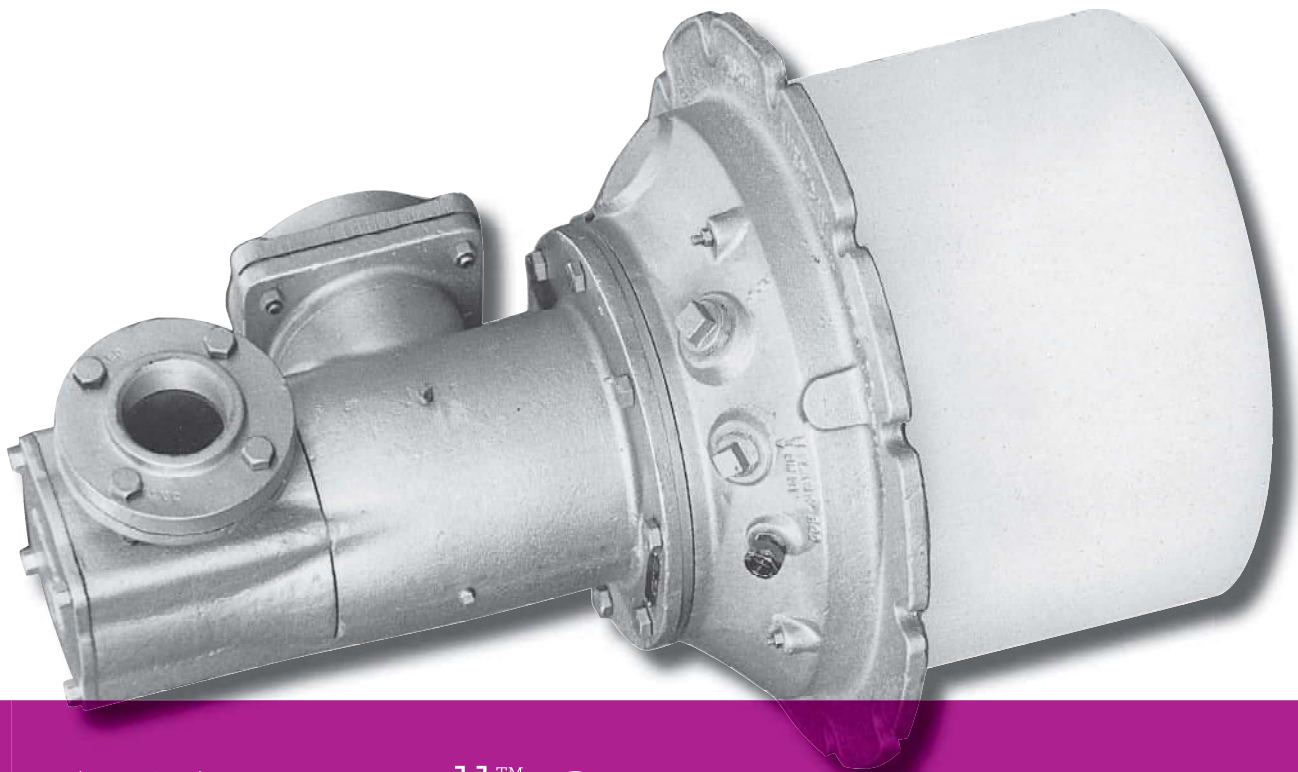




North American Fire•All™ Gas Burners



4514 Fire•All™ Gas Burner

- Gas-only burner
- Conventional forward flame pattern
- 1.5 to 26 million Btu/h HHV
- Chambers up to 2400°F (with alloy nose)
- Low Btu fuels (500 Btu/ft³ or higher)

Product Overview | 4514 Fire•All™

4514 FIRE•ALL™ are nozzle-mix, sealed-in burners used for many years on high temperature furnaces such as those for forging steel, melting aluminum or brass, and reheating steel bars or ingots...and on low temperature ovens and air heaters.

Their construction allows maximum efficiency through close control of air/gas ratio, furnace atmosphere, and furnace pressure--all contributing to better product quality.

OPERATION

Control: Normally, air primary with a cross-connected, pressure-balance regulator. For maximum turndown, use a 7216 (biased) Regulator, or throttle gas only.

To protect burner from heat damage, do not set air pressure below 1 osi in a 1900°F furnace, or below 2 osi at 2200°F (whether gas is on or off).

Gas pressure requirement: About 1 osi at the burner for natural gas on stoichiometric ratio; about 1/3 of the air pressure for coke oven gas.

Lighting: See 4514 Dimension Sheet for recommended premix pilot tips.

Flame Supervision. Flame safeguards are recommended for all installations. An ultraviolet cell will monitor pilot or main flame. For maximum safety, North American 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 4514 Burners are tabulated on Bulletin 8832.

Tile/Installation. Burner tiles are cast refractory rated for 2800°F furnace temperature. They are replaceable in the field, except for the 4514-10 whose mounting must be returned to the factory for tile replacement (or purchase a spare mounting plate with a tile cast onto it).

Burner tiles should be supported securely in the furnace wall by a layer of 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.)

