

NMG NOZZLE MIX GAS BURNERS



WARNING

These instructions are intended for use only by experienced, qualified combustion start-up personnel.

Adjustment of this equipment and its components, by unqualified personnel, can result in fire, explosion, severe personal injury, or even death.

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These instructions are intended to serve as guidelines covering the installation, operation, and maintenance of Hauck equipment. While every attempt has been made to ensure completeness, unforeseen or unspecified applications, details, and variations may preclude covering every possible contingency. **WARNING: TO PREVENT THE POSSIBILITY OF SERIOUS BODILY INJURY, DO NOT USE OR OPERATE ANY EQUIPMENT OR COMPONENT WITH ANY PARTS REMOVED OR ANY PARTS NOT APPROVED BY THE MANUFACTURER.** Should further information be required or desired or should particular problems arise which are not covered sufficiently for the purchaser's purpose, contact Hauck Mfg. Co.



WARNING

This equipment is potentially dangerous with the possibility of serious personal injury and property damage. Hauck Manufacturing Company recommends the use of flame supervisory equipment and fuel safety shutoff valves. Furthermore, Hauck urges rigid adherence to National Fire Protection Association (NFPA) standards and insurance underwriter's requirements. Operation and regular preventative maintenance of this equipment should be performed only by properly trained and qualified personnel. Annual review and upgrading of safety equipment is recommended.

A. GENERAL INFORMATION

The NMG Series Nozzle Mix Burner has been designed for applications requiring a general purpose long-life, low maintenance gas burner. The NMG performs equally well when firing "on ratio", with excess fuel, or with excess air, burning any clean industrial gas. NMG burners can be converted for combination fuel firing by adding a Hauck NMC conversion kit.

Combustion air and fuel are channeled into the burner nozzle separately. Since the burner nozzle is sealed into the refractory tile, all combustion air is supplied through the burner. The NMG burners couple a uniform flame front with good flame stability and retention over the entire operating range.

NMG burners are available for preheated air operation up to 800°F or for high temperature furnace application.

NMG burners can be controlled manually or automatically. Automatic control normally employs a Hauck Ratio Regulator for each control zone to maintain air-fuel ratio. An alternate system uses control valves in each of the fuel and air lines, linking the valves to a single motor controller (See Section F, Typical Piping Schematics).

B. RECEIVING AND INSPECTION

Upon receipt, check each item on the bill of lading and/or invoice to determine that all equipment has been received. A careful examination of all parts should be made to ascertain if there has been any damage in shipment.

IMPORTANT

If the installation is delayed and the equipment is stored outside, provide adequate protection as dictated by climate and period of exposure. Special care should be given to all motors and bearings, if applicable, to protect them from rain or excessive moisture.

C. CAPACITIES

O N R A T I O G A S	NMG BURNER NO.	AIR PRESSURE													
		4 oz.		6 oz.		8 oz.		12 oz.		16 oz.		20 oz.		24 oz.	
		AIR CFM	BTU CAP. IN 1000 BTU/HR	AIR CFM	BTU CAP. IN 1000 BTU/HR	AIR CFM	BTU CAP. IN 1000 BTU/HR	AIR CFM	BTU CAP. IN 1000 BTU/HR	AIR CFM	BTU CAP. IN 1000 BTU/HR	AIR CFM	BTU CAP. IN 1000 BTU/HR	AIR CFM	BTU CAP. IN 1000 BTU/HR
210x50	21	114	25	136	29	158	36	196	41	224	46	251	50	273	
210	33.5	183	41	224	47.3	258	58	316	67	365	75	409	82	447	
215	70	382	86	469	99	540	121	660	140	764	157	856	172	938	
220	132	720	161	878	186	1015	228	1244	263	1435	294	1604	322	1757	
230	272	1484	333	1817	385	2100	471	2569	544	2968	608	3317	666	3633	
240	413	2253	505	2755	583	3180	714	3895	825	4500	922	5030	1011	5515	
260	780	4255	955	5210	1103	6017	1351	7370	1560	8510	1744	9514	1911	10425	

Capacities based on natural gas 1040 Btu/Cu. Ft. Minimum gas pressure required at burner inlet 6 "wc.

