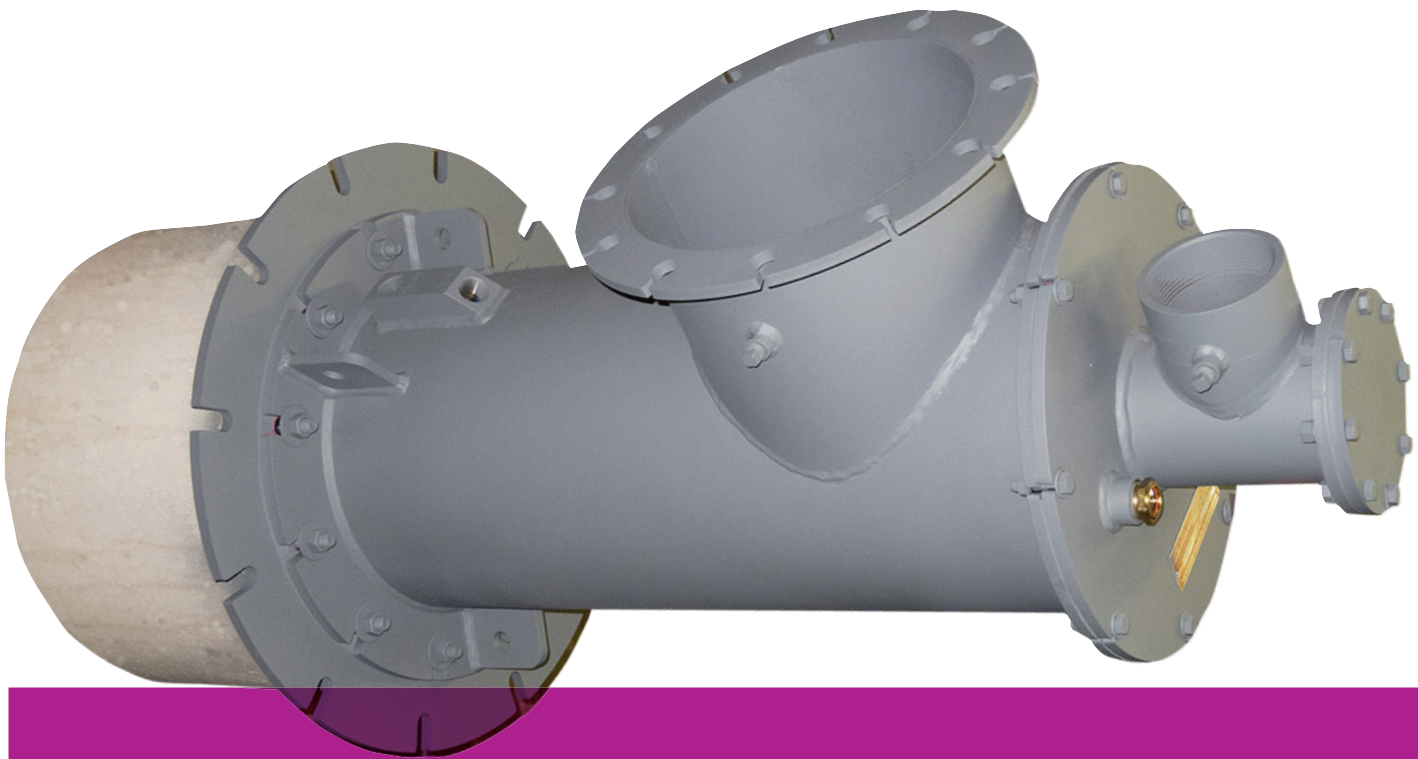




North American HiRAM[®]



4575 High Velocity Gas Burner

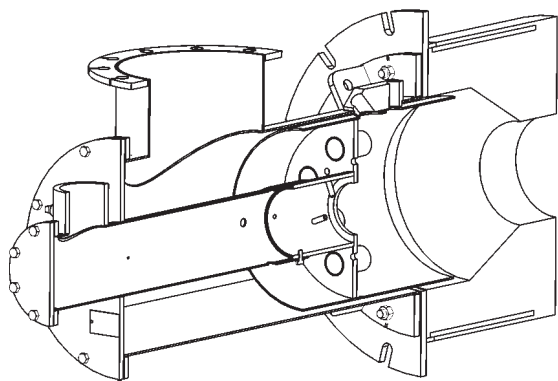
- Low NOx burner
- High Velocity - High Turndown
- Inputs to 4 - 25 million Btu/h HHV (1000-6600 kW LHV)
- Simple cross connected pressure balance regulator ratio control
- Direct Spark or Pilot Lighting
- Furnace temperatures up to 2400°F (1315°C)
- 6575 version for gas and light oil
- Tile options for many applications

Product Overview | HiRAM®

The North American 4575 HiRAM® Burner's true high velocity results from exceptionally high capacity rates relative to the reduced tile discharge areas. Velocities ranging from 500 to 750 feet per second (100 to 230 M/S) drive heat into a furnace load, creating tremendous momentum while entraining and recirculating 7-10 cubic feet of furnace gases for every cubic foot of burner product that exits the tile.

The benefit of high velocity entrainment is excellent temperature, uniformity, and thermal efficiency. HiRAM® Burners are particularly applicable to aluminum melters, ladle heaters, soaking pits, rotary kilns, heat treat furnaces, fluidized bed and dryers: Any installation where high velocity entrainment, penetration, and recirculation can benefit temperature uniformity and thermal efficiency.

HiRAM®s are an extension upward of the North American Tempest® High Velocity Burner line. For capacities less than 4,000,000 Btu/h HHV (1000 kW LHV), consider 4441 or 4445 Tempest Burners. For capacities higher than a HiRAM® consider a 4821 with an "R" tile.



TYPES OF APPLICATIONS

- Aluminum melters
- Ladle heaters
- Soaking pits
- Rotary kilns
- Heat treat furnaces
- Fluidized bed
- Dryers
- Variety of other applications

PERFORMANCE BENEFITS

- High velocity
- Low NOx emissions
- High excess air
- Direct spark or pilot ignition
- Wide operating limits
- Cross-connected regulator ratio control
- Available dual-fuel operation
- Metal alloy tile options
- Medium velocity tile options
- Metal jacketed tile options

SPECIAL ENGINEERED OPTIONS

- LNI™ injector mounting plate
- Backplate with classic 4575 swing bolts
- High back-pressure designs up to 15 psi (1 bar)
- Double ignition/FS connections



INSTALLATION AND OPERATION

HiRAM®s are suitable for furnace temperatures up to 2400°F (1345°C). They can be used with preheated air up to 600°F (315°C). The reduced tile discharge opening also protects burner internals from radiant heat and from melting furnace splash. Standard burners include 3000°F (1650°C) dense castable tiles.

Burner tile installation should be made in accord with instructions on Supplement DF-M1 for hard refractory lined furnaces or DF-M2 for fiber lined furnaces. It is generally not necessary to use a metal jacketed tile in fiber lined furnaces with 4575 burners.

The HiRAM® burners can be used with a variety of control systems including pressure-balanced or electronic fuel/air ratio systems. The gas pressure requirement is approximately 0.7 that of the combustion air when firing on stoichiometric ratio.

System pressure drops should be checked to make sure that adequate gas pressure will be available at the burner. In order to avoid any potential combustion driven oscillations which can produce excessive noise or vibration, it is imperative that a limiting orifice valve be installed within 5 pipe diameters (5D) of the gas connection.

Standard 4575 HiRAM® burners can be used with Natural Gas or Propane. They are not designed for fuel rich operation, or fuels that contain Propylene or Hydrogen. Prolonged fuel rich operation may damage the burner.

LIGHTING AND FLAME SUPERVISION

A gas pilot or direct spark igniter can be used to light 4575 HiRAM® burners when the main air is set to a low fire rate.

Flame supervision systems will detect a pilot flame more reliably if the main burner air pressure is set at or below 2.5" w.c. (6.2 mbar). Direct spark igniters light 4575 HiRAM burners more reliably when the combustion air pressure is set below 7.0" w.c. (17 mbar). See Sheet 4000-2 for general details concerning direct spark ignition.

Ports on the bottom of a burner can get blocked with debris, and spark igniters work best when installed in the top or side positions. Avoid configuring the ignition/flame supervision ports on the bottom quadrant of the burner. Torch lighting is not recommended because of high tile pressures.

HiRAM® burners (except the -8-A and -14 sizes) are available in dual fuel (gas/light oil) models -- see Bulletin 6575. A gas pilot is required for lighting oil in a 6575.

