Gas Information Sheet 20

Over-pressure protection of LPG installations

Overview

This gas information sheet provides information about over-pressure protection for LPG installations.

Over-pressure can occur if a regulator:

- suffers mechanical or diaphragm failure
- has a foreign body lodged between the valve and its seat or a blocked or under-sized vent opening.

If precautions are not taken to limit an over-pressure situation, downstream equipment like appliances and other regulators may be damaged and combustion affected.

How does over-pressure occur?

Over pressure occurs where piping or equipment is subjected to a pressure exceeding a pre-determined value. For example, where the inlet pressure on a single stage regulator is 1,200 kPa (cylinder pressure) and the outlet is 3 kPa.

If, under normal operating conditions, the outlet pressure rises to approximately 4 kPa, the regulator will lock-up and prevent any further increase.

However, if the regulator valve does not seat properly, the inlet pressure will pass down-stream into the consumer piping potentially resulting in:

- damaged appliances or components and gas leaks
- enlarged or unstable and unsafe burner flames.

What does over-pressure protection (OPP) do?

OPP prevents gas pipework or appliance gas pressures from exceeding a predetermined value, ensuring a safe situation exists in the event of gas pressure regulator malfunction or failure.

When is OPP required?

Over pressure protection prevents the pressure in gas pipework or in gas appliances from exceeding a predetermined value. It will ensure a safe situation exists in the event of malfunction or failure of any gas pressure regulator.

Any part of the gas installation that is not rated to withstand the inlet pressure to its gas pressure regulator shall be provided with over-pressure protection.

Where is OPP required?

An OPP device must be:

- able to prevent piping and components being subjected to pressures higher than their maximum over-pressure
- provided (as per AS/NZS 5601.1 clause 5.11.2) when the operating pressure at the inlet to the gas pressure regulator exceeds:

- the maximum over-pressure of piping and components supplied by the regulator up to and including the next downstream regulator, in other words, any part of a gas installation that is not rated to withstand the inlet pressure to its gas pressure regulator must be provided with OPP
- LP Gas pressures of 14 kPa.

What is maximum over-pressure?

Maximum over-pressure is the maximum pressure the installation or any particular portion of the installation, or individual component including appliances, remains safe and for:

- any portion of an installation is the:
  - lowest maximum over-pressure of the components comprising that portion of the installation; or
  - the pressure to which that portion of the installation has been tested, if neither of the pressures in the items below are known.
- individual components is (if known) the:
- component's maximum over-pressure, or
  - 1.5 times the rated working pressure of the component.

Obtaining the rated working pressure

The manufacturer's technical literature should include (or state) the rated working pressures.

Methods of over-pressure protection

An OPP system can comprise one or more of a number of devices, and the methods used in consumer piping systems include:

- pressure relief valves
- regulators with internal pressure relief
- regulators with over-pressure shut-off (OPSO)
- over-pressure slam shut (OPSS) device.

Pressure relief valves

Pressure relief valves are a method of protection installed on the outlet side of a regulator to protect the downstream installation. They have no other function and gas does not flow through them under normal operating conditions. A threaded relief outlet allows the connection of a vent pipe. It is essential that a relief valve be properly sized.

Regulators with internal pressure relief

Regulators with internal pressure relief have a spring-loaded relief opening in the diaphragm bearing plate. Two springs are located beneath the sealing cap and adjustment screw, with the:

- larger one controlling the outlet pressure
- smaller one controlling the relief pressure.

In an over-pressure situation, the pressure acting below the diaphragm (at a set point) overcomes the relief spring pressure and gas passes to atmosphere. Some regulators have full relief (under certain conditions) and others have partial relief.

Regulators with internal (full or partial) pressure relief that are located within a building must be fitted with a vent line terminating outside the building, as per AS/NZS 5601.1, clause 5.11.5.

Regulators with over-pressure shut-off (OPSO)

An OPSO device shuts off the supply of gas at a pre-determined setting. Over-pressure is sensed on the outlet side of the regulator. Manual reset is required to restore supply. Some regulators fitted with OPSO also have internal relief, in which case the OPSO setting must always exceed the relief pressure setting.

For example, relief may be set to activate at 20% above the required outlet pressure and OPSO at 25%.

Over-pressure slam shut (OPSS) device

An OPSS device is installed as a separate component, and is usually located upstream of the regulator (1st or 2nd stage) with a piped connection to sense pressure downstream of the regulator.

Alternatively, it can be installed down-stream of any regulator if required.

Other alternatives

Any other proposed alternatives, such as high pressure switches combined with appropriately rated components, should be discussed with Energy Safe Victoria at the design stage.

Other considerations

A decision will need to be made by the installation designer, piping installer, or appliance installer about the most appropriate over-pressure protection method. Because each method has advantages and disadvantages, considerations must include the

- customer's operational requirements
- the system's cost.

The following points may be of assistance:

- OPSO requires manual reset.
- Production problems may occur if the gas supply is shut off.
- The reset process may incur costs (for example, call-out fees).
- High temperatures affecting consumer piping can cause an OPSO to trip.
- Gas emitted from a relief device may not be readily detected depending on the location of the vent termination point.
- Venting a relief device may be impractical. The length and route have to be considered.
- An over-pressure situation may not be apparent to the customer if gas is being vented to atmosphere. (And may also result in high gas consumption complaints).
- Relief gas passing to atmosphere is wasted and contributes to the greenhouse effect.
- LPG is heavier than air and the vent termination point must be located safely.

Nuisance tripping of an OPSO

If nuisance tripping occurs, check the:

- outlet and relief pressure springs against the manufacturer's specification
- OPSO operation and settings to ensure they are within design parameters
- piping is not subject to excessive temperature.

Relief valve installation may be required in some circumstances.

Who we are

At Energy Safe Victoria we work to keep Victoria energy safe.

We regulate the energy industry and sector to ensure generation, supply and usage uphold safety standards, and engage with the community to raise awareness of energy safety risks.

In everything we do, we strive to deliver on our purpose to keep Victoria energy safe. Always.

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