Bulletin 250
10/20/2004

Eclipse Spiral Flame Burners

Series DSF

BASIC BURNER

COMPLETE BURNER

Eclipse Spiral Flame Burners are nozzle-mixing burners designed to produce a rapidly spinning flame that spreads out evenly over the surface of the combustion block and surrounding furnace wall with virtually no forward velocity. This permits the burner to be placed close to the work load without flame impingement. The radiant heat from the block and wall surfaces minimizes hot spots and promotes temperature uniformity in the load. Applications include direct fired furnaces, direct fired heat exchangers, pot furnaces, salt bath furnaces, ladle heaters, galvanizing tanks, and similar equipment. When DSF burners are used to replace existing burners, loads can be positioned closer to the walls, increasing furnace capacity and improving production rates.

DSF Burners are available in nine sizes with maximum capacities from 6,000 to 5,200,000 Btu/hr. They may be mounted in furnace roof or walls, depending on the process involved.

ADVANTAGES

- • • Short flame travel permits full use of furnace space.
- • • Evenly distributed radiation from combustion block and walls promotes temperature uniformity.
- • • Turndowns up to 10:1 depending on model.
- • • Spiral flame pattern maintained at all firing rates.
- • • Exceptional flame stability.
- • • Variety of block materials.

ASSEMBLIES

Eclipse DSF burners are available as Basic Assemblies consisting of the burner head with peepsight, or Complete Assemblies which include the basic assembly plus air butterfly valve, gas butterfly valve, manual gas cock, and related pipe nipples. Because of the variety of block materials available for DSF burners, no one block is considered standard and included with the burner. All block and holder assemblies must be ordered separately. See page 2 for block and holder options available.

IGNITION & FLAME MONITORING

Eclipse recommends that all DSF burners be ignited by a blast type pilot. Although continuous or intermittent piloting may be used, Eclipse strongly recommends interrupted piloting for maximum operating safety. UV scanners can be used with all sizes of DSF burner. Flame rods may also be used with all sizes except the L-52 when it is operated with an interrupted pilot.

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.

PERFORMANCE DATA

(Using Natural Gas—0.6 Sp. Gr.)

Burner	Capacities in 1000's Btu/Hr. At Various Air Pressures, " w.c.[1]								Gas Press.[2] " w.c.	Max. Flame Dia.,[4] Inches	Max. Flame Thickness,[4] Inches	Maximum Excess Air	
	.5"	1"	2"	4"	7"	14"	21"	28"				% XS Air	1000's Btu/Hr.
L-52 DSF	6	9.5	14	20	28	45	57	65	1.5[3]	11	2	30	50
H-52 DSF	10	16	25	35	48	68	84	100	1.9[3]	12	2	35	74
83 DSF	35	50	70	105	135	195	240	280	3.6[3]	48	2	40	200
84 DSF	55	75	110	165	220	320	390	460	2.9[3]	50	3	30	350
104 DSF-A	84	120	178	235	355	485	609	710	1.7	42	3	60	440
125 DSF	95	145	215	325	450	715	885	1040	2.1	60	4	40	740
166 DSF	295	385	525	735	985	1435	1775	2075	3.8	60	6	30	1600
248 DSF	400	575	840	1150	1575	2310	2920	3190	3.8	84	6	30	2450
3212 DSF	630	890	1260	2040	2460	3410	4140	4750	3.1	96	7	30	3650

[1] Combustion air pressures measured at tap "A".
[2] High fire gas pressure measured at tap "B" except as noted.
[3] Burner does not have gas pressure tap. Measure pressure in gas line immediately ahead of burner connection.
[4] Approximate. See "Minimum Burner Spacing" on pg. 3.

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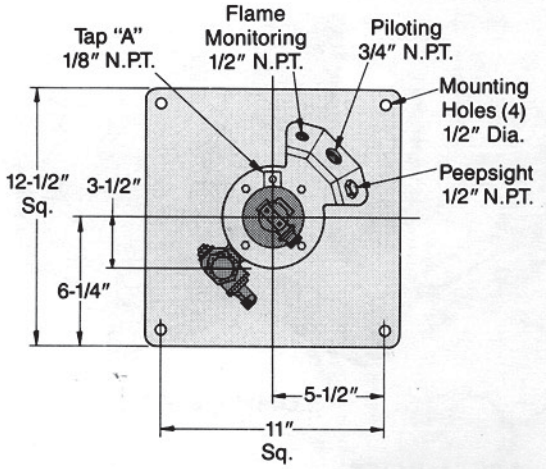
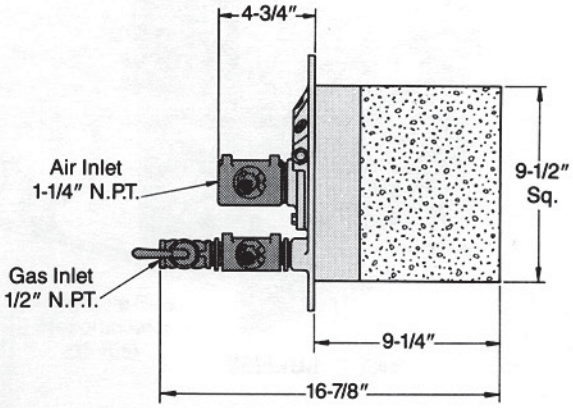
Innovative Thermal Solutions