To avoid damaging spark igniters and flame rods, they must be removed from their ports before the backplate with attached internals are disassembled from the main body.

UV flame detection can be used for all HiRAM® sizes or flame rods in 4575-9 through 4575-14 sizes. See table below for pilot, igniter, and flame rod part numbers.

COMBUSTION AIR CAPACITIES scfh (Nm³/h)
(for Btu/h HHV, multiply by 100)

Burner designation	combustion air pressure drop across the burner in osi/ "w.c./mbar					Flame length Feet (M) stoic. ratio 16 osi
	0.2 0.35 0.9	1 1.7 4.3	4 6.9 17.2	9 15.6 39	16 27.7" w.c. 69 mbar	
4575-8-A	4400 (118)	9400 (251)	19 600 (524)	31 000 (829)	41 500 (1109)	5 (1.5)
4575-8-B	5250 (140)	13 300 (356)	29 500 (789)	43 600 (1165)	62 000 (1657)	6 (1.8)
4575-9	9200 (246)	21 000 (561)	44 000 (1176)	64 000 (1711)	89 000 (2379)	9 (2.7)
4575-10-A	10 600 (283)	23 800 (636)	47 600 (1272)	72 500 (1938)	101 000 (2700)	8 (2.4)
4575-10-B	12 500 (334)	28 000 (748)	57 500 (1537)	85 000 (2272)	119 000 (3181)	10 (3.0)
4575-12	19 100 (511)	42 700 (1141)	81 500 (2178)	118 000 (3154)	164 000 (4384)	10 (3.0)
4575-14	34 000 (909)	64 000 (1711)	124 000 (3315)	188 000 (5025)	250 000 (6683)	17 (5.2)

Burner designation	Maximum excess air rates in % combustion air pressure, osi (mbar)			Air capacities not burning, scfh (Nm ³ /h) (use to size blowers) 16 osi/27.7" w.c./69 mbar	Pilot set	Direct spark igniter	Flame Rod
	1 (4.3)	9 (39)	16 (69)				
4575-8-A	325	400	350	55 000 (1470)	4011-12	4055-E	—
4575-8-B	650	500	750	81 000 (2165)	4011-12	4055-E	—
4575-9	800	900	1200	116 000 (3101)	4011-12	4055-E	4-25432-4
4575-10-A	675	800	900	145 000 (3876)	4011-12	4055-E	4-25432-4
4575-10-B	1100	1300	1200	177 000 (4731)	4011-12	4055-E	4-25432-4
4575-12	1500	1200	1000	199 000 (5319)	4011-12	4055-E	4-25432-11
4575-14	1200	1200	1200	388 000 (10 371)	4011-12	4055-E	4-25432-11

① Do not operate fuel rich. (consider a 4821-R for rich high velocity operation)

Medium velocity 4575 burners operate at reduced air pressures compared to the high velocity versions listed above.

Tile Options | HiRAM®

EXPANDED TILE OPTIONS

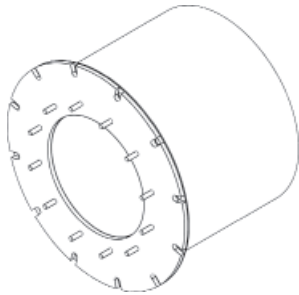
To compliment the “classic” high velocity refractory tile, the HiRAM® burner family is now available with many standard tile options that previously were only available as engineered specials. Each tile option within a burner size has the same mounting plate diameter and tile length. See the tile dimension table for details.

ORIGINAL “CLASSIC” REFRACTORY TILE

The classic HiRAM® refractory tile has a reduced tile exit that produces a high velocity flame which improves temperature uniformity in the furnace. The tile geometry also protects burner internals from radiant heat and from melting furnace splash. They are made with 3000°F (1650°C) dense castable material and are suitable for furnace temperatures up to 2400°F (1345°C).

METAL JACKETED TILES

Jacketed refractory tile options are available for applications where extra tile support is needed. Jackets are available with 304 or 309 stainless steel and are ½” larger in diameter than the classic refractory tile. The metal jacket is used as the outer form when the refractory is poured to make the tile, so the jacket fits very tightly around the refractory. The refractory used is the same as with the classic HiRAM® tile.

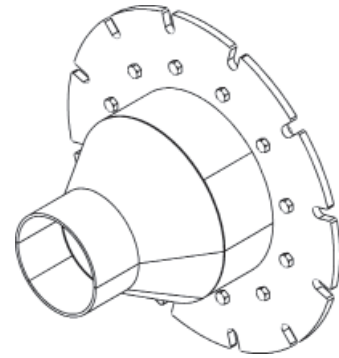


When installed the jacket must be protected with enough insulation so as not to exceed the rated temperature. The maximum temperature rating for jacket metals depends upon frequency of heat-up/ cool-down cycles. As an example, batch annealing furnaces that are heated and cooled every day should use the "intermittent exposure" ratings. Continuous annealing furnaces that remain at the same temperature for months at a time, can run 100°F (38°C) hotter.

Designation	Jacket Metal	Intermittent exposure
4575- -J304	304 SST	1500°F (816°C)
4575- -J309	309 SST	1800°F (982°C)

METAL TILES

The HiRAM's® stabilizer design allows the burner to be offered with a metal tile which contains no refractory. Its lightweight construction makes them ideal for applications like refractory drying or mounting on rotary dryers and calciners. They can be used as an alternative to the 4570 HiVAM® burners. The mounting plate is made from 304 stainless steel and the tile walls are available with 310 or 330 stainless steel.



Designation	Tile Material	Maximum Temp.
4575- -M310	310 SST	1800°F (982°C)
4575- -M330	330 SST	2000°F (1093°C)

MEDIUM VELOCITY TILES

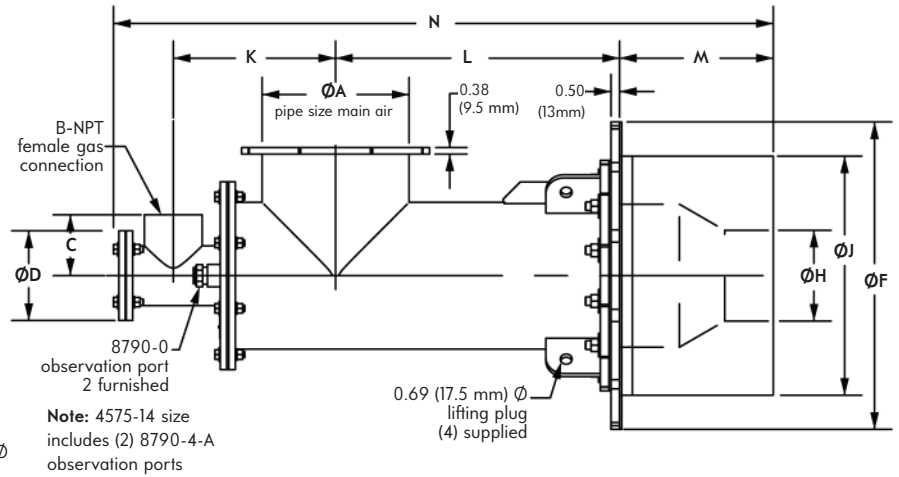
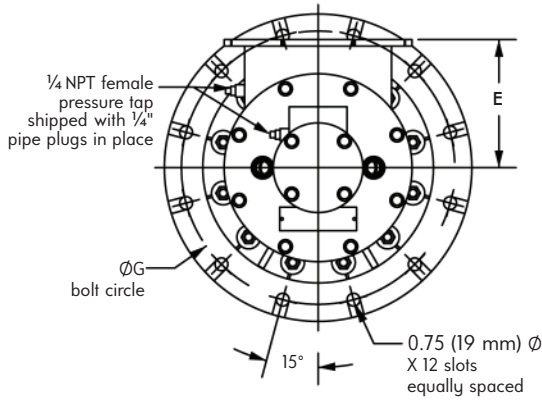
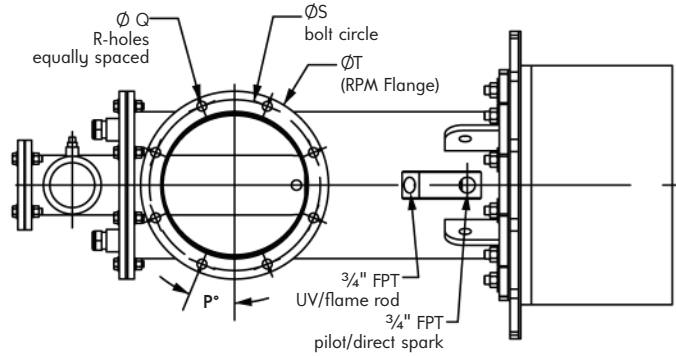
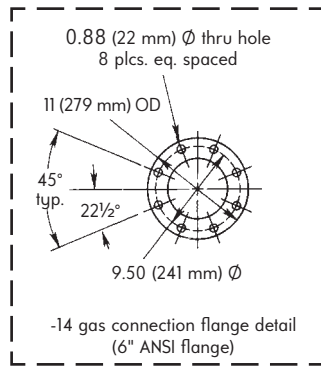
Medium velocity burners have advantages when high velocity is not needed. They can be installed in narrower furnaces because lower velocity flames are less likely to impinge the opposite chamber wall, generally make less noise, and have lower air pressure requirements than high velocity burners.

