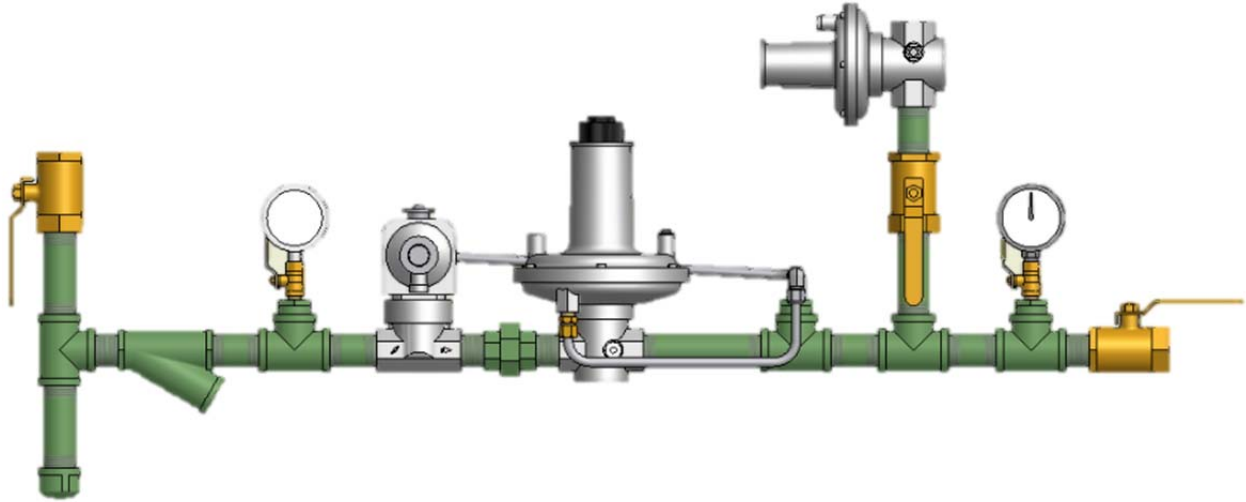




RGM PREPIPED REGULATOR GAS MANIFOLD



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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Attachment: Application Sheet GJ76

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 Hauck Regulator Gas Manifold (RGM) is a factory-assembled, prepiped gas train that permits easy, fast installation. The Hauck RGM is designed to meet National Fire Protection Association (NFPA) standards as well as stand up to the adverse conditions commonly experienced at many industrial, rotary drying and asphalt plants. The RGM not only satisfies the need for a regulator manifold that adheres to recommended component and piping practices, but also assists in meeting the system requirements commonly necessary for installation approval. The 2400 series RGMs will service any clean fuel gas up to **15 psig (1,030 mbar)** and provide a constant outlet pressure in the range of **1.4-2.3 psig (96-158 mbar)**.

For best results, additional downstream components required in the fuel gas system per NFPA are available as prepiped gas manifolds (PGMs) which include high and low gas pressure switches and safety shutoff valves.

The RGM consists of several components:

COMPONENT	FUNCTION
Inlet Shutoff Valve	Provide manual shutoff of gas on inlet side of RGM. Allows isolation of manifold components.
Sediment Trap	Isolates large particles in the fuel supply line upstream of safety components.
Strainer	Isolates finer particles in the fuel supply line upstream of safety components.
Inlet Gas Pressure Gauge	Display gas pressure during initial set-up and operation
Safety Shutoff Valve (JSAV)	Monitors pressure downstream of the regulator and slams shut should the pressure exceed the adjustable response limit. Features visual indication of closed position and must be manually reset.
Pressure Regulator (VGBF)	Adjustable diaphragm type regulator that reduces gas supply pressure for other gas safety components and appliance usage.
Safety Relief Valve (VSBV)	Relief valve with adjustable opening pressure to control temporary pressure surges and avoid sudden pressure increases downstream of a pressure reducing regulator.
Outlet Gas Pressure Gauge	Display gas pressure during initial set-up and operation
Outlet Shutoff Valve	Provide manual shutoff of gas on outlet side of RGM. Allows isolation of components downstream of manifold.