TABLE 1

**NMG-H CAPACITY TABLE
 (Air Flow @ 16 osig)**

NMG BURNER NO.	ITEM	COMBUSTION AIR TEMP., °F				MIN. FLOW	EXCESS AIR, %
		100	400	650	800		
H210	Combustion air, scfm	67	54	48	45	7	200
	Natural gas, scfh	371	300	264	248	38	
H215	Combustion air, scfm	140	113	100	94	14	200
	Natural gas, scfh	775	625	550	517	77	
H220	Combustion air, scfm	263	212	187	175	26	200
	Natural gas, scfh	1457	1175	1035	971	145	
H230	Combustion air, scfm	544	439	386	363	54	200
	Natural gas, scfh	3014	2432	2141	2009	300	
H240	Combustion air, scfm	825	666	586	550	82	150
	Natural gas, scfh	4570	3743	3302	3102	455	
H260	Combustion air, scfm	1560	1259	1108	1040	156	150
	Natural gas, scfh	8643	6974	6138	5761	865	

TABLE 2

C. CAPACITIES (Continued)

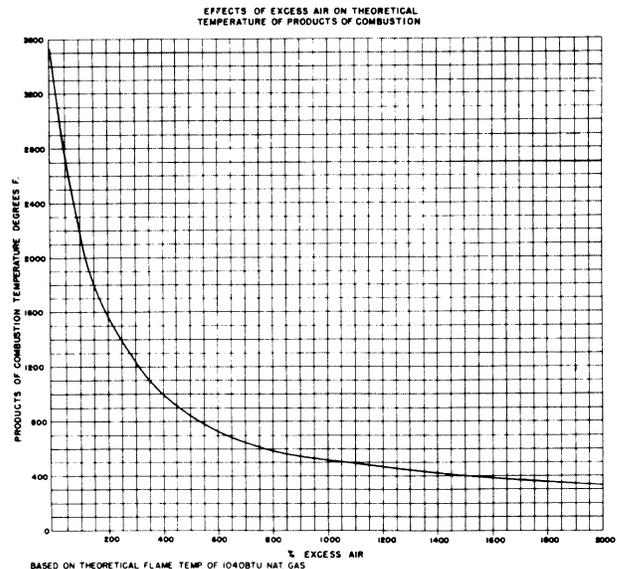
NMG-H CAPACITY TABLE AND APPLICATION NOTES

1. Fuel capacity based on natural gas at 1040 Btu/cu. ft.
2. Natural gas flows shown for 10% excess air. 6 "wc minimum gas pressure required at burner.
3. Combustion air capacities at 16 osi total pressure. Air flows at lower pressures proportional to $\sqrt{P/16}$. Air flows at intermediate temperature proportional to $\sqrt{\frac{860}{T_h+460}}$ times the flow at 400°F.
4. Include sensible heat of preheated air when computing total burner heat output. Sensible heat Btu/hr = scfm x 1.11 x ΔT(°F).
5. Excess air % maximums (approx.) shown for 16 osig secondary air pressure.
6. To size pipe for preheated air, compute acfm = scfm $(\frac{T+460}{520})$.
7. When supervising flame, provide approximately 16 osig ambient purge air (1-1/2 – 2 cfm) to special scanner purge assembly.
8. Flame lengths are shown in Hauck Application Sheet GJ58.
9. When sizing blower, consider application and operation so as to prevent overloading the blower motor at ambient scfm.