DIMENSIONS

L-52 & H-52 DSF

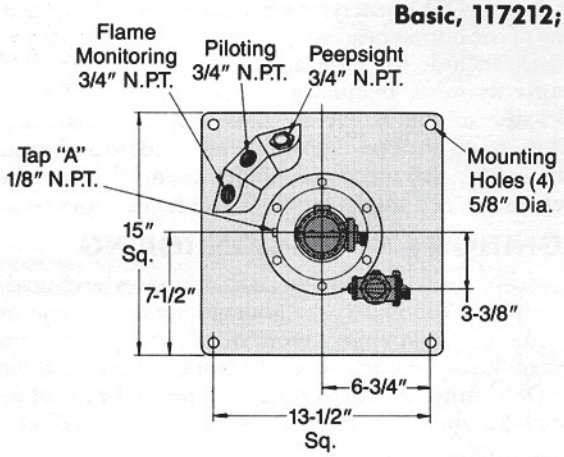
L-52: Basic, 117207; Complete, 117207-99
H-52: Basic, 117252; Complete, 117252-99

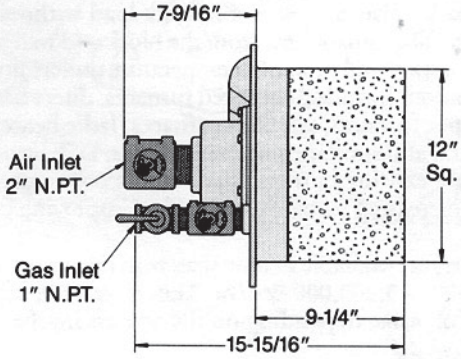




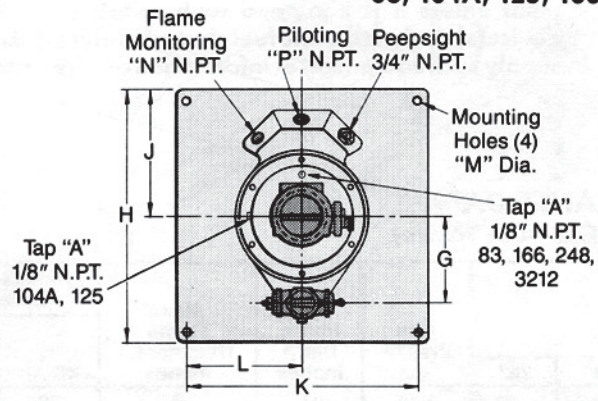
84 DSF

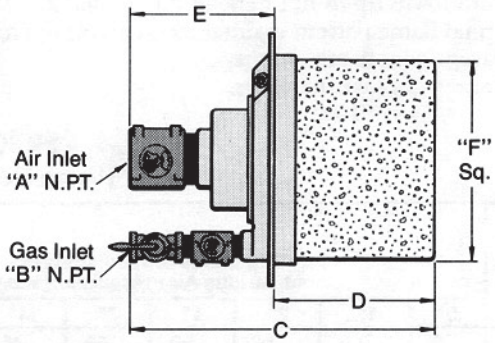
Basic, 117212; Complete, 117212-99





83, 104A, 125, 166, 248, & 3212 DSF





Basic Burner. Although the block and holder assembly is illustrated as part of the basic burner, it must be ordered as a separate item. See page 3.

Additional items included with Complete Burner.

Burner	Assembly No.		Dimensions In Inches													
	Basic	Complete	A	B	C	D	E	F	G	H	J	K	L	M	N	P
83 DSF	117196-00	117196-99	2	3/4	16-1/4	9-1/4	5-5/8	11-1/2	3-7/8	14-1/2	7-1/4	13	6-1/2	5/8	3/4	3/4
104 DSF-A	117253-00	117253-99	2-1/2	1	19-5/8	11-3/8	10-1/8	14-1/2	6	17-1/2	8-3/4	16	8	9/16	3/4	3/4
125 DSF	117254-00	117254-99	3	1-1/4	21-1/4	11-3/8	10-1/8	14-1/2	6	17-1/2	8-3/4	16	8	9/16	3/4	3/4
166 DSF	117258-00	117258-99	4	1-1/2	21-3/8	11-3/8	11-1/2	16	6-7/8	19	9-1/2	17-1/2	8-3/4	5/8	3/4	1
248 DSF	117259-00	117259-99	6	2	24-5/8	13-3/4	17-1/4	18	8	21	10-1/2	19-1/2	9-3/4	5/8	3/4	1
3212 DSF	117255-00	117255-99	8	3	29-3/8	13-3/4	21-1/4	21-1/2	9-5/8	24	12	22-1/2	11-1/4	3/4	3/4	1

