FIRE-ALL DUAL-FUEL™ BURNERS

Bulletin 642

642 Fire: **All Dual-Fuel Burners** are widely used on heat treat and non-ferrous melting furnaces, kilns, ovens, air heaters, dryers, chemical process equipment, and other applications where superior temperature uniformity is required. (For higher temperature service, specify 625 Burners.)

These sealed-in, nozzle-mix burners for gas and/or distillate oil are stable on stoichiometric ratio, with large amounts of excess air, or with up to 50% excess fuel (provided additional air for combustion is in the furnace near the burner).

OPERATION

Burners can be lighted at rich, lean, or correct air/fuel ratio, then immediately turned to high fire.

Required gas pressures are low: 1 osi at the burner for coke oven gas, less for natural gas. Required oil pressure at the burner is nearly zero, but a pressure drop of about 10 osi should be taken across the Sensitrol Valve.

The most common ratio control system for 642 Burners uses a cross-connected regulator and Ratiotrol. When appropriate for the application, flow balancing systems or fuel only control (see “Excess Air” paragraph) is very satisfactory.

If furnace temperatures after shutdown rise above 1900 F, pass some air through burner to prevent overheating. During gas operation, use at least 4 osi atomizing air to cool atomizer (full atomizing air may be used); or for extended periods of operation on gas, atomizer can be withdrawn and stored: Use a backplate and gasket to seal rear of burner (see Parts List 42/425).

LIGHTING/FLAME SUPERVISION

A 411 Pilot Set normally is used to light 642 Burners. On gas, direct spark ignition of the burner is available- see Sheet 455. A manual torch can be used in some applications.

Burners accept ultraviolet (UV) scanners for monitoring pilot or main frame. A flame rod can be used to monitor pilot or main **gas** fire. Adapters are listed in Bulletin 8832.

When using flame supervision, an **interrupted** pilot is required-do not use constant or intermittent pilots, if using direct spark ignition, turn off spark after burner lights.

An observation port is furnished with all burners. A lighter hole cover is supplied if a pilot is not ordered. Positions of pilot, flame detector, and observation port are interchangeable as long as pilot and flame detector are mounted in adjacent holes.

EXCESS AIR

Excess air can improve temperature uniformity by avoiding hot sports in front of burners, by churning furnace atmosphere to reduce stratification, and by creating positive furnace pressure to eliminate cold air infiltration.

Excess air can give very high effective burner turndown. Thus a furnace used for high temperature work (such as heat treating at 1900 F) with burners firing on stoichiometric air/fuel ratio can also be used for low temperature jobs (such as drawing or drying at 600 F) with burners firing on lean ratio.

Table 1. TOTAL AIR CAPACITIES*
scfh
(for Btu/hr, multiply by 100)

Burner designation	16 osi air at burner
642-2	2600
642-3	4100
642-4	6300
642-5	10300
642-6	15700
642-7-A	27000
642-7-B	33500
642-8-A	44800

* includes combustion and atomizing air.

CONSTRUCTION FEATURES

Air and gas inlets can be roated in 90° intervals, but air and gas pipes should be brought in from the top or side to prevent oil dripping into them.

Mounting plates are cast iron. Standard tiles are 9” long.

For thicker furnace walls, funnel beyond end of tile should be flared **at least** 30° included angle, starting at the tile OD. Extension tiles are not recommended.

For installation convenience, burner body can be separated from the mounting plate and tile assembly. But tile must be set in the wall with pilot and flame detector notches in proper location relative to intended burner body position.

Jacketed Tiles. 642-LC Burners have a carbon steel jacket around the tile for applications where there is no furnace refractory to support tile for applications where there is no furnace refractory to support tiles and where temperatures surrounding the jacket willnot exceed 800 F.

304(-L4) or 309 (-L9) stainless jackets are available for higher temperatures.

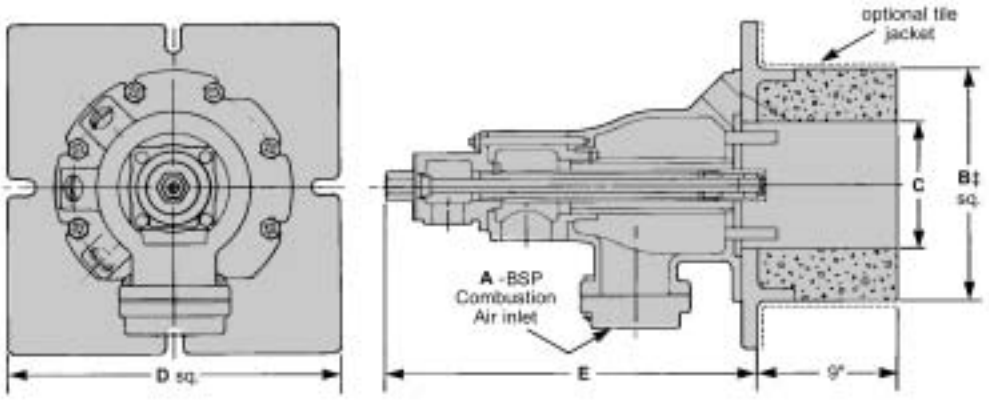
Table II. COMBUSTION AIR CAPACITIES in scfh