D. EXCESS AIR

MAXIMUM % EXCESS AIR

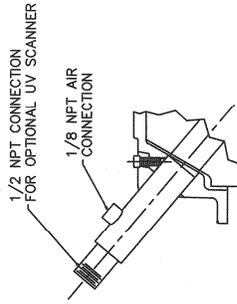
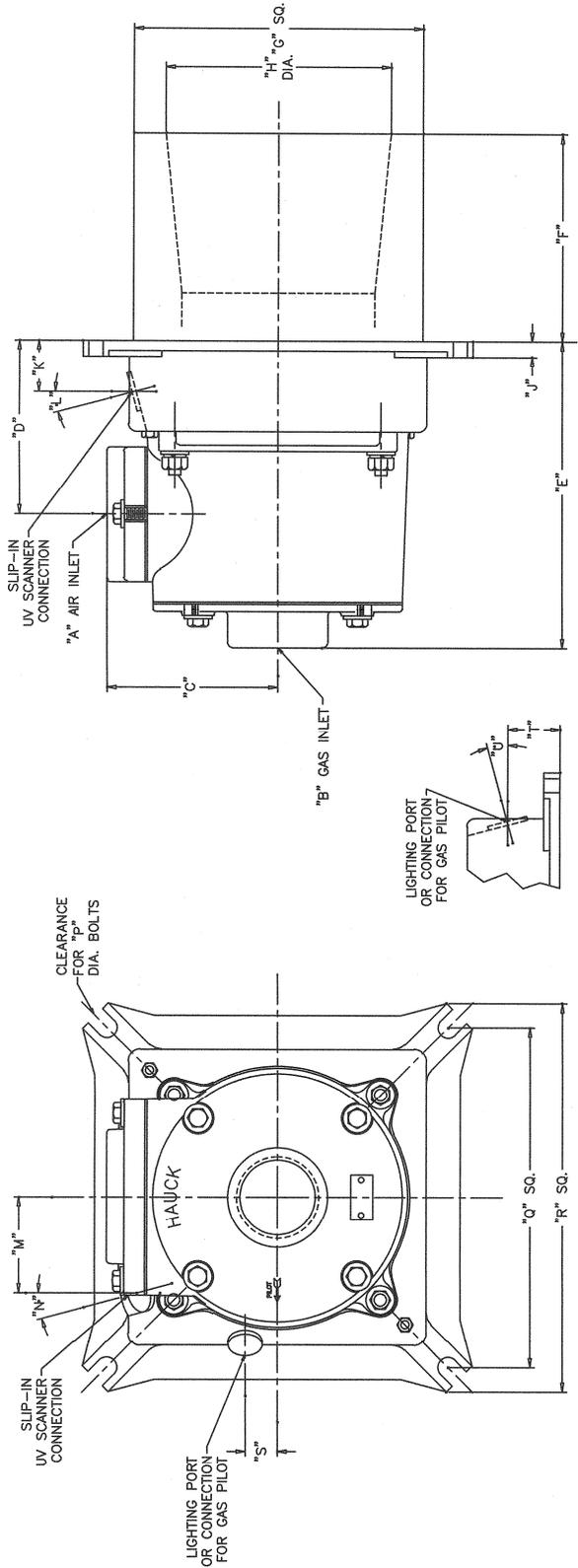
NMG BURNER NO.	AIR PRESSURE		
	4 oz.	8 oz.	16 oz.
210X50	750	750	750
210	1000	1000	1000
215	600	600	600
220	600	600	600
230	600	600	600
240	200	300	400
260	400	600	400
180	100	100	100
1100	300	500	700



TO USE CHART—Determine maximum temperature at which combustion gases are to enter furnace. Follow that temperature line horizontally from scale on the left until it intersects curve; then drop vertically down to read % excess air required at bottom.

Table 3

E. DIMENSIONS



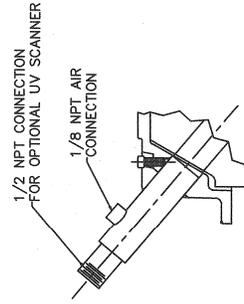
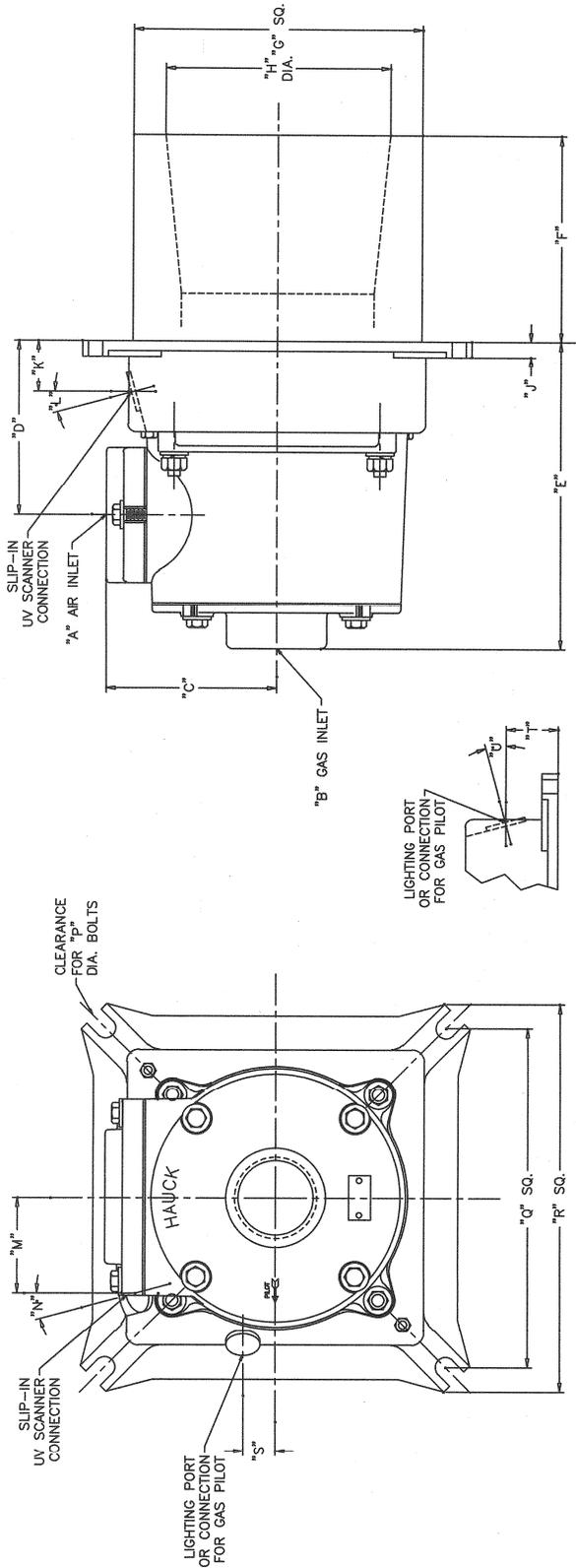
SECTION "A-A"
 SHOWING OPTIONAL UV SCANNER ADAPTER

