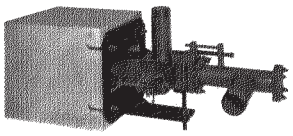
Eclipse PrimeFire 300 Burners

Operating Instructions 7.13

Version 1



Installation:

1-1. Install the burner mounting bracket (2) with gasket (4) on the precombustor (6) using four T-bolts, washers, and nuts (3). Support the burner mounting bracket with a jack screw (A) and nuts (B). Ensure horizontal plate (2) is level. Briefly install the burner and flexible hoses into the precombustor (6) to ensure that the supply piping will permit easy burner installation.

NOTES: Where possible, this work should be done prior to (or in the very early stages of) the furnace heat up.

The T-bolts are intended only to secure the mounting plate to the precombustor. The mounting plate must be supported by the bolt assembly prior to the installation of the burner.

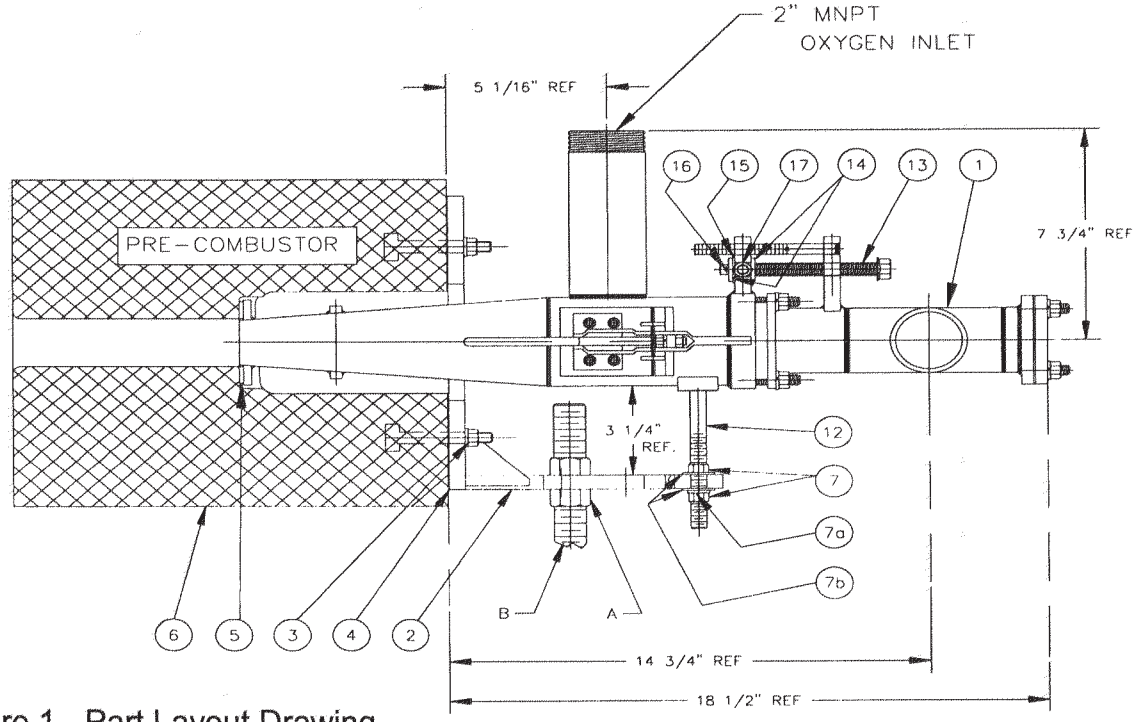


Figure 1 - Part Layout Drawing

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1-2. Prior to installing the burner, have both the oxygen and the gas supply lines ready and pressurized—so that within a few minutes of the burner being placed in the block, an oxygen flow of about 1000 SCFH (27 m_n^3/hr) can be started to provide cooling. The only action to start oxygen flow at this point should be to open the ball shutoff valve closest to the burner.

1-3. Install the front flange gasket (5) by placing a thin film of silicon adhesive on the front end flange face, and then placing the gasket on the flange face. Ensure that the gasket is centered on the flange and that it does not extend past the nozzle lip into the path of the oxygen flow.

