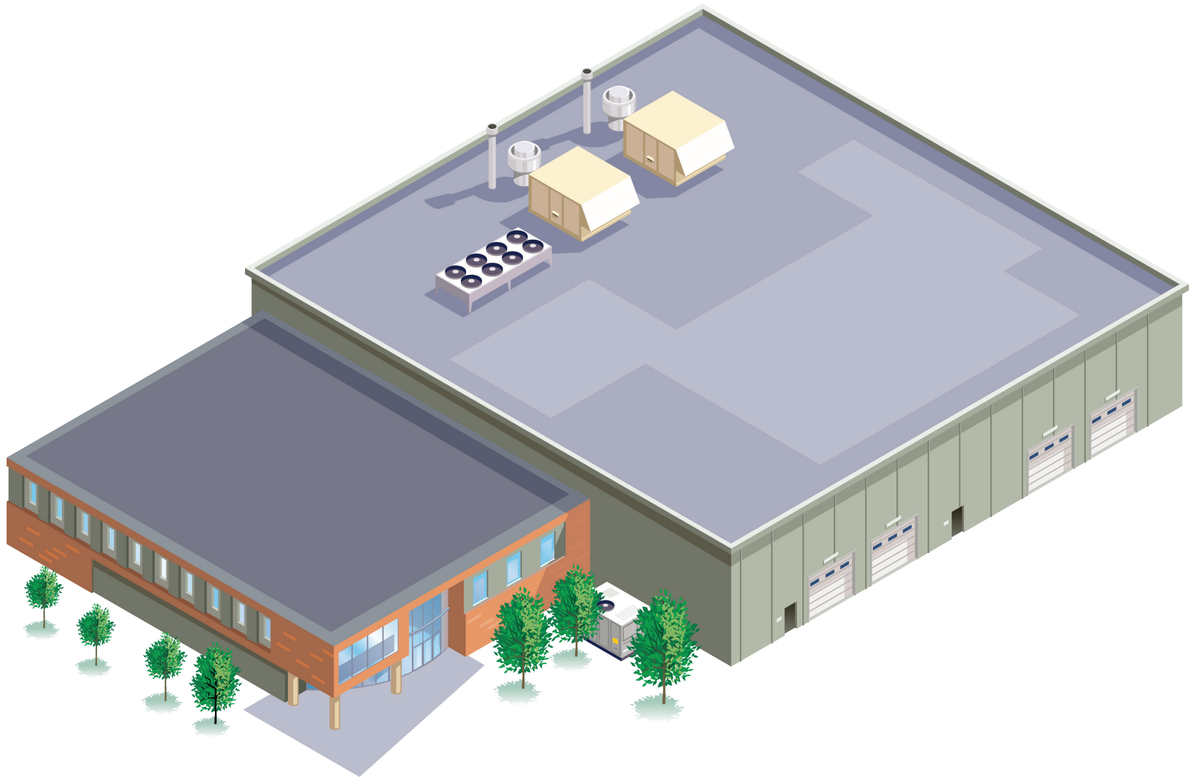
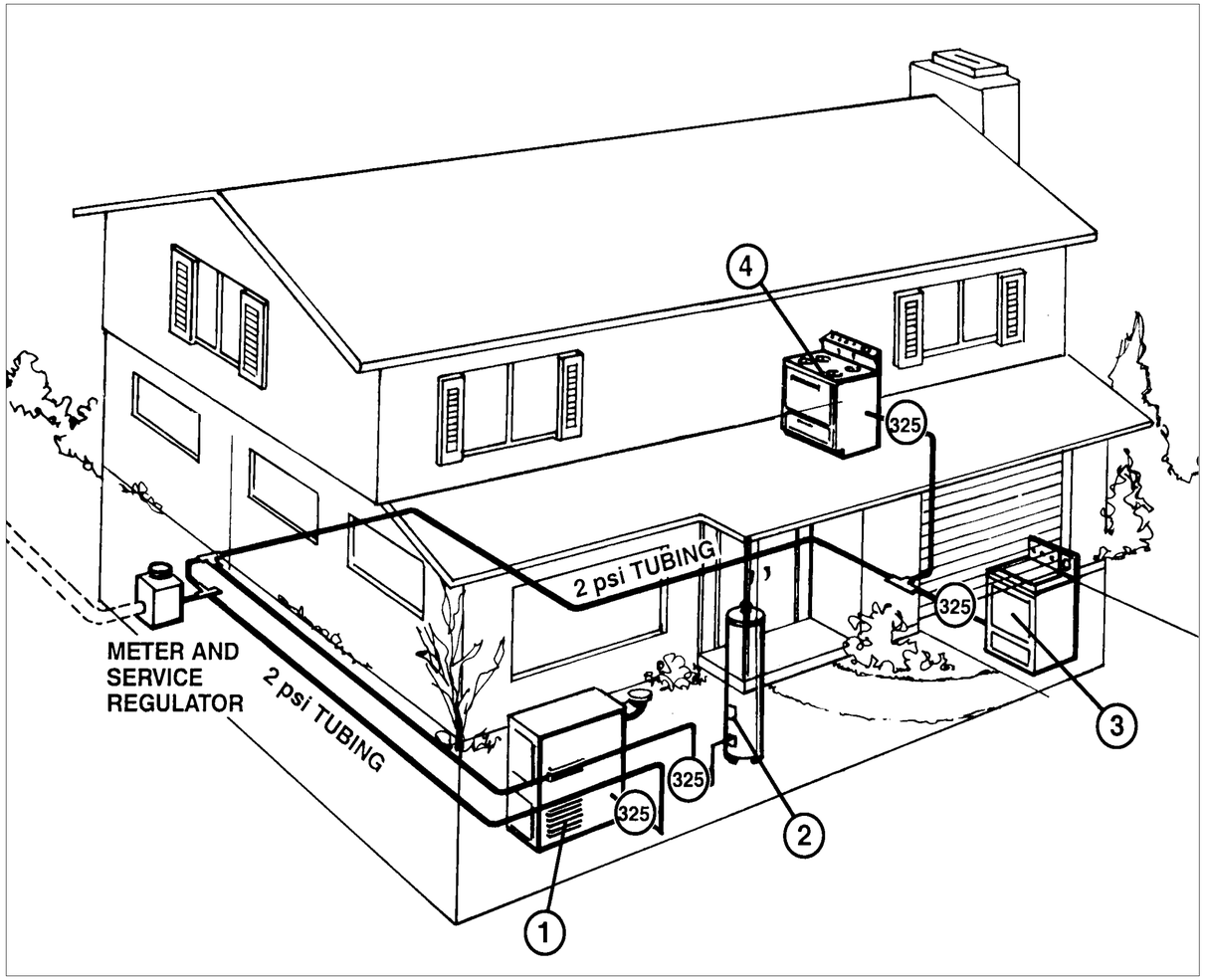
Certified Line Pressure Regulator Training