BURNER NO.	"A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"	"J"	"K"	"L"	"M"	"N"	"P"	"Q"	"R"	"S"	"T"	"U"
NMG 210	1 NPT	3/4 NPT	3 11/16	4 3/8	7 1/16	5	6	4	7/16	1 13/16	30"	1 3/4	15"	3/8	7 3/8	8 5/8	0	1 9/16	30"
NMG 215	1 1/2 NPT	1 NPT	3 1/2	4 5/8	7 9/16	5	7 1/2	4 5/16	1/2	3 1/2	30"	1 7/8	13"	3/8	9	10 1/4	0	1 1/2	30"
NMG 220	2 NPT	1 1/4 NPT	4 1/8	4 7/8	8 1/8	6 1/2	9	5 1/2	1/2	4 1/8	40"	2 3/4	15"	5/8	10 5/8	12 1/8	0	1 13/16	47"
NMG 230	3 NPT	2 NPT	5 5/16	5 1/2	9 11/16	6 1/2	9	7	1/2	5 5/16	40"	2 3/4	15"	5/8	10 5/8	12 1/8	0	1 13/16	47"
NMG 240	4 NPT	2 1/2 NPT	7 5/8	8 7/8	14 7/16	11 5/16	14 3/4	9 1/2	5/8	7 5/8	39"	3 1/4	0"	5/8	17 1/4	19 3/4	1	2 5/16	56"

Y3110
 (NOT TO SCALE)

NOTES:
 1. ALL PRESSURE TAP CONNECTIONS ARE 1/8 NPT.
 2. NMG 210-220 HAS NO PRESSURE TAP ON AIR INLET FLANGE.

