



# FIRE-ALL DUAL-FUEL BURNERS

Bulletin 614

614 FIRE. ALL Dual-Fuel Burners are nozzle mix, sealed in burners for gas, light oil, or heavy oil. Capable of efficient operation throughout a wide temperature range, these burners are equally at home on low temperature ovens and high temperature forge and melting furnaces.

Ruggedly built for sustained, maintenance-free operation, 614 Burners also provide for quick change of fuels without disturbing process operations.

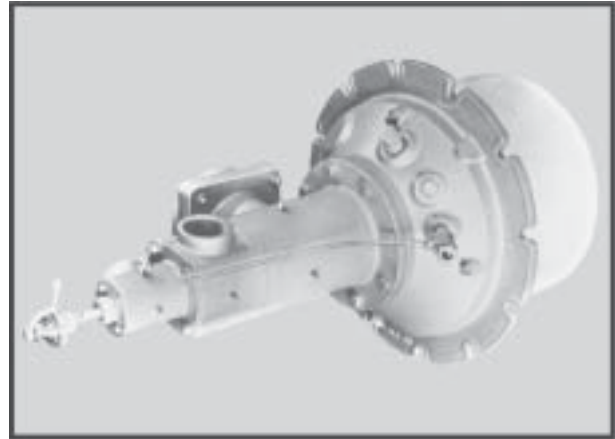
Sealed mountings help maintain furnace pressure, controlled atmosphere, and closer air/fuel ratio control—all contributing to better product quality.

Fire. All Burners have been used for years on all types of furnaces with great success.

## COMBUSTION CHARACTERISTICS

**Oil.** Oil viscosity air (4 osi minimum) should be left on to protect the atomizer. Maximum required natural gas pressure at the burner for stoichiometric ratio is about 1/4 of the combustion air pressure.

**Air/Fuel Ratio.** 614 Dual-Fuel Burners are stable with at least 100% excess air. They also can operate with excess fuel without forming carbon, but additional air for complete combustion must be available in the furnace near the burner.



For limits in a specific case, either rich or lean, consult Continental Thermal.

**Turndown.** Fire. All Burners can be turned down to atomizing air only (with fuel to match) except when burning residual oils in a cold tight furnace. For prolonged operation on atomizing air only, specify an alloy burner nozzle if furnace temperature is above 1600 F.

**Preheated Air.** 614 Burners are designated for use with ambient air. They are suitable for some preheated air applications (upto 700 F) preheat. Consult Continental Thermal.

### Total air capacities (including main and atomizing air)

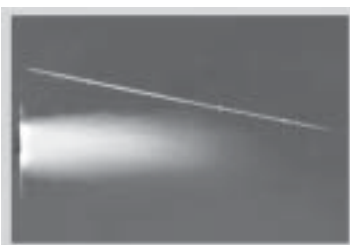
Burner designation	16 osi air pressure drop across the burner				24 osi air pressure drop across the burner				Approx. flame lengths with 16 osi main air (in open furnace)
	Air scfh	Light oil gph	Heavy oil gph	Gas scfh	Air scfh	Light oil gph	Heavy oil gph	Gas scfh	
614-6	17900	13	12	1790	21900	16	15	2190	4'-5'
614-7	28400	21	19	2840	34800	26	23	3480	5'-6'
614-8-A	48900	36	33	4890	60000	44	40	6000	8'-9'
614-8-B	81500	60	54	8150	100000	74	67	10000	9'-12'
614-9	165000	122	110	16500	202000	150	135	20200	15'-18'
614-10	247000	183	165	24700	303000	224	202	30300	20'

For Btu/hr, multiply by 100

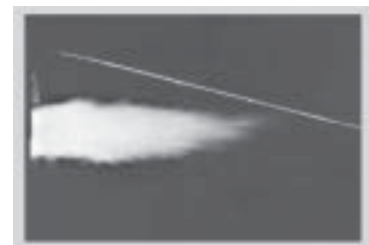
Light oil at 135000 Btu/gal.