Elevated Pressure Systems



Typical 2 – 5 psi Elevated Pressure Piping System

- Street gas pressure is reduced to 2 psi – 5 psi using a utility supplied gas service regulator.
- The service regulator is located in an area where it can be vented to the outdoors.
- The gas is distributed throughout the structure using copper tubing or CSST to each gas appliance.
- The distribution pressures are greater than the inlet pressure of the gas appliance pressure regulator.
- An intermediate (line) regulator is used to reduce the pressure to within the rated inlet pressure range of the gas appliance regulator while operating and to maintain a reduced pressure during non-operating periods.
- The tubing or CSST can be sized to allow for significant pressure drop. The minimum operating inlet pressure to the line regulator should be approx. 1 psi when the appliance(s) are operating.
- Typical 2 – 5 psi piping systems use one line pressure regulator for each appliance or one line pressure regulator serving multiple applicances that are in close proximity to one another.



Line Pressure Regulators are Certifed to ANSI Z21.80/CSA 6.22:

- Class I: Reduces natural gas service regulator pressures (2, 5, or 10 psi) or LPG 2 psi service regulator pressure to appliance operating rated inlet pressures (1/2 psi or less).
- Class II: Reduces natural gas service regulator pressure (5 or 10 psi) to 2 psi or less.
- Line pressure regulators rated for inlet pressures in excess of 2 psi and capable of an outlet pressure of 1/2 psi or less shall be provided with an independent means to limit the downstream pressure to 2 psi maximum in the event of failure of the regulating system mechanism.
- Line pressure regulators with separate overpressure protection devices shall be factory assembled and supplied into the field as a unit.

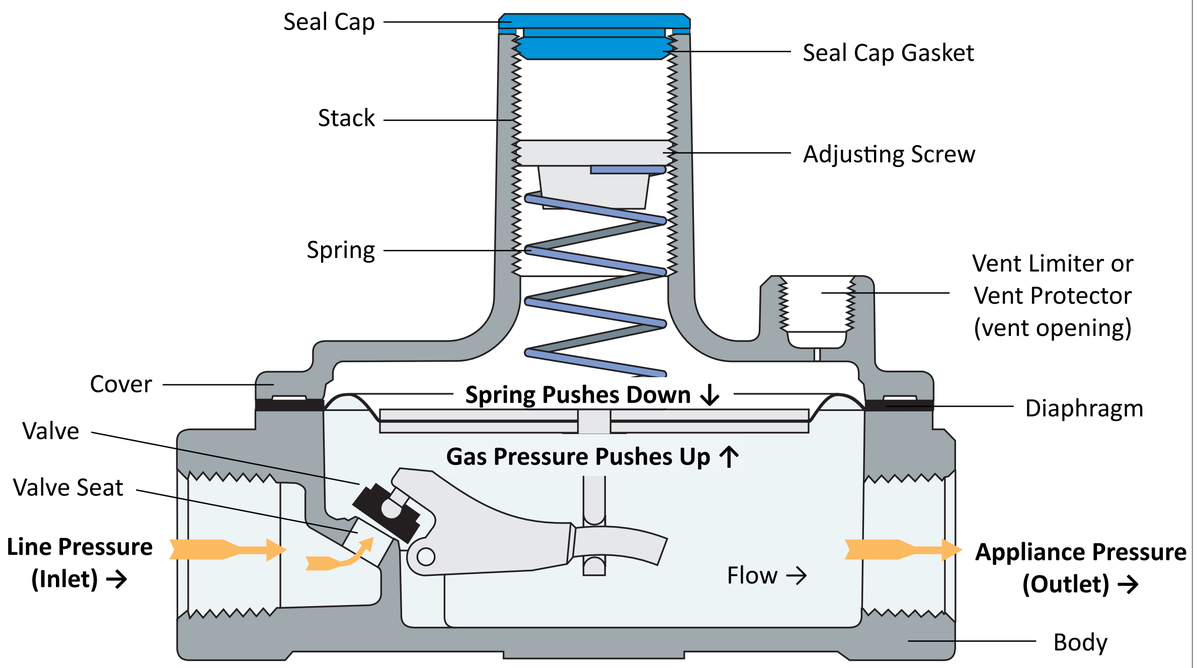
325-3L

325-7AL

325-5L with OPD 48

Line Pressure Regulators are Designed for Dead-End Lockup:

- When an appliance shuts off, gas pressure downstream of the regulator attempts to equalize with upstream gas pressure.
- As the outlet pressure increases and begins to exceed the set point pressure, the regulator assumes its fully closed position (this is true for all Maxitrol regulators).
- Further increases in downstream pressure over set point pressure increases the valve to valve seat sealing force.
- Regulators capable of dead-end lockup stop inlet to outlet pressure equalization and maintain and outlet pressure slightly above set point pressure under static conditions.



Line Pressure Regulator Dead End Lockup Characteristics:

- Class I: Lockup pressure is 150% of initial operating outlet pressure or the initial operating outlet pressure plus 5” w.c., whichever is greater.
- Class II: Lockup pressure is 150% of initial operating outlet pressure.
- **NOTE:** To allow the regulator to assume its normal lockup pressure, it is important to have a gradual increase in supply pressure. Whenever initially introducing or restoring the gas supply to the line pressure regulator, open the manual valve **very slowly** in the line supplying the line pressure regulator.
- **NOTE:** If the regulator is undersized, incorrectly placed into a service, improperly oriented, or mounted too far from the appliance, a higher than desired lockup pressure can occur. This may result in the appliance’s automatic valves not being able to open until upstream pressure is relieved.

