GFC 104 - FUEL GAS INSTALLATION AND OPERATION STANDARDS

OVERVIEW

- INTRODUCTION – LPG & NATURAL GAS
- LPG TYPICAL INSTALLATION
- NATURAL GAS TYPICAL INSTALLATION
- GAS PIPING INSTALLATION
- CONTAINER
- GAS APPLIANCE INSTALLATION
- INSPECTION, TESTING AND COMISSIONING
- OPERATION
- SAFETY REQUIREMENT

INTRODUCTION

LPG Storage System

- MS 830:2013
- NFPA 58:2015

LPG & NG Low Pressure Piping System

- MS 930:2017
- NFPA 54:2014

Gas Pipeline

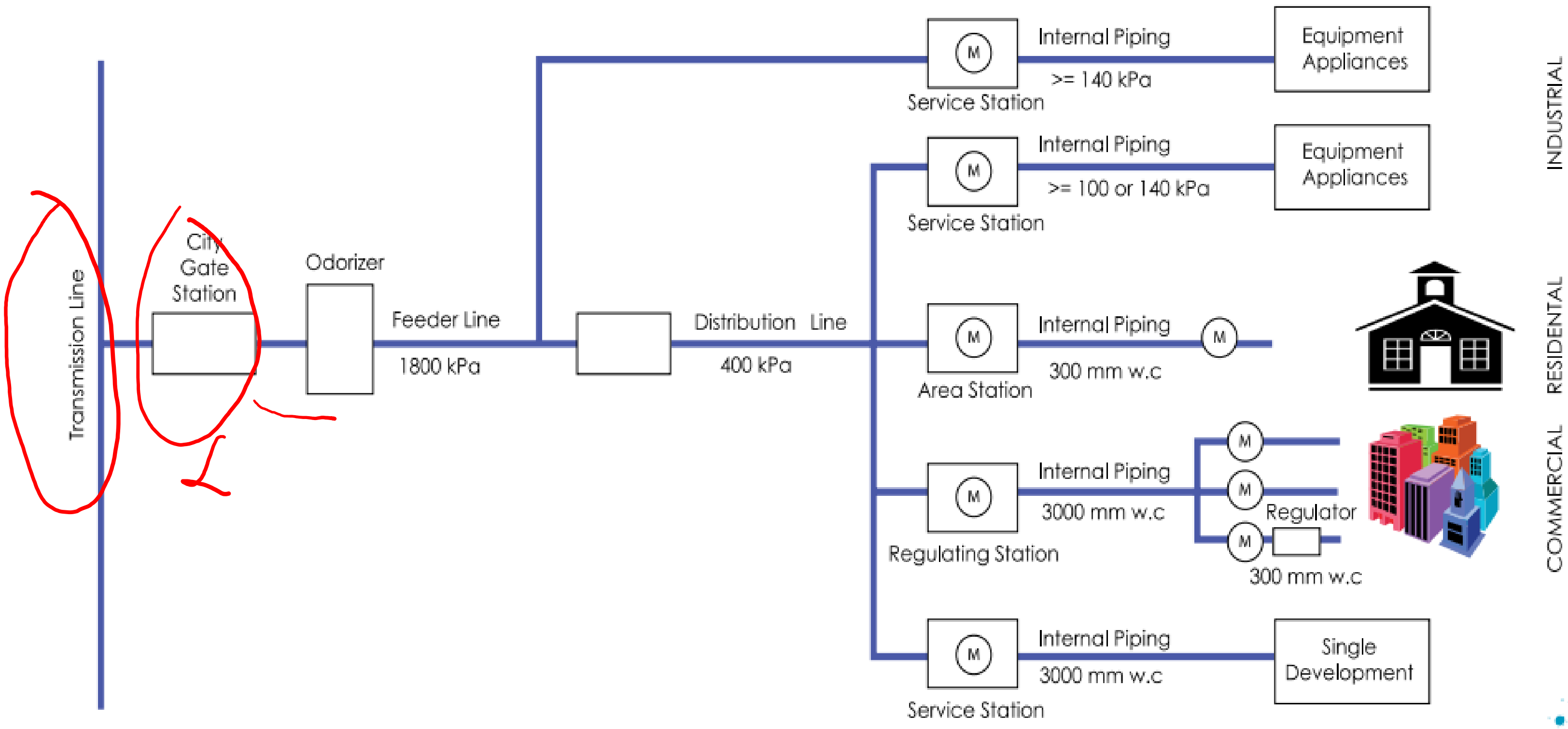
- ASME B31.8 : 2014

INTRODUCTION

Natural Gas

- natural gas is mainly methane
- natural gas is not stored at the consumer's premises due to the complexity of storage facilities. Natural gas only can be easibly liquefied under cryogenic conditions
- natural gas is lighter than air. Hence, escaping vapour rises upwards
- natural gas forms a flammable mixture within flammability limit when mixed with air in the correct proportion
- natural gas is odorised before distribution

NATURAL GAS TYPICAL INSTALLATION



The pressure from the main line is reduced at the city gate station to about 1700 - 2070 kPa (250-300 psig) and subsequently at district stations to 400 kPa (60 psig). The pressure is further reduced at area stations in residential complexes to about 300 mm w.c. (0.43 psig) before the pipe enters the building for further reticulation to gas appliances. Refer to Fig. 3.

NATURAL GAS TYPICAL INSTALLATION

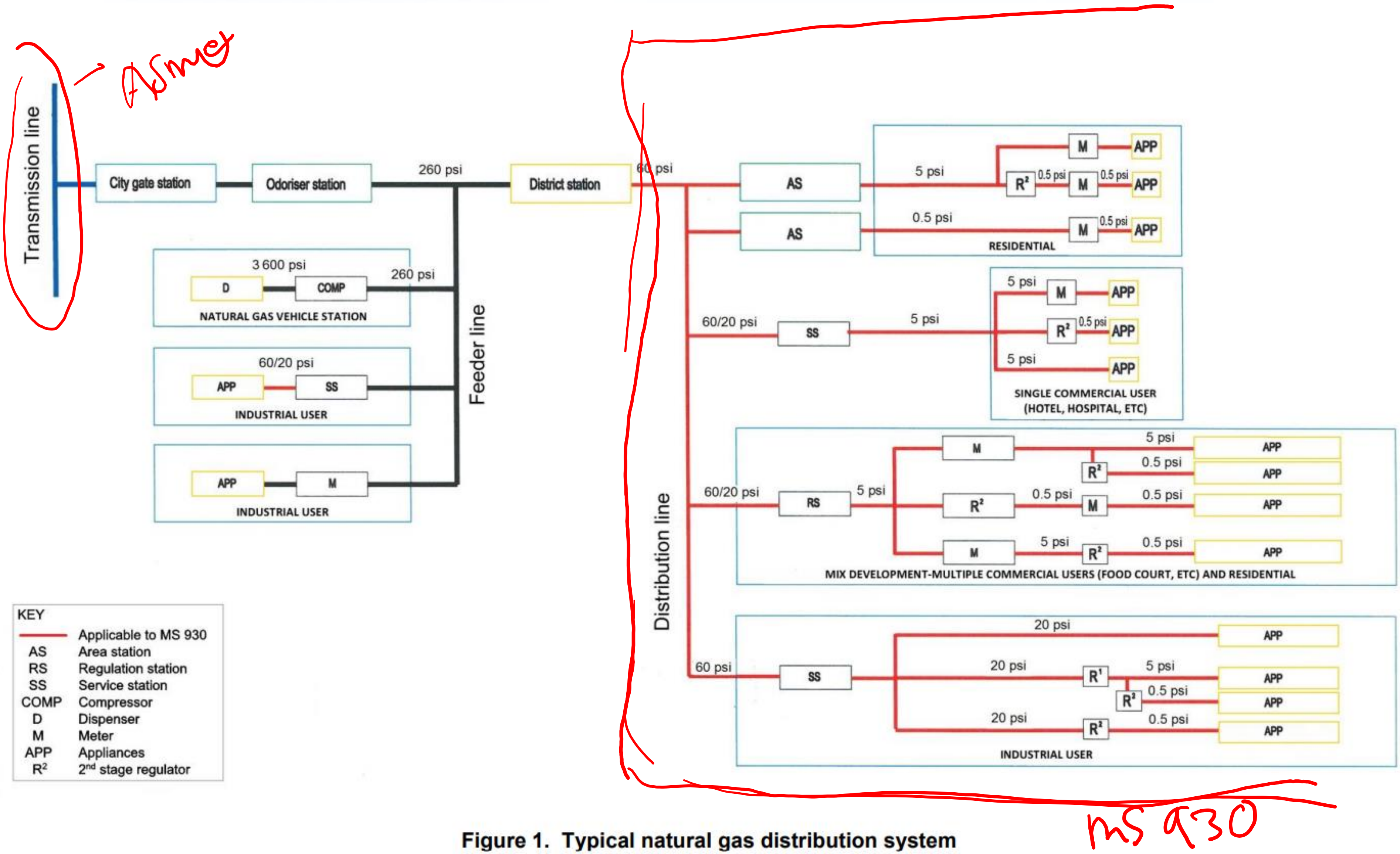
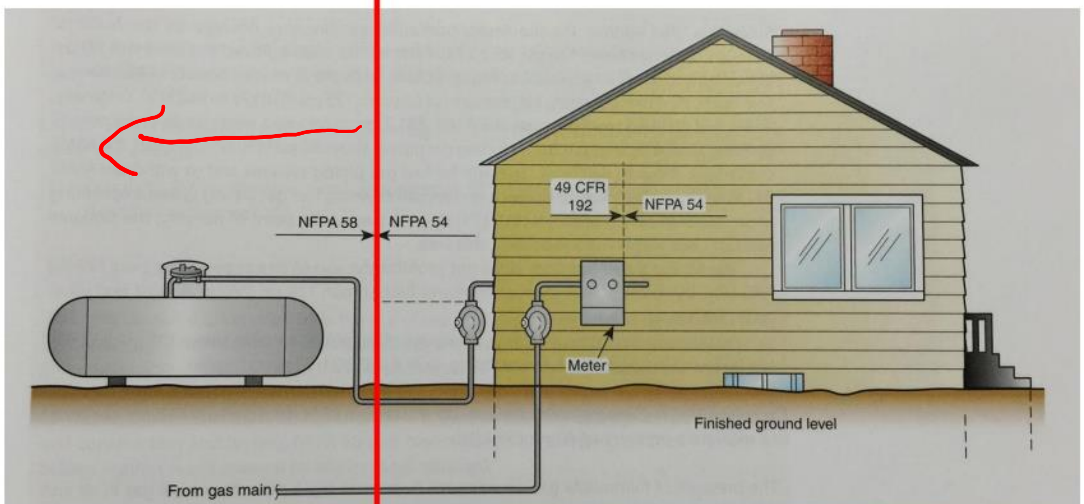


