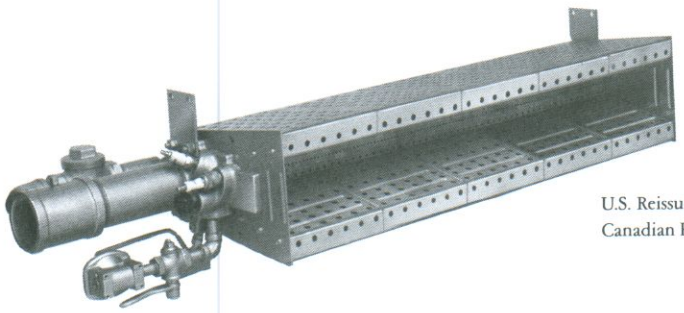
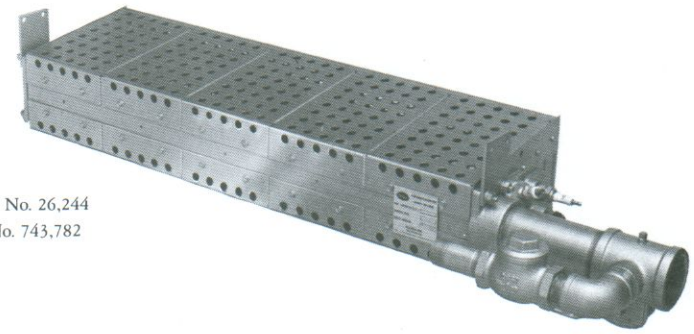
ECLIPSE AIR HEAT BURNERS FOR MAKE-UP AIR

SERIES "AH-MA"





U.S. Reissue Pat. No. 26,244
Canadian Pat. No. 743,782

Eclipse Air Heat Burners for make-up air produce an odorless, smokeless flame suitable for directly heating fresh air for ventilation purposes. These burners burn natural gas or propane vapor. Burner input is normally controlled by a single control valve in the gas line, allowing turndowns as high as 30:1.

Make-up air heat burners are line type burners assembled from 6″, 12″, and 18″ straight sections, tees, and crosses to produce nearly any configuration required. Large burners can be built as a combination of staged, individually controlled sections to increase turndown.

A profile plate must be installed around the burner to produce an air pressure drop within the range specified in the table below. See page 2 for information on profile plate sizing.

CAUTION: It is dangerous to use any fuel burning equipment unless it is equipped with suitable flame sensing devices and automatic fuel shut-off valves. Eclipse can supply such equipment or information on alternate sources.

SPECIFICATIONS

Burner Net Free Area: 11.8 Sq. In. Per Linear Foot of Burner
Max. Upstream Air Temp.: 450°F.

Air △P[1] Across Burner, ″ W.C.	Air Flow,[2] SCFM Per Sq. In. Opening	Input In Btu/Hr. Per Lineal Foot of Burner		Gas △P,[3] ″ W.C.		Flame Length, Inches
		Maximum	Minimum	Nat. Gas	Propane	
0.4 (min.) 1.0 (max.)	13.6 21.5	550,000 800,000	25,000 26,700	1.2 2.5	0.5 1.0	18-24 24-30

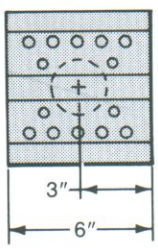
[1]Air at 70°F and sea level.
[2]Air at 70°F and sea level. Required flow per sq. in. of combined profile opening and burner net free area to produce the corresponding △P.
[3]Measured between the gas pressure tap "A" and a hole in the duct wall 10″ to 20″ downstream of the burner face.

