123970 replacement is accomplished as follows:

1. With the flame detector lead wire already disconnected, unscrew the flame detector and remove it. (see Figures 9 and 10)
2. Inspect the detector thoroughly. If eroded, the detector should be replaced. Otherwise clean the detector with a fine emery cloth.
3. Install the replacement flame detector. Hand-tight only.
4. Reconnect the flame detector lead wire.

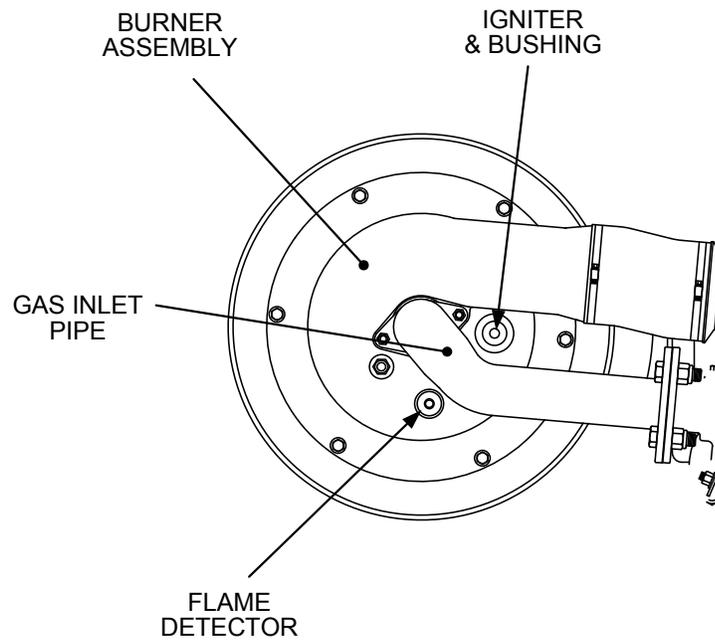


Figure 9. Burner Assembly Igniter & Flame Detector Locations

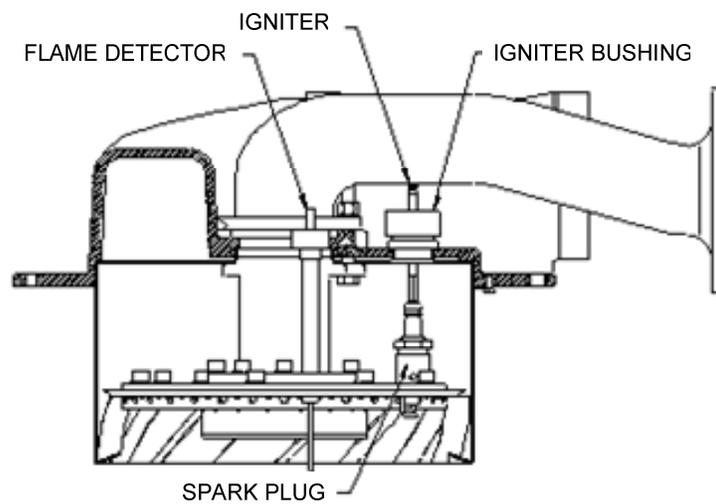


Figure 10. Burner Assembly Cut-Away View

NOTE

Paragraph 6.2.2 applies only to Benchmark boilers that use the aluminum type condensate trap (part no. 24060). If your boiler has a cast iron trap, call your local AERCO sales representative to learn about upgrading to the aluminum type condensate trap.

6.2.2 Condensate Trap Maintenance

The condensate trap, part no. 24060 used in all Benchmark Models should be inspected, cleaned and reassembled as follows:

NOTE

The condensate trap should already be disconnected from the exhaust manifold connection of the unit during the exhaust manifold inspection procedure.