Figure 1. Typical natural gas distribution system

LPG TYPICAL INSTALLATION

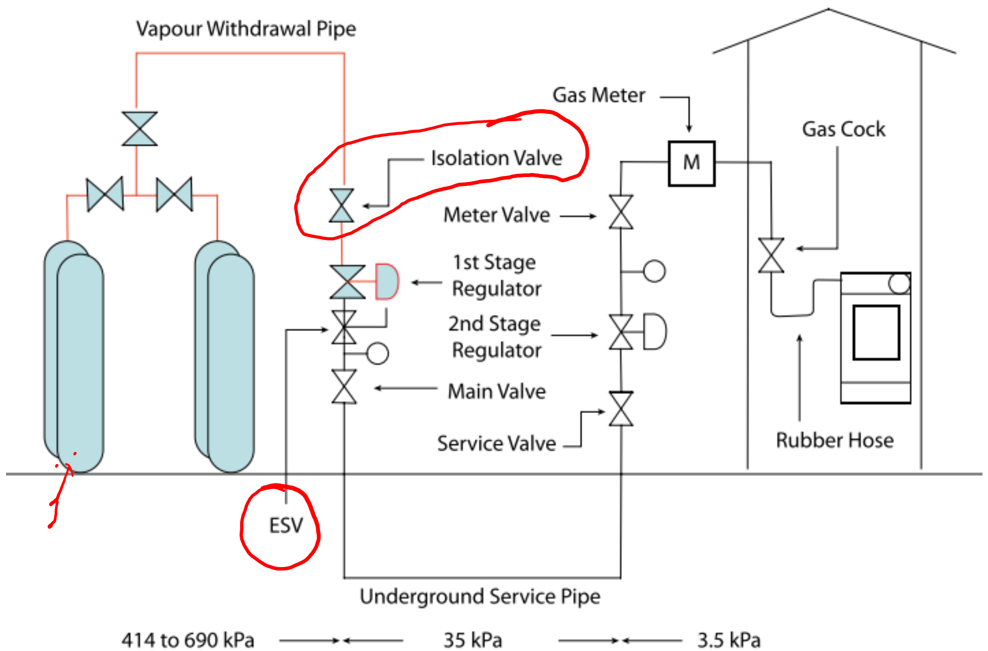
LPG DISTRIBUTION SYSTEM



MS 830 : 2013
(LPG Storage)

MS 930 : 2017
(Gas Piping)

LPG TYPICAL INSTALLATION



LPG is stored at consumer's premises in pressurised vessels (for bulk storage systems) or in cylinders, which are manifold together. The design pressure of the vessel or cylinder is usually 1725 kiloPascal (kPa) or 250 pounds per square inch (psig). Bulk storage vessels may be installed in any of the following configurations:

- aboveground - tank is fully exposed aboveground
- underground - tank is fully buried underground
- mounded - tank is fully earth-covered above the ground

LPG TYPICAL INSTALLATION

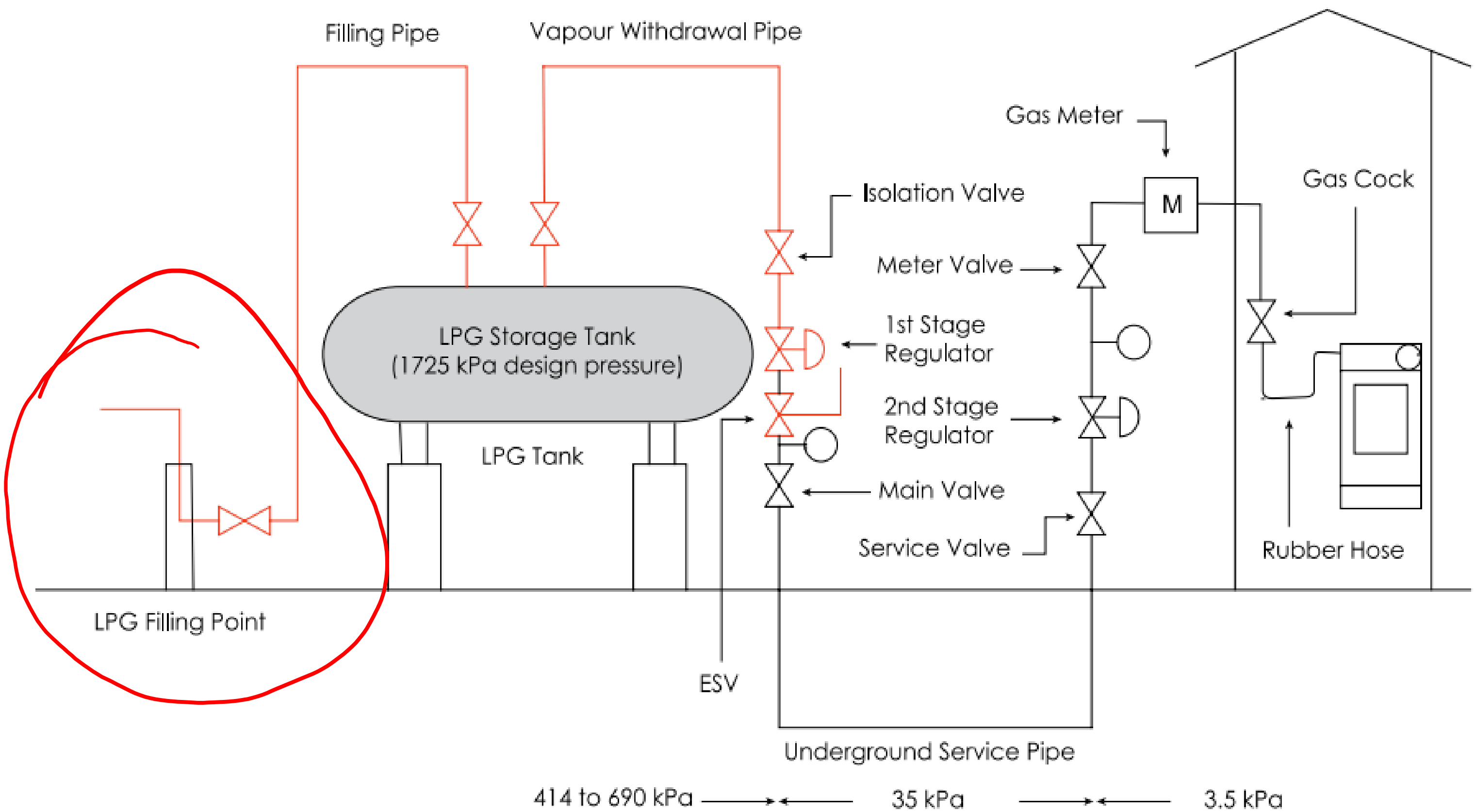


Fig. 2 : LPG bulk storage and piping system

GAS PIPING INSTALLATION

The general principles that must be borne in mind when planning a gas pipe installation on residential premises are as follows:

a) the piping system must be designed so that the gas meter provided by gas supplier can be properly located for or within the building of the owner or each customer.

b) gas pipes should be located such that the locations of isolation valves are easily accessible to the users to facilitate line isolation during emergency. Each floor or section of a building should be provided with an isolation point, in case of fire or leakage at any of the sections.

c) gas pipes should, as far as practicable, be run outside the building, especially when the operating line pressure exceeds 35 kPa (5.0 psi). However for maintenance purposes, it is recommended that pipe riser to be installed at accessible and reachable location near corridors or dedicated shafts.

d) gas pipes should preferably enter the building aboveground and remain aboveground and in ventilated location.