Table 1. RGM Components

B. RECEIVING & 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

MODEL NO.	CONN. SIZE	Inlet Pressure		
		15 psig	10 psig	5 psig
		(scfh)		
2410	1 NPT	3,150	2,510	1,500
2415	1-1/2 NPT	10,800	8,990	6,200
2420	2 NPT	19,300	16,400	11,800
2430	3 NPT	38,200	32,300	23,300
2440	4" FLG	63,400	54,300	38,600

NOTES:

1. 2000 Series RGM's used in conjunction with PGM's meet NFPA requirements for single burner or unison light-off multiple burner industrial applications.
2. Flange connections are ANSI 125lb rated flanges.
3. Maximum inlet pressure is **15 psig**. Consult Hauck for higher inlet pressure options.
4. Flow based on natural gas with 0.59 s.g., 60°F, **inlet pressure as specified, and nominal 2 psig outlet pressure** from the RGM; consult Hauck for different application conditions.
5. To calculate Btu/hr throughput, multiply natural gas flow in scfh by actual higher heating value (HHV) in Btu/ft³.

Table 1. RGM Capacities

MODEL NO.	CONN. SIZE	Inlet Pressure		
		100 kPa	69 kPa	34 kPa
		(nm ³ /hr)		
2410	1 NPT	84	67	40
2415	1-1/2 NPT	289	241	166
2420	2 NPT	517	439	316
2430	3 NPT	1,020	865	624
2440	4" FLG	1,700	1,450	1,030

NOTES:

1. 2000 Series RGM's used in conjunction with PGM's meet NFPA requirements for single burner or unison light-off multiple burner industrial applications.
2. Flange connections are ANSI 125lb rated flanges.
3. Maximum inlet pressure is **100 kPa**. Consult Hauck for higher inlet pressure options.
4. Flow based on natural gas with 0.59 s.g., 0°C, **inlet pressure as specified, and nominal 13.8 kPa outlet pressure** from the RGM; consult Hauck for different application conditions.
5. To calculate kW throughput, multiply natural gas flow in nm³/hr by actual lower heating value (LHV) in MJ/nm³, then multiply by 0.278 kW·hr / MJ.

Table 2. RGM Metric Capacities

D. DIMENSIONS

See appropriate Dimension sheet for detailed dimensional information.

E. INSTALLATION

1. Prepare an area to install the manifold. Ideally, make provisions to isolate the manifold from plant or equipment vibration by installing a flexible connection between the manifold and the connection to the equipment being supplied with gas. The RGM must be leveled when installed.
2. Before making any connection to the RGM, have the main gas supply line purged. Purge the line long enough to remove any debris that may be in the line.
3. Fabricate and/or install a support structure for the manifold. Typically, if the installation location permits, the manifold can be supported by a rack below it or held up by a structure above the manifold. Hauck does not recommend installing a RGM without a support structure.

NOTE

When installing the manifold, the visual indicator on the JSAV safety shut-off valve must be visible to operators.

4. Remove any inlet covers from the manifold and connect the inlet of the RGM to the gas supply line. For flanged connections, verify that a gasket is present between the supply flange and the inlet flange. Tighten all bolts on the flange. For threaded connections, use a suitable pipe sealant and tighten the supply connection to the manifold inlet. Hauck recommends the use of a high quality thread sealant with teflon (Loctite 565 or equal) for natural gas and propane gas service.

NOTE

When using a teflon based pipe sealant, avoid over-engagement of connections. Teflon will reduce the friction on the pipe threads and multiply the force when pipes are tightened. Valves, fittings and pipe can crack when over-engaged.

5. Connect the outlet of the RGM to the PGM or other gas manifold inlet. Pipe the VSBV Safety Relief Valve to an appropriate area according to your installation requirements. See Figure 1 for typical gas piping layouts.

