

Technical Note

Commentary on Overpressure Protection

v.1

An overpressure protection device is something that protects the downstream piping from an unsafe pressure build-up in the event that the regulator fails. Typically a regulator fails when debris builds up on the valve seat or orifice. This keeps the regulator from locking up (shutting bubble tight) during periods when there is no gas usage. As a result, gas will continue to pass through the regulator and the pressure will build up in the downstream piping.

As an example, a regulator with 5 PSIG on the inlet, set to deliver 7" w.c. should normally lock up at under 12" w.c. If debris kept the valve open, the pressure could potentially rise as high as 5 PSIG. Since many appliance valves and regulators are only rated with a 14" w.c. Operating and 2 PSIG Emergency pressure rating, they may not function properly or may be damaged causing potential unsafe operation.

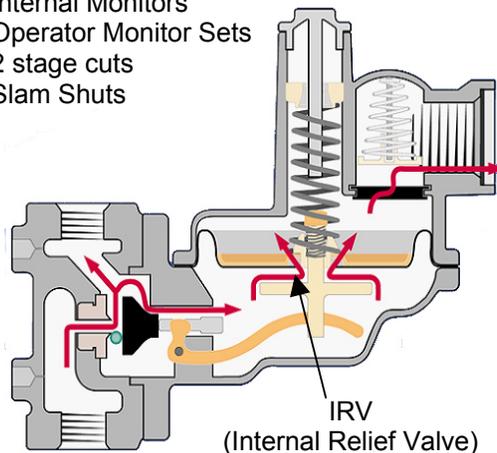
A variety of Overpressure Protection Devices (OPD) exist including:

- ❑ Spring Loaded Relief Device (Relief Valve)
- ❑ Monitor Regulators
- ❑ A Series Regulator (2 stage cut)
- ❑ Automatic Shutoff Device with manual reset

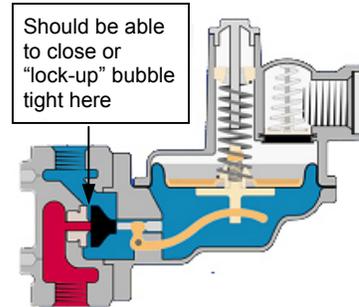
These can be an integral part of the regulator or a separate unit.

Examples:

Regulators with Internal Relief Valves
External Relief Valves
Internal Monitors
Operator Monitor Sets
2 stage cuts
Slam Shuts



The service regulator above is built with an internal relief valve. If the regulator is properly sized and selected the relief valve can provide overpressure protection and be used in 2 PSIG or 5 PSIG systems. This type of regulator must always be vented to a safe outside location.



The line pressure regulator above does not have an OPD (over-pressure protection device) built into it. For CSA compliant systems, this regulator should only be used on inlet pressures of 2 PSIG or less and outlet pressures of 14" w.c. or less.



The line pressure regulator above employs an upstream wide open monitor. It senses the pressure being delivered by the downstream regulator. Should the downstream regulator fail open, the upstream monitor takes over and maintains pressure close to set point. This type of regulator is CSA certified for installation on systems up to 5 PSIG inlet and can be installed without a vent line if local authorities permit.

Overpressure protection is required by code in most installations where pressure is 2 PSIG. Below are excerpts from most relevant codes.

NFPA 54 / ANSI Z223.1 National Fuel Gas Code

Section 5.9 Overpressure Protection Devices

- 5.9.1. General. **Overpressure protection devices shall be provided to prevent the pressure in the piping system from exceeding that value that would be cause unsafe operation of any connected and properly adjusted appliance.**[see 5.9.5]
- 5.9.5. Each pressure limiting or pressure relieving device shall be set so that the pressure shall **not exceed a safe level beyond the maximum allowable working pressure for the piping and appliances connected.**

International Fuel Gas Code

Section 416 (IFGS)

- 4.16.1 General. Overpressure protection devices shall be provided in accordance with this section to prevent the pressure in the piping system from exceeding the pressure that would cause unsafe operation of any connected and properly adjusted appliance.

IFGS Commentary: ***“Overpressure protection devices are used to protect appliances from abnormally high gas pressure that can result from the failure of pressure regulators in the piping system.*** Overpressure could result in appliance damage and/or hazardous operation (see commentary section 410.1)

ANSI Z21.80 / CSA 6.22-M97 Standard for Line Pressure Regulators

1.14 Overpressure Protection Devices

- 1.14.1 Line Pressure regulators rated for inlet pressures in excess of 2 PSI (13.8 kPa) and capable of being adjusted to deliver an outlet pressure of ½ PSI (3.5 kPa) or less shall be provided with an independent means to limit the downstream pressure to 2 PSI (13.8 kPa) maximum in the event of failure of the regulating mechanism.**
- 1.14.2 An overpressure shutoff device (see part V, Definitions), if provided, shall require a manual procedure to reset the device following actuation

Author's Comments:

Within GAMA (the Gas Appliance Manufacturer's Association) and the gas industry as a whole, it has generally been accepted that the acceptable safe pressure that residential and small commercial systems can accept under **emergency** conditions (regulator failure) is 2 PSIG. Most gas utilities will size their Service Regulators that deliver low pressure so that even in a failed state they will limit the downstream piping pressure to 2 PSIG build up.

Most gas valves are only rated for 14" w.c. (0.5 PSIG) Operating Pressure. Due to the fact that many gas appliances now lack standing pilots, the gas pressure can continue to rise after the appliance shuts off. This static pressure is gray zone because the appliance is not running (operating) but will be subject to this elevated pressure for a split second when it next turns on. There is much debate about what pressure these devices can handle at static and still operate. Likewise, when an upstream regulator fails the pressure will rise irrespective of whether overpressure protection is employed. It is still clear that above 2 PSIG some form of over-pressure protection is required.