

Translation: Only the Danish document has legal validity

Notice from the Danish Maritime Authority L – the Construction and Equipment, etc. of Recreational Craft

Chapter III Fixed LPG installations and cooking appliances using spirits or kerosene of 1 October 2006

Regulation 1 – Application	2
Regulation 2 – Definitions	2
Regulation 3 – General	3
Regulation 4 – Pressure regulation devices	3
Regulation 5 – Pipe connections and hose assemblies	4
Regulation 6 – LPG appliances.....	5
Regulation 7 – Location and installation of LPG cylinders.....	6
Regulation 8 – Safety devices.....	6
Regulation 9 – Flues and air intakes	6
Regulation 10 – Testing and putting into service	7
Regulation 11 – Instructions regarding operation, inspection and maintenance	7
Regulation 12 – Installation and repair of LPG installations.....	7
Regulation 13 – Installation	7
Regulation 14 – Fire-extinguishing equipment.....	8
Regulation 15 – Portable equipment.....	8

Regulation 1 – Application

- 1 This chapter shall apply to all LPG installations for cooking food, heating or refrigeration as well as cooking appliances using spirits or kerosene that have been installed after 1 June 2003, cf. however 2.
- 2 Regulation 7(1), regulations 11, 12, 14 and 15 shall also apply to systems and installations installed prior to 1 June 2003; however regulations 11, 12, 14 and 15 shall have been met no later than by 1 June 2004.

Regulation 2 – Definitions

- 1 “LPG (bottled) gas”: Mixture of light hydrocarbons that form a gas at normal temperature and pressure and that are kept for general use in a liquid state in containers by increasing the pressure above normal. The main constituents are propane, propene, butane and butene, which are sold as propane gas or butane gas or a mixture of the two gases. The English designation is liquefied petroleum gas (LPG).
- 2 “LPG gas cylinder”: Portable container produced for LPG.
- 3 “LPG installation”: An installation consisting of cylinder, pressure regulation equipment, safety device (gas tester), pipes, hoses, valves, joints and arrangements intended to store, supply, monitor and control the supply of gas to and including the gas appliance.
- 4 “Simple LPG installation”: An installation as shown in Annex 1.
- 5 “LPG appliance”: An appliance designed for cooking food, heating or refrigeration.
- 6 “Ventless LPG appliance”: An appliance in which the combustion air is taken from the space in which the appliance is located and the combustion products are released into the same space (appliances for the preparation of food).
- 7 “LPG appliance with closed combustion”: An appliance having a combustion chamber, air intake and outlet that are sealed off from the space in which the appliance is located.
- 8 “Deck gas cylinder housing”: Housing designed solely for the storage of gas cylinders, including pressure regulators and safety devices (gas testers) and, where applicable, spare and empty cylinders and which is required to be situated on the open part of the deck where any leakage may flow unhindered overboard.
- 9 “Closed gas housing or compartment”: Gas-tight housing or space designed solely for the storage of gas cylinders with pressure regulators and safety devices (gas testers) and, where applicable, spare and empty cylinders, and which is provided with a separate drain above the waterline in order that any leakage may flow unhindered overboard.
- 10 “High pressure side”: The part of the installation before the pressure regulator, including the cylinder, where the pressure at 20°C is 0.7 MPa (7 bar) for propane gas and 0.175 MPa (1.75 bar) for butane gas.
- 11 “Low pressure side”: The part of the installation following the pressure regulation device, where the pressure must not exceed 0.01 MPa (100 mbar).
- 12 “Pressure regulation device”: A device which comprises one or more regulators for reducing the pressure from the high pressure side of the installation to the low pressure side of the installation.
- 13 “Pipe connection”: A connection made of a recognised metallic material.
- 14 “Hose connection”: A connection made of a recognised flexible material.
- 15 “Main shut-off valve”: A valve which is capable of closing off the gas cylinder from the rest of the installation.
- 16 “Shut-off valve/cock”: A valve/cock which is capable of shutting off the gas supply to the individual gas appliance.