DIMENSIONS

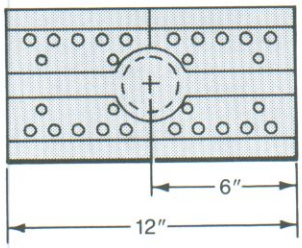
STRAIGHT BURNERS LESS END PLATES

Rear Views

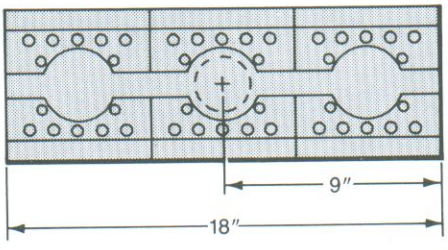
6″



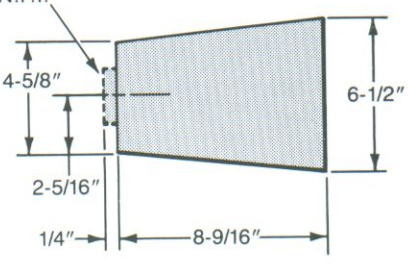
12″



18″

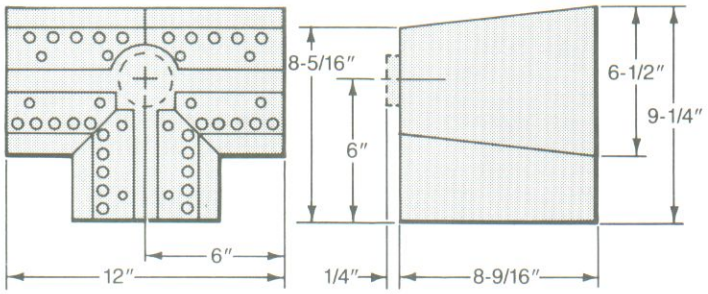


End View
6″, 12″, 18″

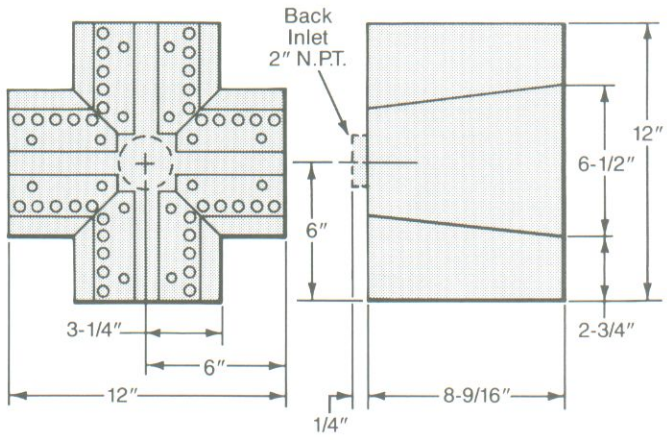


DIMENSIONS (Cont'd.)

TEE



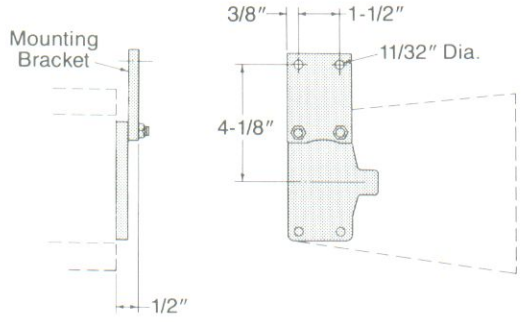
CROSS



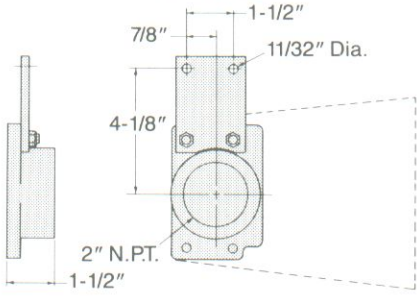
BURNER ASSEMBLY NUMBERS

Burner	Assembly Number	
	Less Back Inlet	With Back Inlet
6″ Straight	111425	111426
12″ Straight	111427	111428
18″ Straight	111429	111430
Tee	111433	111434
Cross	111431	111432

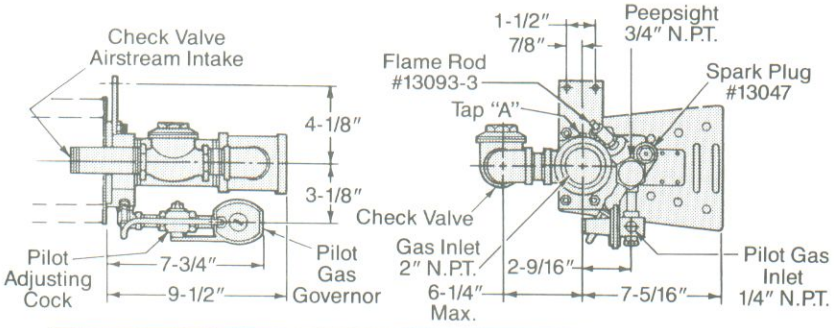
PLAIN END PLATE #111435



END PLATE FOR GAS FEED ONLY #111443



PILOTING END PLATE

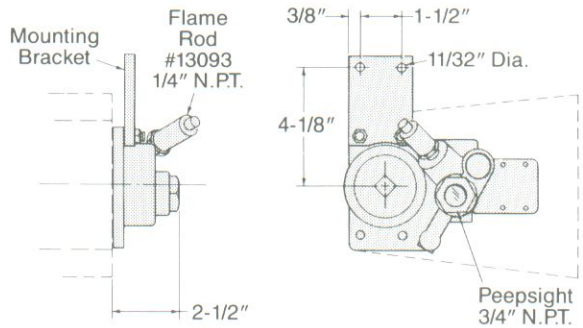


Lineal Feet of Burner	Pilot End Assembly* Numbers		Check Valves (Included)	
	w/Peepsight & Flame Rod	w/o Peepsight & Flame Rod**	" N.P.T.	Assy. No.
0.5 thru 2.5	111437	111437-1	3/4	550092
3.0 thru 3.5	111436	111436-1	1	550096
4.0 thru 7.5	111439	111439-1	1-1/4	550100
8.0 thru 10.0	111438	111438-1	1-1/2	550104
10.5 thru 18.0	111442	111442-1	2	550108