Heavy oil at 150000 Btu/gal.

Natural gas at 1000 Btu/cf.



**Gas (left) and light oil flames for 614-6 Dual-fuel Burner with 16 osi main and atomizing air pressure drop across burner. White lines on pipe above flame indicate 1' intervals.**



**SPECIFICATIONS**

**Flame Supervision.** An ultraviolet cell will monitor pilot or main flame or gas or oil. For maximum safety, Continental Thermal urges interrupted pilots when flame safeguards are used--pilots should be on only for a preset ignition period (usually 15 seconds), after which flame supervision detects main fire only. Adapters for mounting flame detection devices on 614 Burners are tabulated on Bulletin 8832.

**Tile/Installation.** Burner tiles are cast refractory rated for 2800F furnace temperature. They should be supported securely in the furnace wall by castable refractory (not insulation) at least 9" thick all around the tile, extending back to the furnace shell and securely anchored to it. (See Supplement DF-M1).

Tiles are replaceable in the field except for the 614-10, whose mounting must be returned to the factory for tile replacement (for purchase a spare mounting plate with a tile cast onto it).

For furnace walls thicker than the length of the tile, the runnel beyond the end of the tile should be flared at a 30° (included) angle, starting at the OD of the tile. If this is not practical, consult Continental Thermal for specific recommendations.

**Complete burners include** tile, mounting plate, Microtrol Oil Valve, and an observation port into which a small quantity of atomizing air is introduced to keep the glass clear. Order pilot tips separately.

**SPECIAL OPTIONS**

The following options are available for the 614 burner but require consultation with your Continental Thermal field engineer for application and ordering information.

1. **Increased capacities** - most sizes are available with up to 30% extra capacity.
2. **Hinged bodies** for easy access to internals.
3. **Short flame** versions are available in most sizes.
4. Special **high pressure oil atomizers** are available.

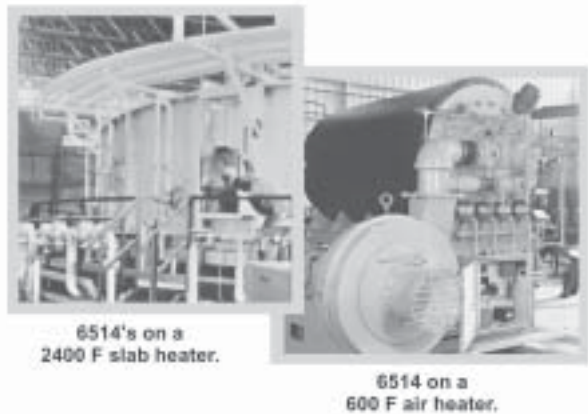
Cleaning air must be introduced into the port downstream of the sensor to keep oil and poc's off the tens.

**Jacketed Tiles.** 614 Burners are available with support jackets around the tile for applications where the tile is not supported by furnace refractory.

Jackets are available in three different metals and have maximum temperature ratings for each. They must be protected with sufficient insulations so as not to exceed rated temperature.

Maximum temperature rating for jacket metals depends upon frequency of heat-up/cool-down cycles. As an example, batch annealing furnaces that are heated and cooled every day should use the "intermittent exposure" ratings. Continuous annealing furnaces that remain at the same temperature for months at a time, can use the higher "continuous" rating.