MINIMUM BURNER SPACING

Burner	L-52	H-52	83	84	104	125	166	248	3212
Minimum Burner-to-Burner Centerline Spacing, Inches	12	12	48	50	42	60	60	84	96
Minimum Burner-to-Load Spacing, Inches	7	7	7	8	8	8	10	10	11

BLOCK HOLDER OPTIONS

ASSEMBLIES

Burner Cat. No.	Block & Holder Assy. No.
L52 DSF	187207
H52 DSF	187252
83 DSF	187196
84 DSF	187212
104 DSF	187253
125 DSF	187254
166 DSF	187258
248 DSF	187259
3212 DSF	187255

All DSF blocks are available in the materials shown at right.

MATERIALS

Dash No.	Trade Name and Description	% Alumina	Max. Recommended Chamber Temp. ˚F.
-41	Morocast 97FC-O hydraulic setting castable with 304 Stainless mounting studs.	97	2600
-61	Morocast 97FC-O with RA330 Stainless Block Wrapper, cast in wrapper	97	1400
-81	Morocast 97FC-O hydraulic setting castable with 304 Stainless mounting studs. Block is tapered 5˚ on 2 sides.	97	2600

The dash number is attached to the block & holder assembly number. Example: 187196-61 indicates an 83 DSF block & holder with a Morocast 97FC-O block with stainless wrapper.

IGNITION & FLAME MONITORING

FLAME RODS

Burner	Electrode Length
L-52 & H-52	7″
83	7-5/16″
84 & 104	11-1/4″
125	7″
166	8″
248 & 3212	11″

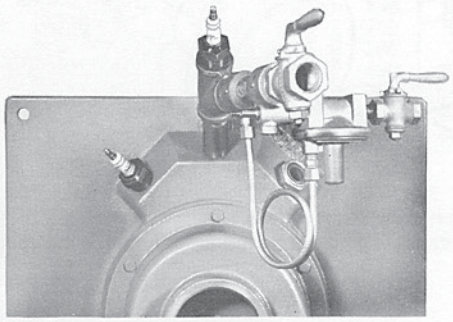
The flame rod for all DSF burners is #14265-2. This rod is furnished with a 12″ electrode which must be cut by the customer to the length shown as measured from the bottom of the threads.

PILOTS

Burner	Recommended Pilot	Pilot Assembly
L-52 thru 125	3B-RAFI–1-3/4	103430
166 thru 3212	4B-RAFI–2	103431

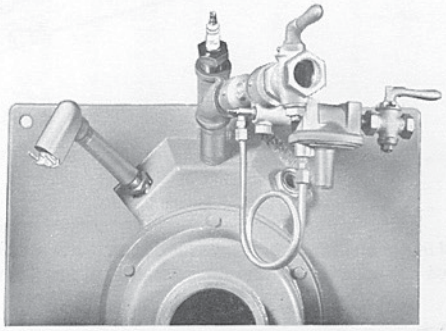
EXAMPLES

Flame rod or scanner must be CCW from pilot when viewed as shown.



"DSF" burner with spark ignited pilot and flame rod.