(not including atomizing air)

Burner designation	air pressure at burner in osi							approx. flame lengths with 16 osi Main Air (in open furnace)	
	0.1	1	5	6	8	12	16	gas	oil
642-2	160	520	1160	1270	1470	1800	2100	$^1/_2$'	$1^1/_2$'
642-3	280	890	1980	2160	2500	3050	3550	$1^1/_2$'	2'
642-4	460	1450	3240	3540	4100	5000	5800	2'	$2^1/_2$'
642-5	750	2370	5300	5800	6700	8150	9450	$2^1/_2$'	$2^1/_2$'
642-6	1180	3700	8300	9100	10500	12900	14800	3'	4'
642-7-A	2070	6550	14600	16000	18500	22700	26200	6'	6'
642-7-B	2580	8150	18200	19900	23000	28200	32600	6'	5'
642-8-A	3320	10500	23500	25800	29700	36400	42000	7'	6'

Table.III. ATOMIZING AIR CAPACITIES in scfh

Burner designation	air pressure at burner in osi					
	14	16	18	20	22	24
642-2, -3, -4	500	520	560	600	620	650
642-5	640	690	720	760	800	840
642-6	800	850	910	950	1000	1050
642-7-A, -7-B	870	930	990	1040	1100	1150
642-8-A	2650	2840	3000	3170	3320	3480



NOTE: For 642-8-A, air and gas connections, cannot be piped in the same place because the "flower pot" type air connection flange would interfere with the $2^1/_2$" gas line.

CLEARANCE DIMENSIONS (for details, see Dimensions 642)

Burner designation	dimensions in inches				
	A	B	C	D	E
642-2	$1^1/_4$	$8^1/_2$	5	12	$13^5/_8$
642-3	$1^1/_2$	$8^1/_2$	5	12	$13^5/_8$
642-4	2	$8^1/_2$	5	12	$13^5/_8$
642-5	$2^1/_2$	$8^1/_2$	5	12	$13^5/_8$
642-6	3	$8^1/_2$	5	12	$13^5/_8$
642-7-A	4	10	7	$13^1/_2$	$17^7/_8$
642-7-B	4	10	7	$13^1/_2$	$17^7/_8$
642-8-A	6	10	7	$13^1/_2$	$17^7/_8$

642- L - metal jackets add about 1" to tile OD.

Table IV. MAXIMUM EXCESS AIR RATES in % (without pilot)

Burner designation	GAS Combustion Air pressure			OIL Combustion Air pressure		
	1 osi	8 osi	14 osi	1 osi	8 osi	14 osi
642-2	-	380	500	-	380	500
642-3	330	1000	1300	210	480	670
642-4	560	1560	1560	480	800	900
642-5	1070	1440	1150	50	250	400
642-6	380	1000	1400	140	560	610
642-7-A	3200	4900	1000	160	330	450
642-7-B	900	1450	1600	150	700	830
642-8-A	460	660	400	200	280	350