Designation	Jacket Metal	Continuous max. temp.	Intermittent exposure
614- -LC	carbon steel	700 F	700 F
614- -LC	304 stainless	1600 F	1500 F
614- -L9	309 stainless	1900 F	1800 F



**Main air capacities in scfh**

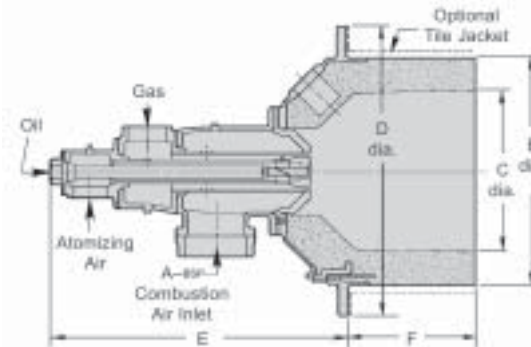
Burner designation	Air pressure drop across the burner in osi					
	1	5	6	8	12	16
614-6	3710	8300	9100	10500	12900	14900
614-7	6100	13600	15000	17200	21000	24400
614-8-A	10600	23700	26000	30000	36700	42400
614-8-B	17600	39200	43000	49600	60500	70000
614-9	36600	82000	89500	104000	127000	146000
614-10	54500	122000	135000	154000	189000	218000

**Atomizing air capacities in scfh**

Air pressure drop across the burner in osi						
14	16	18	20	22	24	
2800	3000	3180	3360	3610	3660	
3770	4030	4270	4500	4720	4900	
6050	6500	7000	7300	7600	7850	
10600	11300	12000	12700	13200	13800	
17200	18400	19600	20700	21600	22500	
27200	29100	30900	32600	34100	35500	

**CLEARANCE DIMENSIONS** (for details, see Dimensions 614)

Burner designation	dimesnions in inches					
	A	B	C	D	E	F
614 & 614-6-L	3	15	10 <sup>3</sup> / <sub>8</sub>	19 <sup>1</sup> / <sub>2</sub>	23 <sup>5</sup> / <sub>16</sub>	9
614 & 614-7-L	4	16	11 <sup>3</sup> / <sub>8</sub>	20 <sup>1</sup> / <sub>2</sub>	25 <sup>1</sup> / <sub>2</sub>	9
614 & 614-8-AL	6	17 <sup>3</sup> / <sub>4</sub>	12 <sup>3</sup> / <sub>8</sub>	22 <sup>3</sup> / <sub>4</sub>	32 <sup>1</sup> / <sub>16</sub>	10
614 & 614-8-BL	6	19	13 <sup>1</sup> / <sub>2</sub>	24	35 <sup>15</sup> / <sub>16</sub>	13
614 & 614-9-L	8	23	16	28	44 <sup>3</sup> / <sub>16</sub>	13 <sup>1</sup> / <sub>2</sub>
614 & 614-10-L	10	27 <sup>1</sup> / <sub>2</sub>	20 <sup>1</sup> / <sub>2</sub>	32 <sup>1</sup> / <sub>2</sub>	50 <sup>9</sup> / <sub>16</sub>	13 <sup>1</sup> / <sub>2</sub>