Flame Spin Direction

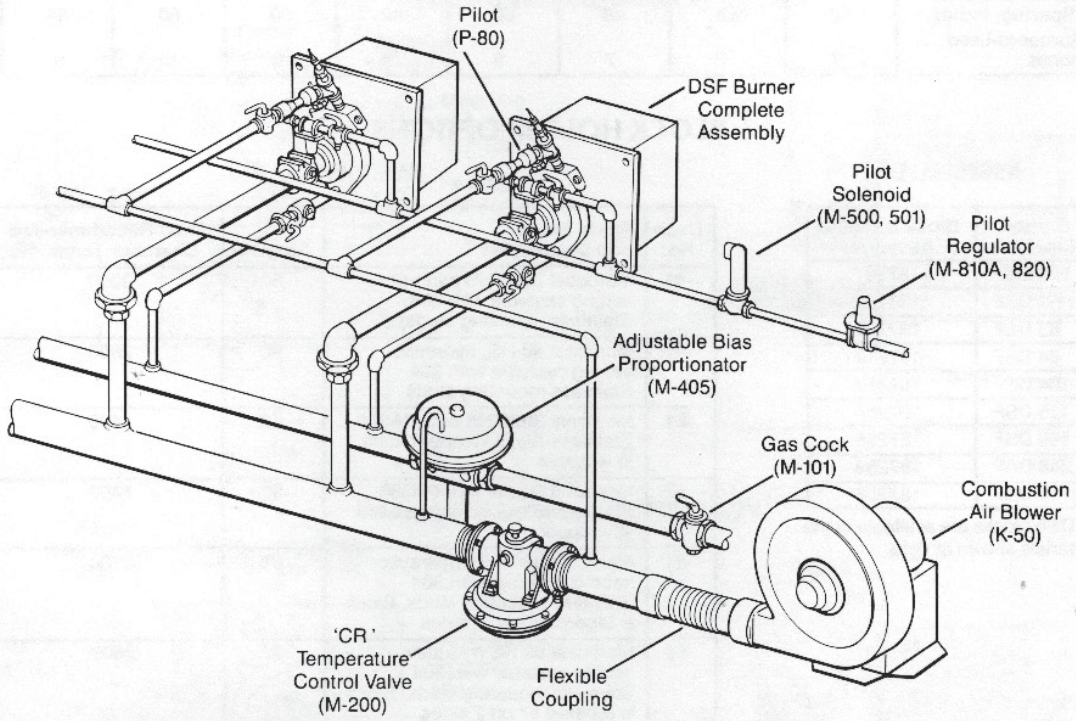


"DSF" burner with spark ignited pilot and scanner.

TYPICAL APPLICATIONS

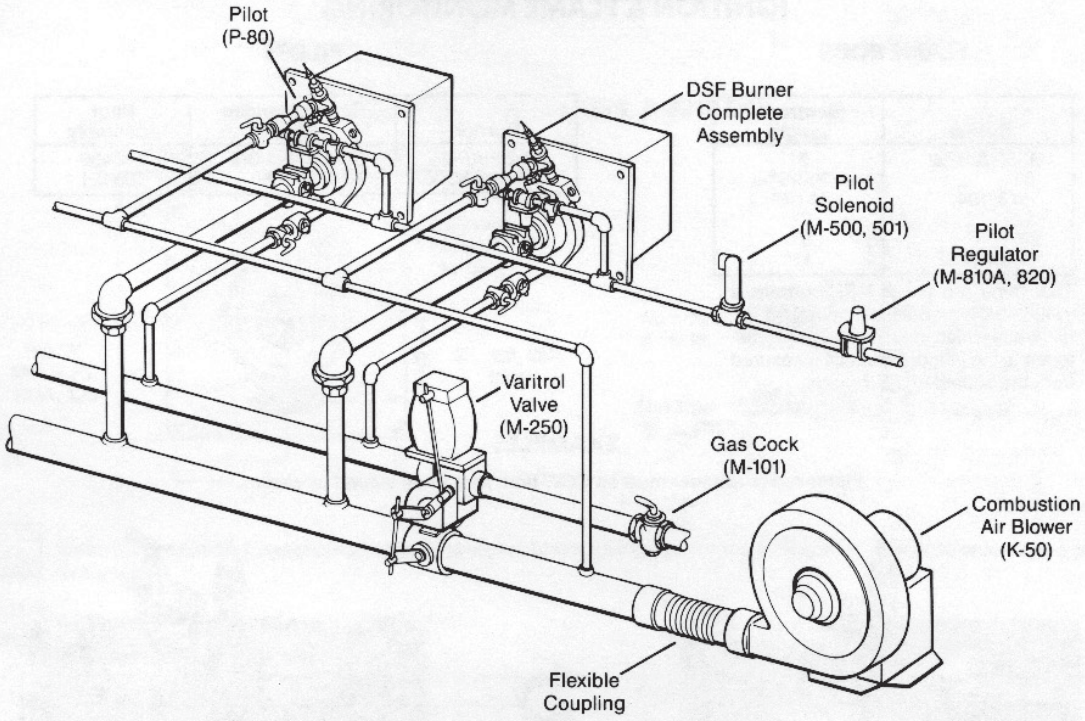
These illustrations do not include all components necessary for a complete combustion system. Contact your Eclipse representative for complete details on the design and installation of combustion systems.

HIGH/LOW CONTROL



The temperature controller actuates the temperature control valve which changes air flow accordingly; the resulting air pressure changes are transmitted to the adjustable bias proportionator which varies gas flow proportionately. A constant air/gas ratio is thus maintained from high fire to low fire.

MODULATING CONTROL



The control motor on the Varitrol valve responds to the temperature controller; the Varitrol flow profile and the linkage between the Varitrol and the air control valve are adjusted for on-ratio operation at any point in the firing range.