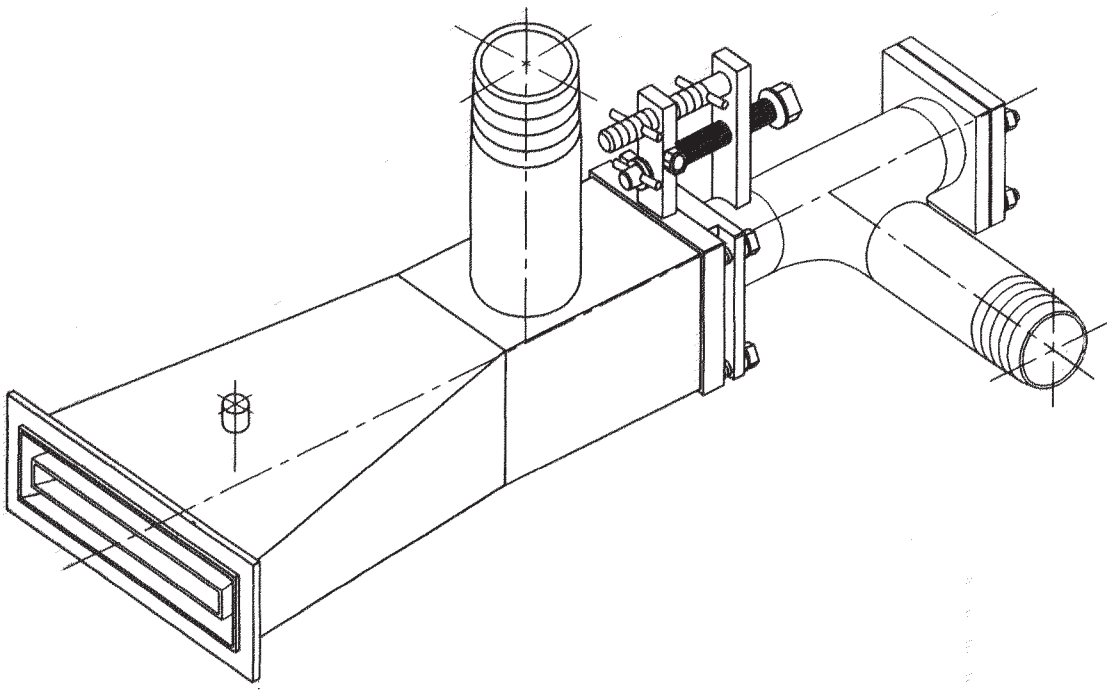

Figure 2 - Burner Drawing

1-4. Adjust the gas nozzle to be even with the oxygen nozzle. See the Adjustment section below, steps 3-1 to 3-3 for instructions.

1-5. Connect the oxygen and the gas flexible hoses to the burner.

NOTE: Prior to the actual installation of the burner, ensure all steps can be completed so that minimum oxygen flow through the burner can be achieved in less than five minutes following burner installation.

1-6. Install the burner in the precombustor—making sure the burner mounting flange is located in the precombustor recess. Be careful not to dislodge the front flange

gasket during installation. Make sure the burner is supported by the support stand (12) and then level the burner by adjusting the burner mounting nuts (7).

WARNING!

If the burner is not level, premature failure of the precombustor is possible.

1-7. Clamp the burner to the mounting bracket using the clamping mechanism on the burner and the anchor rings on the mounting bracket. Do not over-tighten the clamps. Enough pressure to ensure a firm seal of the burner to the pre-precombustor is all that is needed. Insert the safety pins through the clamping mechanism to lock it in place.

WARNING!

Make sure furnace is at a minimal temperature for auto ignition (800°C).

1-8. Open the oxygen shut off valve closest to the burner to begin flowing oxygen at a rate of about 1000 SCFH (27 m_n^3hr) through the burner to provide cooling.

WARNING!

Ensure that all lock-out and tag-out procedures are in place per your plant procedures.

Gas Firing:

To start the burner using natural gas:

2-1. Follow installation procedures 1-8 above.

2-2. Adjust the oxygen flow to provide an oxygen/gas ratio of 2.2:1 equivalent to the lowest firing range of the burner.

2-3. Open the natural gas shut-off valve (a plop sound will signify ignition), set flows to minimum.

NOTE: Observe the initial firing to ensure that the flame is in the center of the precombustor. Some minor adjustment may be necessary to ensure a good flame geometry. Make sure that the burner remains level and in line with the precombustor center line.

2-4. Oxygen and gas flows can then be raised or lowered as desired. See the table below for the recommended flow ranges.

Burners	Min. Gas Flow [1]	Max. Gas Flow	Min. Oxygen Flow [2]	Max. Oxygen Flow [2]
0.13-0.50 x 10^8 kCal 0.5-2 MM BTU	13.4 Nm^3/h 500 Cu Ft/h	53.6 Nm^3/h 2 000 Cu Ft/h	26.8 Nm 1 000 Cu Ft/h	107.2 Nm^3/h 4 000 Cu Ft/h
0.25-1.00 x 10^6 kCal 1-4 MM BTU	26.8 Nm^3/h 1 000 Cu Ft/h	107.2 Nm^3/h 4 000 Cu Ft/h	53.6 Nm^3/h 2 000 Cu Ft/h	214.4 Nm^3/h 8 000 Cu Ft/h
0.51 x 2.03 x 10^6 kCal 2-8 MM BTU	53.6 Nm^3/h 2 000 Cu Ft/h	214.4 Nm^3/h 8 000 Cu Ft/h	107.2 Nm^3/h 4 000 Cu Ft/h	428.8 Nm^3/h 16 000 Cu Ft/h

Note[1] - Assumes 1,000 BTU/Cu Ft of Gas.
Note[2] - Assumes Stoichiometric Firing.