Jacketed Tile options are available 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 insulation so as not to exceed rated temperature. The 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
4514- -LC	carbon steel	700°F	700°F
4514- -L4	304 stainless	1600°F	1500°F
4514- -L9	309 stainless	1900°F	1800°F

COMBUSTION AIR CAPACITIES scfh (for Btu/h HHV, multiply by 100)

Burner designation	air pressure drop across the burner in osi								approximate flame length stoichiometric ratio	available excess air ratio setting
	0.1	1	5	6	8	12	16	24		
4514-6	1 180	3 710	8 300	9 100	10 500	12 900	14 900	18 200	4 1/2'	300%
4514-7	1 930	6 100	13 600	15 000	17 200	21 000	24 400	29 900	5'	650%
4514-8-A	3 350	10 600	23 700	26 000	30 000	36 700	42 400	51 900	8	450%
4514-8-B	5 550	17 600	39 200	43 000	49 600	60 500	70 000	85 700	9'	250%
4514-9	11 600	36 600	82 000	89 500	104 000	127 000	146 000	179 000	16'	700%
4514-10	17 300	54 500	122 000	135 000	154 000	189 000	218 000	267 000	19'	350%

Dimensions | 4514 Fire•All™

Burner Nose options are available for sizes shown below and can be specified in the product number. The burner nose establishes main combustion air flow and influences flame propagation. Nose material is either cast iron that is suitable for cold air applications up to 1800°F, or cast stainless alloy for preheated air (maximum 700°F) applications up to 2400°F.

Mat'l	Cap'y	-6	-7	-8A	-8B	-9	-10
Cast iron	1.0	✓	✓	✓	✓	✓	✓
Cast Alloy	1.0	✓	✓	✓	✓	✓	✓
Cast iron	1.1		✓	✓	✓	✓	✓
Cast Alloy	1.1		✓	✓	✓	✓	✓
Cast iron	1.2			✓	✓	✓	✓
Cast Alloy	1.2			✓	✓	✓	✓
Cast iron	1.3			✓	✓	✓	✓
Cast Alloy	1.3			✓	✓	✓	✓

The product designation 1.0 represents standard main air capacity shown on page 1. Use of an extra capacity burner nose will result in either more air at 16 psi or standard air flow at lower pressure. Extending the capacity of the burner by increasing air pressure beyond 16 psi, or using the extra capacity nose, is acceptable for most gas applications. Specific applications involving low Btu fuels and extra capacity should be reviewed with North American.

Also, when firing extra capacity, the combustion air flow velocity within the supply piping, and associated pressure loss, can be excessive for some burners. The -8B, -9 and -10 products when operated at 1.2 or 1.3 capacity will develop high pipe velocity based on the burner's air connection size. As an alternative to increasing blower pressure, an oversized air inlet can be purchased separately for these size burners. The connections are SW-type (slip-on sleeve or welded construction) and are one pipe size larger than the standard supply. Nose and oversize air connection part numbers can be found in supplement literature (see Parts List and Burner Options documents).

Additional options are available for the 4514 burner but require consultation with North American for application and ordering information. See Sheet 6514-3 for an overview of burner options.

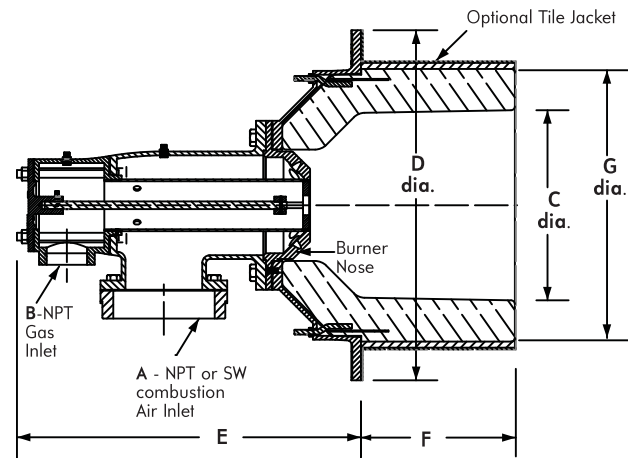
DUAL FUEL

6514 FIRE•ALL™ Burners are available for oil standby or combination gas and oil firing. See Bulletin 6514. 4514 Gas Burners can be converted to 6514 Dual-Fuel™ Burners with an appropriate conversion kit (see Parts List 4514-2).

CLEARANCE DIMENSIONS (for details see Dimensions 4514)

Burner designation	Dimensions in inches							Wt. lb
	A ¹	B	C	D	E	F	G	
4514-6	3	2	10 ³ / ₈	19 ¹ / ₂	14 ¹⁵ / ₁₆	9	15	190
4514-7	4	2 ¹ / ₂	11 ³ / ₈	20 ¹ / ₂	16 ⁷ / ₈	8 ⁷ / ₈	16	215
4514-8-A	6	2 ¹ / ₂	12 ³ / ₈	22 ³ / ₄	22 ³ / ₈	10	17 ³ / ₄	320
4514-8-B	6	3	13 ¹ / ₂	24	25 ¹⁵ / ₁₆	12 ⁷ / ₈	19	420
4514-9	8	4	16	28	30 ¹³ / ₁₆	13 ⁷ / ₁₆	23	740
4514-10	10	6	20 ¹ / ₂	32 ¹ / ₂	35 ¹ / ₈	13 ⁵ / ₈	27 ¹ / ₂	960

¹SW connection standard for -9 and -10 only.



