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Gasfitting information sheet No. 19

Over-pressure protection and vent terminal locations

Aim

The aim of this document is to help gasfitters understand why over-pressure protection (OPP) is required and what their options are for OPP. In addition, this document aims to educate gasfitters around the requirements for regulator vent terminal locations.

Why is over-pressure protection required?

An over-pressure situation can occur if a regulator becomes faulty. Such a fault can be caused by any number of reasons; mechanical failure, foreign body between the valve and its seat, diaphragm failure or blocked or undersized vent opening.

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

Where does over-pressure occur?

Over-pressure situations occur when high inlet pressures are regulated to low outlet pressures. For example, the inlet pressure on a single stage regulator could be 1200 kPa (cylinder pressure) and the outlet 3 kPa.

If under normal operating conditions the outlet pressure rose to approximately 4 kPa, the regulator would "lock-up" and prevent any further rise. However, if the regulator valve did not seat properly, the inlet pressure (1200 kPa) would pass down-stream into the consumer piping.

The rise in pressure could damage appliances or components and cause gas leaks. Burner flames become enlarged or unstable and unsafe. Therefore, it is very important to maintain a safe gas installation by protecting against over-pressure and preventing its consequences.

What is over-pressure protection?

OPP is defined in AS/NZS 5601.1: 2013 Gas Installations as "A device or system for preventing the pressure in gas pipework or in gas appliances from exceeding a predetermined value."

What does over-pressure protection do?

OPP 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 incapable of withstanding the inlet pressure to its gas pressure regulator shall be provided with over-pressure protection.

Where is over-pressure protection required?

Section 5.11.2 of AS/NZS 5601.1: 2013 outlines that OPP shall be provided where the operating pressure at the inlet to a gas pressure regulator exceeds:

(a) The maximum over-pressure of piping and components supplied by the regulator up to and including the next downstream regulator; and

(b) 7 kPa for NG & SNG, and 14 kPa for LPG.

The OPP device shall ensure that piping and components supplied by the regulator up to and including the next downstream regulator will not be subjected to a pressure greater than the maximum overpressure for that piping and those components.

Methods of over-pressure protection

An OPP system can comprise one or more of a number of devices. The following methods are used in consumer piping systems:

(a) Pressure relief valve

Purpose made pressure relief valves have no other function, and gas does not flow through the device 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.

(b) Regulator with internal relief

These regulators have a spring-loaded relief opening in the diaphragm bearing plate. Two springs are located beneath the sealing cap and adjustment screw. The larger one controls the outlet pressure, the smaller one controls the relief pressure. In an overpressure 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.

(c) Regulator with over-pressure shut-off (OPSO)

An OPSO device operates on the inlet to the regulator control orifice and 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 and the OPSO setting must always exceed the relief pressure setting. For example, relief may be set to activate at 20% above required outlet pressure, and OPSO at 25%.

(d) Over-pressure slam shut

An OPSS device is installed as a separate component, usually located upstream of a 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.

(e) Other alternatives

1. Upgrade equipment

Where neither OPSO nor pressure relief is a practical solution, one alternative is to upgrade the installation using components with suitable rated working pressures.

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2. Pressure switches

If a system is required on an appliance to protect against combustion problems caused by over-pressure, then a pressure switch can be installed downstream of the safety shutoff valves and wired into the safety shut-off system. The switch will actuate at a set pressure and cause safety shut-down.

Considerations when selecting a regulator system

A decision will need to be made by the installation designer, piping installer or appliance installer as to which method of overpressure protection will be most appropriate. Because each method has advantages and disadvantages, the operational requirements of the customer must be considered, as must the cost of the system. The following points may help:

OPSO requires manual reset.

Production problems may occur if the gas supply is shut-off.

The process of resetting may incur costs (call-out fees etc).

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. (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 care must be taken to locate the vent termination point safely.

Regulator vent terminal location

Section 5.11.5.9 of AS/NZS 5601.1:2013 outlines that “A vent terminal shall be located where gas discharge will dissipate without entering buildings or creating any hazard.”

A regulator with internal pressure relief which is located within a building must be fitted with a vent line that terminates outside the building. Full details of the requirements can be found in section 5.11.5 of AS/NZS 5601.1:2013.

Generally, regulators with internal relief have a threaded vent opening. However, not all regulators with a threaded vent have internal relief because manufacturers often use a standard casting for a range of regulators. Some regulator vent openings are fitted with a removable insect screen.

A common mistake gasfitters make when carrying out gas installations supplied by two 45 kg LPG cylinders is that; they will consider all the clearance requirements for the LPG cylinders, however, they don’t consider the clearance requirements for the regulator vent terminal in the change-over regulator. In most situations an exclusion from ignition sources and openings to a building is 1.5m in all directions from the vent terminal location.

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