GAS PIPING INSTALLATION

e) gas pipes should be properly painted and labelled for identification purposes. The colour for gas pipes should be yellow.

f) the pipe route selection should avoid any positions where the pipe could be liable to damage, either during the building construction or when the property is finally occupied.

g) the fire resistance of the building must not be impaired.

h) the route should, as far as possible, avoid the need to cut into load-bearing walls or joist.

i) pipes may be concealed, but provision should be made for access. Exposed gas pipes would facilitate leak detection and maintenance.

j) pipe riser ducts must have 2 hour fire rated doors and have one side as an external wall with fixed louvers or ventilated pre-cast block venting naturally to atmosphere.

GAS PIPING INSTALLATION

l) pipes passing through a cavity must take the shortest route and be sleeved.

m) pipes are normally run above ceiling, dropping down to appliances on the floor below it, when no other route is available.

n) pipes must not be laid under or through foundations.

o) pipes should never run diagonally across walls or floor. They should normally follow the line of the walls and be kept close to them.

p) the piping system must not be exposed to the excessive external stress, vibration or corrosion.

q) the piping system must be installed at a location where maintenance and checking work can be done easily.

GAS PIPING INSTALLATION

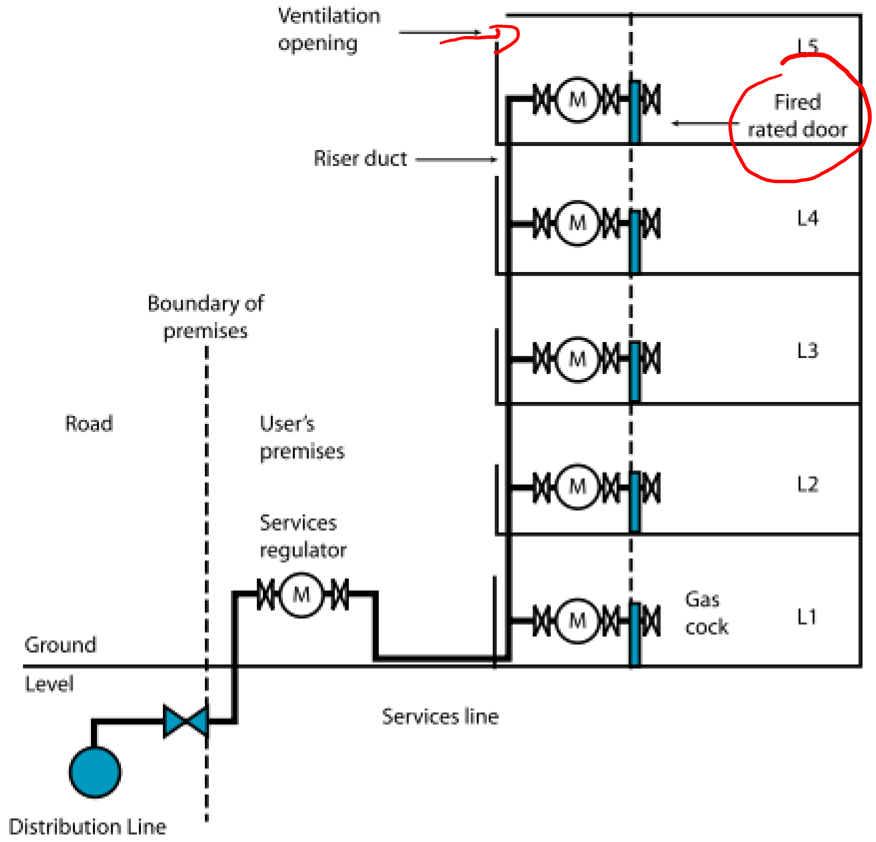


Fig. 8 : A typical natural gas piping layout on domestic consumer's premises

GAS PIPING INSTALLATION

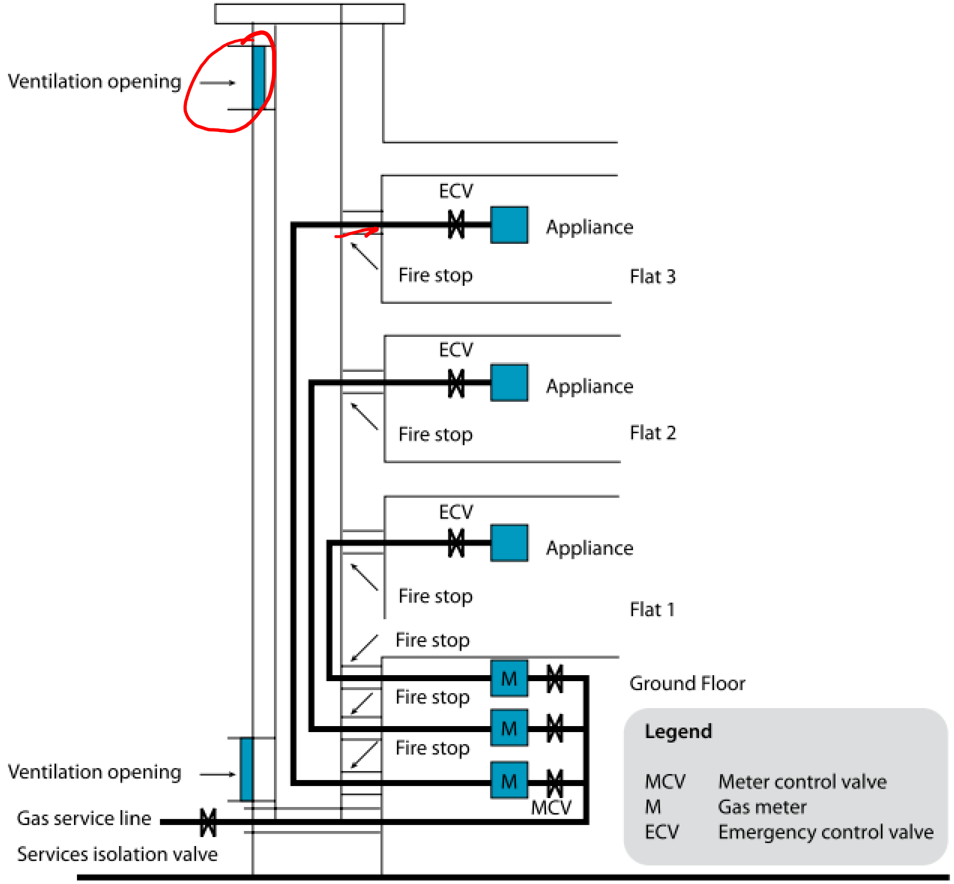


Fig. 9 : Typical layout of ventilated gas pipe shaft/duct

GAS PIPING INSTALLATION

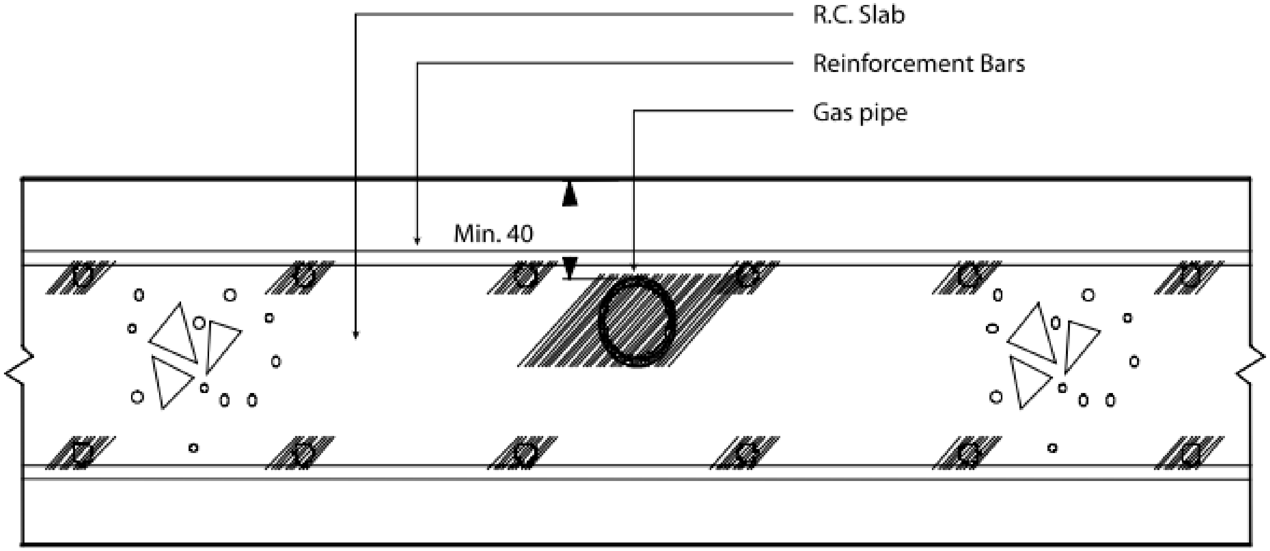


Fig. 10 : Piping embedded in concrete floor

Piping buried in a ground

Underground pipes also need to be protected against above ground loading by using protective sleeves and concrete slabs. When dissimilar metal are joined underground, an insulating coupling or fitting should be used.