DIMENSIONS SHOWN ARE SUBJECT TO CHANGE. PLEASE OBTAIN CERTIFIED PRINTS FROM FIVES NORTH AMERICAN COMBUSTION, INC. IF SPACE LIMITATIONS OR OTHER CONSIDERATIONS MAKE EXACT DIMENSION(S) CRITICAL.

Ordering Information | 4514 Fire•All™

ORDERING INFORMATION

	4514 -	---	/	---	/	---	
Product Size	}			}			Burner Nose
Connection	}			}			Capacity
6..... 3"							1.0main air capacity
7..... 4"							1.1.....1.1 x main air capacity
8-A 6"							1.2.....1.2 x main air capacity
8-B 6"							1.3.....1.3 x main air capacity
9..... 8"							
1010"							
				Tile			Material
				BO .. burner only			H...cast iron
				LX.... refractory tile (no jacket)			A...alloy
				LC.... steel tile jacket			
				L4.... 304 stainless jacket			
				L9.... 309 stainless jacket			

- Example 1 4514-8-A/LC/1.2A Fireall gas burner complete with carbon steel jacketed tile and 1.2 capacity alloy nose
 Example 2 4514-6/BO/1.0H Fireall gas burner only with standard capacity iron nose
 Example 3 4514-9/LX/1.2H Fireall gas burner complete with refractory tile and 1.2 capacity iron nose

Note: See Supplement 6514-6 for cross referencing old product numbers.

WARNING: Situations dangerous to personnel and property may exist with the operation and maintenance of any combustion equipment. The presence of fuels, oxidants, hot and cold combustion products, hot surfaces, electrical power in control and ignition circuits, etc., are inherent with any combustion application. Components in combustion systems may exceed 160°F (71°C) surface temperatures and present hot surface contact hazard. Fives North American Combustion, Inc. suggests the use of combustion systems that are in compliance with all Safety Codes, Standards, Regulations and Directives; and care in operation.

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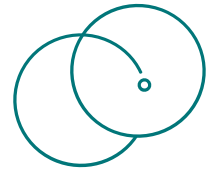
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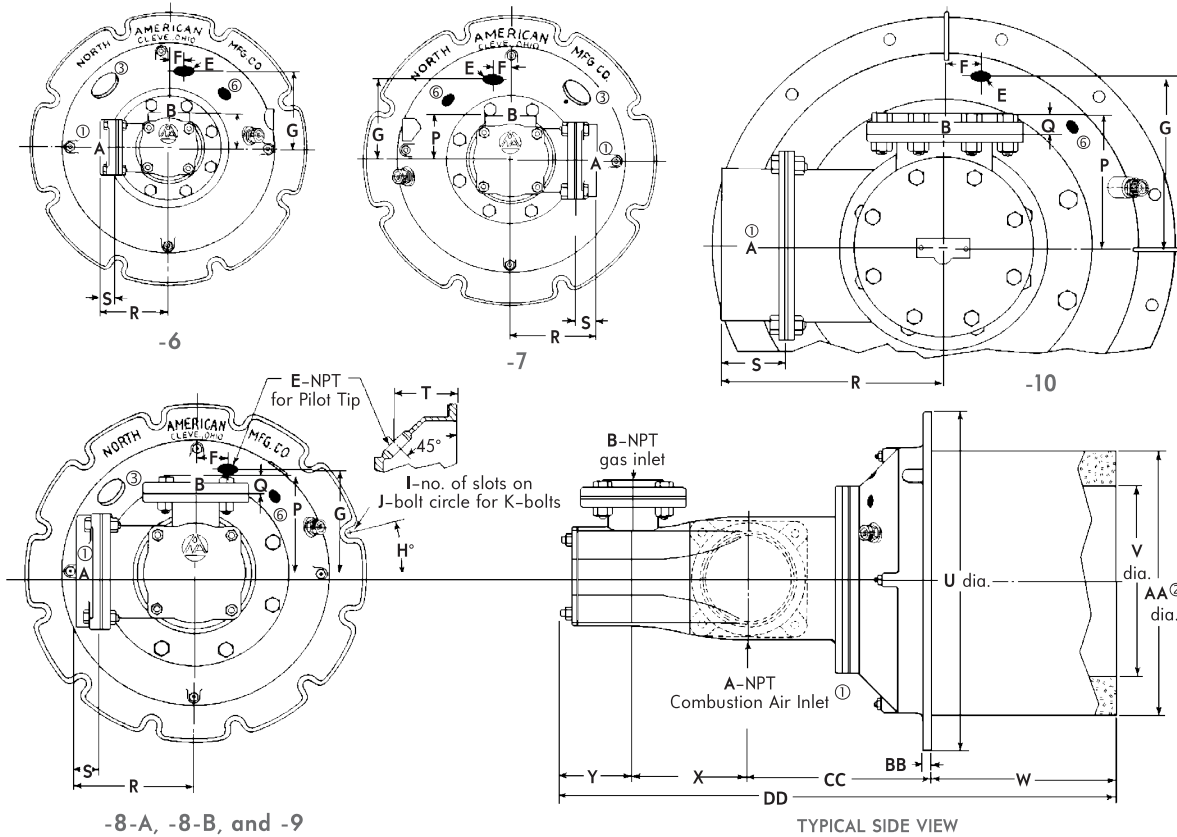
PROCESS TECHNOLOGIES

