ECLIPSE TUBE FIRING BURNER
FOR PREHEATED COMBUSTION AIR

MODEL 63-TFB-L

The Eclipse 63 TFB-L burner is a natural gas burner designed to fire radiant tubes and immersion tubes with inputs up to 750,000 Btu/Hr. For higher inputs, the 63 TFB-H burner, Bulletin H-349, should be considered. 63 TFB-L burners contain stainless steel internals for use with preheated combustion air. They are ideal for recuperative systems that reduce fuel consumption by transferring waste flue gas heat to the burner air supply. Burner supply pressures and maximum radiant tube heat transfer rates are shown on page 2.

63 TFB-L burners include an alloy air tube that maintains the proper air velocity past the nozzle regardless of radiant tube diameter. The flame profile provides uniform heat release along the entire length of the firing tube, eliminating hot spots and ensuring long radiant tube life. Although the 63 TFB-L burner performs equally well with ambient combustion air, preheated air is strongly recommended to reduce fuel consumption and operating costs.

These burners are designed to mount tightly to the radiant tube flange. To place the nozzle at the inner face of the furnace wall, the burner length from the mounting flange to the inner face must be specified on the order. The radiant tube should run straight downstream of the burner for a length equal to eight tube diameters before the first bend or elbow. Sufficient length of firing tube must be available in the furnace to provide adequate heat transfer.

CONTROL

The 63 TFB-L is designed for two position (high-low or high-off) control. Low fire inputs as low as 5,000 Btu/Hr. can be achieved providing sufficient excess air is available for combustion. Although time proportional control may be used, proportional temperature control should not be used, as sustained operation at some intermediate firing rates may produce undesirable radiant tube temperature profiles.

ADVANTAGES

- Single size for all diameter radiant tubes.
- Easy installation and burner accessibility.
- Exceptional flame stability.
- Low air and gas pressure requirements.
- Good flame visibility.
- Minimum high fire excess air.
- Up to 650% low fire excess air with low fire inputs down to 5000 Btu/Hr., depending on control system.
- High heat transfer at low noise levels.
- Excellent radiant tube temperature uniformity.

ASSEMBLIES

The basic assembly consists of burner body, spark rod, alloy air tube and mounting gaskets. Two peepsights are provided, one viewing down the center of the gas tube, the other sighting down the space between the gas tube and alloy air tube.

The customer must supply a combustion air valve installed at the burner air inlet if ambient air is used, or at the recuperator inlet for preheated air systems. A gas cock plus adjustable limiting orifice valve should be installed at the gas inlet. For ease and accuracy of burner adjustment, Eclipse recommends that a metering orifice be placed in the gas line to each burner.

IGNITION AND FLAME MONITORING

The 63 TFB-L burner is ignited by direct spark at high fire. Although flame rods can be used to monitor preheated combustion air burners, Eclipse recommends UV scanners. High ambient temperatures will be encountered at burners using preheated combustion air. Eclipse recommends the use of scanner coolers with heat block seals to protect the scanner. Because the scanner sights through the gas passage in the casting, a gas-tight seal is required.

CAUTION: It is dangerous to use any fuel burning equipment unless it is equipped with suitable flame sensing device(s) and automatic fuel shut-off valve(s). Eclipse can supply such equipment or information on alternate sources.
## Combustion Air Pressure Required, "W.C.

<table>
<thead>
<tr>
<th>High Fire Input Btu/Hr.</th>
<th>Combustion Air Temp., °F</th>
<th>60°F</th>
<th>400°F</th>
<th>800°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>50,000</td>
<td>0.05</td>
<td>0.08</td>
<td>0.12</td>
<td></td>
</tr>
<tr>
<td>100,000</td>
<td>0.15</td>
<td>0.24</td>
<td>0.36</td>
<td></td>
</tr>
<tr>
<td>150,000</td>
<td>0.35</td>
<td>0.57</td>
<td>0.84</td>
<td></td>
</tr>
<tr>
<td>200,000</td>
<td>0.83</td>
<td>1.02</td>
<td>1.50</td>
<td></td>
</tr>
<tr>
<td>300,000</td>
<td>1.40</td>
<td>2.30</td>
<td>3.40</td>
<td></td>
</tr>
<tr>
<td>400,000</td>
<td>2.50</td>
<td>4.10</td>
<td>6.00</td>
<td></td>
</tr>
<tr>
<td>500,000</td>
<td>4.00</td>
<td>6.40</td>
<td>9.30</td>
<td></td>
</tr>
<tr>
<td>600,000</td>
<td>5.76</td>
<td>9.20</td>
<td>13.40</td>
<td></td>
</tr>
</tbody>
</table>

Combustion air pressure is measured at the pressure tap shown in the dimension drawing.

Gas pressure required is less than 2"w.c. at all firing rates.

## Maximum Radiant Tube Heat Transfer Rates

CAUTION: EXCEEDING THESE RATES WILL SHORTEN TUBE LIFE.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1550</td>
<td>70</td>
<td>65%</td>
</tr>
<tr>
<td>1650</td>
<td>60</td>
<td>64%</td>
</tr>
<tr>
<td>1750</td>
<td>50</td>
<td>63%</td>
</tr>
<tr>
<td>1850</td>
<td>45</td>
<td>62%</td>
</tr>
</tbody>
</table>

1 For tube free to radiate on three sides. For tubes closely enclosed by brickwork, i.e. lower tubes or continuous furnaces, reduce the figure shown by 15 Btu/Hr./Sq. In.

2 Using burner and recuperator.

## Burner Input Calculation

\[
\text{Max. Burner Input} = \frac{\text{Max. Radiant Tube Heat Transfer} \times \text{Radiant Tube Surface Area}}{\text{Heat Transfer Efficiency}}
\]

Example: The "U" tubes shown are to be retrofitted with 63 TFB-L burners and Eclipse Bayonet-Ultra recuperators. Chamber temperature is 1650°F.

**Max. Radiant Tube Heat Transfer** (from chart above):

- Upper Tubes = 60 Btu/Hr./Sq. In.
- Lower Tubes = 45 Btu/Hr./Sq. In.

**Surface Area** = O.D. x \( \pi \times (\text{Effective Length} \times 2) \)

\[
= \frac{4\times3.14 \times 100}{1413} \text{ Sq. In.}
\]

**Heat Transfer Efficiency** (from chart above): = 64% or .64

**Max. Burner Input**

- Upper Tubes = \( \frac{60 \times 1413}{.64} = 130,000 \text{ Btu/Hr.} \)
- Lower Tubes = \( \frac{45 \times 1413}{.64} = 99,000 \text{ Btu/Hr.} \)

**Dimensions 63 TFB-L-PCA**