* Pilot end assembly includes gas inlet casting, ignition plug (#13047), adjustable pilot cock, pilot regulator, check valve, mounting bracket and miscellaneous fittings; when ordered with peepsight, flame rod is #13093-3.

** For use with U.V. scanner.

FLAME MONITORING END PLATE #111440



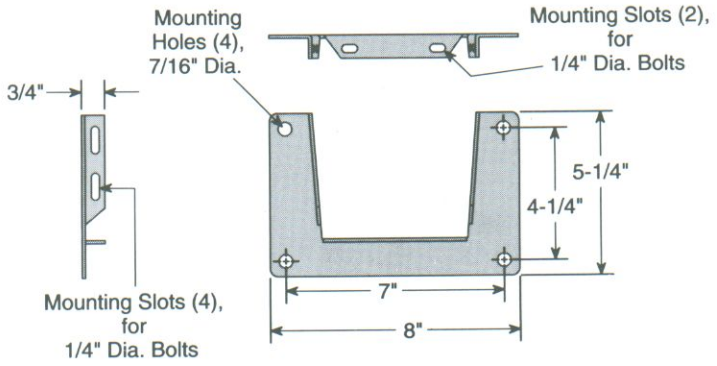
For U.V. scanning, adaptor #109000 is for burners up to 5 feet; it replaces the peepsight (3/4" N.P.T.). Adaptor #109559 is for burners longer than 5 feet; it replaces the flame rod (1/4" N.P.T.).

#109000

#109559

DIMENSIONS (Cont'd.)

MOUNTING BRACKET #10023



SYSTEM DESIGN

REQUIREMENTS

1. At low fire, the burner requires 150 cfh of airstream flow into the check valve line per foot of burner. The chart under the "Piloting End Plate" section of page 2 shows the maximum burner length that each standard pilot end assembly will supply. **WARNING: Do not install any valve or controlling device in the gas line between the burner and the check valve tee. Because this section of the gas line carries a partial premix at low fire, the flame can propagate back through the pipe to the tee. Valves or devices installed in the section can melt, releasing gas and causing fires or explosions.**
2. Unless approved by the factory, every leg of a tee or cross must be separated from another tee or cross by at least 6" of burner.
3. One 2" gas inlet is required for every 10MM Btu/hr. of burner input.
4. Burners must be supported every ten feet.

BURNER STAGING

Effective turndown can be tripled by staging burners as shown in the sketch. Burner 1 is used for ignition and low fire heat. If more heat is required, burners 2 and 3 can be lit by simply supplying gas to them. They will pilot from burner 1. Automatic fuel shut-off valves must be provided to shut off gas flow to burners 2 and 3 unless flame is proven on Burner 1.

The back inlets to burners 2 and 3 should be as close to burner 1 as possible. The gas line to burners 2 and 3 must be fitted with an auxiliary check valve capable of passing 150 cfh air per foot of burner length. See Item 1 under "Requirements."

DUCT CONFIGURATION

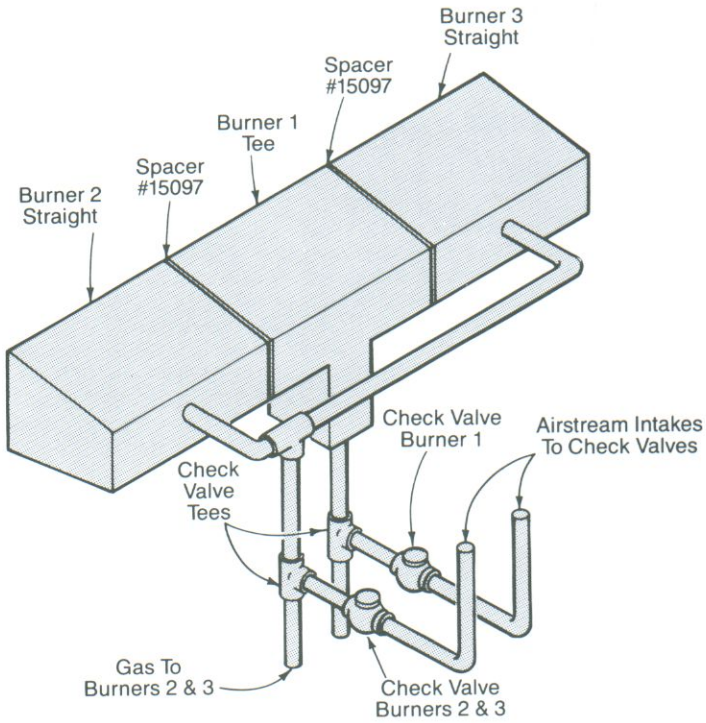
If the burner is operated at the rate input, allow a minimum of 46" from the burner face to the nearest point of flame impingement. This distance is especially important to maintain on a pull-through system with a fan.