ENERGY | COMBUSTION

North American Fire•All™ Gas Burners

Dimensions 4514

DIMENSIONS — Main air and gas connections can be rotated relative to one another and to the mounting plate. Drawings show connections as assembled at the factory. Arrangements shown reduce maintenance 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 CHANGE. PLEASE OBTAIN CERTIFIED PRINTS FROM FIVES NORTH AMERICAN COMBUSTION, INC. IF SPACE LIMITATIONS OR OTHER CONSIDERATIONS MAKE EXACT DIMENSION(S) CRITICAL.

Burner designation	common dimensions in inches and degrees															
	A ^①	B	E	F	G	H°	I	J	K	P	Q	R	R ₁ ^④	S	T	U
4514-6	3	2	3/4	1	5 17/32	22 1/2	8	18	5/8	2 1/2	-	5 3/16	10 3/8	1 1/16	3 7/16	19 1/2
4514-7	4	2 1/2	1 1/4	1 1/4	5 3/4	22 1/2	8	19	5/8	3 1/4	-	6 1/8	10 1/8	1 1/16	3 3/16	20 1/2
4514-8-A	6	2 1/2	1 1/4	1 1/2	6 7/8	15	12	21 1/4	5/8	3 7/8	-	7 3/8	11 1/4	1 3/16	4 5/16	22 3/4
4514-8-B	6	3 ^⑤	1 1/4	1 1/2	7 3/8	15	12	22 1/2	5/8	6 13/16	1 3/16	8 1/2	12 3/8	1 13/16	4 5/16	24
4514-9	8	4 ^⑤	1 1/2	2 1/4	9 7/8	15	12	26 1/2	5/8	8 13/16	1 1/16	13 3/8	-	3 13/16	6 3/16	28
4514-10	10	6 ^⑤	1 1/2	2 1/2	12 3/16	15	12	30 1/2	3/4	9 11/16	1 1/16	15 1/16	-	4 3/8	5 1/16	32 1/2

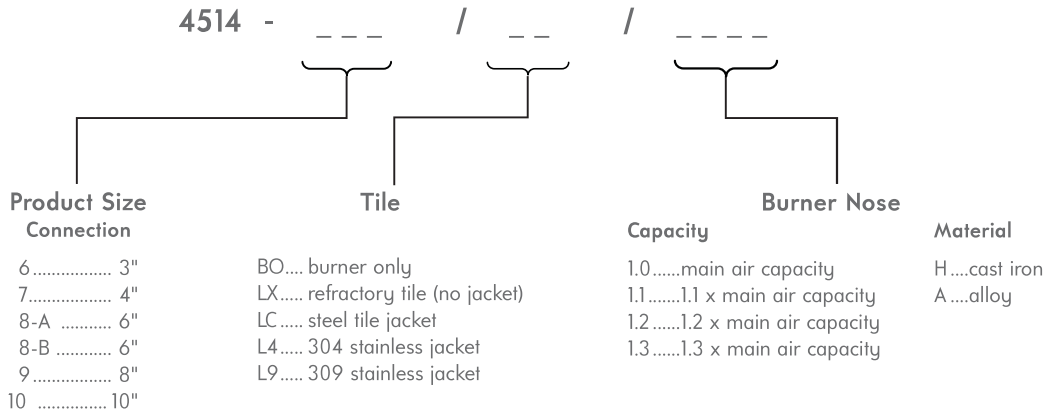
Burner designation	V	W	X	Y	4514- /LX (refractory tile)				wt lb	4514- /LC, /L4, L9 (jacketed tile)				wt lb	Pilot Tip
					AA ^②	BB	CC	DD		AA ^②	BB	CC	DD		
4514-6	10 3/8	9	4	2 11/16	15	5/8	8 1/4	23 5/16	190	16	3/4	8 3/8	24 1/16	210	4021-12
4514-7	11 3/8	8 7/8	4 3/4	2 7/8	16	5/8	9 1/4	25 3/4	215	17	3/4	9 3/8	25 7/8	240	4025-0-T
4514-8-A	12 3/8	10	6 5/16	3 3/16	17 3/4	5/8	12 13/16	32 3/8	320	18 3/4	3/4	12 15/16	32 1/2	355	4025-0-T
4514-8-B	13 1/2	12 7/8	8 3/16	4 15/16	19	5/8	12 13/16	38 13/16	420	20	3/4	12 15/16	38 15/16	465	4025-0-T
4514-9	16	13 7/16	11 5/16	4 13/16	23	5/8	14 11/16	44 1/4	740	24 1/4	1 3/16	14 7/8	48 7/16	805	4025-2-T
4514-10	20 1/2	13 3/8	13 1/16	6	27 1/2	1/2	16 1/8	48 3/4	960	27 1/2	1 1/16	16 5/16	48 3/4	1010	4025-2-T

See page 2 for notes and additional information.