6. Upon completing the piping connections, system pressure and leak testing should be performed with compressed air or an inert gas in accordance with NFPA 54. The RGM is pressure and leak tested according to this specification at Hauck and is not required to be re-tested upon initial installation. Thereafter, safety device testing should be conducted and documented at least annually in accordance with NFPA 86. **DO NOT OVERPRESSURIZE THE MANIFOLD COMPONENTS.**

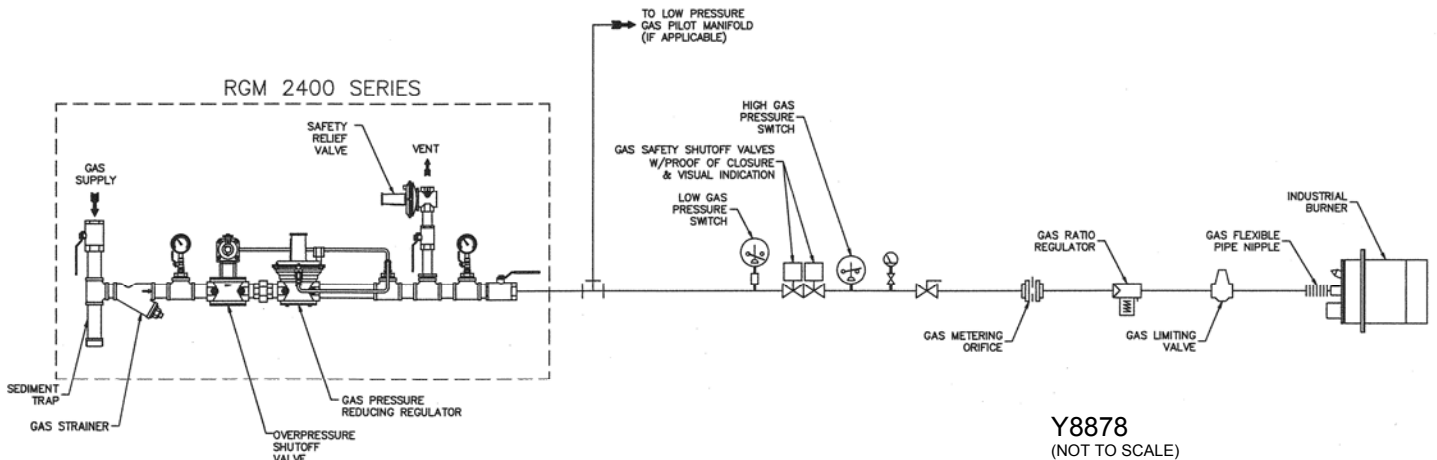
CAUTION

Do not exceed **15 psig (1,030 mbar)** when leak testing any standard RGM. Do not use water or the intended fuel gas to leak test the RGM.

- a. First, close the gas cock to the pressure gauges and the manual shut-off valves on the up and downstream sides of the RGM, as well as on the upstream side of the VSBV Safety Relief Valve.
- b. Remove the pipe cap located on the bottom of the sediment trap.
- c. Visually inspect the piping for any potential problems or points of leakage.
- d. Pressurize the manifold with through the opening made in step b. Isolate any components that are not able to withstand the pressure being used for the leak test.
- e. Once the RGM is pressurized, the manifold should be leak tested according to accepted practices. One method is to spray a solution of dishwashing liquid and water over all connection points and observe if any bubbles appear. Bubbles will indicate leaks. If any leaks appear, immediately repair them. Repeat the leak test until all leaks are repaired. Consult the local Gas Company for other leak test methods if necessary.

7. When all leaks are repaired, open the gas cock and shutoff valves closed in step 5. The RGM is now ready for operation.