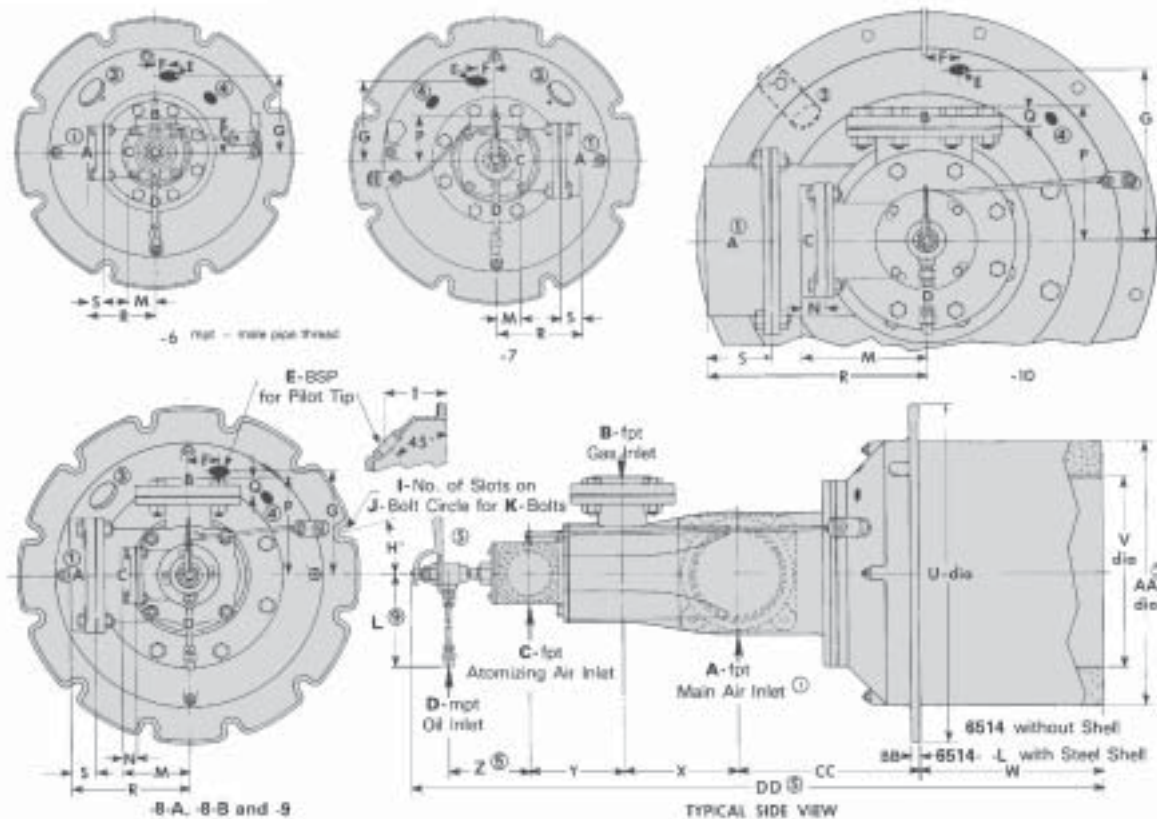




# FIRE-ALL DUAL-FUEL BURNERS

Dimensions 614

**DIMENSIONS** - Main air, gas, atomizing air, and oil connections can be rotated relative to one another and to the mounting plate. Drawings show connections as assembled as the factory. These arrangements reduce maintenance by preventing oil dripping into air or gas manifolds (which should be above burners) and by minimizing dirt accumulation in pilots and flame supervisory devices. Pilot and main air connections cannot be aligned in the same direction.



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

### Common dimensions in inches for 614 and 614 - L

Burner Designation	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P
614-6	3	2	1 1/2	3/8	3/4	1	5 17/32	22 1/2	8	18	5/8	19 3/4	2	-	2 1/2
614-7	4	2 1/2	2	3/8	1 1/4	1 1/4	5 3/4	22 1/2	8	19	5/8	19 3/4	1 3/4	-	3 1/4
614-8-A	6	2 1/2	2 1/2	3/8	1 1/4	1 1/2	6 7/8	15	12	21 1/4	5/8	19 3/4	2 3/8	-	3 7/8
614-8-B	6	3	3	3/8	1 1/4	2 1/4	7 3/8	15	12	22 1/2	5/8	19 3/4	5 3/16	1 1/2	6 3/16
614-9	8	4	4	1/2	1 1/2	2 1/4	9 7/8	15	12	26 1/2	5/8	20 3/4	7 13/16	1 1/2	8 3/4
614-10	10	6	6	1/2	1 1/2	2 1/2	12 3/16	15	12	30 1/2	3/4	20 3/4	8 3/16	1 3/4	9 5/8