GAS PIPING INSTALLATION

Pipe penetrating through solid wall or floor

Gas pipes passing through solid walls or floors must take the shortest practicable route and be enclosed in a gas tight sleeve.

Anti corrosion tape should be wrapped at least 100 mm travel from finish wall.

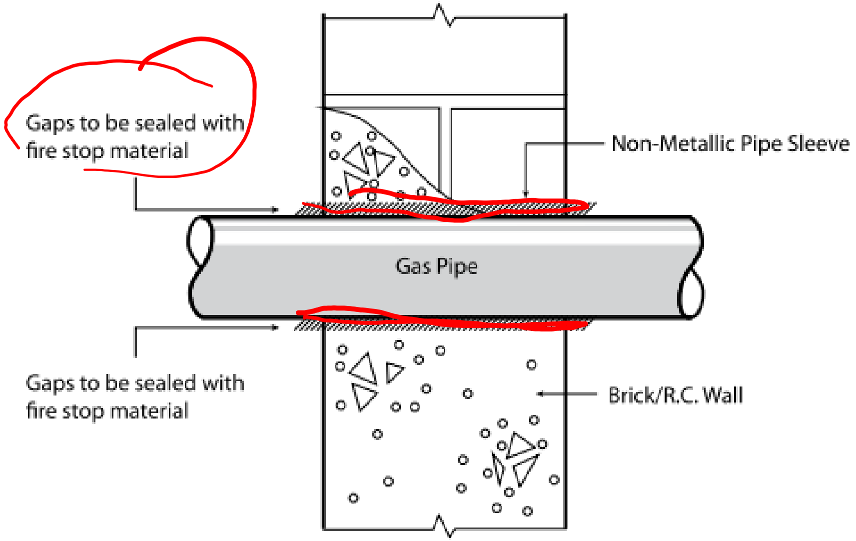


Fig. 11 : Pipe penetrating through solid wall or floor

GAS PIPING INSTALLATION

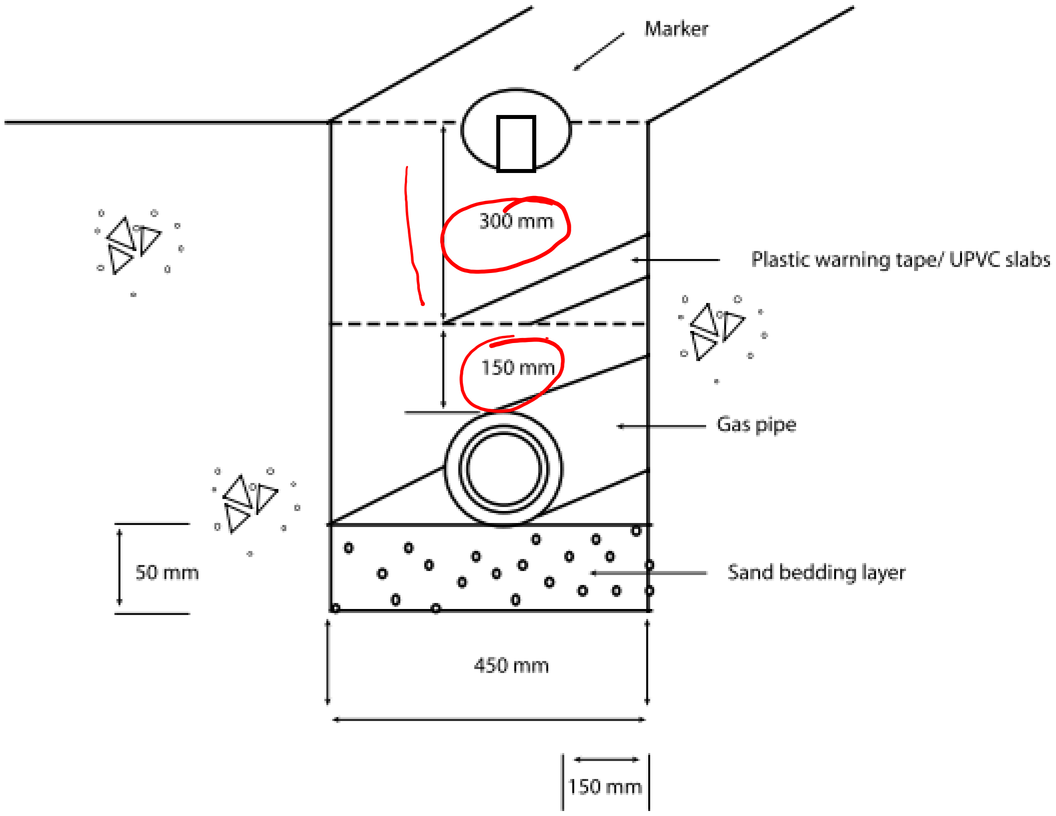


Fig. 12 : Piping buried in ground floor or under concrete external of building

GAS PIPING INSTALLATION

Drain Crossing

Drain crossing gas pipe should be installed under the drain as shown in the following figure:

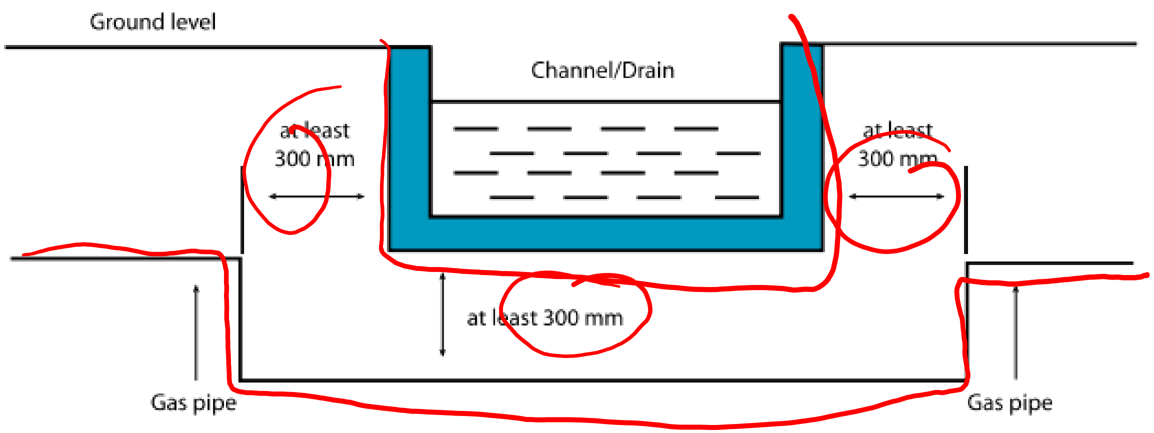


Fig. 14 : Typical drain crossing

GAS PIPING INSTALLATION

PIPE JOINTING

Jointing methods must also be suitable for the particular gas reticulation design. Gas piping joints must have good strength and leak tightness properties. The joint must be able to sustain the maximum end force due to the internal pressure and any additional forces due to temperature expansion or contraction, fatigue or to the weight of the pipe and its contents.

Welded joints are normally used for their excellent strength and sealing properties under all operating conditions. However, sometimes threaded joints may be use for very small diameter pipes operating at low pressures. Threaded joints are very leak-prone, hence, they should not be used in concealed/underground pipe installations as stated in MS 930.

Although welding is preferred, threaded joints and fittings are permitted for pipe sizes up to and including 4" operating at 35 kPa (5 psig) or less. Pressure piping larger than 4" and all pressure piping above 35 kPa (5 psig) regardless of size must be welded or flanged.