WARNING!

Do not fire burner above or below capacity ranges as this may cause the burner block to overheat.

Adjustment: For 1-4 MM Btu/h and 2-8 MM Btu/h models only

3-1. Before attempting any flame shape adjustment with the burner adjustment screw (13), loosen the locking bolt (17).

3-2. The gas nozzle can be adjusted to +1" to 1/2" with respect to the front end flange. To move the gas nozzle forward, turn the adjustment screw (13) clockwise. Each of the increments on the position rod represent 1/8" of gas nozzle travel.

To decrease the flame length and stiffen the flame, the oxygen velocity will need to be increased. This is accomplished by moving the gas nozzle forward from its current position **(turn the adjustment screw (13) clockwise)**.

To **increase the flame length and create a lazier flame,** the oxygen velocity will need to be decreased. This is accomplished by moving the gas nozzle back from its current position **(turn the adjustment screw (13) counter-clockwise)**.

NOTE: The packing rope cover nuts should not need to be loosened to move the gas nozzle for flame shape adjustment. However, if the gas nozzle is difficult to move, loosen the cover nuts, adjust the gas nozzle and tighten the nuts after the adjustment has been made.

3-3. Tighten the locking bolt (17) after the desired flame shape adjustment has been made.

Velocity adjustment position settings:

-½ Gas tip retracted 1/2" into the burner (away from the furnace)
0.Flush Gas tip even with the end of the burner
+½ Gas tip extended 1/2" past the end of the burner (toward furnace)
+1 Gas tip extended 1" past end of burner

GAS AND OXYGEN VELOCITIES FOR 1 - 4 MM BTU/HR PRIMEFIRE® 300 BURNER AT VARIOUS SETTINGS

Firing Rate	Gas Velocity fps	Oxygen Velocity fps (-½)	Oxygen Velocity fps (0)	Oxygen Velocity fps (+½)	Oxygen Velocity fps (+1)
1.0 MM BTU	16.5	14.6	16.5	17.2	17.9
2.0 MM BTU	33.0	29.2	33.0	34.4	35.8
3.0 MM BTU	49.5	43.8	49.5	51.6	53.7
4.0 MM BTU	66.0	58.4	66.0	68.8	71.6

GAS AND OXYGEN VELOCITIES FOR 2 - 8 MM BTU/HR PRIMEFIRE® 300 BURNER AT VARIOUS SETTINGS

Firing Rate	Gas Velocity fps	Oxygen Velocity fps (-½)	Oxygen Velocity fps (0)	Oxygen Velocity fps (+½)	Oxygen Velocity fps (+1)
2.0 MM BTU	15.3	14.6	15.0	15.5	16
5.0 MM BTU	38.3	36.5	37.5	38.7	40
8.0 MM BTU	61.2	58.4	60.0	62.0	64

Burner Shutdown (Temporary):

If a burner is to be taken offline temporarily, and not removed from the burner block, oxygen must be supplied to the burner at a rate of 1000 SCFH (27 $M^3_{(n)}$) for cooling purposes. If both the oxygen and gas flow to the burner are interrupted for more than 10 to 15 minutes, the burner must be removed from the precombustor.

NOTE: Any breastwall erosion which exposes the burner block sides will reduce the time an operating burner can remain installed.

Burner Removal and Shutdown:

4-1. Shut off the gas and oxygen flows by closing the gas and oxygen shut off valves closest to the burner.

4-2. Remove the safety pins from the burner clamping mechanism.

4-3. Release the burner clamps from the mounting bracket's retention rings. Remove the burner from the precombustor (6) and mounting bracket (2). Disconnect the gas and oxygen lines from the burner's inlet.

4-4. Place a Fiberfrax®[1] rolled blanket in the cavity of the precombustor to prevent hot furnace gases from escaping through the block.

4-5. If the burner is left out of service, then all service valves on the metering and control skid should be closed.

WARNING!
Ensure that all lock-out and tag-out procedures are in place per your plant procedures.

NOTE: Whenever removing a burner from service, always keep the oxygen compatible components cleaned and sealed. Hoses should be capped when not used. Burners should be cleaned and stored in a sealed plastic bag.

[1]Fiberfrax is a registered trademark of Unifrax Corporation.

Typical Shift Observations:

It is recommended that each shift inspects the Primefire® burners just as you would inspect firing conditions in your present furnace.

Recommended checks:

1. Flame shape and appearance
2. Burner block appearance
3. Proper cooling effect on burner and block
4. Combustion oxygen flow and natural gas flow.

Obvious changes from the standard should be investigated. If needed, fuel should be shutoff with combustion oxygen set to a minimum while the situation is investigated.

Burner Maintenance:
Under normal operating conditions, the Primefire® burner should need little attention. If you need to remove and inspect a burner, follow the procedure in the *Burner Removal and Shutdown* section on page 6.