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SHUT DOWN OF GAS OR FUEL SUPPLIES

Fire and Security Consulting Services is frequently asked about the regulatory requirements relating to flammable gas and / of flammable / combustible liquid installations, which may include LP gas, reticulated natural (town) gas, diesel fuel or petroleum spirit.

Regulatory Requirements

Naturally the installation must comply with either:-

1. AS1596-2002 – The Storage and Handling of LP Gas; and / or
2. AS 5601-2004 – Gas Installations, as applicable.
3. AS1940 – 2004 – The Storage and Handling of Flammable and Combustible Liquids.

The confusion exists where distribution lines are installed within buildings, and whether or not the Building Code of Australia (BCA) has any requirements.

BCA Clause D2.1 states:-

D2.7 <i>Installations in exits and paths of travel</i> (c) <i>Gas or other fuel services must not be installed in a required exit.</i>

The “Guide to the BCA” states that gas and fuel services are prohibited in both fire isolated and non fire isolated exits but that the prohibition does not apply to “a path of travel” to an exit. The objective of the prohibition is to eliminate, as far as practicable, hazardous conditions existing in exits.

The inference of the BCA requirements is that gas or fuel distribution pipe may be installed anywhere within a building except in an exit, subject to compliance with AS1596, AS1940 and AS5601.

Alternative Solution Considerations

From a Fire Engineering perspective the inference of permitting gas or fuel lines anywhere within a building has potential serious implications. Any Alternative Solution which requires the Fire Engineer to develop a “design fire” must consider all sources of flammable and/or combustible materials. If a gas or fuel line ruptures either through thermal or mechanical damage in a fire, the contribution of the gas or fuel will certainly be difficult to quantify and will seriously affect the validity of the solution.

Accordingly the Fire Engineer will assess the likely impact of a ruptured line and require some sort of automatic shut down device at the point of supply.

The following is provided as a guide to implementing the Fire Engineer’s requirements.

Excess Flow Valves

Gas and Fuel storages may be fitted with “excess flow” valves. These are automatic valves which automatically shut when the flow exceeds the design flow. They are simple and efficient but have one significant flaw as follows.

The design flow has to be preset and can only be a single predetermined flow rate, which if exceeded by an event such as a ruptured line, will close. However if the gas or fuel line is designed to serve a number of installations, such as multiple gas fired heaters, the design flow must, by definition, be the maximum flow for all devices operating simultaneously. If only one device is operating and the line to that equipment ruptures, the excess flow valve will “see” this as an increased demand from multiple devices and potentially will not shut, thus gas from the ruptured line will escape and pose an increased fire load or hazard.

Automatic Shut Down

Where the building has a fire detection system or manual Fire Alarm points, a shut down valve can be installed in the line from the gas or fuel supply, which, when receiving a signal from the detection system, can be shut.

The device cannot be reset until the downstream line is pressurised and can hold pressure, thus ensuring that the reset function does not release gas or fuel into a ruptured line.

Figure 1 below shows a typical installation in a sprinkler protected car park of an unsprinklered building (see note below), designed to isolate the LP Gas cylinders from the gas hot water heaters in the apartments.



Figure 1 – Gas Shutdown System

Note the following:-

1. The yellow box with coloured buttons is the control unit which requires a 240V 50Hz electrical supply to keep the valve energised and open; and also the signal from the fire detection system.
2. The shut down valve has an integral by-pass valve allowing the downstream pipe to be re-pressurised after repair of burner shut off. Adequate downstream pressure is required before the valve will reset.
3. The yellow handled valves allow for the installation and removal (for servicing) of the valve.
4. The blue handled valve is the by-pass whilst the valve is removed for service.

Power supplies

All safety systems shall be fail safe open or closed as appropriate. In the case of gas shut down, fail safe closed is required.

The valve shown is the FSCS preferred solution of a fail safe closed (power failure) valve with 240Vac power and a simple mains power trip from the FIP to a relay within the control box.

Mains power failure will trip the valve and the power supply can be taken from any source. Note that if the power is from a source that may regularly be isolated, then constant shut down situations may occur and the resetting will be required by a gas plumber on every occasion.

If you take it from the Essential Services supply, this will reduce resetting requirements.

All valves are required to have AGA approval. A Form 15 from designer and Form 16 from both electrical and gas valve installer are required.

Note that QFES will see this as a Special Fire Service and needs to comply with BFSR2008. Note that if there is a gas appliance in a sprinkler protected building; A2118.1 requires automatic shut down on sprinkler actuation.

Whilst many Companies should be competent to source and install this equipment; FSCS has found that in S E Queensland, RJW Gas Services (Rockie Whitbread on 0407 111 595) has a comprehensive understanding of the requirements and available equipment.