- 17 “Flame monitoring device”: Shut-off valve with a sensor element which is kept open by the heat from the flame in the gas appliance and which shuts when the flame goes out.
- 18 “Accessible”: The individual components can be inspected, maintained and disassembled, with or without the use of tools, but without removal of a permanent part of the ship.
- 19 “Readily accessible”: The individual components can be reached quickly and safely in the event of an emergency without the use of tools.
- 20 “Approved and marked”: Approved and marked by Danmarks Gasmaterial Prøvning (the Danish Governmental Gas Institute) or other equivalent testing institutes, including testing institutes in other EU Member States and in countries that are signatory to the EEA Agreement, and which provide appropriate and satisfactory guarantees in terms of the technical, professional and impartial nature of the tests.
- 21 “Competent undertaking”: An undertaking with at least one person employed having expertise in respect of simple LPG installations and who by virtue of their trade background and practical training may be regarded as able to install such installations correctly.
- 22 “Authorized plumbing and heating installer”: An undertaking holding authorisation, inter alia, to undertake the installation of gas appliances.
- 23 “Cooking appliance using spirits”: Appliance which burns spirits and is designed for cooking food.
- 24 “Cooking appliance using kerosene”: Appliance which burns kerosene and is designed for cooking food.

Part A – LPG installations

Regulation 3 – General

- 1 The LPG installation with its associated components shall be capable of operating at between -20°C and +50°C as well as with vibrations and exposure to the maritime environment.
- 2 LPG installations shall be of a type from which only gas in vapour form can be drawn off.
- 3 All gas appliances on the ship in question shall be designed for the same operating pressure.

Regulation 4 – Pressure regulation devices

- 1 All LPG installations shall be provided with approved and marked pressure regulation devices which reduce the pressure, making them suitable for use in the gas-consuming appliances. The supply pressure of the gas appliances shall be stated on a notice placed in a conspicuous position on the gas cylinder. Pressure above 0.003 MPa (30 mbar) may not be used in any gas-consuming appliance.
- 2 The pressure regulation device may be fitted with a device which restricts the discharge of gas in the event of rupture of a hose or pipe or a pressure control safety device which prevents uncontrolled rises in pressure on the low pressure side. The gas that may be released via the device shall be released to the gas cylinder housing or to the open air.
- 3 The nominal regulated operating pressure shall be stated on the pressure regulating device.
- 4 Pressure regulation devices with manual external means of control shall not be used.
- 5 The pressure regulation device shall be fitted in the gas cylinder housing or storage space for the gas cylinder.
- 6 The pressure regulation device shall be attached to the gas cylinder.
- 7 Pressure regulation devices shall be made of a metallic, non-corrosive material or be surface-treated with paint or plastic which is effective against external corrosion.

Regulation 5 – Pipe connections and hose assemblies

1 General

- .1 The LPG gas shall be conveyed in permanently fitted metallic pipe connections, with the exception of the use of short hose assemblies to gas appliances and the connection fitted in the gas cylinder housing between the pressure regulation device and the leak-tightness tester.
- .2 Pipe connections and hose assemblies shall be so dimensioned as to prevent the pressure drop in the connections/couplings reducing the operating pressure to below the value specified by the manufacturer on the gas appliance when all gas-consuming appliances are in use. See table in Annex 2.
- .3 Pipe connections and hose assemblies shall not pass into machinery spaces.