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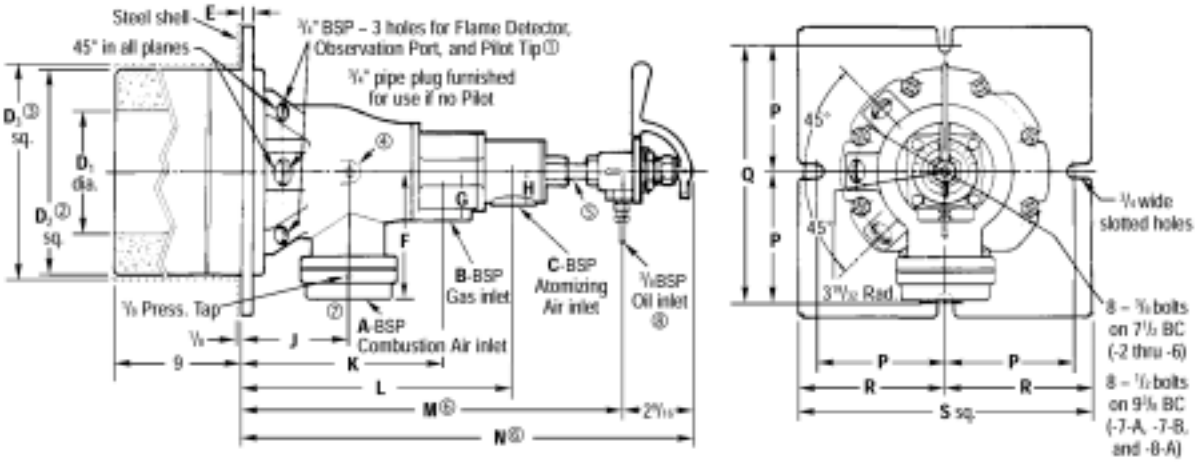
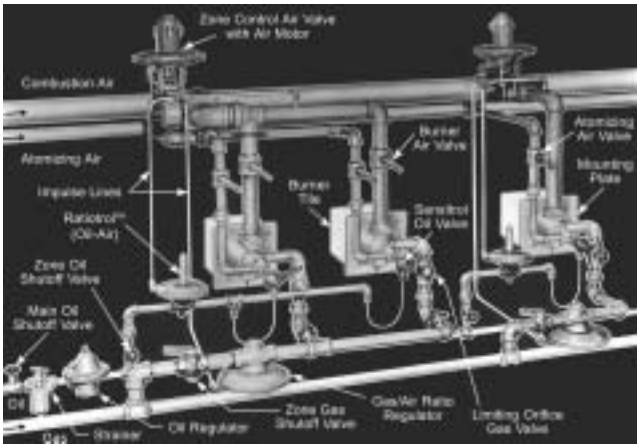


DIMENSIONS SHOWN ARE SUBJECT TO CHANGE PLEASE OBTAIN CERTIFIED PRINTS FROM CONTINENTAL THERMAL IF SPACE LIMITATIONS OR OTHER CONSIDERATIONS MAKE EXACT DIMENSION(S) CRITICAL.

Burner Designation	Dimensions in inches																		
	A	B	C	D_1	$D_2$②	$D_3$③	E	F	G	H	J	K	L	M	N	P	Q	R	S
642-2	1 1/4	1	3/4	5	8 1/2	9 1/2	1/2	5 1/4	2	1 3/8	4 3/8	8 3/8	11 5/16	15 13/16	18 3/8	5 1/4	10 1/2	6	12
642-3	1 1/2	1	3/4	5	8 1/2	9 1/2	1/2	5 1/4	2	1 3/8	4 3/8	8 3/8	11 5/16	15 13/16	18 3/8	5 1/4	10 1/2	6	12
642-4	2	1 1/4	3/4	5	8 1/2	9 1/2	1/2	5 1/4	2	1 3/8	4 3/8	8 3/8	11 5/16	15 13/16	18 3/8	5 1/4	10 1/2	6	12
642-5	2 1/2	1 1/2	1	5	8 1/2	9 1/2	1/2	5 1/4	2	1 3/8	4 3/8	8 3/8	11 5/16	15 13/16	18 3/8	5 1/4	10 1/2	6	12
642-6	3	1 1/2	1	5	8 1/2	9 1/2	1/2	5 8/16	2	1 3/8	4 3/8	8 3/8	11 5/16	15 13/16	18 3/8	5 1/4	10 1/2	6	12
642-7-A	4	2 1/2	1 1/4	7	10	11	9/16	6 15/16	2 5/8	2 3/8	5 7/8	11	15 1/8	20 1/16	22 5/8	6 1/8	12 1/4	6 3/4	13 1/2
642-7-B	4	2 1/2	1 1/4	7	10	11	9/16	6 15/16	2 5/8	2 1/8	5 7/8	11	15 1/8	20 1/16	22 5/8	6 1/8	12 1/4	6 3/4	13 1/2
642-8-A	6	2 1/2	2	7	10	11	9/16	10 11/16	2 5/8	1 3/4	5 7/8	11	15 1/8	20 1/16	22 5/8	6 1/8	12 1/4	6 3/4	13 1/2

Burner Designation	Wt. lb.	Sensitrol Oil valve	Recommended Pilot size
642-2	83	183-02-A	
642-3	83	183-02-A	411-11
642-4	83	183-02-A	or
642-5	83	183-02-A	411-12
642-6	83	183-02-B	
642-7-A	139	183-02-C	411-11
642-7-B	139	183-02-C	or
642-8-A	145	183-02-C	411-12



Piping arrangement for single-and double-burner zones.