- ① A square threaded flange is used for sizes -6, -7, -8. SW style (suitable for slip-on or welded connection) inlet may be ordered as a special option.
An SW inlet is standard for -9 and -10 burners.
- ② Opening in furnace shell or outer wall must be ½" larger than dimension "AA" to allow for mounting plate fillet and draft.
- ③ Blank boss (for optional uses with oil and dual-fuel models).
- ④ Applies when optional SW inlet is specified.
- ⑤ Flanged connection -- ANSI 125 psi threaded flange.
- ⑥ 1" fpt for electrode or UV flame detector.

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.

ORDERING INFORMATION



- Example 1 4514-8-A/LC/1.2A Fireall gas burner complete with carbon steel jacketed tile and 1.2 capacity alloy nose
 - Example 2 4514-6/BO/1.0H Fireall gas burner only with standard capacity iron nose
 - Example 3 4514-9/LX/1.2H Fireall gas burner complete with refractory tile and 1.2 capacity iron nose
- Note: See Supplement 6514-6 for cross referencing old product numbers.

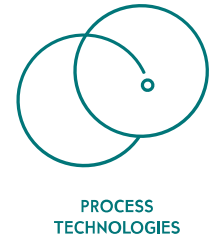
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North American 4514 Gas Burners Engineering Data

Sheet 4514-1

4514-6 ^①	Main Air Pressure, psi				
	0.25	1	4	8	16
Max. % XSAir	500	900	900	450	300
Max. % XSFuel	45 ^②	45 ^②	45 ^②	45	45
Flame Length/Diameter, inches					
on ratio, no XSAir	12/12	18/24	36/24	50/12	65/12
at max. XSAir	3/3	3/3	3/3	4/4	8/8
at max. XSFuel	12/24	18/36	60/24	60/36	72/30

4514-7 ^①	Main Air Pressure, psi				
	0.25	1	4	8	16
Max. % XSAir	450	650	650	650	650
Max. % XSFuel	45 ^②	45 ^②	45 ^②	45	45
Flame Length/Diameter, inches					
on ratio, no XSAir	36/12	36/24	48/24	60/18	70/18
at max. XSAir	6/6	6/3	6/3	6/3	6/3
at max. XSFuel	24/36	60/36	72/24	72/36	84/24

4514-8-A ^③	Main Air Pressure, psi				
	0.25	1	4	8	16
Max. % XSAir	450	450	450	450	450
Max. % XSFuel	45 ^②	45 ^②	45	45	45
Flame Length/Diameter, inches					
on ratio, no XSAir	24/24	36/36	60/24	72/24	80/24
at max. XSAir	4/4	6/6	6/6	8/8	12/8
at max. XSFuel	24/36	36/48	84/36	108/36	132/30

4514-8-B ^④	Main Air Pressure, psi				
	0.25	1	4	8	16
Max. % XSAir	450	350	450	450	250
Max. % XSFuel	45 ^②	45 ^②	45	45	45
Flame Length/Diameter, inches					
on ratio, no XSAir	48/24	72/36	120/48	120/36	120/36
at max. XSAir	8/8	8/8	8/8	8/8	6/10
at max. XSFuel	30/18	84/24	108/30	120/36	132/36

(See Notes on page 2)

4514-9 ^①	Main Air Pressure, osi				
	0.25	1	4	8	16
Max. % XSAir ^⑤	450	600	700	750	700
Max. % XSFuel	45 ^②	45 ^②	45	45	45
Flame Length/Diameter, inches					
on ratio, no XSAir	48/36	72/36	132/36	190/36	227/36
at max. XSAir	8/8	8/8	8/8	8/8	8/8
at max. XSFuel	60/30	108/36	168/42	192/48	240/48

4514-10 ^①	Main Air Pressure, osi				
	0.25	1	4	8	16
Max. % XSAir	75	100	150	250	350
Max. % XSFuel	45 ^②	45 ^②	45	45	45
Flame Length/Diameter, inches					
on ratio, no XSAir	72/36	120/36	156/48	192/48	252/48
at max. XSAir	24/12	24/12	24/12	24/12	24/12
at max. XSFuel	84/36	144/36	180/60	216/60	252/60

NOTES

- ① Maximum main air pressure at which pilot will light main flame is 1 osi for listed conditions.
- ② Flame tends to lick up at these conditions.
- ③ Pilot will light main flame at all listed conditions.
- ④ Maximum main air pressure at which pilot will light main flame is 8 osi for listed conditions.
- ⑤ Pilot will not light main flame at listed conditions.

All test data was obtained in an open laboratory furnace with free air available. Because of differing operating conditions in the field and a host of other variables, use reasonable caution in applying this data to field situations.

Air pressure on the pilot was 8 osi in all tests.

The 4514 Burner will generate an adequate signal for flame supervision at all conditions listed except as noted.