2 Pipe connections

- .1 Only drawn copper piping or corrosion-resistant piping which is galvanically compatible may be used. The minimum wall thickness of pipes with an external diameter of 12 mm or less shall be not less than 0.8 mm and not less than 1.5 mm for pipes with a diameter greater than 12 mm.
- .2 Pipe connections shall, as far as practicable, be fitted with joints and with an expansion loop.
- .3 Fittings for connections and joints shall be metallic and of one of the following types:
 - .1 flared fitting;
 - .2 cutting ring fitting with a ring thickness of not less than 0.5 mm; or
 - .3 compression fitting.
- .4 Pipe connections shall be located as high as practicable above the bottom of the ship and be isolated from the hull and other equipment.
- .5 Unavoidable pipe joints and connections shall be readily accessible.

3 Hose assemblies

- .1 Hose assemblies may only be used on the low pressure side, and they shall be of a recognised quality and type.
- .2 Hose assemblies shall be approved and marked for assembly on DS 24 hose connections or provided with permanently attached end fittings of a recognised type, such as swage sleeves or sleeves with grooves. Hoses with fittings shall be readily accessible.
- .3 Hose assemblies shall be tension-free and shall not be liable to kink.

4 Materials

- .1 The melting point of welded and moulded fittings shall not be below 450°C.
- .2 Fittings and sealing material, where applicable, shall be galvanically compatible with each other as well as with the relevant metallic pipe.
- .3 Collar bands shall be reusable and made of a corrosion-resistant material, such as 18Cr 8Ni stainless steel or equivalent material.
- .4 End fittings shall be made of a corrosion-resistant material, such as bronze or stainless steel. End fittings made of bronze and cutting rings shall not contain more than 15% zinc.
- .5 Cutting ring fittings, when used in connection with copper pipes, shall be provided with a bronze sleeve and bronze cutting ring. All components shall fit together and be of the same type.

5 Installation

- .1 Pipe connections shall not come into direct contact with the ship's hull and other equipment.

- .2 All supply connections and components shall be conducted at least 30 mm away from electrical wires if the supply connections are not protected by an external jointless pipe or the electrical wires are not protected in accordance with a recognised standard.
- .3 All connections shall be conducted at least 100 mm away from the exhaust pipe of the engine and its associated components. Pipe connections shall be conducted 100 mm from electrical terminals (clamping screws).
- .4 Metallic pipe connections shall be supported by permanently fitted, non-metallic bushings with clearance every 0.5 m. The bushings shall be corrosion-resistant, have no grinding or cutting properties or other damaging effects on the pipe and be compatible with the pipe material.
- .5 All joints and connections in the installation shall be fitted in such a way that no tension occurs in the fittings.
- .6 Pipe penetrations in divisions or bulkheads expected to be watertight at the penetration level shall be watertight. Hose assemblies shall not be passed through such divisions or bulkheads.
- .7 Pipe connections which pass through divisions or bulkheads shall be protected at the penetration point against damage caused by friction.
- .8 All threaded fittings shall be of a recognised conical type and the sealing material shall be applied to the male part within the joint.

6 Shut-off valves

- .1 All LPG installations shall be fitted with a readily accessible manually controlled main shut-off valve for each cylinder, which shall be fitted on the high pressure side before the pressure regulation device. The main shut-off valve may be the cylinder valve.
- .2 An LPG installation with two cylinders shall be fitted with an automatic or manual gas-reversing valve in addition to the main shut-off valve required for each cylinder.
- .3 On the low pressure side, a shut-off valve shall be installed for each gas appliance. The shut-off valve shall be readily accessible and capable of being operated in the vicinity of the gas appliance without the need to reach over appliances with naked flames. However, the valve shall not be situated where it could be operated erroneously. Gas installations with only one gas appliance need not be fitted with a shut-off valve if the main shut-off valve is deemed to be readily accessible and capable of being operated in the vicinity of the appliance.
- .4 By means of an indicator, it shall immediately be easy to see whether a gas appliance's shut-off valve is open or closed.
- .5 Stopcocks shall be spring loaded and shall only be used on the low pressure side. Needle valves shall not be used on the low pressure side and sliding valves shall not be used anywhere on the installation.