GAS PIPING INSTALLATION

Joints in steel pipe may be welded in accordance with API 1104 or ASME IX. Metallic pipe and fitting threads should be taper pipe threads and should comply with ANSI B2.1.

Joints in copper pipe should be brazed in accordance with ANSI/AWS B2.2-91. Copper fittings should conform to EN 1254.

Joints in polyethylene pipe should be made by heat fusion in accordance with manufacturers' instruction. Polyethylene fittings should conform to ASTM D2683 or ASTM D3261. Plastic pipe or tubing should not be threaded.

Welders of metallic gas piping or jointers of non-metallic piping must have a valid certificate of qualification from the relevant authority such as DOSH or Construction Industry Board (CIDB). For this, welders have to pass performance qualification tests according to the API 1104 or equivalent code requirements before they can be allowed to do the welding job.

GAS PIPING INSTALLATION

SECTION 5: GAS PIPING INSTALLATION

5.1 Piping underground

5.1.1 Clearances

Underground gas piping shall be installed with clearance from any other underground structure to avoid contact therewith, to allow maintenance, and to protect against damage from proximity to other structures. In addition, underground plastic piping shall be installed with sufficient clearance or shall be insulated from any source of heat so as to prevent the heat from impairing the serviceability of the pipe.

5.1.1.1 For electrical services

For clearance with electrical services, underground piping shall be installed at least 500 mm (20 in.) distance for voltage less than 1 kV and 1 m distance for voltage above 1 kV. Gas piping shall not be installed within the same trench as electrical services cables.

For clearance with lightning arrester, underground piping shall be installed at least 1.5 m (5 ft) distance.

5.1.1.2 For other than electrical services

Underground piping shall be installed minimum of 300 mm (12 in.) distance from other services.

GAS PIPING INSTALLATION

5.1.2 Protection against damage

Means shall be provided to prevent excessive stressing of the piping where there is heavy vehicular traffic or soil conditions are unstable and settling of piping or foundation walls could occur. Piping shall be buried or covered in a manner so as to protect the piping from physical damage. Piping shall be protected from physical damage where it passes through flower beds, shrub beds, and other such cultivated areas where such damage is reasonably expected.

5.1.2.1 Cover requirements

5.1.2.1.1 Private land

Underground piping systems shall be installed with a minimum of 300 mm (12 in.) of cover.

a) The minimum cover shall be increased to 450 mm (18 in.), if external damage to the pipe or tubing from external forces is likely to result.

b) Where a minimum of 300 mm (12 in.) of cover cannot be provided, the pipe shall be installed in conduit or bridged (shielded).

5.1.2.1.2 Beyond the boundary line of private land

Underground piping systems shall be installed with a minimum of 900 mm (35 in.) of cover or deeper whichever is required by the authority.

GAS PIPING INSTALLATION

5.2.4 Identification of piping

Gas piping shall be painted with golden yellow or as specified by the authorities having jurisdictions.

Gas flow directional signage shall comply with the *Gas Supply Act* 1993 and *Gas Regulations* 1997, painted in black and placed at spacing of 6-metre interval or at any change of direction.

GAS PIPING INSTALLATION

5.2.8 Above-ceiling locations

Gas piping may be installed in accessible above-ceiling spaces and shall be welded. Valves, accessories or any threaded connections shall not be located in such spaces.

5.2.9 Prohibited locations

To prevent the distribution of gas leakage throughout the building, piping inside any building shall not be installed at the following locations:

a) lift shaft;

b) flues, chimneys and gas vents;

c) circulating air duct and ventilating duct;

d) chute;

GAS PIPING INSTALLATION

e) enclosed staircase;

f) electrical rooms;

g) air handling unit (AHU) room;

h) protected lobby;

i) fire-fighting lobby;

j) protected corridors or passageways which are routes of escape/exit;

k) under load bearing foundations and walls;

l) area or location owned or exclusively used by third party (e.g. local authority); and

m) any locations deemed to be unsafe by the authorities having jurisdiction.

CONTAINER

2.4 Marking of containers

2.4.1 Cylinders shall be marked in accordance with MS ISO 22991 or DOT.

2.4.2 Container exceeding 0.15 kl shall be conspicuously and permanently marked with the following information:

a) manufacturer's name or trade-mark, serial number and year of manufacture;

b) pressure vessel code to which it is made;

c) the water capacity in litres (L) or kilolitres (kl);

d) outside surface area in square meter (m^2);

e) class of vessel (e.g. Class 1);

f) design pressure in kilopascals (kPa);

g) date of initial hydrostatic test;

h) date of hydrostatic retest;

i) the maximum safe working pressure in kilopascal (kPa);

j) the tare mass in kilograms (kg) of container (for containers to be filled by mass);

k) maximum permitted filling level in percent (%) (for containers to be filled by volume);

l) the wording "This container shall not contain a product that has a vapour pressure in excess of ___ kPa at 36.7 °C"; and

m) official stamp of the inspecting authority.

GAS APPLIANCE INSTALLATION

- The gas appliance must be of the approved type and is suitable for the type of gas supply (natural gas or LPG) to which it will be connected. The installer should provide the user with all the relevant manufacturer's instructions.

- Gas appliances should not be installed in premises without the connection being tested for gas tightness, ascertaining that all the gas safety controls are in proper working order, ensuring that there is proper ventilation and the operating pressure is as recommended by the manufacturer.

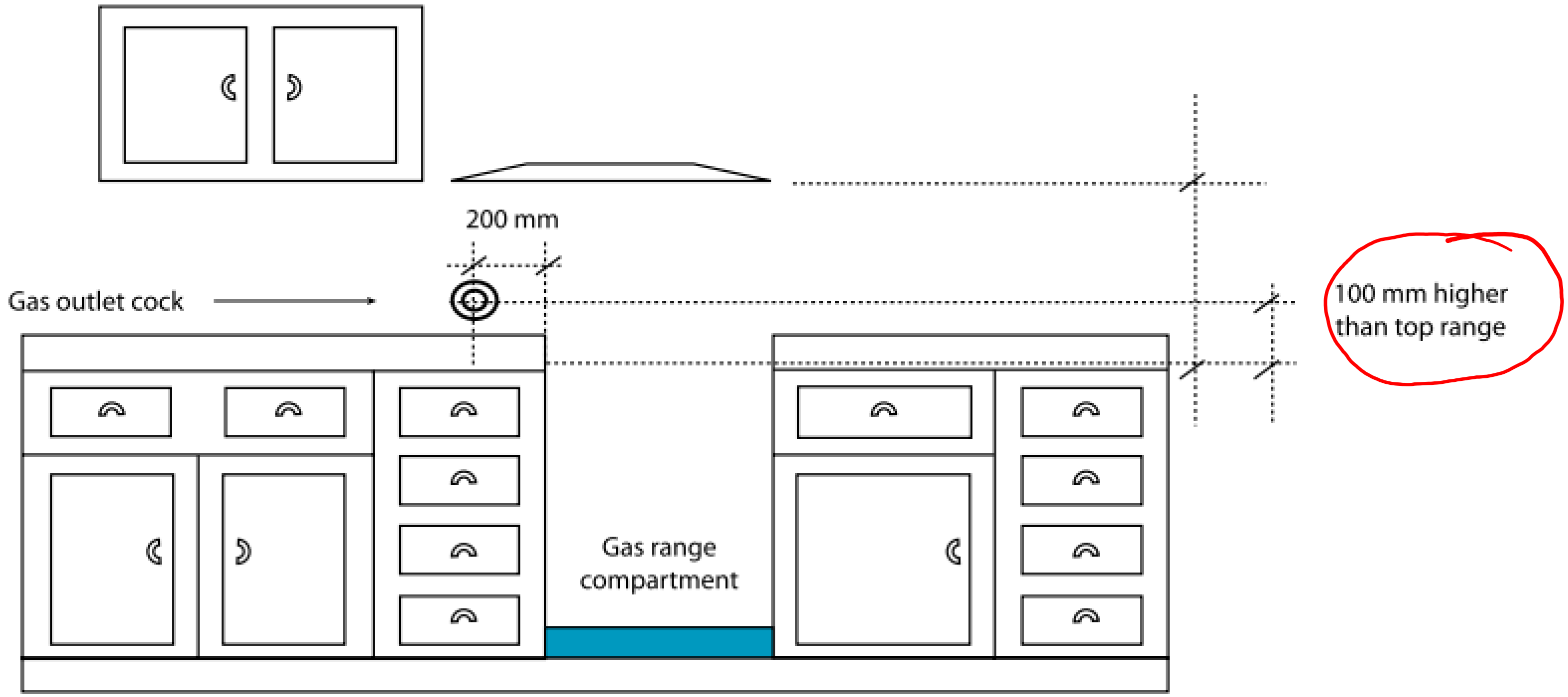
- To enable appliances to be moved to a limited extent for convenience of use or to facilitate cleaning, a flexible hose connection approved by Energy Commission should be used. The length of connecting hose or tube from the gas cock to the appliance should not exceed 1.5 m. The material of the hose or tube should be rubber or copper approved by Energy Commission.