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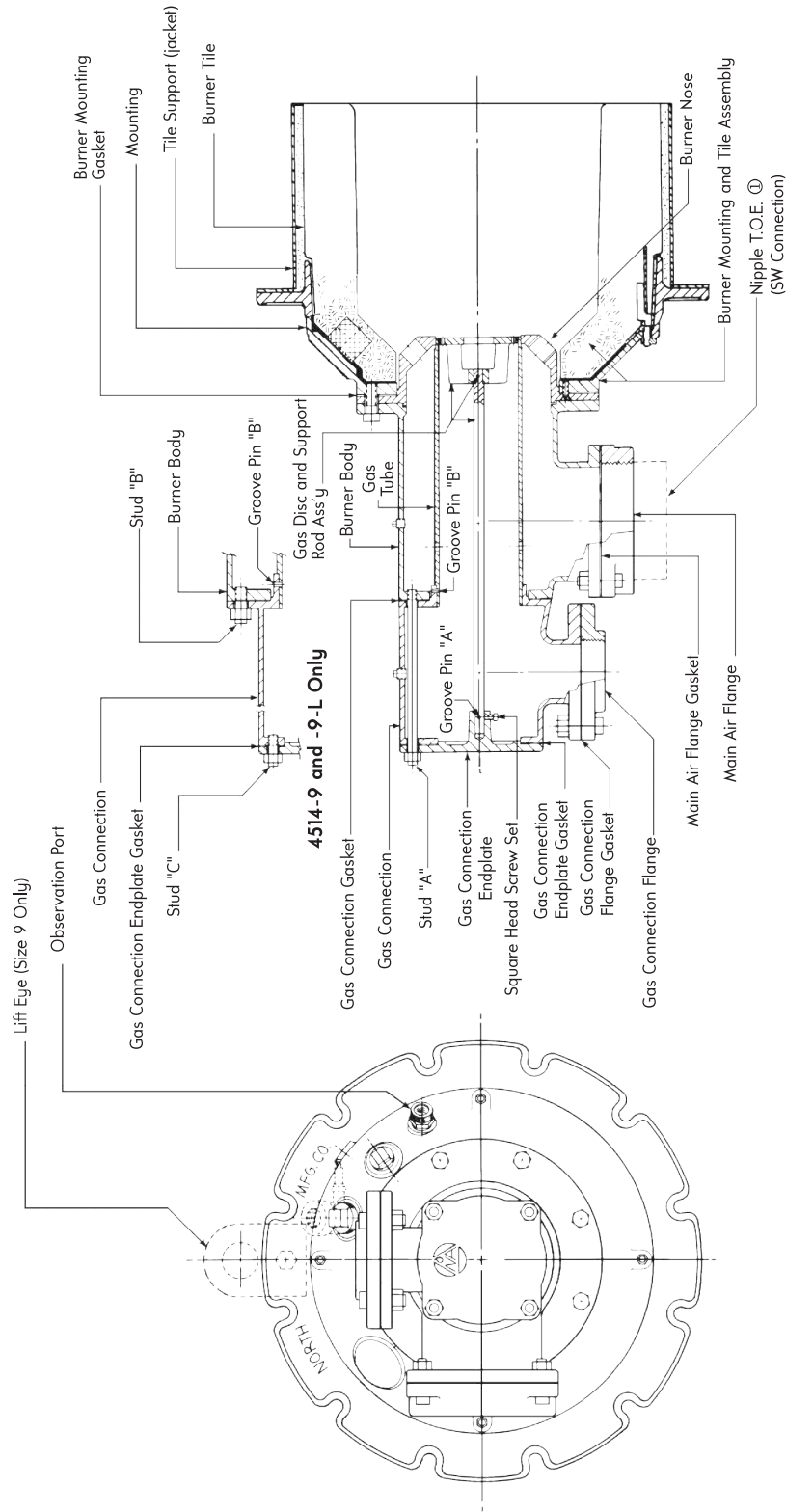


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North American Fire•All™ Gas Burners