325-3L

325-5L

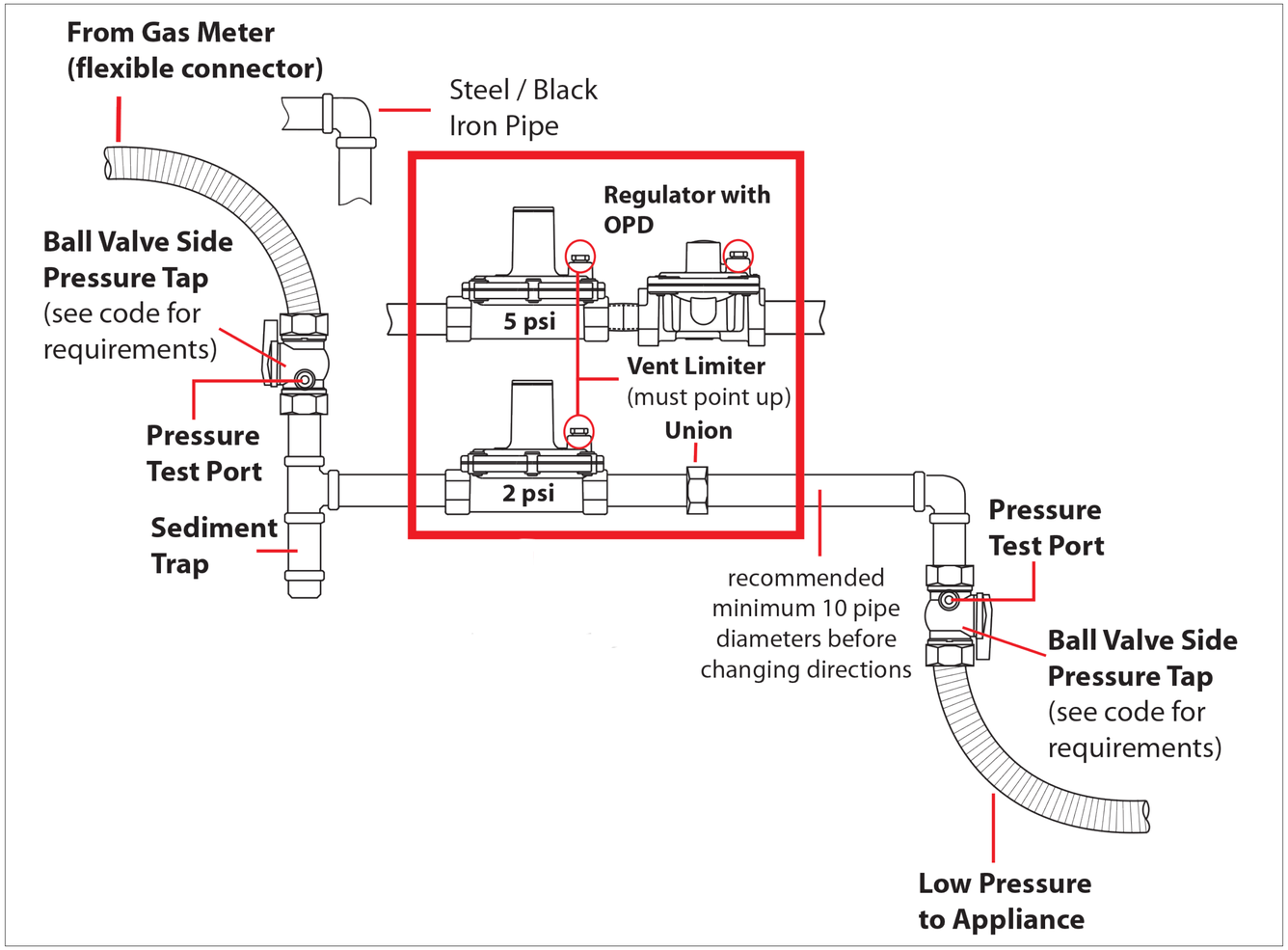
325-7AL

325-9L

325-11L

Typical Line Pressure Regulator/Manifold Configuration

Refer to National and Local Codes for Requirements



- Venting must be controlled in accordance with government and plumbing codes and regulations to avoid the danger of escaping gas should there be any internal leakage.
- Vent pipes must be open and the open end protected against entry of foreign matter, including water.