GAS APPLIANCE INSTALLATION

- Adequate ventilation for combustion should be provided by ensuring air change, natural or otherwise in the kitchen as a whole. Separate flues or venting to the outside air are normally not required for domestic cooking appliances unless the kitchen area is fully air-conditioned. In such cases, flues should be designed and installed according to MS 930 requirements. Appliance manufacturers generally offer detailed information on proper venting of gas appliances. These instructions must be closely followed as specified in the appliance installation manual and operating instructions.

- Gas cocks should not be located in a position where either the flame of the gas table range could touch the gas cock or where heat from flame could have any significant effect on it or the gas hose.

GAS APPLIANCE INSTALLATION



GAS APPLIANCE INSTALLATION

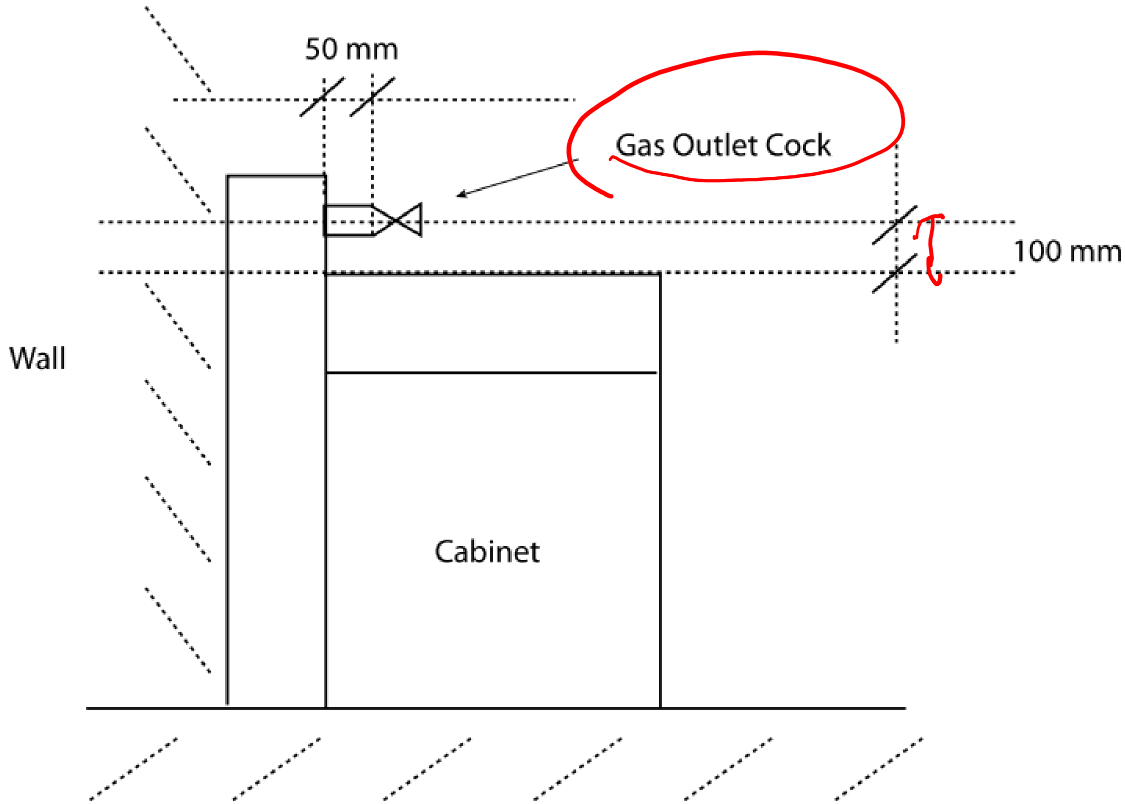


Fig. 16 : Typical location of gas cock at cabinet type top range

INSPECTION, TESTING AND COMMISSIONING

- Prior to acceptance and initial operation, all piping installations should be inspected and tested by a competent person to ensure that the materials, design, fabrication and installation comply with the technical and safety requirements of the recognized standards.
- Inspection should consist of visual examination during or after fabrication, assembly or test as appropriate.
- Corrosion protective coating should be subjected to holiday testing (test of the continuity of protective coating). Coating defects or damage that may impair effective corrosion control should be repaired prior to installation in the ditch as specified by the relevant codes such as MS 830 or National Association of Corrosion Engineers (NACE) Recommended Practice.

INSPECTION, TESTING AND COMMISSIONING

- The pressure or leak test medium should be air, water or an inert gas (e.g. nitrogen, carbon dioxide). Gas may be used as the test medium at the maximum pressure available in the system at the time of the test.
- Pipe joints including welds should be left exposed for examination during the test. Expansion joints should be provided with temporary restraints, if required for the additional thrust load under test.
- Soapy water solution test may be used to locate leaks if all joints are accessible during the test. The test pressures and duration for various sections of natural gas and LPG piping systems are summarised in the table below:

INSPECTION, TESTING AND COMMISSIONING

Table 7. LPG piping system pressure/leak test requirements

Scope	Maximum operating pressure (kPa (psi))	Type of test		Test pressure (kPa (psi))	Test duration (hour)		Equipment			
		Test	Medium		Above ground	Buried	Pressure gauge	Pressure chart recorder[a]	Soap solution	Gas detector[b]
From tank/manifold up to 1^{st} stage regulator	Up to 860 (125)	Pneumatic/leak	Nitrogen	1 900 (275)	1	-	√	√	√	
		Leak (during commissioning)	LPG	Operating pressure	-		-	-	√	√
From 1^{st} stage regulator up to 2^{nd} stage regulator	Up to 140 (20)	Pneumatic/leak	Nitrogen Air	345 (50)	1	24	√	√	√	-
		Leak (during commissioning)	LPG	Operating pressure	-	-	√	-	√	√
After 2^{nd} stage regulator	Up to 7 (1)	Pneumatic/leak (appliances disconnect)	Nitrogen Air	140 (20)	0.5	24	√	√	√	-
		Leak (during commissioning)	LPG	Operating pressure	-	-	√	-	√	√

[a] Pressure chart recorders shall be used when underground piping systems are involved.

[b] Soapy water solution shall be used when a gas detector is not available.

INSPECTION, TESTING AND COMMISSIONING

Table 8. Natural gas piping system pressure/leak test requirements

Scope	Maximum operating pressure (kPa (psi))	Type of test		Test pressure (kPa (psi))	Test duration (hour)		Equipment			
		Test	Medium		Above ground	Buried	Pressure gauge	Pressure chart recorder[a]	Soap solution	Gas detector[b]
From service station up to 2nd stage regulator/ meter/appliance	Above 140 (20)	Hydrostatic	Water	1.5 x MAOP	1	24	√	√	-	-
		Pneumatic/leak	Nitrogen		1	24	√	√	√	-
			Air							
From service or area station up to 2nd stage regulator/meter/ appliance	Up to 140 (20)	Hydrostatic	Water	345 (50)	1	24	√	√	-	-
		Pneumatic/leak	Nitrogen						√	
			Air							
		Leak (during commissioning)	Natural gas	Operating pressure	-	-	√	-	√	√
After 2nd stage regulator	Up to 7 (1)	Pneumatic/leak (appliances disconnect)	Nitrogen	140 (20)	0.5	24	√	√	√	-
			Air							
		Leak (during commissioning)	Natural gas	Operating pressure	-	-	√	-	√	√

[a] Pressure chart recorders shall be used when underground piping systems are involved.

[b] Soapy water solution shall be used when a gas detector is not available.

MS830 :Annex C

Annex C
(normative)

Pressure testing of pipe work at LPG installations

C1 Connections between container or cylinder and first-stage regulator

C1.1 Testing of the connection between storage containers or cylinders and the first-stage regulator shall be made at 1 925 kPa (gauge) using soapy water solution to detect leaks at all joints.

There shall be no loss in pressure after a period of 1 h.