E. DIMENSIONS (Continued)



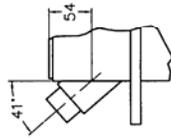
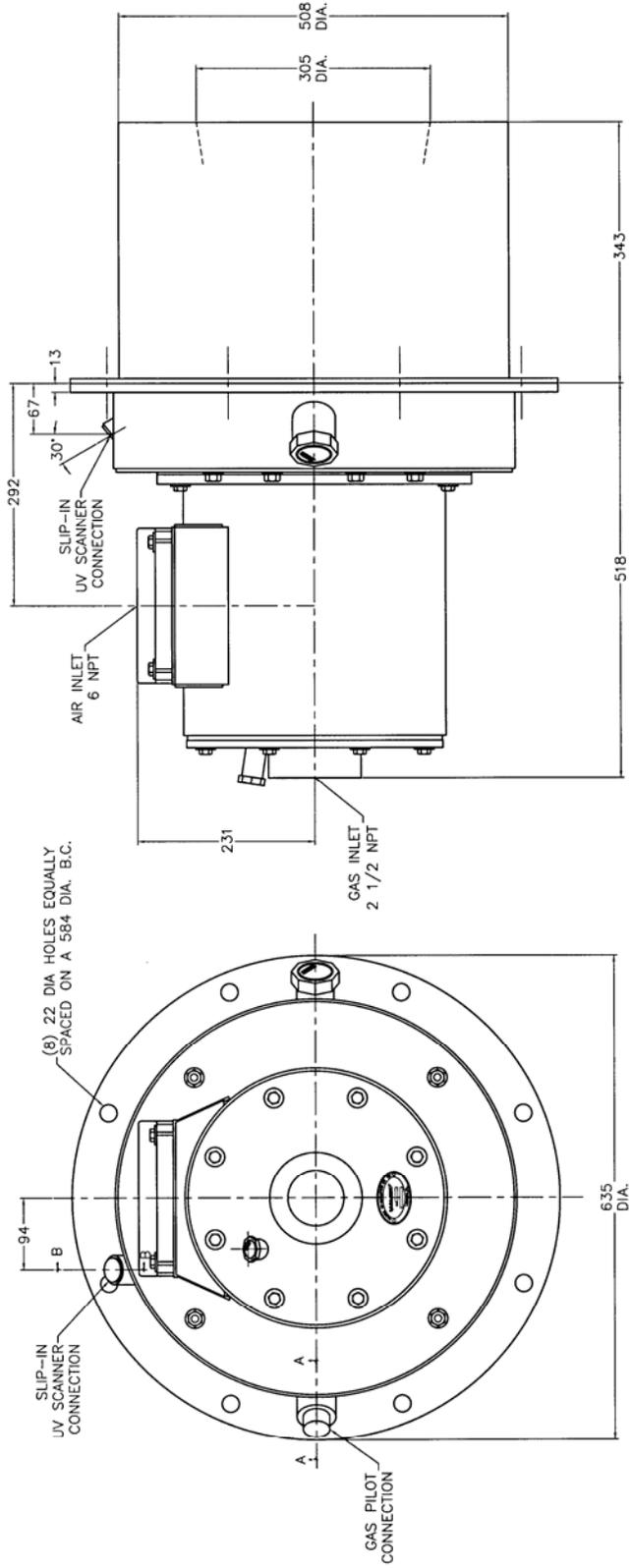
SECTION "A-A"
SHOWING OPTIONAL UV SCANNER ADAPTER

BURNER NO.	"A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"	"J"	"K"	"L"	"M"	"N"	"P"	"Q"	"R"	"S"	"T"	"U"
NMG 210	1 NPT	3/4 NPT	94	111	179	127	152	102	11	46	30"	4	13"	10	187	219	0	40	30"
NMG 215	1 1/2 NPT	1 NPT	89	117	192	127	191	110	13	89	30"	48	13"	10	229	260	0	38	30"
NMG 220	2 NPT	1 1/4 NPT	105	124	206	165	229	140	13	105	40"	70	15"	16	270	308	0	46	47"
NMG 230	3 NPT	2 NPT	135	140	246	165	229	178	13	135	40"	70	15"	16	270	308	0	46	47"
NMG 240	4 NPT	2 1/2 NPT	194	225	367	287	375	241	16	194	39"	83	0"	16	438	502	1	59	56"

Y3110 METRIC
(NOT TO SCALE)

NOTES:
1. ALL PRESSURE TAP CONNECTIONS ARE 1/8 NPT.
2. NMG 210-220 HAS NO PRESSURE TAP ON AIR INLET FLANGE.

E. DIMENSIONS (Continued)



Y3112 METRIC
NMG260
(NOT TO SCALE)

NOTE:
1. DIMENSIONS ARE IN MM.