Regulation 6 – LPG appliances

- 1 LPG appliances shall be of appliance category 13B/P (for both butane and propane) and be designed for a connection pressure of 0.003 MPa (30 mbar).
- 2 All gas appliances shall be CE marked in accordance with Council Directive 90/396/EEC of 29 June 1990 on the approximation of the laws of the Member States relating to appliances burning gaseous fuels, and shall be installed in ships in accordance with the present regulations and the manufacturer's instructions.
- 3 All gas appliances shall be securely attached to the ship in order to eliminate undue tension in the pipes, hoses and fittings.

- 4 All gas appliances, including pilot devices for flames, shall be provided with flame safety devices.
- 5 All gas appliances, with the exception of appliances used for the preparation of food and which are monitored during use, shall have closed combustion.
- 6 All gas appliances shall be marked as regards instructions and the type of gas with which the appliance is to be supplied.
- 7 Next to every gas appliance with open combustion, a notice shall be displayed in a prominent position with letters at least 4 mm high containing the following text:
“WARNING! Avoid asphyxiation – Ventilate the room constantly when the appliance is in use – Do not use the appliance for heating.”
- 8 The distance of flammable materials from the naked flame of the gas appliance shall comply with Annex 3.
- 9 Gas appliances for space and water heating placed in accommodation spaces shall be installed in such a way that persons cannot come into contact with hot surfaces which may cause burning.
- 10 There shall be an adequate free area around the gas appliances to allow inspections and maintenance to be adequately carried out.
- 11 Gas appliances used for cooking food shall be fitted with arrangements (fiddles) able to keep the cooking utensils in place up to a 30° list for ordinary sailing craft and up to a 15° list for motorised craft and multi-hull sailing craft.

Regulation 7 – Location and installation of LPG cylinders

- 1 Gas cylinders in ships with a length of less than 24 m shall contain not more than 11 kg of gas and there shall be not more than two cylinders of this size on board (one in use and one spare).
- 2 Gas cylinders with regulation and safety devices shall be securely fixed by means of arrangements able to withstand the stresses caused by the ship.
- 3 The gas cylinder regulation and safety devices shall be installed in the gas cylinder housing or compartment.
- 4 Gas cylinders which are not placed on open deck shall be placed in closed gas cylinder housing or compartments located above the waterline and provided with a 19 mm drain situated 75 mm above the waterline in order that any leakage can flow unhindered overboard.
- 5 Gas cylinder housing/compartments, including ventilation and drains, shall be placed at least 500 mm away from the ship’s companionways and shall be arranged in such a way that regulation and safety devices are readily accessible.
- 6 Gas cylinder housing/compartments shall only be used for storing gas cylinders and associated pressure regulation and safety devices.
- 7 Gas cylinder housing/compartments shall, as far as possible, not be fitted with electrical installations, but if such installations are required for lighting, for example, the fittings shall be of an explosion-proof design.
- 8 Spare or empty cylinders shall also be stored in gas cylinder housing/compartments.

Regulation 8 – Safety devices

- 1 The safety devices shall, as a minimum, comprise a bubble-type leak tester which shall be mounted in the gas cylinder housing/compartment immediately after the reduction valve and shall be easy to check.

Regulation 9 – Flues and air intakes

- 1 Flues and air intakes shall be installed in accordance with the manufacturer’s instructions.

- 2 Flues shall be dimensioned and positioned so as to ensure that combustion products are led out to the open air unhindered.
- 3 Flues and air intakes shall be air-tight throughout their entire length from the appliance to the outlet onto open deck.
- 4 Dampers shall not be installed in the flue.
- 5 It shall be possible to inspect the entire length of the flue.
- 6 The discharge pipe of the flue onto open deck shall be located at a distance of at least 500 mm from ventilators, hatches, other openings to the craft's interior, windows, fuel feeders and the fuel tank air pipes.
- 7 The flue shall be insulated to prevent damage or possible ignition of the vessel's structure and accommodation spaces.
- 8 The part of the flue located on open deck shall be fitted with a grille or a screen to protect the pipe from damage and prevent contact with the hot pipe.