INSPECTION, TESTING AND COMMISSIONING

PRESSURE TEST OF LINE (NEW, OLD OR MAINTAINED)

CHECKLIST TO BE REPEATED*

STEP 1 ENSURE BRANCH LINE ISOLATION VALVES ARE IN THE CLOSED POSITION AND PLUGGED

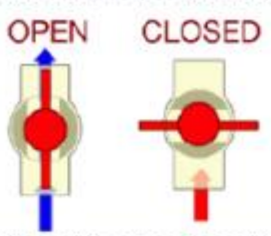
STEP 2 SELECT ANY SOCKET OR VALVE INLETS FOR INTRODUCTION OF MEDIUM FOR PRESSURE TEST (PNEUMATIC OR HYDROSTATIC)

STEP 3 INSTALLATION OF PRESSURE GAUGE FOR READING TAKING ARE TO BE INSTALLED IN DESIGNATED BRANCH LINE FOR PRESSURE OBSERVATION

STEP 4 INSERTION / INTRODUCTION OF MEDIUM INTO BRANCH LINE AT DESIGNATED PRESSURE

STEP 5 PERFORM PRESSURE RECORDING OF TEST LINE WITH REQUIRED TIME REQUIREMENT

STEP 6 LEAK TEST / SNOOP TEST OF GIVEN LINES AND CHECK FOR LEAKING (IF LEAKING, RE-SEAL PIPE/REPAIR PIPE AND REPEAT STEPS 1-6



OPERATION

- Gas piping systems in service are subjected to various degrading or abnormal operating conditions such as third-party activities, corrosive environment , ground erosion , excessive pressure fluctuations, malfunctioning or breakdown of component s, material wear and tear, and tampering . It is the duty of the owner or occupier of the premises to safely operate and maintain the system in accordance with manufacturer's specifications.

- The regulations provide for a 'responsible person' who may be the licensee or consumer, or an occupier of the premises, or where there is no consumer or occupier, the owner of the premises or any person authorized by the consumer or occupier to be in charge of the gas pipeline or gas installation in the premises.

OPERATION

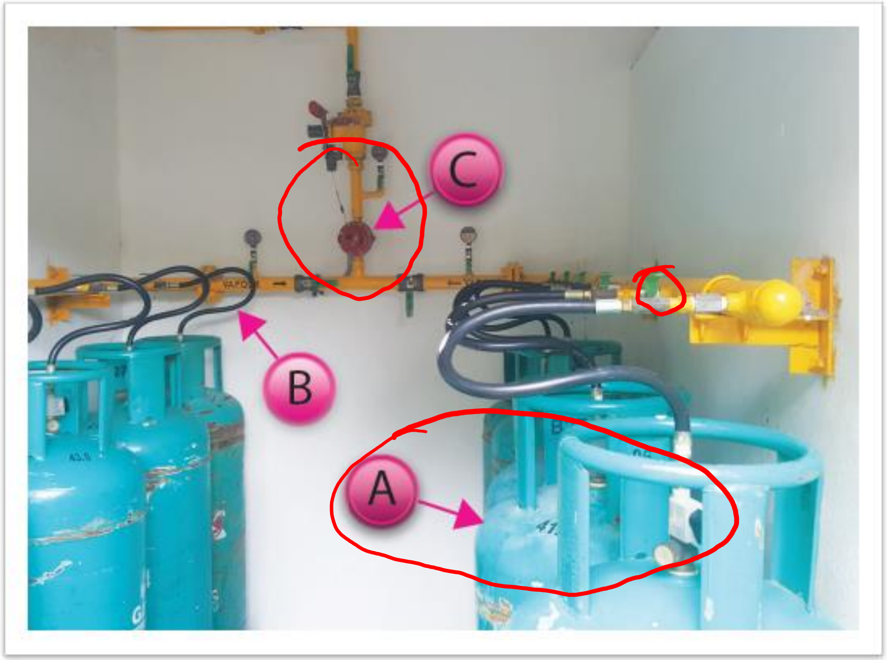
His role is essentially to be in charge of the gas pipeline or gas installation in the premises to ensure that certain basic safety and administrative requirements are being adhered to in the operation and use of the system . He is responsibilities as provided for under the regulations are as follows :

- ensuring that the gas pipeline can be continuously identified,
- immediately taking all reasonable steps to cause the supply of gas to be shut off in the event of him knowing or suspecting gas escaping into the premises ,
- informing the related authority if gas continues to escape after supply has been shut off ,
- taking all reasonable steps to ensure that gas can be re-supplied without causing any danger after supply is shut off for safety reasons,
- ensuring that the gas installation is maintained in a good and efficient working order,
- ensuring that safety is observed at all times so as to prevent danger from arising at the gas installation ,
- attending and assisting any inspection on the gas installation performed by the related Authority or his Authorized Officers,
- keeping of a maintenance record book in which any maintenance and repair work carried out on a gas installation is recorded,
- being informed of any alteration or repair to be carried out on the supply system by the competent person,
- being notified of any necessary emergency repairs done by the competent person, and
- taking adequate precautions to prevent a gas installation or equipment from being accidentally or inadvertently made unsafe during maintenance work.

SAFETY REQUIREMENT

Examples of Compliant Installations

(a) Example 1



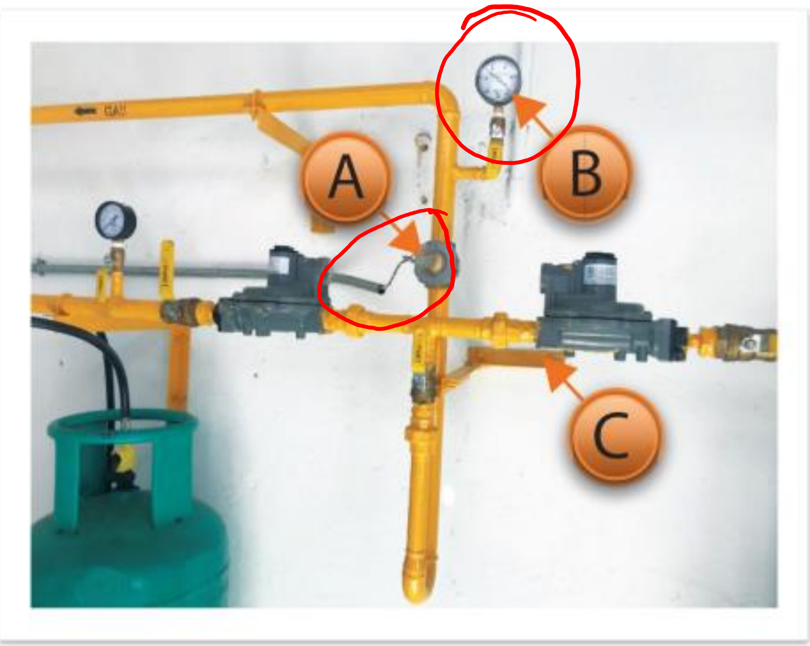
A. 50kg LPG cylinders for commercial use

B. Pigtail connecting a 50kg LPG cylinder to the manifold is fitted with a check valve

C. Emergency shut-off valve installed at an appropriate location and pullout cable placed in a suitable conduit

SAFETY REQUIREMENT

(b) Example 2



A. Emergency shut-off valve installed at an appropriate location and pullout cable placed in a suitable conduit

B. Pressure gauge installed to indicate the pressure of the gas in the piping system

C. Regulator installed not higher than two (2) meters above finished floor level

SAFETY REQUIREMENT

(c) Example 3

A. Standard safety signage

B. LPG storage containing not more than 12 units of 50kg LPG cylinders

C. Emergency shut-off valve installed at an appropriate location and pullout cable placed in a suitable conduit

SAFETY REQUIREMENT

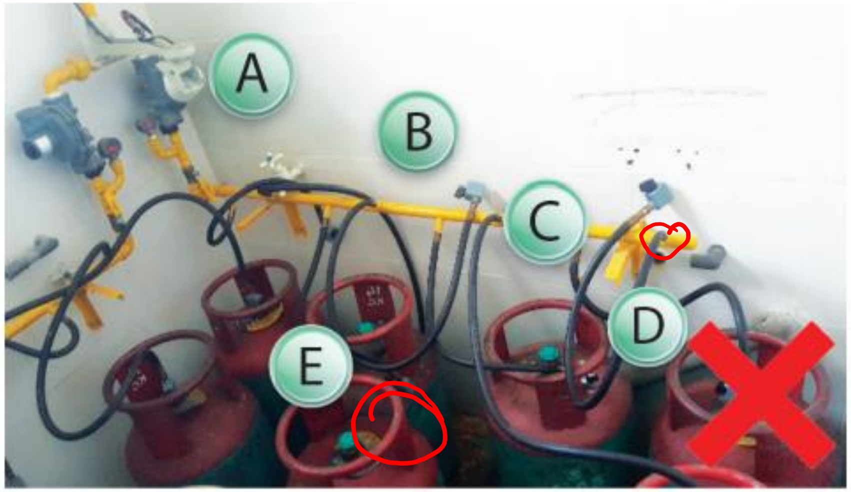
Examples of Non-Compliant Installations

(a) Example 1

A. 14kg LPG cylinders for domestic use
B. No emergency shut-off valves installed
C. Pigtail connecting LPG cylinder to the manifold is not fitted with check valve