The velocity of the mixture exiting the tile will be 25-50% of the high velocity version. The medium velocity tiles used in the 4575-burner family have no exit restriction, so the tile backpressure and burner air pressure requirements are lower. A medium velocity 4575 operating at 9 osi/15.6"w.c./39 mbar air pressure will have about the same capacity as the high velocity burner at 16 osi/27.7"w.c./69 mbar. To avoid over firing medium burners, consider high fire as 9-12 osi and do not operate with a main air pressure over 16 osi (27.7" w.c., or 69 mbar).

Because medium velocity tile exits are completely open, the burner internal parts have less protection from the thermal radiation in the furnace. To protect burner internal parts from heat damage, do not set air pressure below 1.6"w.c./4 mbar in a 1800°F furnace (982°C), or below 3.5"w.c./9 mbar in a 2100°F (1150°C) (whether gas is on or off).

Dimensions | HiRAM[®]

Burner designation	A	B
4575-8-A	6	2½
4575-8-B	6	2½
4575-9	8	2½
4575-10-A	10	3
4575-10-B	10	3
4575-12	12	3
4575-14	14	6†



Burner designation	dimensions in inches (mm) and degrees											
	C	D	E*	F	G	H	J	K	L	M	N	
4575-8-A						4.06 (103)						
4575-8-B	3.8 (95)	5.3 (133)	7.5 (191)	18 (457)	16 (406)	4.63 (118)	14 (356)	9.5 (241)	16.6 (422)	9.0 (229)	38.63 (981)	
4575-9						5.31 (135)						
4575-10-A						6.25 (159)						
4575-10-B	4.8 (121)	6.3 (159)	11 (267)	22 (559)	20 (508)	6.50 (165)	18 (457)	11.1 (281)	20.6 (524)	12.0 (305)	47.38 (1203)	
4575-12						7.00 (178)						
4575-14	12 (313)	8.3 (210)	12 (305)	26 (660)	24 (610)	9.75 (248)	22 (559)	16 (406)	24.4 (619)	18.0 (457)	64.0 (1626)	

†6" - 150 lb ANSI Gas Inlet (see detail in upper left-hand corner).

*SW style inlet (optional--see parts list, page 12) will add 4.38" (111 mm) to the dimension "E" shown.

The air connections on standard 4575 burners are RPM flanges.

ANSI flanges are available as specials for air or gas connections on most 4575 burners.

Burner designation							4575 Burner Weight LBS.			
	P°	Q	R#	S	T	Std. HV Refractory	Std. HV ref w/jacket	Std. HV metal tile	Burner Only	
4575-8-A				7.88 (200)	9.0 (229)	225 (102)	252 (114)	132 (60)	94 (43)	
4575-8-B	22.5°	0.6 (14)	8	7.88 (200)	9.0 (229)	223 (101)	241 (109)	132 (60)	94 (43)	
4575-9				10.00 (254)	11.0 (279)	227 (103)	244 (111)	136 (62)	98 (44)	
4575-10-A				12.25 (311)	14.0 (356)	401 (182)	432 (196)	204 (93)	147 (67)	
4575-10-B	15°	0.8 (19)	12	12.25 (311)	14.0 (356)	400 (181)	429 (195)	204 (93)	146 (66)	
4575-12				14.25 (362)	16.0 (406)	405 (184)	433 (196)	212 (96)	153 (69)	
4575-14	15°	0.8 (19)	12	16.25 (413)	18.0 (457)	737 (334)	783 (355)	317 (144)	228 (103)	

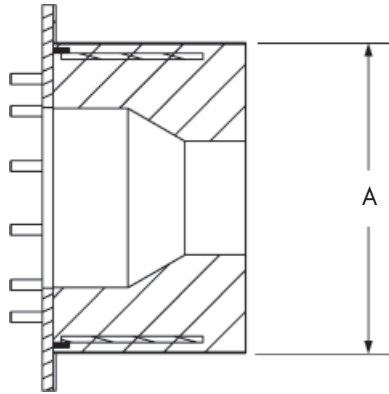
DIMENSIONS SHOWN ARE SUBJECT TO CHANGE. PLEASE OBTAIN CERTIFIED PRINTS FROM FIVES NORTH AMERICAN COMBUSTION, INC. IF SPACE LIMITATIONS OR OTHER CONSIDERATIONS MAKE EXACT DIMENSION(S) CRITICAL.

Alternative Tile Dimensions | HiRAM[®]

High Velocity Tile
with Jacket

Designation

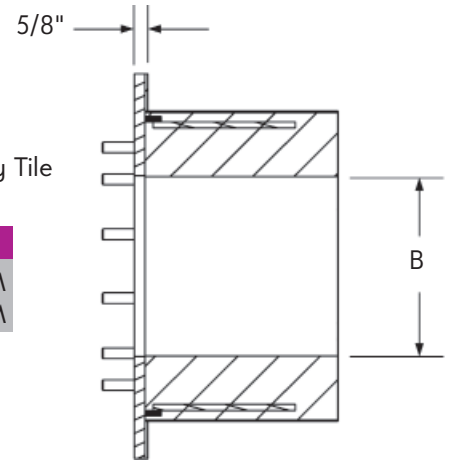
4575- -J304
4575- -J309



Medium Velocity Tile
with Jacket

Designation

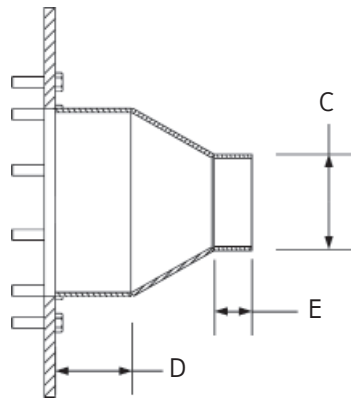
4575- -J304M
4575- -J309M



High Velocity
Metal Tile

Designation

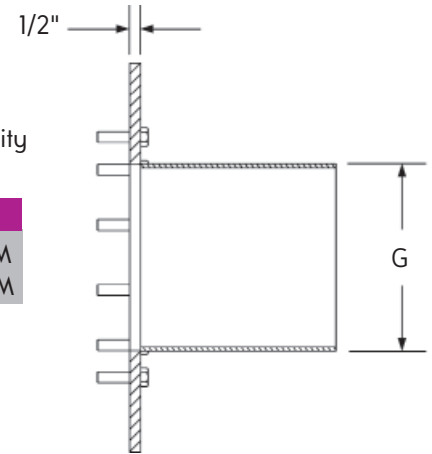
4575- -M310
4575- -M330



Medium Velocity
Metal Tile

Designation

4575- -M310M
4575- -M330M



	4575 Alternative Tile Dimension inches (mm)					
	A	B	C	D	E	G
4575-8-A	14.5 (368)	7.88 (200)	4.44 (113)	3.5 (89)	1.75 (44)	8.69 (221)
4575-8-B	14.5 (368)	7.88 (200)	5.0 (127)	3.5 (89)	2.38 (60)	8.69 (221)
4575-9	14.5 (368)	7.88 (200)	5.69 (145)	3.5 (89)	2.84 (72)	8.69 (221)
4575-10-A	18.5 (470)	11.44 (291)	6.63 (168)	4.0 (102)	3.56 (90)	11.94 (303)
4575-10-B	18.5 (470)	11.44 (291)	6.88 (175)	4.0 (102)	3.56 (90)	11.94 (303)
4575-12	18.5 (470)	11.44 (291)	7.38 (187)	4.0 (102)	3.5 (89)	11.94 (303)
4575-14	22.5 (572)	13.5 (343)	10.13 (257)	7.5 (191)	7.4 (188)	14.44 (367)

Other dimensions are the same as the standard tile, see page 5.