See the latest of National Fuel Gas Code pt. 9.1.19, International Fuel Code latest edition Section 410.3, Uniform Plumbing Code/ IAMPO/ANSI UPC 1208.7.5

For Use Indoors

vLimiter

For Use Outdoors

vProtector

Indoor Installation

Venting to the Outdoors:

- The diaphragm must be allowed to breathe to the atmosphere for unrestricted movement. The effective regulator vent opening should never be restricted.
- Vent piping should be installed directly into the vent port.
- Vents that run longer than 10 feet in length may require an increase to the next larger size to allow for free movement of air.
- Each regulator should have a separate vent line unless approved by code.
- Vent ports **must** be open and the open end protected against entry of foreign matter, including water.

Venting Indoors:

- vLimiter® **vent limiters** are designed for use indoors where limiting the amount of gas escapement due to diaphragm failure is critical.
- A vLimiter® **vent limiter** may only be used on a regulator that is approved for such usage. Always follow manufacturer's installation instructions for proper orientation of the pressure regulator using a vent limiting device.

Outdoor Installation:

- vProtector® **vent protectors** are available for all outdoor applications to ensure proper vent protection.
- Vent ports **must** be open and the open end protected against entry of foreign matter, including water.
- vLimiter® **vent limiters** should NOT be used outdoors, even as a protective device.

vLimiter ® Vent Limiting Devices

- Maxitrol vent limiting devices eliminate the need to run vent piping to the outside. Vent limiting devices are designed for use indoors and in spaces where limiting the amount of gas escapement due to failure is critical.
- **Vent limiting devices should not be used outdoors if they are exposed to the environment.**

12A09 (1/8” NPT)

12A39 (3/8” NPT)

12A49 (1/2” NPT)

vProtector ® Vent Protecting Devices

- vProtector® **vent protectors** are available for all outdoor applications to ensure proper vent protection.

13A15 (1/8” NPT)

13A15-5 (3/8” NPT)

13A25 (1/2” NPT)

vLimiter® Vent Limiting Device

Maxitrol vent limiting devices meet ANSI Z21.80/CSA 6.22

The requirement states:

- 1.11 Materials - 1.11.4
  “Vent Limiters shall be of materials having melting points of no less than 800°F (427°C).”

- 1.13 Markings - 1.13.2
  “Separate vent limiters shall be marked so as to be individually identifiable.”

12A09 (1/8” NPT)

12A39 (3/8” NPT)

12A49 (1/2” NPT)

⚠ WARNING

Service and installation must be performed by a trained/experienced service technician.

All products, including gas pressure regulators, used with combustible gas **must** be installed and used strictly in accordance with instructions of the manufacturer, with government codes and regulations, and plumbing codes and practices. Maxitrol line pressure regulators should be installed and operated in accordance with our “Safety Warning Instructions.”

NOTE: When a vent limiter is installed, the valve must be mounted in a horizontal, upright position.

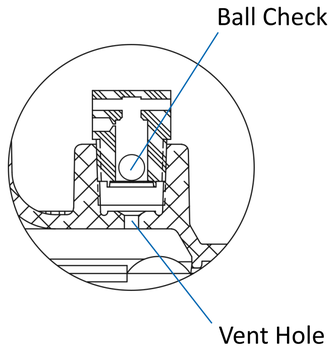
Why can’t I install the regulator sideways or upside down?

If a regulator with a vLimiter® vent limiting device is installed in any orientation other than the horizontal upright position, the ball check in the vent limiter will roll into the *Limiting Position*.