Parts List 4514-2

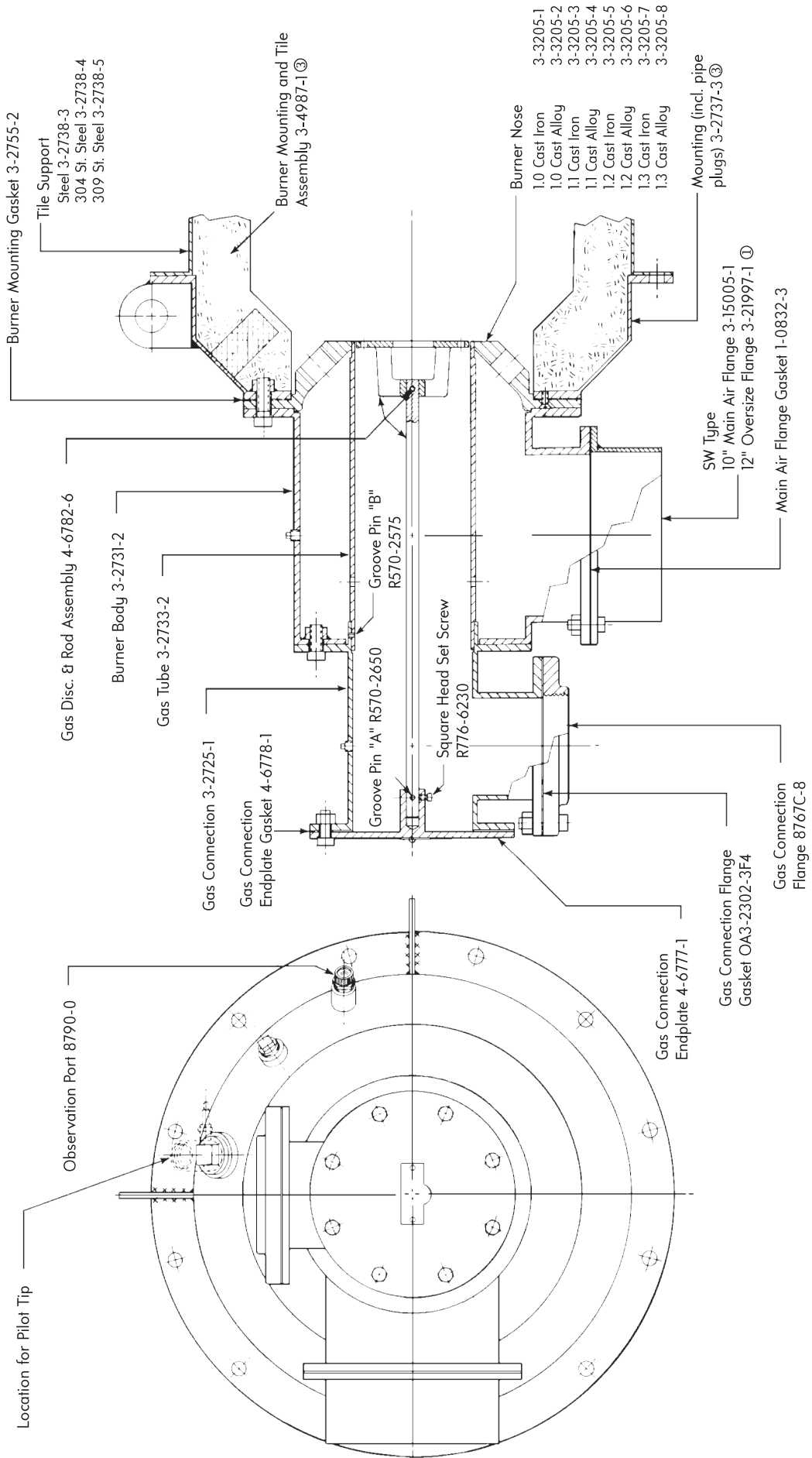
4514-6 thru -9



Part Name	Burner Designation				
	4514-6	4514-7	4514-8-A	4514-8-B	4514-9
Burner Body	3-2688-2	3-2422-2	3-2999-2	3-2646-2	3-2845-3
Burner Mtg. Gasket	3-2683-2	3-2532-2	3-3004-2	3-2653-2	3-2631-3
Burner Tile, Cast	3-7094-1	3-7095-1	3-7096-1	3-7097-1	3-7098-1
Burner Mtg. & Tile	3-7099-1	3-7099-4	3-7099-7	3-7099-10	3-7099-13
Gas Connection	3-2687-1	3-2423-2	3-2989-1	3-2647-2	3-2846-1
Gas Disc. and Support Rod Assembly	4-6782-1	4-6782-2	4-6782-3	4-6782-4	4-6782-5
Gas Connection Endplate	4-6741-1	4-45316-1	4-6753-1	4-6764-1	4-6760-1
Gas Connection Endplate Gasket	4-6742-1	3-2517-1	4-6754-1	4-6765-1	3-2625-2
Gas Connection Flange	—	—	—	8767C-6	8767C-7
Gas Connection Flange Gasket 2F4	—	—	—	OAS3-2302-1F4	OAS3-2302-
Gas Connection Gasket	4-6742-1	3-2517-1	4-6754-1	4-6765-1	—
Gas Tube	3-2679-2	3-2511-2	3-3005-2	3-2649-2	3-2621-3
Groove Pin "A"	R570-2360	R570-2380	R570-2390	R570-2390	R570-2390
Groove Pin "B"	R570-2300	R570-2300	R570-2300	R570-2300	R570-2578