Industrial Single Burner Gas Layout



Industrial Multiple Burner Gas Layout

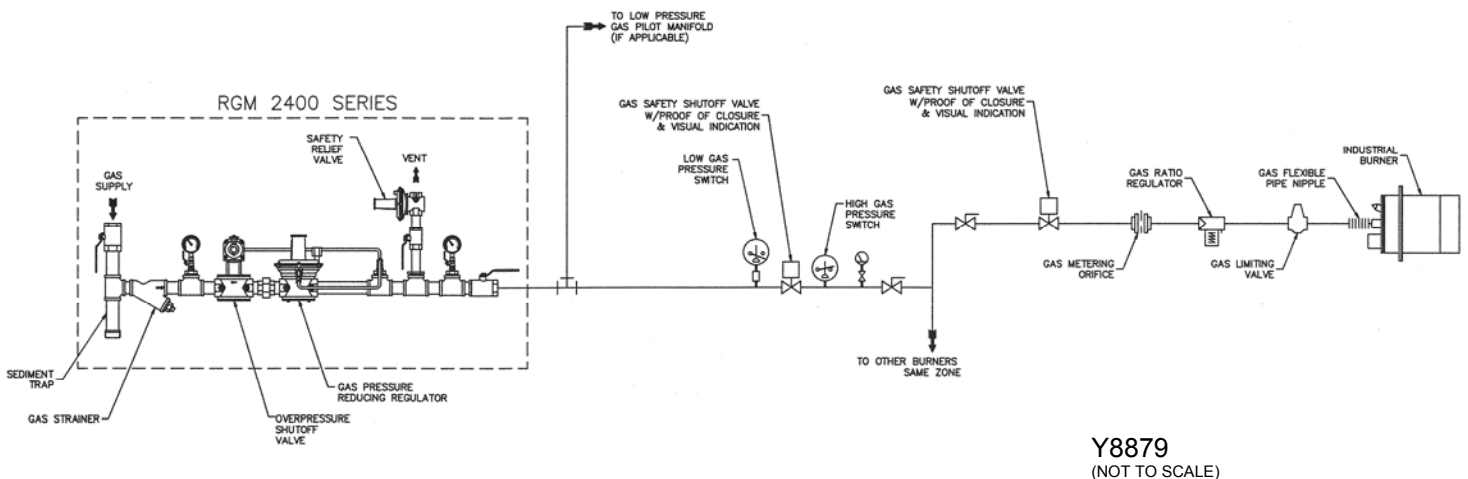


Figure 1. Typical Gas Piping Layouts

F. OPERATION

Once the RGM is properly installed and the fuel gas line is purged, it may be necessary to adjust the response pressure for the slam shut valve, relief pressure for the relief valve, and operating pressure for the reducing regulator. Before making any adjustments, verify the maximum pressure rating for each component downstream of the RGM.



WARNING

If the gas line is not properly purged, debris can get into the safety shut-off valves. If this occurs, the shut-off valves may not fully close.

1. First, set the outlet pressure of the VGBF Pressure Reducing Regulator as desired. This has an adjustable range between **1.4-2.3 psig (96-158 mbar)**. Depending on the pressure and flow requirements, this step may not be necessary. To adjust the pressure:
 - a. Monitor the pressure downstream of the VGBF.
 - b. Unscrew the cap on the regulator tower.
 - c. Adjust the screw clockwise for more pressure, counter-clockwise for less pressure.
 - d. When adjustments are complete, screw the cap back on the regulator tower.
2. Set the relief pressure on the VSBV Safety relief valve as desired. This has an adjustable range between **2.4-4.8 psig (165-330 mbar)**. Depending on the pressure and flow requirements, this step may not be necessary. To adjust the pressure:
 - a. Monitor the pressure upstream of the VSBV.
 - b. Unscrew the cap on the regulator tower.

CAUTION

The VSBV will open during adjustment! Ensure that a non-flammable gas is used for this step or the outlet side of the regulator is piped to an appropriate location.