F. TYPICAL PIPING SCHEMATICS

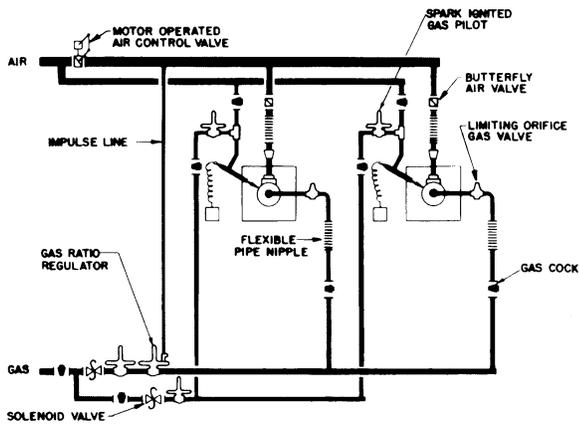


Figure 1. Ratio Control System

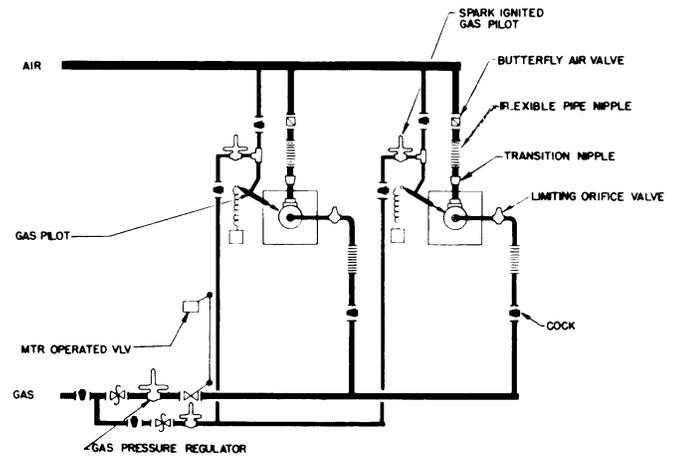


Figure 2. Excess Air Control System

G. INSTALLATION

CAUTION

All cast refractory burner components are porous and therefore subject to moisture absorption. Refractory components should not be stored or exposed to damp conditions potentially reducing their normal expected life. Care **must** be taken at initial startups and after extended idle times to assure refractory components have been sufficiently dried prior to normal firing conditions. It is highly recommended that **low fire drying for at least 6-8 hours at 50 to 100% excess air** occur at initial startups prior to exposing refractory components to normal firing operation. Thereafter, if the refractory components are exposed to excessive moisture, condensation, or high humidity for extended periods, **allow at least 30 minutes of low fire drying** before beginning normal operation. Failure to do so may cause any moisture present to expand rapidly resulting in refractory spalling and/or premature failure.

1. Furnish an opening in the furnace wall slightly larger than the outside dimensions of the refractory tile. Since NMG burners can fire in any position, they can be installed through the roof, walls or bottom of the furnace.

For tile locking method see Figure 3.

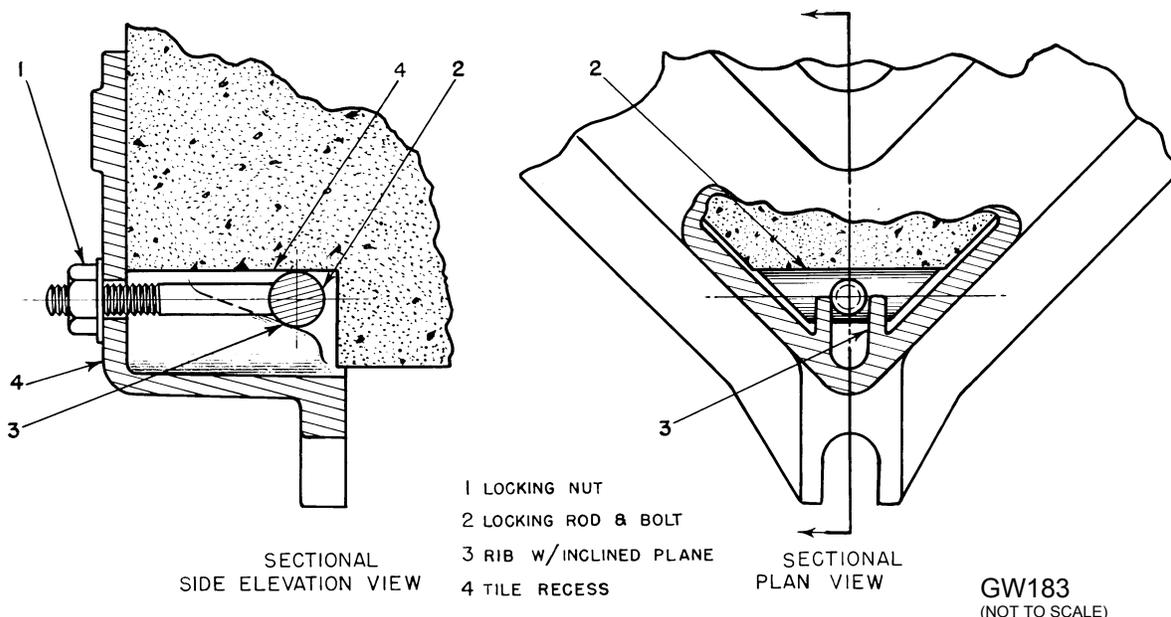


Figure 3.