Burner Designation	Q	R	R	S	T	U	V	W	X	Y	Z	for 614 only				wt lb
												AA	BB	CC	DD	
614-6	-	5 3/16	10 3/8	1 1/2	3 5/16	19 1/2	10 3/8	9	3 7/8	4	4 1/16	15	5/8	8 5/16	31 13/16	165
614-7	-	6 1/16	10 1/8	1 1/2	3 15/16	20 1/2	11 3/8	9	4 11/16	4 1/16	4 7/16	16	5/8	9 1/4	34	215
614-8-A	-	7 7/15	11 1/4	1 3/4	4 5/16	22 3/4	12 3/8	10	6 1/14	4 15/16	4 15/16	17 3/4	5/8	12 7/8	41 9/16	300
614-8-B	1 3/16	8 7/16	12 3/8	1 3/4	4 5/16	24	13 1/2	13	8 1/8	6 11/16	5 3/16	19	5/8	12 7/8	48 7/16	410
614-9	1 5/16	13 3/8	-	3 13/16	6 5/16	28	16	13 1/2	11 5/16	8 7/16	6 3/16	23	5/8	14 11/16	57 3/16	705
614-10	1 9/16	15 7/16	-	4 3/8	5 15/16	32 1/2	20 1/2	13 7/16	13 1/16	11 3/16	6 11/16	27 1/2	1/2	16 1/8	63 5/8	990

See back for notes and additional information, including 614-L dimensions and weights. 614-10 only is offered with a short (2") title designated 614-10-S.

Burner Designation	for 614- -L only				wt lb	for 614 and 614-L	
	AA	BB	CC	DD		Microtrol oil valve	Recommended pilot tip
<b>614-6</b>	16	$\frac{3}{4}$	$8\frac{7}{16}$	$32\frac{5}{16}$	190	183-02-C	421-12
<b>614-7</b>	17	$\frac{3}{4}$	$9\frac{3}{8}$	34-1/2	245	183-02-D	4025-0-T
<b>614-8-A</b>	$18\frac{3}{4}$	$\frac{3}{4}$	13	$42\frac{15}{16}$	335	183-02-D	4025-0-T
<b>614-8-B</b>	20	$\frac{3}{4}$	13	$48\frac{15}{16}$	455	183-02-D	4025-0-T
<b>614-9</b>	$24\frac{1}{4}$	$\frac{13}{16}$	14-7/8	$57\frac{11}{16}$	755	183-01	4025-2-T
<b>614-10</b>	$27\frac{1}{2}$	$\frac{11}{16}$	$16\frac{5}{16}$	64	1020	183-01	4025-2-T

1. Flanged connection -- a standard Continental Thermal square threaded flange for sizes - 6, -7, -8, main air connections, but SW style inlet may be specified with no change in price. An SW inlet (suitable for slip-on or welded connection) is standard for -9 and -10 burners.
2. Opening in furnace shell or outer wall must be 1/2" larger than dimension "AA" to allow for mounting plate fillet and draft.
3. Blank boss-- as a no cost special may be specified with a 2" pipe tap for photocell, or a 1-1/2" tap suitable for 5025-3-IT Oil Pilot, in which case Continental Thermal will drill out 1/2" web or refractory left in tie before shipment, and the burner nose will be positioned so none of its hotels are in front of that opening. To order, specify "...Burner Complete with 3-\_\_\_ - \_ mounting (fill in part number from appropriate parts list for mounting with 2" tap or 1-1/2" tap as desired) For -10 size, which has no boss, one half of an appropriately sized coupling is added when specified.
4. 1" BSP for electrode or UV flame detector
5. Pipe nipple not furnished by Continental Thermal. Dimension Z and DD assume a 3/8" close nipple between burner and Microtrol Oil Valve (614-6) through -8-B) and a 1/2" close nipple between burner and Microtrol Valve 614-9 and -10)
6. Applies when optional SW inlet is specified
7. Flanged connection -- a Standard Continental Thermal square threaded flange is used.
8. Flanged connection -- a standard ANSI 125 psi threaded flange is used.
9. If optional tubing purchased from Continental Thermal.

ANSI or SW flanges: Flat face companion flanges and full gaskets are supplied with this equipment. Do not use raised face flanges that may damage mating flange.