Part Name	Burner Designation				
	4514-6	4514-7	4514-8-A	4514-8-B	4514-9
Lift Eye	—	—	—	—	3-2780-1
Main Air Flange (standard)	8765-6-C	8765-7-D	8765-8-E	8765-8-E	8765-9-FW②
Main Air T.O.E. ① (SW Conn.) (Oversize SW conn)	R590-7057	R590-7154	R590-7170	R590-7170	—
Main Air Flange Gasket	4-5371-2	4-5371-3	4-5371-4	4-5371-4	4-5371-5
Mounting (incl. pipe plugs)	3-2684-5	3-2528-4	3-2998-3	3-2645-3	3-2630-4
Mounting, 1½" Tap	3-2684-6	3-2528-5	3-2998-4	3-2645-4	3-2630-5
Mounting, 2" Tap	3-2684-7	3-2528-6	3-2998-5	3-2645-5	3-2630-6
Nose, 1.0 cast iron	3-3201-2	3-3203-2	3-3202-1	3-3200-1	3-3204-1
Nose, 1.0 cast alloy	3-3201-3	3-3203-3	3-3202-2	3-3200-2	3-3204-2
Nose, 1.1 cast iron	—	3-3203-6	3-3202-3	3-3200-3	3-3204-3
Nose, 1.1 cast alloy	—	3-3203-7	3-3202-4	3-3200-4	3-3204-4
Nose, 1.2 cast iron	—	—	3-3202-5	3-3200-5	3-3204-5
Nose, 1.2 cast alloy	—	—	3-3202-6	3-3200-6	3-3204-6
Nose, 1.3 cast iron	—	—	3-3202-7	3-3200-7	3-3204-7
Nose, 1.3 cast alloy	—	—	3-3202-8	3-3200-8	3-3204-8
Observation Port	8790-0	8790-0	8790-0	8790-0	8790-0
Square Head Set Screw	R776-6230	R776-6230	R776-6230	R776-6230	R776-6230
Stud "A" (4 req'd)	3-2690-1	3-2556-1	3-2655-1	3-2655-2	—
Stud "B" (8 req'd)	—	—	—	—	R822-1430
Stud "C" (8 req'd)	—	—	—	—	R822-1325
Tile Support Steel	3-2691-1	3-2703-1	3-2991-1	3-2661-1	3-2632-2
304 Stainless Steel	3-2691-2	3-2703-2	3-2991-2	3-2661-2	3-2632-3
309 Stainless Steel	3-2691-3	3-2703-3	3-2991-3	3-2661-3	3-2632-4

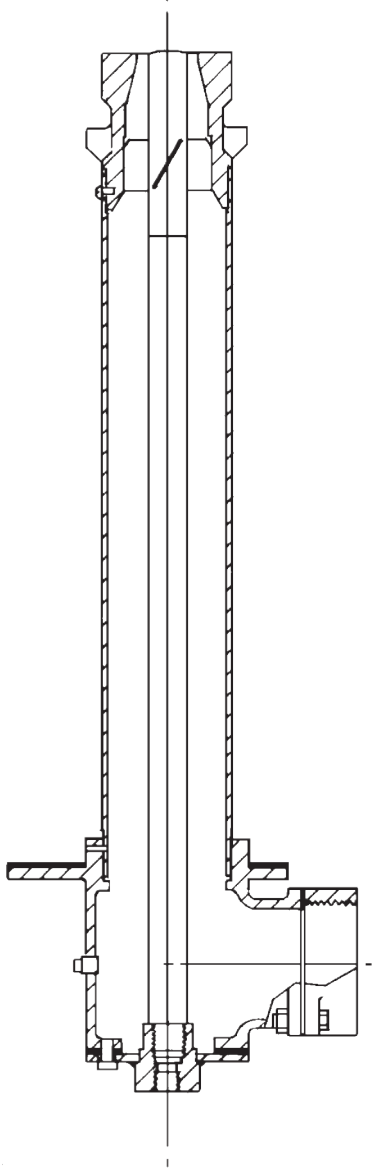
4514-10 only



See page 4 for notes.

WARNING: Situations dangerous to personnel and property may exist with the operation and maintenance of any combustion equipment. The presence of fuels, oxidants, hot and cold combustion products, hot surfaces, electrical power in control and ignition circuits, etc., are inherent with any combustion application. Components in combustion systems may exceed 160°F (71°C) surface temperatures and present hot surface contact hazard. Fives North American Combustion, Inc. suggests the use of combustion systems that are in compliance with all Safety Codes, Standards, Regulations and Directives, and care in operation.

6514 DUAL-FUEL™ CONVERSION KITS for 4514 Gas Burners



To order Gas-to-Dual-Fuel Kit, specify: 6514CK-(code for pipe size)-4514 Gas-to-Dual-Fuel Conversion Kit. Gas-to-Dual-Fuel Kit does not include Sensitrol™ Oil Valve. Optional (recommended) Sensitrol Valve must be ordered separately.

Example: 6514CK-8-B4514 Gas-to-Dual-Fuel Conversion Kit
1813-02-D Sensitrol Valve

[Kit consists of Insert DF shown above. Insert DF consists of: Atomizing air connection (with inlet flange and gasket on -8-B, -9, and -10), DF atomizing air nozzle, oil connection assembly, D-F oil tube, and standard multi-port oil nozzle. Existing gas burner parts to discard are: Endplate, gasket, support rod and gas disc.]

TO ORDER SPARE PARTS, SPECIFY: 1-Part Number 2-Part Name 3-Burner Designation

Examples: 8765-6-C Main Air Flange for 4514-6
3-2733-2 Gas Tube for 4514-10

NOTES

- ① Optional main air connection with SW and oversize air connection with SW are not part of standard burner and must be ordered separately.
- ② SW-Type Main Air Flange for 4514-9.
- ③ Spare tile is available only assembled to new mounting plate or to customer's mounting (returned to Fives North American prepaid, FOB Cleveland, OH USA plant).

CONTACT

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