When the ball check is in the *Limiting Position*, the regulator will experience high lock-up and will not operate properly.

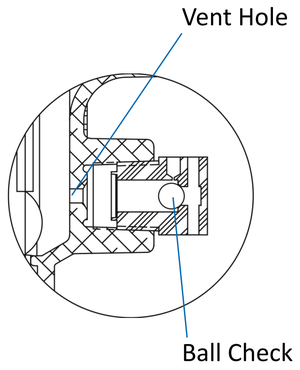
Must be installed directly in vent: do **not** use elbow to place upright.

CORRECT



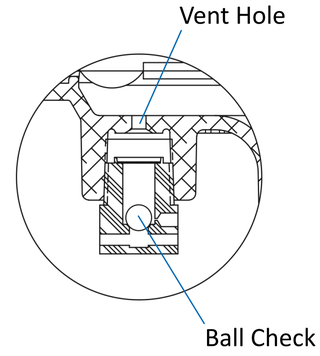
Open/Normal Position

INCORRECT



Closed/Limiting Position

INCORRECT

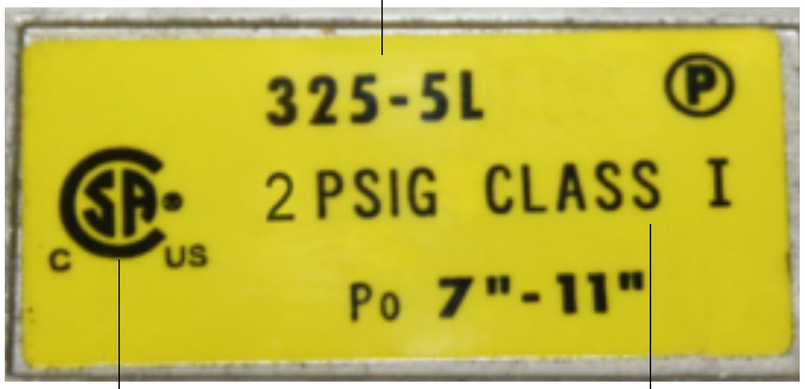


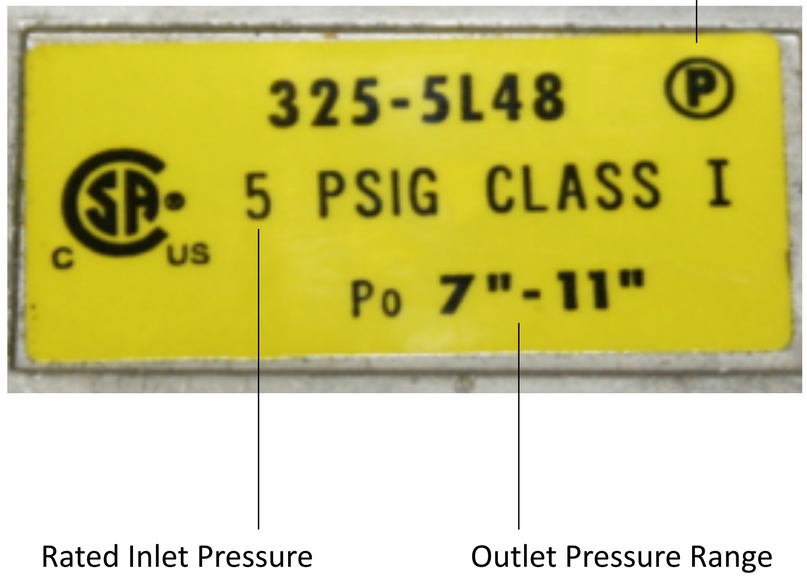
Closed/Limiting Position

Typical 2 psi Line Pressure with Vent Limiting Device Installed

- Venting **must** be controlled in accordance with government and plumbing codes and regulations to avoid the danger of escaping gas should there be any internal leakage.
- Maximum allowable vLimiter® **vent limiter** venting rate (see table below).
- vLimiter® **vent limiters** can only be installed in products they are certified for.
- Specific Gravity Air = 1.00

Vent Limiter Maximum Allowable Venting Rate		
Requirements for Vent Limiters	**Specific Gravity**	**Maximum allowable flow rate, in cubic feet per hour (cm^3/s)**
Vent limiter for use only with natural, manufactured, mixed gases and LP gas-air mixtures.	0.64	2.5 (19.6)
Vent limiter for use with liquified petroleum gases.	1.53	1.0 (7.9)





Rated Inlet Pressure:

- The highest inlet pressure for which the line pressure regulator is intended to be used.