G. INSTALLATION (Continued)

IMPORTANT

Do not disassemble the tile from the burner mounting assembly to install them separately. The burner and tile are factory assembled with a sealant between them. Disassembly will destroy the effectiveness of this sealant.

2. Inspect the mounting assembly. Ensure that all bolts connecting the burner to the mounting plate and those connecting the mounting plate to the refractory tile are securely fastened.
3. "Butter" the outside surfaces of the tile with fire clay.
4. Insert the tile into the furnace wall. For best results, install a high temperature gasket between the furnace wall and the mounting plate.
5. For soft wall installations at temperatures less than 1600°F, the tile should be encased in a stainless steel shell. For higher temperatures, provisions should be made to support the tile independent of the soft wall.
6. Tile extensions between the end of the burner tile and the inside surface of the wall should be provided at the nominal O.D. dimensions of the burner tile.
7. Bolt the mounting plate to the furnace wall.
8. Ensure that a complete seal exists between the mounting assembly, the tile and the furnace wall.

IMPORTANT

The burner mounting plate is designed to support the weight of the burner only. Ensure that all piping is adequately supported by an external means other than the mounting assembly.

9. Install the air line at the appropriate burner connection. If required due to the placement of the air piping, the air inlet can be rotated from a 12 o'clock position to one of either 4 (burners 210 thru 240) or 8 (burners 260) additional positions. (If a flame scanner is used, when rotating the burner, be sure to always place the scanner such that dirt can not fall back into the scanner viewing port. In addition, a scanner purge air connector (1/8" copper pipe) should always be used to prevent soot build-up during firing.

IMPORTANT

NMG210-230 Burners only – If the pilot and air are to be in line, a 45° No. 1 spark ignited gas pilot must be used to avoid interference. Also, NMG220-230 Burners only – If the pilot and air are to be in line, special consideration should be given to the method of installing the air line piping. It will be necessary to remove or disconnect the air piping from the burner to facilitate removal and reinstallation of the pilot.

G. INSTALLATION (Continued)

To rotate the air inlet, accomplish the following:

- A. Remove all the screws which hold the burner assembly to the mounting plate.
- B. Rotate the entire burner assembly to the allowable position which best suites the required piping connection.
- C. Replace and securely tighten all the screws which connect the burner assembly to the mounting plate.
- D. Loosen and remove all of the hex screws on the burner backplate. The number of screws will depend on the burner size.
- E. Rotate the burner backplate, with its attached nozzle assembly, until the word "pilot" on the backplate is realigned with the pilot opening in the mounting bracket unless the pilot is in line with or 180° from the air line. In that case the word "pilot" should be 90° from the actual pilot location.
- F. Ensure that the gasket between the backplate and the burner body is properly seated.
- G. Replace and tighten all of the hex screws on the burner backplate.

10. Install the gas line at the appropriate connection (gas inlet).

H. OPERATIONS

Once installed, the burner is ready for operation. The NMG burner is designed to operate with the air and gas pressure best suited to the application. Capacity and excess air tables are given in Sections C and D of these instructions.

It is recommended that the burner be ignited under low fire conditions. When the burner is operating, the pilot can be shutoff since the burner is designed to maintain ignition of the fuel-air mixture.

The NMG mounting plate is provided with a port for monitoring the pilot and main flame, using a UV scanner or other suitable device. If the pilot and air inlet are to be in line, a 45° No. 1 spark ignited gas pilot must be used with NMG210-230 model to avoid interference. (Alternately, if a 9 o'clock secondary air position is required and it is desired to use the standard No. 1 pilot, the mounting plate may be rotated so as to position the pilot at either the 12 o'clock or 3 o'clock position).

Burners intended for preheated air operation are identified by the letter "H" immediately preceding the Model Number figures. Preheated air up to 800°F maximum may be utilized.

I. MAINTENANCE

The NMG Series burner has no moving parts requiring any lubrication. However, periodic cleaning may be required to remove dirt and soot build-up inside the burner air passages caused by a dirty air supply or soot blow back from the furnace during periods of shut down.

Periodically check the refractory tile for coke build-up or other damage.