Regulation 10 – Testing and putting into service

- 1 Before being put into service and following major repair, gas pipes following the reduction valve in the system up to the regulation valves of the gas appliance shall be pressure tested using three times the operating pressure, but not more than 0.015 MPa (115 mbar). If the pressure can be maintained constantly for five minutes ± 0.005 MPa (50 mbar) the installation shall be deemed to be sound.

Soap solutions containing ammonia may not be used in connection with leak-tightness tests.

The following shall then be carried out:

- .1 the entire installation shall be visually examined to check the gas and water-tightness of bushings, pipe housing and the correct installation of the appliance and gas cylinders;
- .2 all gas appliances, including pilot light safety devices and, where applicable, pilot flames, shall be function tested in accordance with the manufacturer's instructions. With all appliances alight, it shall also be checked that the flame height is normal; and
- .3 the leak-tightness tester shall also be function tested.

Regulation 11 – Instructions regarding operation, inspection and maintenance

Instructions shall be provided for operation, inspection and maintenance of the system, including gas appliances, containing at least the points listed in Annex 5 as well as particular instructions from the manufacturers.

Regulation 12 – Installation and repair of LPG installations

- 1 Installation and repair of LPG installations that are not simple LPG installations shall be carried out by an undertaking with valid authorisation as heating and plumbing installers.

Part B – Cooking appliances using spirits or kerosene

Regulation 13 – Installation

- 1 Appliances using spirits under pressure may not be used.
- 2 Safety distances from flammable material, as shown in Annex 3, shall be complied with.
- 3 The appliances shall be properly secured in a water-tight tray made of non-flammable material with a 25 mm rim.
- 4 Fuel shall be stored in its original packaging, and there shall be not more than 6 litres of spirits on board.

Part C – Provisions common to parts A and B

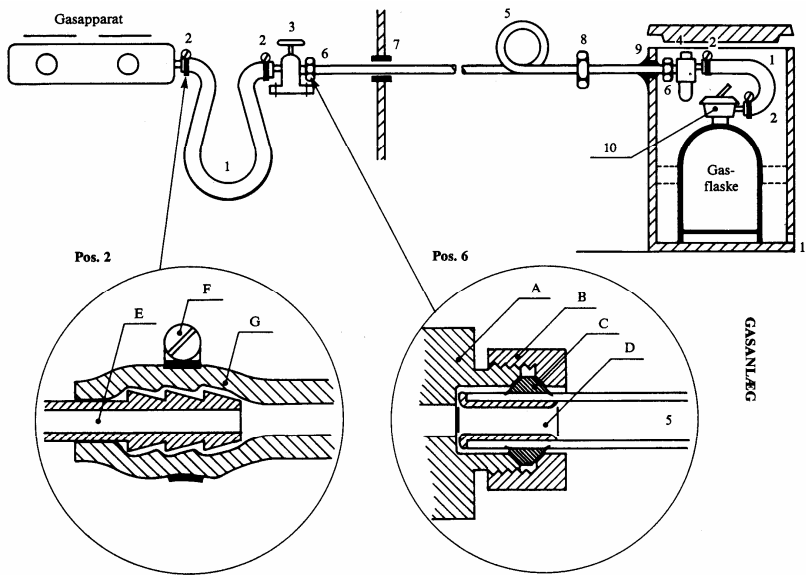
Regulation 14 – Fire-extinguishing equipment

- 1 A suitable manual fire-extinguisher of at least 2 kg shall be provided in vessels having the aforementioned installations.
- 2 A suitable fire blanket shall also be provided next to cooking installations

Regulation 15 – Portable equipment

Portable equipment using LPG, spirits or kerosene shall not be used on board ships, with the exception of equipment used in connection with maintenance and repair.