- c. Adjust the screw clockwise for relief at a higher pressure, counter-clockwise for relief at a lower pressure. A good rule of thumb is to set the VSBV relief pressure about 30% higher than the outlet pressure of the VGBF, but not above the maximum pressure rating for any downstream components or the response limit of the JSAV. This prevents nuisance system shutdowns due to pressure fluctuations.
 - d. When adjustments are complete, screw the cap back on the regulator tower.
3. Finally set the response limit of the JSAV Safety Shutoff Valve. This has an adjustable range between **2.9-5.1 psig (200-350 mbar)**. Depending on the pressure and flow requirements, this step may not be necessary. To adjust the pressure:
 - a. Monitor the pressure downstream of the VGBF.
 - b. Unscrew the cap on the regulator tower.
 - c. Adjust the screw clockwise for response at a higher pressure, counter-clockwise response at a lower pressure. A good rule of thumb is to set the JSAV response pressure 50% higher than the VGBF outlet pressure, but not above the maximum pressure rating for any downstream components.
 - d. When adjustments are complete, screw the cap back on the regulator tower.

G. RECOMMENDED SPARE PARTS

ITEM	QUANTITY	PART NO.	DESCRIPTION
1	1	12528	Gauge, Pressure, 0-15 psig
2	1	61254	Gauge, Pressure, 0-5 psig

CONTROL SYSTEM SPECIAL FEATURES TO MEET NFPA 86 REQUIREMENTS FOR MULTIPLE BURNER GAS APPLICATIONS

Prior to startup of the burner system, it is required that the heating chamber be purged to remove any possible accumulation of flammable vapors.⁽¹⁾ One of the conditions for this purge to begin is that the safety shutoff valve is “proved closed”.⁽²⁾ For a multiple burner system firing into a common heating chamber this purge does not need to be repeated after a flame failure or burner shutdown provided that one of the following conditions exists:

- A) the heating chamber is proven to be operating above the auto-ignition temperature of 1400°F (760°C)⁽³⁾, or
- B) at least one of the burners of a multiple burner system remains in operation and can provide for ignition of any unintended release of fuel through the inoperative burners.⁽⁴⁾

There are three options that can be utilized to comply with NFPA 86 2011 Edition's “proof of closure” requirement. The first uses two gas safety shutoff valves at each burner; the second uses one gas safety shutoff valve in the main supply gas train, plus two gas safety shutoff valves at each burner; and the third option utilizes one gas safety shutoff valve in the main gas supply line and a single gas safety shutoff valve at each burner.

For Option 1, specific requirements and a typical gas piping layout (see Figure 1) are as follows:

Gas Safety Shutoff Valves

1. The main (first) gas safety shutoff valve at each burner requires both a proof of closure switch and visual indication.⁽⁵⁾
2. The blocking (second) gas safety shutoff valve at each burner requires only visual indication. (NOTE: IRI systems require proof of closure on both gas safety shutoff valves and a normally open vent valve between the main and blocking gas safety shutoff valve).

Electrical Wiring

The proof of closure switch in the main (first) gas safety shutoff valve at each burner must be connected in series with the purge limits.