1. Remove the connections on the inlet and outlet sides of the condensate trap shown in Figure 11.
2. Refer to Figure 11 and loosen the four (4) thumbscrews securing the cover on the condensate trap. Remove the cover.
3. Remove and discard the O-ring gasket currently installed in trap. It will be replaced with the new O-ring included in the Maintenance Kit during reassembly.
4. Remove the float (with float guide attached) from the condensate trap.
5. Remove and discard the currently installed orifice gasket from the trap. The new orifice gasket from the Maintenance Kit will be installed during reassembly.
6. Thoroughly clean the trap and float. Also inspect the drain piping for blockage. If the trap cannot be thoroughly cleaned, replace the trap.
7. Check the condensate drain tapped hole in the exhaust manifold (Figure 12) to ensure it is clear of blockage.
8. After the above items have been inspected and thoroughly cleaned, replace the orifice gasket (use new gasket) and float in the condensate trap. Replace the O-ring (use new O-ring) and replace the trap cover.
9. Reassemble all piping and hose connections to the condensate trap inlet and outlet. Reconnect trap to condensate drain connection on the exhaust manifold (f.

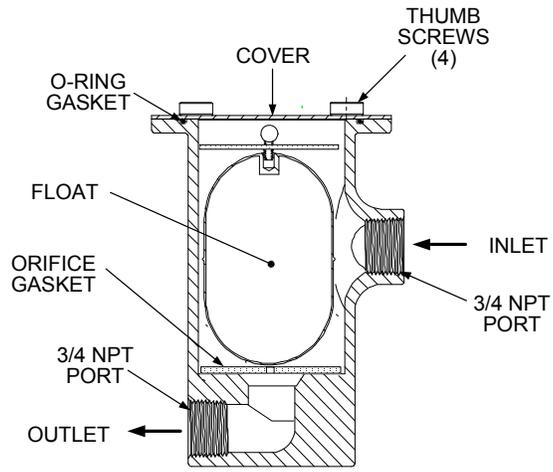


Figure 11. Condensate Trap Part No. 24060

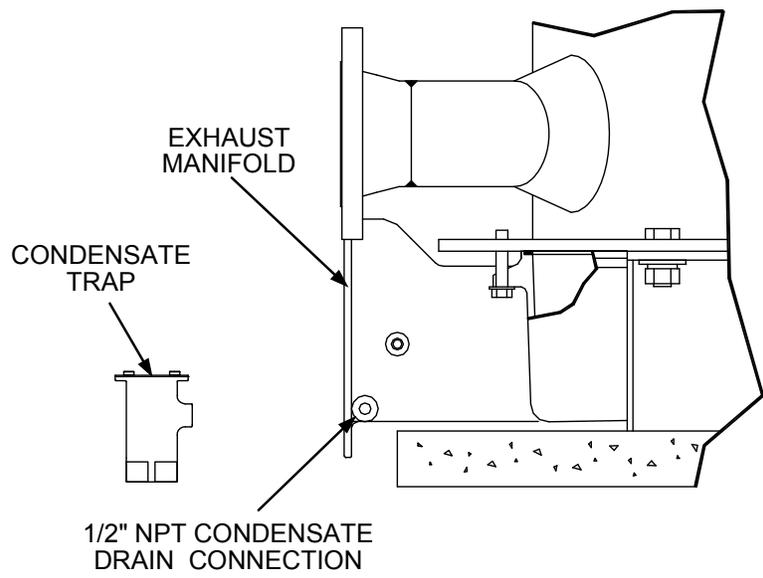


Figure 12. Benchmark 2.0LN Condensate Trap Location

7. FINAL REASSEMBLY AND TESTING

Upon completion of all waterside and fireside inspections, reassemble the unit and perform the tests specified in paragraphs 7.1 and 7.2.

7.1 Reassembly and Set-Up Following Completion of Inspections

Following completion of the all required inspections and replacements, perform the following reassembly and setup procedures:

1. Ensure that the heat exchanger has been filled and the water supply and return valves have been opened.
2. Turn ON the external circuit breaker to the unit.
3. At the front panel of the unit, set the **ON/OFF** switch on the C-More Control Panel to the **ON** position.
4. Press the **LOW WATER LEVEL RESET** button to reset the low water cutoff.
5. Press the **CLEAR** switch to reset the fault relay. This will turn off the **FAULT** LED and clear any displayed error message.
6. Replace the unit side panels and top panels.

7.2 Final Testing Following Inspections

Upon completion of the inspections and replacements specified in this Technical Service Bulletin, perform the Combustion Calibration Tests specified in Chapter 4 of O & M Manual GF-110 or GF-110T (Texas).

Following successful completion of the Combustion Calibration Tests, return the Benchmark 2.0 Boiler to service use.