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.

Engineering Data | HiRAM® High Velocity

4575-8-A with standard HV tile	osi "w.c." mbar	0.2	1	4	9	16
		0.3	1.7	6.9	15.6	27.7
		0.9	4.3	17.2	39	69
Main Air Flow, not burning, scfh (Nm ³ /h)		—	—	—	—	54 000 (1443)
Main Air Flow, burning, stoich., scfh		4400	9400	19 600	31 000	41 500
Main Air Flow, burning, stoich, Nm ³ /h		(118)	(251)	(524)	(829)	(1109)
Gas Pressure, stoich, "w.c. (mbar)		.17 (.43)	0.9 (2.2)	3.3 (8.2)	7.3 (18.1)	12.8 (31.9)
Tile Pressure, stoich., "w.c. (mbar)		.17 (.43)	0.9 (2.2)	3.1 (7.8)	6.9 (17.2)	12.3 (30.6)
Maximum %XSAir with flame signal (UV)		200	325	400	400	350
Maximum %XSFuel		30	30	30	30	30
Maximum %XSAir, ignition--pilot		200	325	400	400	350
Maximum %XSAir, ignition--direct spark		125	325	250	250	300
Flame Length, stoich., ft. (Meter)		3 (0.9)	3.5 (1.1)	4 (1.2)	4.5 (1.4)	5 (1.5)
Flame Diameter, stoich., in. (mm)		9 (229)	12 (305)	12 (305)	12 (305)	18 (457)

4575-8-B with standard HV tile	osi "w.c." mbar	Main Air Pressure, osi/"w.c./mbar				
		0.2	1	4	9	16
		0.3	1.7	6.9	15.6	27.7
		0.9	4.3	17.2	39	69
Main Air Flow, not burning, scfh (Nm ³ /h)		—	—	—	—	81 000 (2165)
Main Air Flow, burning, stoich., scfh		5250	13 300	29 500	43 600	62 000
Main Air Flow, burning, stoich, Nm ³ /h		(140)	(356)	(789)	(1165)	(1657)
Gas Pressure, stoich, "w.c. (mbar)		.24 (.60)	1.3 (3.2)	5.0 (12.5)	10.9 (27.1)	18.5 (46.1)
Tile Pressure, stoich., "w.c. (mbar)		.17 (.43)	0.9 (2.2)	3.3 (8.2)	7.1 (17.7)	12.1 (30.2)
Maximum %XSAir with flame signal (UV)		425	650	500	500	750
Maximum %XSFuel		30	30	30	30	30
Maximum %XSAir, ignition--pilot		425	650	500	300	—
Maximum %XSAir, ignition--direct spark		200	200	200	—	—
Flame Length, stoich., ft. (Meter)		3.5 (1.1)	4 (1.2)	4.5 (1.4)	5 (1.5)	6 (1.8)
Flame Diameter, stoich., in. (mm)		10 (254)	12 (305)	16 (406)	18 (457)	20 (508)

4575-9 with standard HV tile	osi "w.c." mbar	Main Air Pressure, osi/"w.c./mbar				
		0.2	1	4	9	16
		0.3	1.7	6.9	15.6	27.7
		0.9	4.3	17.2	39	69
Main Air Flow, not burning, scfh (Nm ³ /h)		—	—	—	—	116 800 (3122)
Main Air Flow, burning, stoich., scfh		8900	20 600	43 400	67 000	89 000
Main Air Flow, burning, stoich, Nm ³ /h		(238)	(551)	(1160)	(1791)	(2379)
Gas Pressure, stoich, "w.c. (mbar)		.17 (.43)	1.2 (3.0)	4.3 (10.8)	10.4 (25.9)	19.2 (47.8)
Tile Pressure, stoich., "w.c. (mbar)		.17 (.43)	.7 (1.7)	2.6 (6.5)	5.7 (14.2)	10.0 (25)
Maximum %XSAir with flame signal (UV)		450	800	900	900	1200
Maximum %XSFuel		30	30	30	30	30
Maximum %XSAir, ignition--pilot		500	800	800	—	—
Maximum %XSAir, ignition--direct spark		400	400	500	—	—
Flame Length, stoich., ft. (Meter)		4.5 (1.4)	6 (1.8)	6.5 (2.0)	7 (2.1)	8 (2.4)
Flame Diameter, stoich., in. (mm)		12 (305)	18 (457)	18 (457)	18 (457)	24 (610)

Medium velocity 4575 burners operate at reduced air pressures compared to the high velocity versions listed above.

Engineering Data | HiRAM[®] High Velocity

4575-10-A with standard HV tile	osi "w.c." mbar	Main Air Pressure, osi/"w.c./mbar				
		0.2	1	4	9	16
		0.3	1.7	6.9	15.6	27.7
		0.9	4.3	17.2	39	69
Main Air Flow, not burning, scfh (Nm ³ /h)	—	—	—	—	145 000 (3876)	
Main Air Flow, burning, stoich., scfh	10 600	23 800	47 600	72 500	101 000	
Main Air Flow, burning, stoich, Nm ³ /h	(283)	(636)	(1272)	(1938)	(2700)	
Gas Pressure, stoich, "w.c. (mbar)	.35 (.86)	1.0 (2.6)	3.6 (9.0)	8.0 (19.8)	13.7 (34)	
Tile Pressure, stoich., "w.c. (mbar)	.17 (.43)	.9 (2.2)	3.3 (8.2)	7.1 (17.7)	12.3 (30.6)	
Maximum %XSAir with flame signal (UV)	500	675	850	800	900	
Maximum %XSFuel	30	30	30	30	30	
Maximum %XSAir, ignition--pilot	500	675	850	800	900	
Maximum %XSAir, ignition--direct spark	300	675	850	800	900	
Flame Length, stoich., ft. (Meter)	4 (1.2)	5 (1.5)	6 (1.8)	7 (2.1)	8 (2.4)	
Flame Diameter, stoich., in. (mm)	8 (203)	9 (229)	12 (305)	14 (356)	16 (406)	

4575-10-B with standard HV tile	osi "w.c." mbar	Main Air Pressure, osi/"w.c./mbar				
		0.2	1	4	9	16
		0.3	1.7	6.9	15.6	27.7
		0.9	4.3	17.2	39	69
Main Air Flow, not burning, scfh (Nm ³ /h)	—	—	—	—	177 000 (4731)	
Main Air Flow, burning, stoich., scfh	12 500	28 000	57 500	85 000	119 000	
Main Air Flow, burning, stoich, Nm ³ /h	(334)	(748)	(1537)	(2272)	(3181)	
Gas Pressure, stoich, "w.c. (mbar)	.35 (.86)	1.0 (2.6)	4.2 (10.3)	9.2 (22.8)	15.9 (39.6)	
Tile Pressure, stoich., "w.c. (mbar)	.35 (.86)	1.0 (2.6)	4.0 (9.9)	8.7 (21.5)	14.9 (37.1)	
Maximum %XSAir with flame signal (UV)	1300	1100	1500	1300	1200	
Maximum %XSFuel	25	25	25	25	25	
Maximum %XSAir, ignition--pilot	1300	1100	1500	1300	1200	
Maximum %XSAir, ignition--direct spark	1300	1100	1500	1300	1200	
Flame Length, stoich., ft. (Meter)	6 (1.8)	7.5 (2.3)	6.5 (2.0)	7.5 (2.3)	10 (3.0)	
Flame Diameter, stoich., in. (mm)	18 (457)	24 (610)	24 (610)	24 (610)	30 (762)	