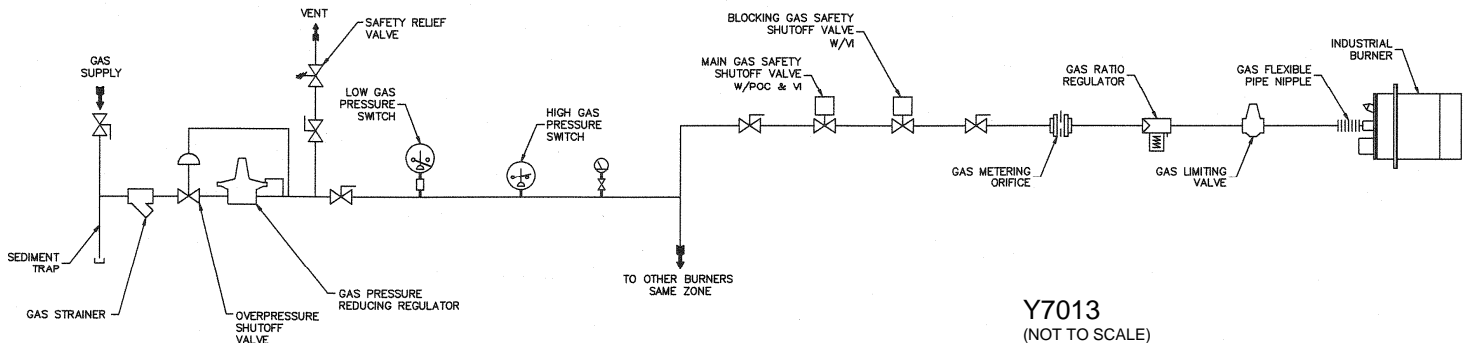


Figure 1. Option 1 Typical Gas Piping Layout

For Option 2, one additional gas safety shutoff valve is required (compared to Option 1), but the field wiring is reduced since only one proof of closure switch is required. Specific requirements and a typical piping schematic (see Figure 2) are as follows:

Gas Safety Shutoff Valves

1. The main gas safety shutoff valve in the main gas train requires both a proof of closure switch and visual indication.⁽⁵⁾
2. The two burner gas safety shutoff valves at each burner require visual indication only.

Electrical Wiring

The proof of closure switch contact in the main gas safety shutoff valve must be connected in series with the purge limits.⁽⁵⁾ Other than for monitoring, there is no need to incorporate proof of closure switches in the individual burner gas safety shutoff valves into the control system.

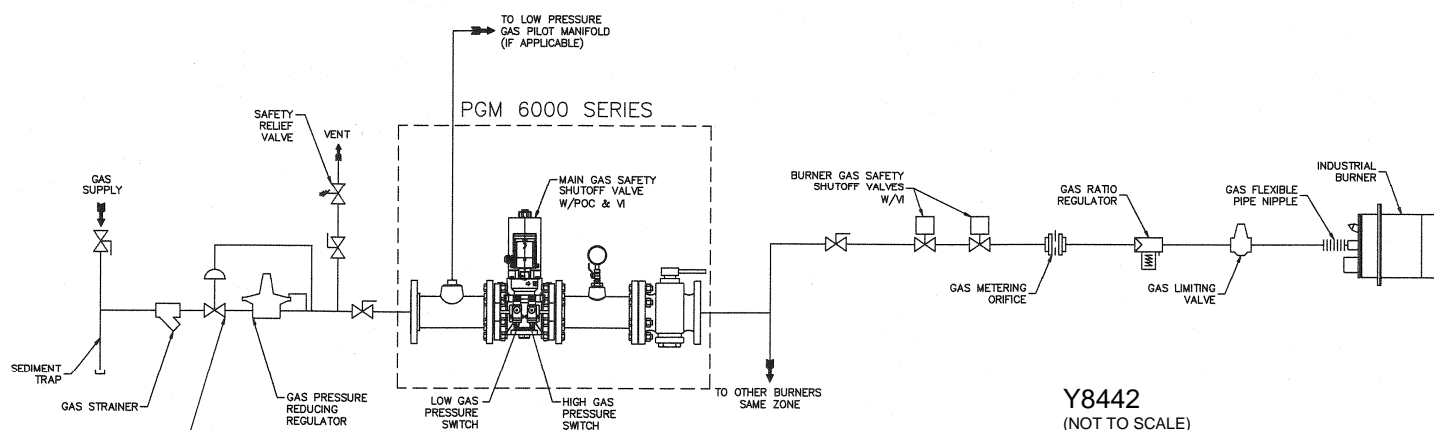


Figure 2. Option 2 Typical Gas Piping Layout

For Option 3, fewer gas safety shutoff valves are required (compared to option 2), but field wiring and the complexity of the control system increases. Also, the potential exists for the entire heating system to be shut down in the event that the single gas safety shutoff valve at a burner is not proved closed. Specific requirements and a typical piping layout (see Figure 3) are as follows:

Gas Safety Shutoff Valves

1. As with Option 2, the main gas safety shutoff valve will require both a proof of closure switch and visual indication.⁽⁵⁾
2. The burner gas safety shutoff valve at each burner requires both a proof of closure switch and visual indication.⁽⁶⁾

Electrical Interlocking of Burner Gas Safety Shutoff Valves

1. The proof of closure switch contact in the main gas safety shutoff valve must be connected in series with the purge limits.
2. Two wires from each burner gas safety shutoff valve closed switch must also be run back to the control panel.
3. A normally open auxiliary relay contact for each burner must be connected in parallel with its associated valve closed switch.
4. These parallel switch/relay circuits must be connected in series to energize an off-delay timer set at a maximum of five seconds.
5. A normally open contact of this off-delay timer must be wired in series with the purge timer circuit and the main gas safety shutoff valve.

Circuit Operation

1. Provided that all burner gas safety shutoff valve closed switches are closed, the off-delay timer contact will close.
2. If all safety and purge limits are satisfied and the main gas safety shutoff valve proof of closure switch contact is closed, the purge timer will be enabled.
3. After purge time is complete, the main gas safety shutoff valve will be enabled.
4. If a burner goes out and the burner gas safety shutoff valve **fails to close** within five seconds, the timer will complete its off-delay and its normally open contacts will be de-energized. This will in turn de-energize the main gas safety shutoff valve and disable the purge timer circuit.

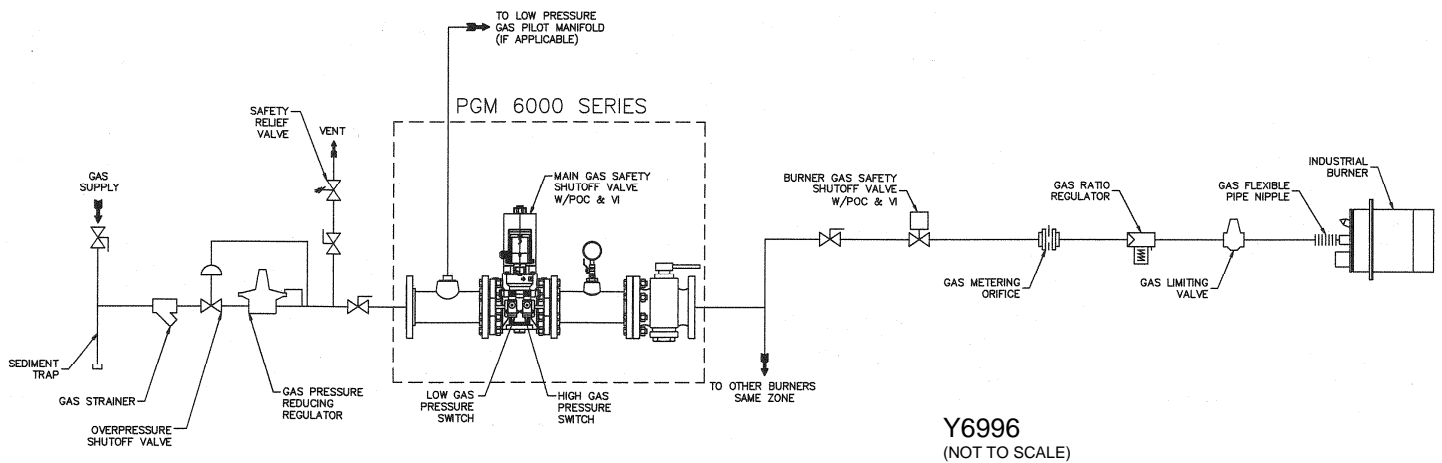


Figure 3. Option 3 Typical Gas Piping Layout

Reference NFPA 86 2011 paragraphs:

- (1) 8.5.1.1
- (2) 8.5.1.2 (C) (2)
- (3) 8.5.1.8 (1)
- (4) 8.5.1.8 (2)
- (5) 8.8.2.2 and Annex A.8.8.2.2
- (6) 8.8.1.3