If a reducing duct transition is used downstream of the burner, then the following distance should be used between the burner and the transition:

For rectangular ducts—the width or height—whichever is greater—of one duct section;

For round ducts—the diameter of one duct section.

Either distance will equalize the air flow throughout the duct before it enters the transition space.



Burner 1 has a Piloting End Plate with pilot, flame rod, and gas inlet/check valve assembly. The spacers separate gas manifolds of the adjacent burners, but allow flame to travel from Burner 1 for ignition of Burners 2 & 3. The check valves must be installed in a horizontal piping run.

SAMPLE CALCULATIONS

BURNER SELECTION

To select a burner, you will need to know:

Air volume in SCFM

Air temperature rise in ° F.

To find the high fire input required, solve:

Btu/Hr. = 1.1 x SCFM x $\triangle$T

To find the required burner length in feet assuming a 1″ w.c. $\triangle$P across the burner, solve:

Feet = Btu/Hr. ÷ 800,000 Btu/Hr./Ft.

Round fractional lengths upward to the nearest half foot.

Example—A make-up air heat burner will be used to heat 60,000 SCFM air from 0° F. to 80° F. Air $\triangle$P across the burner will be 1″ w.c.

Btu/Hr. = 1.1 x 60,000 x 80 = 5,280,000 Btu/Hr.

Burner Length, Feet = 5,280,000 Btu/Hr. ÷ 800,000 Btu/Hr./Ft. = 6.6 Feet

Round this upward to 7 feet.

PROFILE PLATE SIZING

To calculate the open area between the burner perimeter and the edge of the profile plate opening, solve the following equation:

$$A_G = \frac{SCFM_T}{SCFM_R} - (A_{NF} \times L_F)$$

where

A_G = Area in sq. in. of the gap between the profile plate and the burner.

$SCFM_T$ = Total air flow around and through the burner.

$SCFM_R$ = Air flow required per squre inch of open area to produce the specified pressure drop.

A_{NF} = Burner net free area in sq. in. per foot of burner

L_F = Burner length in feet.

Example—For the burner selection example above:

$SCFM_T$ = 60,000 SCFM

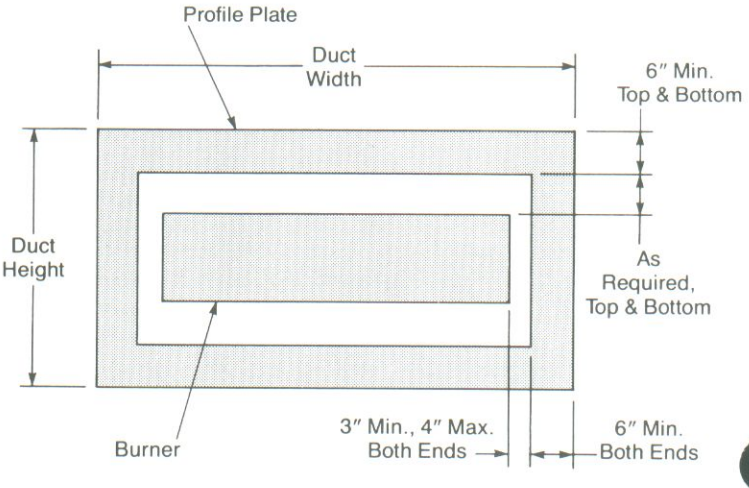
$SCFM_R$ = 21.5 SCFM per sq. in. (from Specs, pg. 1)

A_{NF} = 11.85 sq. in. per ft. (from Specs, pg. 1)

L_F = 7 ft.

$$A_G = \frac{60{,}000}{21.5} - (11.85 \times 7) = 2708 \text{ sq. in.}$$

The profile opening must provide uniform air flow down the length of the burner. See the accompanying illustration for other profile plate requirements.



Offered By:
Power Equipment Company
2011 Williamsburg Road
Richmond, Virginia 23231
Phone (804) 236-3800
Fax (804) 236-3882

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