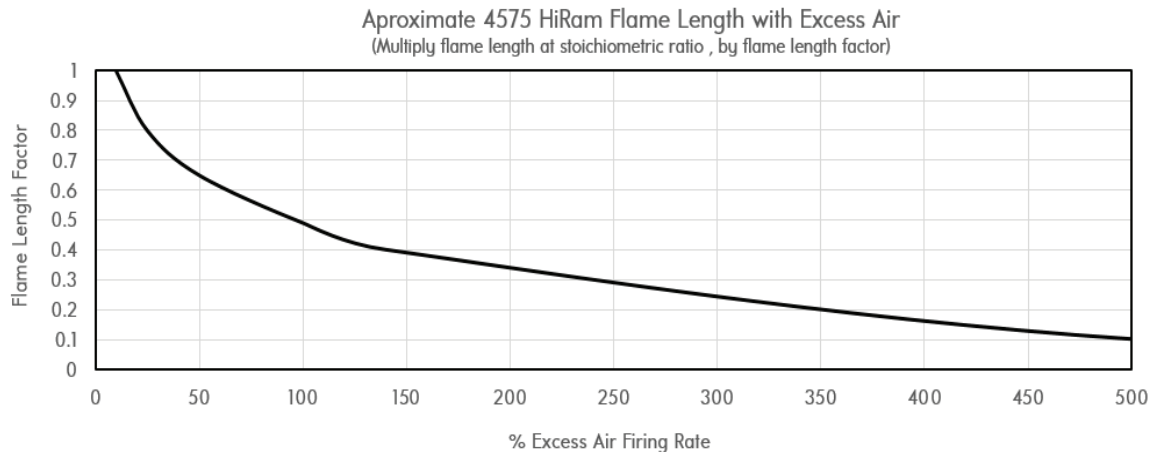
4575-12 with standard HV tile	osi "w.c." mbar	Main Air Pressure, osi/"w.c./mbar				
		0.2	1	4	9	16
		0.3	1.7	6.9	15.6	27.7
		0.9	4.3	17.2	39	69
Main Air Flow, not burning, scfh (Nm ³ /h)	—	—	—	—	199 000 (5319)	
Main Air Flow, burning, stoich., scfh	9100	42 700	81 500	118 000	164 000	
Main Air Flow, burning, stoich, Nm ³ /h	(511)	(1141)	(2178)	(3154)	(4384)	
Gas Pressure, stoich, "w.c. (mbar)	.17 (.43)	1.6 (3.9)	5.2 (12.9)	10.9 (27.1)	19.2 (47.8)	
Tile Pressure, stoich., "w.c. (mbar)	.17 (.43)	.9 (2.2)	2.4 (6.0)	5.2 (12.9)	8.7 (21.5)	
Maximum %XSAir with flame signal (UV)	800	1500	1500	1200	1000	
Maximum %XSFuel	30	30	30	30	30	
Maximum %XSAir, ignition--pilot	300	700	1000	1000	—	
Maximum %XSAir, ignition--direct spark	500	400	300	—	—	
Flame Length, stoich., ft. (Meter)	6 (1.8)	7 (2.1)	8 (2.4)	8.5 (2.6)	10 (3.0)	
Flame Diameter, stoich., in. (mm)	14 (356)	14 (356)	16 (406)	18 (457)	118 (457)	

Medium velocity 4575 burners operate at reduced air pressures compared to the high velocity versions listed above.

Engineering Data | HiRAM[®] High Velocity

4575-14 with standard HV tile	osi "w.c. mbar	Main Air Pressure, osi/"w.c./mbar				
		0.2 0.3 0.9	1 1.7 4.3	4 6.9 17.2	9 15.6 39	16 27.7 69
Main Air Flow, not burning, scfh (Nm ³ /h)	—	—	—	—	—	388 000 (10 371)
Main Air Flow, burning, stoich., scfh	39 500	68 500	125 700	186 000	251 400	
Main Air Flow, burning, stoich, Nm ³ /h	(1056)	(1831)	(3360)	(4972)	(6720)	
Gas Pressure, stoich, "w.c. (mbar)	0.17 (.43)	0.9 (2.2)	3.6 (9.0)	8.3 (20.7)	13.8 (34.5)	
Tile Pressure, stoich., "w.c. (mbar)	—	—	2.1 (5.2)	4.0 (9.9)	6.2 (15.5)	
Maximum %XSAir with flame signal (UV)	1500	1500	1500	1500	1250	
Maximum %XSFuel	15	15	15	15	15	
Maximum %XSAir, ignition--pilot	750	1000	—	—	—	
Maximum %XSAir, ignition--direct spark	500	500	—	—	—	
Flame Length, stoich., ft. (Meter)	8 (12.4)	10 (3.0)	13 (4.0)	16 (4.9)	18 (5.5)	
Flame Diameter, stoich., in. (mm)	30 (762)	36 (914)	36 (914)	36 (914)	42 (1067)	

Medium velocity 4575 burners operate at reduced air pressures compared to the high velocity versions listed above.



MEDIUM VELOCITY

4575-8-B with MV tile	osi "w.c. mbar	Main Air Pressure, osi/"w.c./mbar				
		0.2 0.3 0.9	1 1.7 4.3	4 6.9 17.2	9 15.6 39	16 27.7 69
Main Air Flow, not burning, scfh (Nm ³ /h)	—	—	—	—	—	104 000 (2780)
Main Air Flow, burning, stoich., scfh	8550	21 400	44 300	68 900	92 000	
Main Air Flow, burning, stoich, Nm ³ /h	(229)	(572)	(1184)	(1842)	(2459)	
Gas Pressure, stoich, "w.c. (mbar)	0.1 (.25)	0.6 (1.5)	2.7 (6.7)	6.1 (15.2)	11.0 (27.4)	
Gas Pressure, 10% excess air, "w.c. (mbar)	0.1 (.25)	0.6 (1.5)	2.4 (6.0)	5.8 (14.4)	9.9 (24.7)	
Maximum %XSAir with flame signal (UV)	350	900	1000	800	700	
Maximum %XSFuel	30	30	30	30	30	
Maximum %XSAir, ignition--pilot	350	900	1000	—	—	
Maximum %XSAir, ignition--direct spark	350	900	1000	—	—	
Flame Length, stoich., ft. (Meter)	5.0 (1.5)	6.0 (1.8)	8.6 (2.6)	8 (2.4)	9.0 (2.7)	
Flame Diameter, stoich., in. (mm)	24 (610)	40 (1016)	32 (813)	36 (914)	36 (914)	

Engineering Data | HiRAM[®] Medium Velocity

4575-12 with MV tile	osi "w.c. mbar	Main Air Pressure, osi/"w.c./mbar				
		0.2	1	4	9	16
		0.3	1.7	6.9	15.6	27.7
		0.9	4.3	17.2	39	69
Main Air Flow, not burning, scfh (Nm ³ /h)		—	—	—	—	231 000 (6175)
Main Air Flow, burning, stoich., scfh		20 990	48 940	100 500	151 100	208 350
Main Air Flow, burning, stoich, Nm ³ /h		(561)	(1308)	(2686)	(4039)	(5569)
Gas Pressure, stoich, "w.c. (mbar)		0.1 (.25)	0.8 (2.0)	4.0 (10.0)	8.0 (19.9)	13.5 (33.6)
Gas Pressure, 10% excess air, "w.c. (mbar)		0.1 (.25)	0.75 (1.9)	3.2 (8.0)	7.0 (17.4)	12.3 (30.6)
Maximum %XSAir with flame signal (UV)		800	2500	2000	1400	1200
Maximum %XSFuel		30	30	30	30	30
Maximum %XSAir, ignition--pilot		800	2500	600	—	—
Maximum %XSAir, ignition--direct spark		800	2500	600	—	—
Flame Length, stoich., ft. (Meter)		9.0 (2.7)	11.0 (3.4)	13.0 (4.0)	14.0 (4.3)	14.0 (4.3)
Flame Diameter, stoich., in. (mm)		48 (1219)	38 (965)	36 (914)	36 (914)	48 (1219)

4575-14 with MV tile	osi "w.c. mbar	Main Air Pressure, osi/"w.c./mbar				
		0.2	1	4	7	9
		0.3	1.7	6.9	12.1	15.6
		0.9	4.3	17.2	30	39
Main Air Flow, not burning, scfh (Nm ³ /h)		—	—	—	—	314 000 (8393)
Main Air Flow, burning, stoich., scfh		6000	93 400	181 000	252 000	297 000
Main Air Flow, burning, stoich, Nm ³ /h		(962)	(2497)	(4838)	(6736)	(7939)
Gas Pressure, stoich, "w.c. (mbar)		0.0	0.0	2.0 (5.0)	3.6 (9.0)	4.0 (10)
Gas Pressure, 10% excess air, "w.c. (mbar)		-0.1 (-.25)	0.0	2.0 (5.0)	3.5 (8.7)	4.0 (10)
Maximum %XSAir with flame signal (UV)		1500	1500	1500	1250	1250
Maximum %XSFuel		30	30	30	30	30
Maximum %XSAir, ignition--pilot		1500	1500	1500	—	—
Maximum %XSAir, ignition--direct spark		100	200	400	—	—
Flame Length, stoich., ft. (Meter)		10 (3.0)	14 (4.3)	17 (5.2)	17 (5.2)	19 (5.8)
Flame Diameter, stoich., in. (mm)		36 (914)	48 (1219)	60 (1524)	60 (1524)	60 (1524)