Annex 1



Simple LPG installation (provisions of regulation 2.4)

Item list for drawing

Position	Subject	Section in the provisions
1	Gas hose	6
2	Collar band	6
3	Stopcock/valve	9
4	Leak-tightness tester	7
5	Copper pipe	8
6	Gas compression fittings	8
7	Bushing	8
8	Pipe clip with electric rubber bushing	8
9	Gas-tight bushing f copper pipe from gas cylinder housing	4
10	Low pressure regulator	5
11	Discharge pipe fr gas cylinder housing, min. 12.7 mm Ø	4

Detail, position 6

- A Stopcock/leak-tightness tester
- B Compression nut to the gas
- C Cutting ring
- D Support bushing to prevent deformation of the copper pipe

Detail, position 2

- E Hose nipple
- F Collar band
- G Gas hose

Annex 2 Construction guidelines for pressure drops due to pipe resistance

Internal diameter of pipe/hose in mm	Pressure drop in kPa/m pipe or hose								
	Power consumption								
	1 kW	2kW	3kW	4kW	6kW	8kW	10kW	12kW	15kW
4	0.004	0.015	0.03	0.5	0.15	0.23	-	-	-
6	0.001	0.004	0.007	0.012	0.03	0.04	0.07	0.1	0.14
8	<0.001	0.001	0.002	0.003	0.01	0.015	0.02	0.025	0.04
10	-	<0.001	<0.001	0.001	0.003	0.004	0.006	0.009	0.013
13	-	-	-	<0.001	0.001	0.001	0.002	0.002	0.004

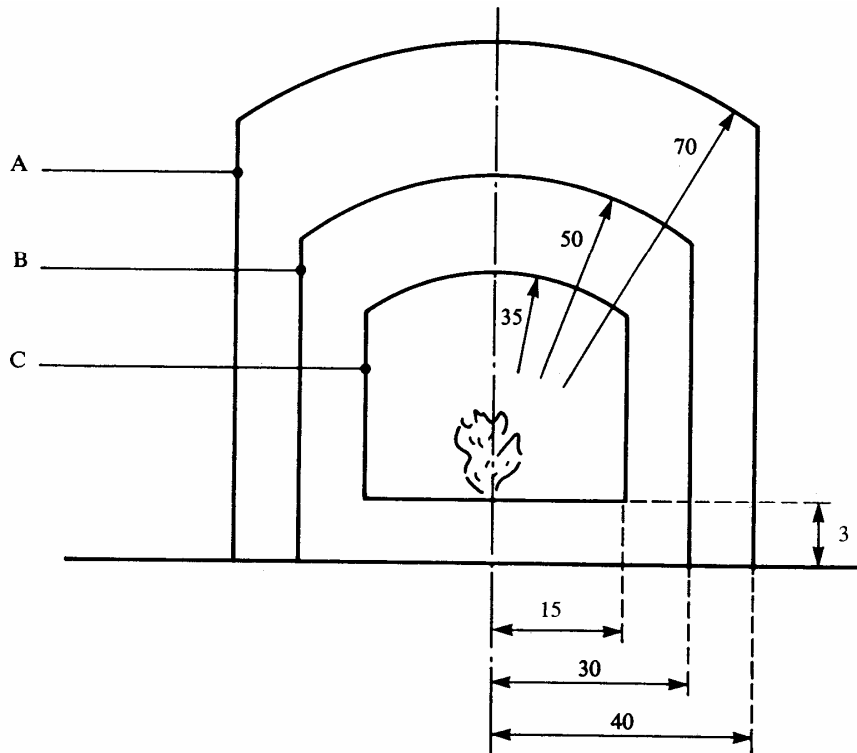
1 This table is for use with propane at 3 kPa, 3.7 kPa and 5 kPa and butane at 3 kPa and 5kPa.