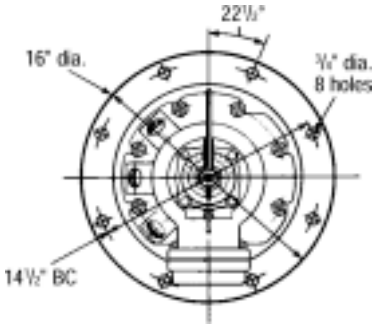
① Pilot, flame detector, and Obesrvation Port positions are interchangeable as long as Pilot and flame detector are in adjacent holes.
② Opening in furnace shell should be about 1/2" larger than dimension D to allow for fillets and draft on mounting plate.
③ For 642- -LC and -L4 Burners only. Opening in oven shell should be about 1/4" larger than dimension D_2.
④ 1/4" air pressure tap on -2,-3,-4,-5 and -6.
⑤ Pipe nipple not furnished by Continental Thermal.
⑥ Dimensions M and N assuem use of a 3/8" NPT close nipple between burner and Sensitrol Valve.
⑦ For 642-8-A, air and gas connections cannot be piped in the same plane because the "flower pot" type air connection flange would interfere with the 2-1/2" gas line.
⑧ Metal tubing is offered as an extra option.

ALTERNATIVE MODELS

642 Burneras for Fiber Lined Furnaces. For furnaces with ceramic fiber walls, special mounting/tile construction is available: 12" diameter tile, jacketed in RA330 expanded metal for all but 2" of its length; a circular mounting flange factory installed from 2" to 9" ("Z" dimension) from the host face of the tile.

Customer must specify this dimension to nearest 1/2" so the face is about flush with inside furnace wall.

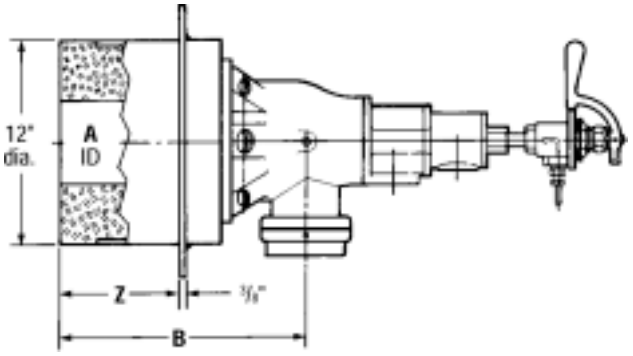
This construction is suitable for 2000 F furnace temperature.



Dimensions in inches

Size Designation	A	B	Z
-2 thru -6	5	$13^{3}/_{8}$	t
-7-A thru-8-A	7	$14^{7}/_{8}$	t

t "Z" dimension variable in 1/2" increments from 2" to 9".

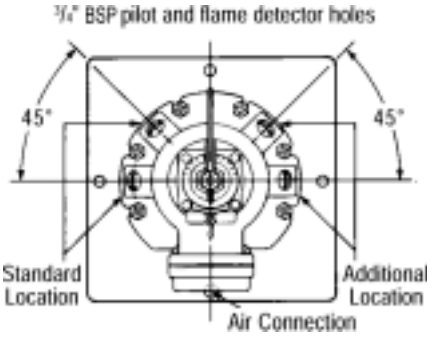


To order, specify: 642-(code)-(A or B if applicable) (Z) Burner complete. (List 183 Sensitrol Oil Valve seperately-- it is included in complete burner price). Include Z dimension in the burner description: between 2 and 9 inches, written to the nearest 0.5" as a decimal.

Example: 642-7-AZ Burner complete with Z dimension of 6.0"
183-02-C Sensitrol Oil Valve.

642 Burners with Extra Pilot and Flame Detector Location. The fixed relationship between 642 Burner air connections and pilot/flame detector holes occasionally presents problems in mounting pilots and flame detctors clear of furnace buckstays or other structural members.

642-2 through-6 Burners can be furnished with a 4-hole 0C3-2042 burner body that has a set of pilot and flame detector holes on each side. Either set can be used and one on the other side used for an observation port-plug any unused holes.



To order, specify: 642-(code)-(2042) Burner complete. (List 183 Microtrol Oil Valve seperately-- included in complete burner price).

Example: 642-2-2042 Burner complete with Special Body
18 3-02-A Sensitrol Oil Valve.

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