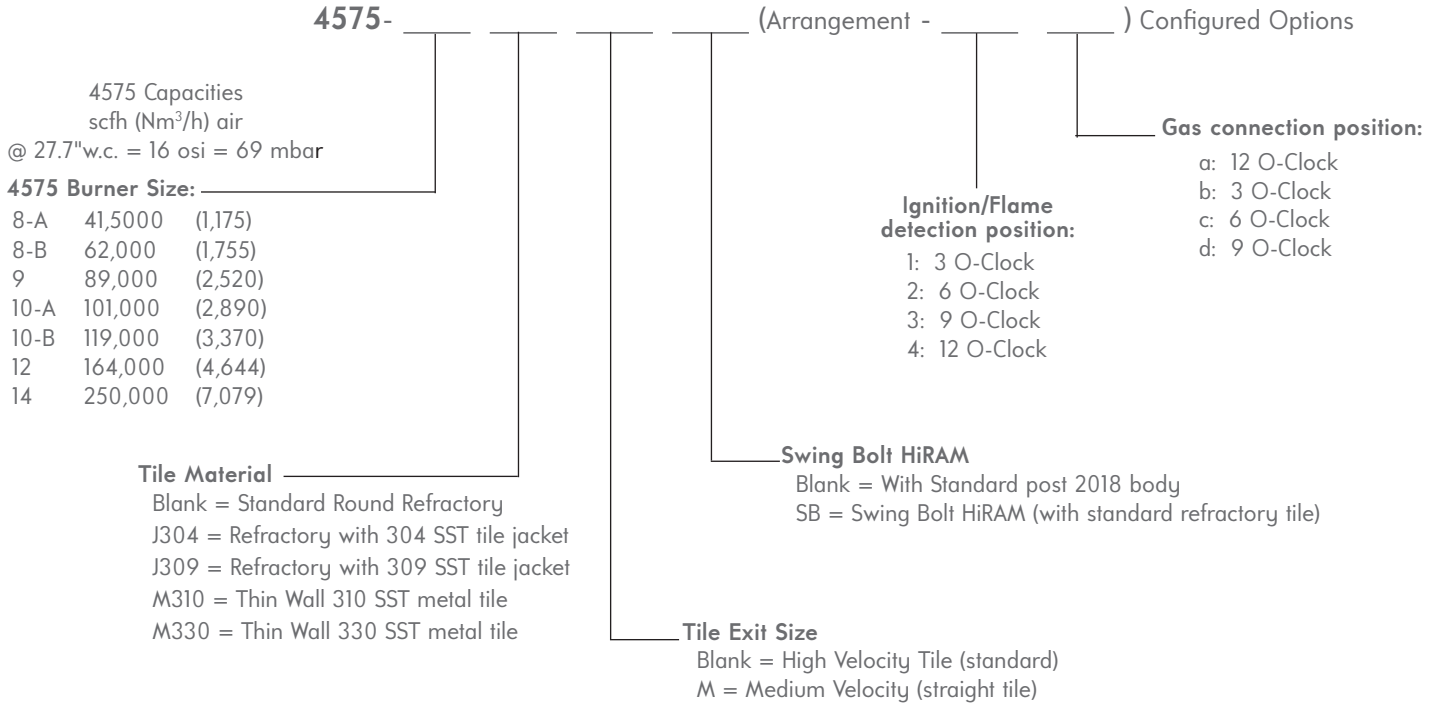
Medium Velocity (MV) HiRAM burners vs. Original High Velocity (HV) HiRAM

The medium velocity tiles available for the 4575-burner family have no tile exit restriction, so the velocity of the flame exiting the tile will be 25-50% lower than a standard 4575 burner with a high velocity tile. This also means that the tile backpressure and burner air pressure requirements are much lower. A medium velocity 4575 operating at 7-10 osi air pressure will have the same capacity as the high velocity burner at 16 osi.

To estimate performance for the 4575 MV burners not listed above:

- MV burner air capacity at 9 osi = HV burner at 16 osi air pressure
- MV burner flame length = 30% longer than HV burner at the same capacity
- MV burner gas pressure = 50% lower than HV burner at the same capacity
- Excess air, lighting, and flame supervision limits should be the same as HV burner at the same capacity

Ordering Information | HiRAM[®]



To order, specify: 4575-(capacity code)-(A or B if applicable)
(specify Arrangement Designators -- see sketch).

Example 1: 4575-9 Burner complete, Arrangement 1d

Example 2: 4575-10-A-J304M Burner complete, Arrangement 1a

Arrangement Designators are specified **relative to the main air connection at 12 o'clock** and should be listed for ignition/flame detection and gas connection in that order.

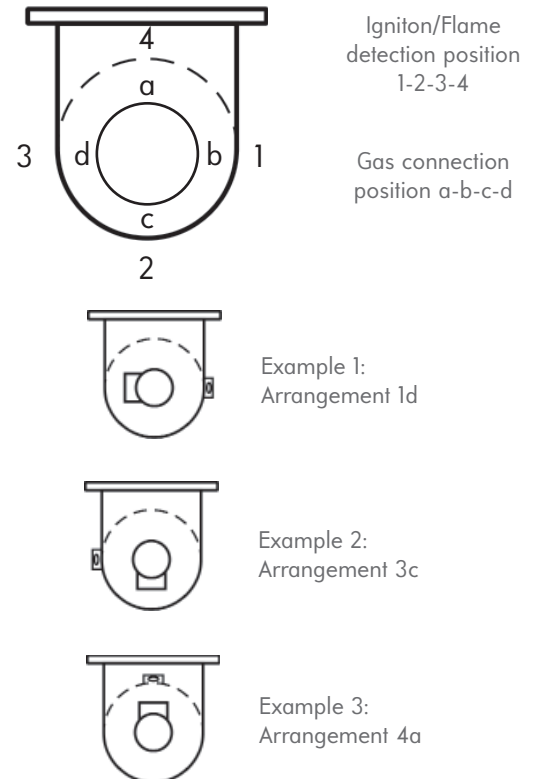
CONFIGURATION CAUTION NOTES:

Good practice dictates that the ignition/flame detection NOT be on the bottom of the burner.

Position #4 may not be suitable for some flame scanners due to interference with the main air connection.

See the table on the bottom of page 3 for igniter, pilot set, and flame rod part numbers

Contact Fives North American Combustion, Inc. for custom 4575 configurations.



HIGH BACK PRESSURE

Standard 4575 burners can be operated with up to 4 psi (0.3 bar) of back pressure without modification. For higher pressures, special engineered designs are available for up to 15 psi (1 bar).

SWING BOLT BACKPLATE DESIGN

The classic swing bolt backplate version of the HiRAM® is available as an engineered special. This design can be useful in applications where the backplate needs to be removed often.

STANDARD SINGLE & SPECIAL DOUBLE IGNITION/FS CONNECTIONS

Standard 4575 burners have a single connection block (boss) that contain a pair of 3/4" FPT ports, one each for ignition and flame supervision. The location of the boss is configured when the burner is ordered. Openings in the "Gas Tube Air Sleeve Assembly" (stabilizer) inside the burner body, are aligned with the ignition/FS ports when the burner is factory assembled.

Double ignition/FS are available as an engineered special. For most sizes, the blocks must be 180° or 90° apart.

LNI INJECTOR MOUNTING PLATE

Standard HiRAM® burners operate with relatively low NOx emissions, but they can be configured to use Low NOx Injection "LNI™" technology for ultra low NOx emissions.

4575 LNI™ burners are operated as a conventional high velocity burner when furnace temperature is below 1450°F (790°C). When the furnace is above that temperature, the burners can be automatically switched to LNI™ firing to inhibit formation of NOx. Air continues to flow through the center port of the burner, but gas is switched to a strategically placed outboard injector.

LNI™ radically changes the mixing of the gas and air. During conventional firing, mixing and combustion is concentrated primarily within the burner tile. When firing with LNI™, the furnace space in front of the burner is used for mixing and combustion.

RECOMMENDED SPARE PARTS

As with any industrial equipment, the selection of burner spare parts should be based on the application and the end user's tolerance for downtime while waiting for replacement parts from the manufacturer. If a facility has multiple burners of the same type, having a complete spare burner can be justified.

- If there are plans to disassemble any part with a gasket, it is a good idea to have that spare gasket available in case it tears.