2 Fittings converted for pipe lengths:

- T and angle 0.6 m
- equal connections 0.3 m
- bent hose or pipe 0.3 m

3 The pipe and hose volume in the installation should be minimised in accordance with this table.

Annex 3



- 1 Zone 1
- 2 Zone 2
- 3 LPG equipment
- 4 Pipes, containers and equipment containing flammable liquids
- 5 Centre of burner

Materials, etc. used in the vicinity of appliances with naked flames intended for cooking food and for space heating as defined in the above figure shall comply with the requirements below, taking into account, in connection with gimbaled appliances, that the burner may swing up to 20° on sailing craft with a single hull and 10° on multi-hulled and motorised craft.

- Freely hanging curtains or other textiles shall not be placed in zones 1 and 2.
- Exposed materials in zone 1 shall be made of glass, ceramics, aluminium, iron or materials with equivalent fire resistance or be heat-insulated.
- Exposed materials in zone 2 shall be made of glass, ceramics, metal or other materials with equivalent fire resistance or be heat-insulated if the surface temperature exceeds 80°C.
- The above requirements shall not apply to the gas appliance itself.

Annex 4 Ventilation

Guidelines for calculation of the required minimum area of ventilation openings in accommodation spaces in which LPG appliances with naked flames and no flue (appliances for boiling, roasting and baking) are installed are given in the following formula:

$$A > 2200U + 650P$$

Where,

A is the effective area in mm²,

U is the specified value given in kW, and

P is the number of persons the accommodation space is designed to hold.

This formula may be used in connection with any space in a vessel having LPG equipment without flues which can be sealed tight.

The minimum area A for fixed ventilation openings is 4,000 mm².

The ventilation shall consist of at least two ventilation openings, equal in size, with one opening located as high as possible and the other one as low as possible. Both openings shall be provided with mushroom-type vents and be fitted so as to prevent inadvertent closure.

Annex 5 Instructions to be included in the instruction manual from the manufacturer

Manufacturers of LPG equipment installed in ships shall supply an instruction manual for operation and maintenance, which includes safety instructions for the equipment. The instruction manual shall as a minimum contain the information set out below. It may form part of an instruction manual produced pursuant to ISO 10240.

- 1 Close the shut-off valve to the system and the main shut-off valve on the cylinder when the gas appliance is not in use. Close the shut-off valves when changing cylinders and in the event of an emergency.
- 2 Ensure that the shut-off valves to the gas appliances are closed before opening the main shut-off valve on the cylinder.
- 3 Check the LPG system regularly for leaks. Check all connections for leaks by:
 - .1 inspecting the leak-tightness tester frequently, but at least once a month;
 - .2 inspecting joints, etc. using a soap solution or other solvent with the gas appliance's shut-off valves closed and the remaining shut-off valves open.
- 4 Never use soap solutions containing ammonia and never search for leaks using a naked flame.
- 5 If a leak is found in the system, close the shut-off valve to the system and the main shut-off valve on the cylinder and have the system inspected and repaired by an authorised heating and plumbing installer/competent undertaking.
- 6 Appliances with naked flames with no separate air intake and flue consume the oxygen in the air of the space, at the same time releasing combustion products into the space. Ventilation is required while such appliances are in use. Therefore, always ensure that the ventilation openings are open and have not been inadvertently closed. Never use such appliances for space heating.
- 7 Never block access to the components of the LPG system.
- 8 Disconnect empty cylinders from the system and close the main shut-off valve, replace the safety caps, including plugs, where applicable, and store the empty cylinders in the gas cylinder housing/compartments designed for this purpose.
- 9 Never use the housing/compartments designed for gas cylinders to store any other equipment.
- 10 Never leave the vessel unattended while a gas appliance is alight.
- 11 Never smoke or use a naked flame while gas cylinders are being changed.
- 12 Hoses in the LPG system shall be inspected regularly, but at least once a year, and shall be replaced if damaged or the quality is impaired.