Static Inlet Pressure:

- The maximum inlet pressure observed with no appliances operating.

Operating Inlet Pressure:

- The minimum inlet pressure observed with all appliances operating.

Outlet Pressure:

- The pressure being supplied to the gas utilization equipment when operating (flow condition).

Line Pressure Regulator:

- A gas pressure regulator intended for installation in a building gas distribution system between the building natural gas service regulator or LP gas 2 psi service regulator and gas utilization equipment.
- Class I: Maximum outlet pressure of 1/2 psi
- Class II: Maximum outlet pressure of 2 psi

Lockup Pressure:

- Pressure supplied to gas utilization equipment when the equipment is not operating (no flow condition).

Minimum Regulation Capacity:

- 0.15 CFH (150 BTU/hr) or less.

Maximum Regulation Capacity:

- Maximum cumulative load of all appliances being served by the line pressure regulator.

Maximum Individual Load Capacity:

- Maximum single appliance capacity or flow at which a line pressure regulator will control lockup pressure within accepting limits.

Vent Limiter:

- A means which limits the flow of gas from the atmospheric diaphragm chamber to the atmosphere in the event of a diaphragm rupture. This may be either a limited orifice or a limiting device.

Overpressure Protection Devices (OPDs):

- A device which under abnormal conditions will act to reduce, restrict, or shut off the supply of gas flowing to the gas utilization equipment. The pressure downstream of the device cannot exceed 2 psi (13.8 kPa).
- Overpressure Shut-Off Device: An overpressure protection device which functions by completely shutting off the flow of gas into the downstream system. Requires a manual procedure to reset the device following actuation.
- Overpressure Relief Device: An overpressure protection device which maintains a maximum set pressure by discharging (venting) gas from the downstream system to a safe location. Can be a separate device or integral to line pressure regulator.
- Monitor Regulator: An overpressure protection device which functions as a second gas pressure regulator in series with the primary gas pressure regulator. The regulator is normally wide open and will only operate in the event of a line regulator failure.

The following must be known:

- Pipe size
- Static inlet pressure
- Operating inlet pressure
- Desired outlet pressure
- Maximum capacity in CFH or BTU
- Is an OPD required?
  - * When static inlet pressure is greater than 2 psi
- Venting requirements

Selecting a 1/2” NPT Line Pressure Regulator:

KNOWN:

- Outlet pressure: 8” w.c.
- Static pressure: 2 psi
- Minimum operating inlet pressure: 1 psi
- Combined BTU rating of all appliances served by the regulator: 145,000 BTU/hr
- Largest single appliance’s BTU rating served by the regulator: 90,000 BTU/hr

SOLUTION:

- Capacity: Total load of all appliances combined
  - 325-3L (3/8”, 1/2”).....250,000 BTU/hr
  - 325-5L (1/2”).....425,000 BTU/hr
- Maximum Individual Load: Largest single appliance served by the regulator
  - 325-3L.....140,000 BTU/hr
  - 325-5L.....300,000 BTU/hr
- The 1/2” NPT 325-3L total load and individual load specifications are not exceeded and it is the acceptable line regulator for this application.

Maxitrol's Imblue Technology®

- Increases corrosion resistance and provides extra protection against the elements for regulators used in outdoor applications. "B" model regulators have Imblued housing and seal caps.
- Is great for coastal regions. Salt air can cause rapid corrosion on regulators if they are not protected.
- A smart option for regulators used on outdoor pool heaters and waste water treatment plant applications.

When ordering be sure to specify Imblue Technology® by including suffix "B" in the part number.