- Spare parts that are good to stock are:
- Pilot tips, pilot ratio regulators
- Igniters, and ignition cables
- Flame supervision parts, (flame relays, flame rods and UV cells)
- Observation ports
- Gas Tube and Air Sleeve Assembly, if the burner is operated at a very high temperature.

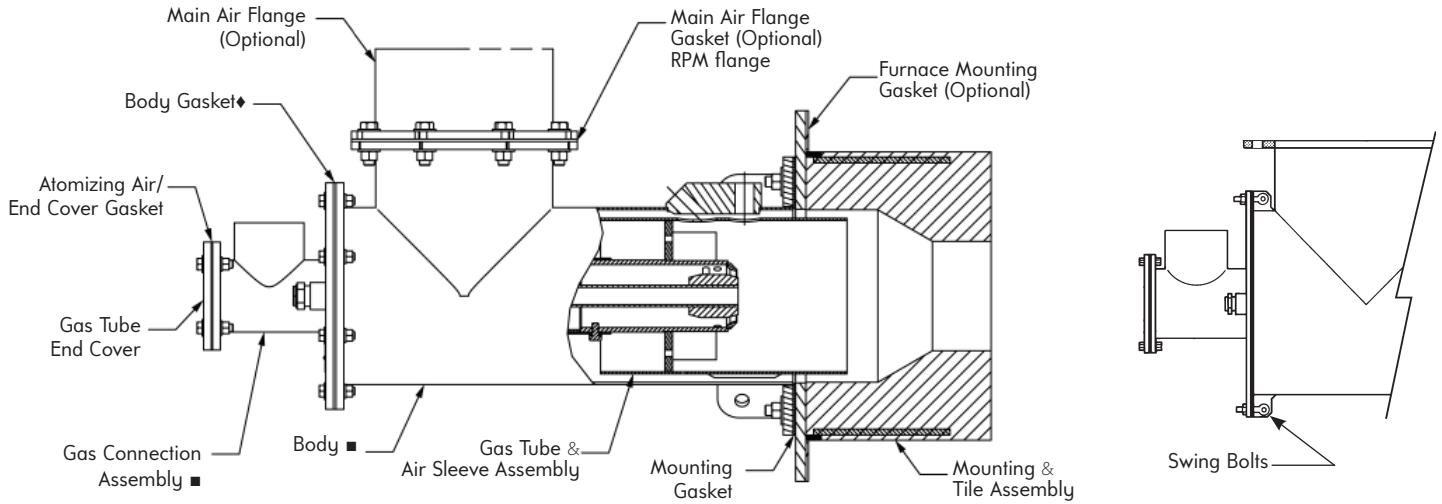
CHANGING THE GAS INLET ARRANGEMENT

If the gas connection is rotated to a new position in the field without re-orienting the "Gas Tube & Air Sleeve Assembly", the ignition and flame supervision ports will be blocked, which could damage the burner, prevent proper operation and void the warranty.

To re-orient the "Gas Tube & Air Sleeve Assembly"

- Remove the spark plug and flame rod, if equipped, to prevent damage
- Remove the bolts that connect the gas connection assembly to the burner body
- Pull the burner internal assembly out of the burner body
- Remove the two bolts that secure the Gas Tube & Air Sleeve Assembly to the Gas Connection Assembly
- Rotate the Gas Tube & Air Sleeve Assembly so that its' ignition and flame supervision holes line up with the ports on the body when the gas connection is in the new arrangement rotation.
- Reverse the procedure to finish the re-orientation.

Spare Parts List | HiRAM®



Part Name	Burner Size						
	-8-A	-8-B	-9*	-10-A	-10-B	-12	-14
Mounting & Tile Assembly	3-6916-1	3-6816-1	3-6453-1	3-6836-1	3-6784-1	3-6431-1	4-12287-1
Body Assembly	4-54712-1	4-54801-1	4-54886-1	4-54673-1	4-54673-1	4-54622-1	4-54895-1
Gas Tube & Air Sleeve Assembly†	4-7953-1	4-7901-1	3-12127-1	3-6835-1	3-6846-1	4-23824-1	4-23827-1
Gas Connection Assembly	4-54713-1	4-54713-1	4-54888-1	4-54623-3	4-59623-3	4-54623-3	4-54898-1
Gas Tube End Cover	4-7618-1	4-7618-1	4-7618-1	4-7643-2	4-7643-2	4-7643-2	4-10349-1
Mounting Gasket	3-6462-1	3-6462-1	3-6462-1	3-6443-1	3-6443-1	3-6443-1	4-10368-1
Body Gasket♦	4-54657-1	4-54657-1	4-54657-1	4-54656-1	4-54656-1	4-54656-1	4-55039-1
Atomizing Air/End Cover Gasket	3-6464-1	3-6464-1	3-6464-1	3-6441-2	3-6441-2	3-6441-2	4-10348-1
High Velocity (HV)							
Refractory HV (Original Tile)	3-6916-1	3-6816-1	3-6453-1	3-6836-1	3-6784-1	3-6431-1	4-12287-1
Refractory HV 304 Jacket (-J304)	4-57171-2	3-15623-2	4-55738-2	4-55142-2	4-55592-2	3-20139-2	4-57172-2
Refractory HV 309 Jacket (-J309)	4-57171-3	3-15623-3	4-55738-3	4-55142-3	4-55592-3	3-20139-3	4-57172-3
Metal 310 HV tile (-M310)	4-57806-8A-1	4-57806-8B-1	4-57806-9-1	4-57807-10A-1	4-57807-10B-1	4-57807-12-1	4-57808-1
Metal 330 HV tile (-M330)	4-57806-8A-2	4-57806-8B-2	4-57806-9-2	4-57807-10A-2	4-57807-10B-2	4-57807-12-2	4-57808-2
Medium Velocity (MV)							
Refractory MV (-M)	4-54927-1	4-54927-1	4-54927-1	3-22177-1	3-22177-1	3-22177-1	4-57824-1
Refractory MV 304 Jacket (-J304M)	4-57843-2	4-57843-2	4-57843-2	4-57844-2	4-57844-2	4-57844-2	4-57845-2
Refractory MV 309 Jacket (-J309M)	4-57843-3	4-57843-3	4-57843-3	4-57844-3	4-57844-3	4-57844-3	4-57845-3
Metal 310 MV tile (-M310M)	4-57809-1-1	4-57809-1-1	4-57809-1-1	4-57809-2-1	4-57809-2-1	4-57809-2-1	4-57809-3-1
Metal 330 MV tile (-M330M)	4-57809-1-2	4-57809-1-2	4-57809-1-2	4-57809-2-2	4-57809-2-2	4-57809-2-2	4-57809-3-2
Options							
Blower Sleeve	2947-8	2947-8	2947-9	2947-10	2947-10	2947-12	2947-14
Clamp (qty)	R120-2425(2)	R120-2600(2)	R120-2600(2)	R120-2600(2)	R120-2600(2)	R120-2425(4)	R120-2425(2) R120-2600(2)
Flame Rod	—NA—	—NA—	4-25432-4	4-25432-4	4-25432-4	4-25432-11	4-25432-11
Main Air Flange	3-8569-1	3-8569-1	3-8569-2	3-8569-5	3-8569-5	3-8569-4	3-8569-6
Main Air Flange Gasket	OA3-2302-24F4	OA3-2302-24F4	OA3-2302-25F4	OA3-2302-26F4	OA3-2302-26F4	OA3-2302-27F4	OA3-2302-28F4
Furnace Mtg. Gasket▲	4-28284-1	4-28284-1	4-28284-1	4-28285-1	4-28285-1	4-28285-1	4-28286-1
	4-28284-2	4-28284-2	4-28284-2	4-28285-2	4-28285-2	4-28285-2	4-28286-2

† Gas Tube, Air Sleeve, Air Tube Disc, Gas Stabilizer, and Air Tubes are an Integral Assembly and must be purchased as a unit called "Gas Tube and Air Sleeve Assembly".

* -9 Burners sold prior to S.O.#GK 3600 (September 1997) should have spare part numbers verified by Engineering before ordering.

♦ Gasket Note: This part number for burners equipped with a through bolt connection. For burners equipped with swing bolt connection use SB Body Gasket, see page 13.