SAFETY REQUIREMENT

b) Example 2



A. Surveillance camera (electrical equipment) not of explosion-proof type

B. LPG storage area not protected with a 4-hour fire-rated wall

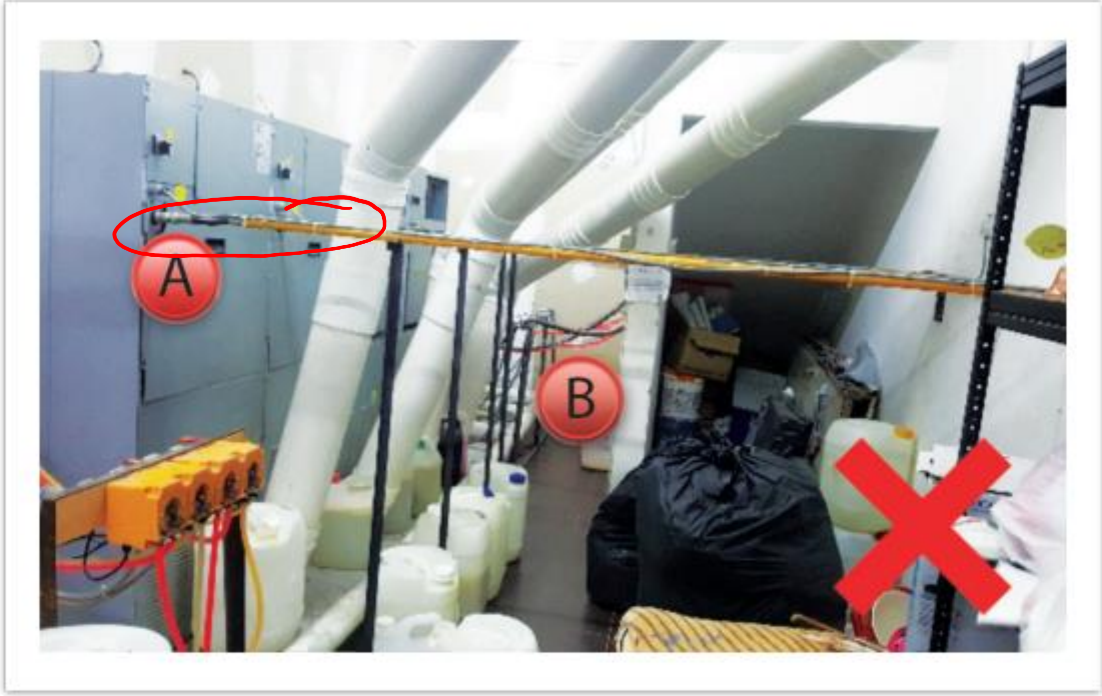
C. No emergency shut-off valve installed

D. Pigtail connecting LPG cylinder to the manifold not fitted with check valve

E. Unused LPG cylinder stored at LPG storage

SAFETY REQUIREMENT

(c) Example 3

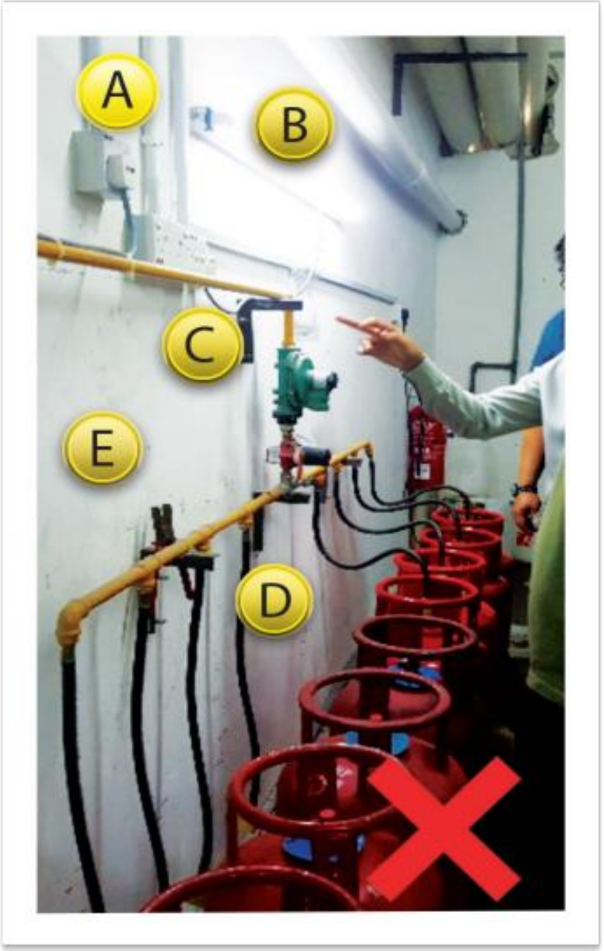


A. Electrical wiring in contact with piping is not of explosion-proof type and suitable for a Zone 2 area

B. Gas detector not installed

SAFETY REQUIREMENT

(d) Example 4



A. Electrical wiring and equipment not of explosion-proof type

B. Electrical equipment not of explosion-proof type

C. No emergency shut-off valve installed

D. Pigtail connecting LPG cylinder to the manifold not fitted with check valve

E. LPG storage area not protected with a 4-hour fire-rated wall

SAFETY REQUIREMENT
MS830 :ELECTRICAL AND ELECTROSTATIC HAZARD PRECAUTIONS

14.4.4 Earthing and bonding

Earthing and bonding of all electrical equipment shall comply with the requirements of MS IEC 60079-10 and MS IEC 60079-14.

14.4.5 Electrostatic hazard precautions

14.4.5.1 An effective earthing point and/or bonding connection shall be provided at the storage site for discharging static electricity from bulk tank vehicles, prior to commencing the delivery operation.

14.4.5.2 Storage containers greater than 2.5 kl water capacity shall be electrically earthed as a protection against the accumulation of static electricity and should have electrical continuity with the earth required in 14.4.5.1 or preferably it should be a common earth. The resistance to earth shall not exceed $1 \times 10^5\ \Omega$

14.4.5.3 Pipelines and hoses conveying liquid LPG shall have electrical continuity and be effectively connected to earth. Attention is drawn to the need to earth the ball and actuating lever of ball valves where non-conducting seals and gland packings are employed.

SAFETY REQUIREMENT
MS830 :FIRE PROTECTION

15.2.3 System compatibility

Fire protection equipment such as hoses, connectors, booster connections, foam compound and the like should be compatible with that of the local fire brigade.

15.2.4 Location

Fire protection equipment shall be located so as to be reasonably adjacent to the risk protected and accessible in an emergency.

15.2.5 Portable fire extinguishers

Portable fire extinguishers (see notes) shall comply with MS 1539: Part 1 as appropriate.

NOTES:

1. Foam extinguishers are not suitable for LPG fires because these products are gaseous at normal atmospheric temperatures.

2. Heavier types of fire extinguishers that are wheeled for portability are not covered by standards but should comply as far as possible with the appropriate standard from the above list.

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15.2.6 Hydrant systems

A hydrant system shall comply with MS 1489 and the following requirements.

a) Hydrants shall be located so that each container is within reach under any conditions of fire and wind and the cooling effect is optimised (see note).

NOTE. Best results are achieved by locating two hydrants at diagonally opposite locations relative to the container.

b) For each hydrant at least one hose and hose fitting, plus one combine jet/spray hose nozzle shall be provided.

c) Hoses and fire hydrants shall be maintained in accordance with requirements of the relevant authority.

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15.2.7 Water supply

The water supply system for fire protection shall comply with the following requirements.

a) Where a garden hose system is specified, it shall consist of at least a 19 mm nominal size hose of non-kink type and the hose length shall not exceed 30 m. The hose system shall be located at a point not more than 18 m from the container. The hose shall be fitted with a 6 mm bore nozzle and permanently connected to a water supply ready for immediate use. The water supply shall be capable of giving a throw of 6 m from the hose nozzle and a discharge rate of 25 L/min.

b) Water for fire protection shall be provided by town mains wherever practicable.

c) Where town mains exist but cannot supply adequate pressure or quantity a booster pump connection shall be provided.

SAFETY REQUIREMENT
MS830 :Annex Q

LPG emergency procedures

Q1 Gas leak

a) shut emergency stop;

b) close all valves of containers;

c) keep bystanders away;

d) no smoking;

e) no naked lights;

f) no engine to be started;

g) call fire brigade (insert telephone number of local fire station);

h) call LPG distributors (inserts LPG distributor's name and all-hours number); and

i) isolate power at main switchboard.

SAFETY REQUIREMENT
MS830 :Annex Q

Q2 Fire

a) shut emergency stop;

b) call fire brigade (insert telephone number of local fire station);

c) call LPG distributors (Insert LPG distributor's name and all-hours number);

d) close all valves of container;

e) keep bystanders away;

f) isolate power at main switchboard; and

g) follow fire-fighting instructions.

THANK YOU