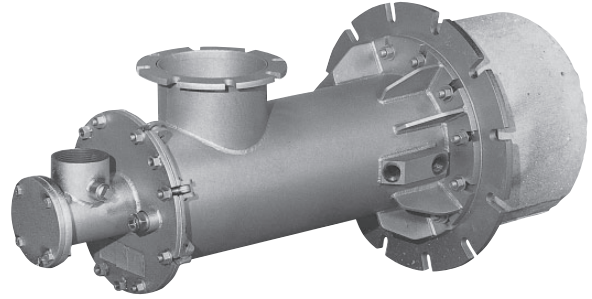
▲ If needed use... -1 gasket for furnace shell temperatures up to 825°F (440°C). Use -2 for furnace shell temperatures up to 975°F (524°C).

■ If body is equipped with swing bolt connection, use "SB" parts or consult engineering, see page 13.

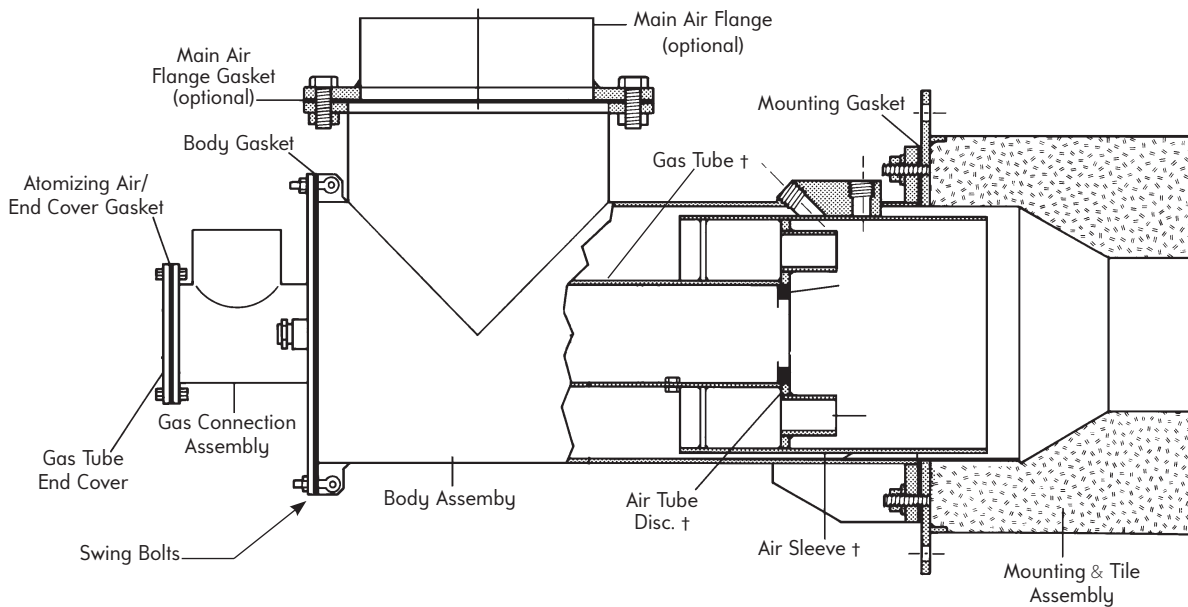
Legacy Spare Parts List | Swing Bolt HiRAM®

4575/6575 SWING BOLT LEGACY DESIGN

HiRAM® burners built before 2018 included swing bolts on the body assembly, to aid in the removal of the burner internal parts for applications that required frequent tile clean outs. Customer feedback was that this feature had limited value to most users, so swing bolts were removed to simplify the standard HiRAM® burner design. 4575 Burners with swing bolts are still available with the original high velocity tile, as well as the spare parts. The list below are the parts unique to the legacy HiRAM® swing bolt burner design.



Burner Designation	Burner Description
4575-8-A-SB	6" 4575-8-A HiRAM Gas Burner with Swing Bolts, arrangement:
4575-8-B-SB	6" 4575-8-B HiRAM Gas Burner with Swing Bolts, arrangement:
4575-9-SB	8" 4575-9 HiRAM Gas Burner with Swing Bolts, arrangement:
4575-10-A-SB	10" 4575-10-A HiRAM Gas Burner with Swing Bolts, arrangement:
4575-10-B-SB	10" 4575-10-B HiRAM Gas Burner with Swing Bolts, arrangement:
4575-12-SB	12" 4575-12 HiRAM Gas Burner with Swing Bolts, arrangement:
4575-14-SB	14" 4575-14 HiRAM Gas Burner with Swing Bolts, arrangement:



Parts for burners with Swing Bolts and extra body gussets (SB)

Part Name	Burner Size						
	-8-A	-8-B	-9*	-10-A	-10-B	-12	-14
SB Body Assembly	3-6915-1	3-6637-1	3-6454-2	3-12877-1	3-12877-1	3-6439-2	4-12283-1
SB Gas Connection Assembly	3-6456-1	3-6456-1	4-22788-1	3-6435-3	3-6435-3	3-6435-3	4-10347-1
SB Body Gasket	3-6463-1	3-6463-1	3-6463-1	3-6442-2	3-6442-2	3-6442-2	4-10366-1

† Gas Tube, Air Sleeve, Air Tube Disc, Gas Stabilizer, and Air Tubes are an Integral Assembly and must be purchased as a unit called "Gas Tube and Air Sleeve Assembly".

* -9 Burners sold prior to S.O.#GK 3600 (September 1997) should have spare part numbers verified by Engineering before ordering.

Higher Capacity or Air Temperature | 4821 Magna-Flame™ Burner

For applications that require higher capacities or higher preheated air temperatures than a standard HiRAM®, consider using a 4821-R burner.

HOT AIR

4821 Hot Air Magna-Flame™ Burners operate with hot air from recuperators or other heat recovery devices to save energy on furnaces, such as steel reheat, aluminum melting, process heaters, and other high temperature applications. Normal capacities are rated at 1000°F (538°C) air at a pressure of 10" w.c. (25 mbar).

HIGH VELOCITY

For applications that benefit from high velocity, such as aluminum melters and holders, steel reheat furnaces or others, the 4821 is available in an "R-version". The refractory tile shape of the R version is reduced (converging) to produce high hot-gas

exit velocities, resulting in increased convective heat transfer and at the same time entrainment of surrounding furnace gases resulting in low NOx emissions. For extremely low NOx applications, consult Fives North American Combustion, Inc. about combining the R-version burner with low NOx injection (LNI) technology.

CONSTRUCTION

4821 Bodies featuring round mounting flanges are fabricated heavy-gauge carbon steel and lined with ceramic fiber and castable refractory. Internal parts are heat-resistant alloy and the stabilizing disc is faced with high alumina refractory.

For capacities less than the HiRAM® consider a 4441 Tempest burner.

COMBUSTION AIR CAPACITY, scfh Nm³/h
(for Btu/h HHV capacity (stoic.), multiply scfh by 100)

Burner designation		Main Air Flow Air @ 10" w.c./25 mbar		Jet Air @ 60°F (15°C) 27.7" w.c./69 mbar	Flame Dimensions with standard tile ^② at 1000°F (538°C) air	
Standard Tile	Reduced Port Tile	60°F (15°C) Air scfh (Nm ³ /h)	1000°F (538°C) Air scfh (Nm ³ /h)	60°F (15°C) Air scfh (Nm ³ /h)	Length Ft. (M)	Dia. Ft. (M)
4821-9	4821-9-R	55 000 (1470)	34 000 (909)	1120 (30)	5.0 (1.5)	2.0 (0.6)
4821-10-A	4821-10-AR	67 000 (1791)	40 000 (1069)	1850 (49)	5.0 (1.5)	2.0 (0.6)
4821-10-B	4821-10-BR	89 000 (2379)	53 000 (1417)	1850 (49)	7.0 (2.1)	2.0 (0.6)
4821-12	4821-12-R	130 000 (3475)	78 000 (2085)	4500 (120)	9.0 (2.7)	3.0 (0.9)
4821-14	4821-14-R	177 500 (4745)	106 000 (2833)	4500 (120)	10 (3.0)	4.0 (1.2)
4821-16	4821-16-R	225 000 (6014)	134 000 (3582)	6700 (179)	13 (4.0)	4.0 (1.2)
4821-18	4821-18-R	280 000 (7484)	172 000 (4598)	8600 (230)	16 (4.9)	5.0 (1.5)
4821-20	4821-20-R	360 000 (9623)	215 000 (5747)	10 750 (287)	17 (5.2)	5.0 (1.5)
4821-22	4821-22-R	435 500 (11 641)	260 000 (6950)	10 750 (287)	20 (6.1)	5.0 (1.5)

② Subtract 10% from flame dimensions shown for reduced port tile "R" version.

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.

CONTACT

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