Tex Engineering Ltd
Unit 35, Claydon Industrial Park,
Gt. Blakenham, Ipswich, Suffolk, IP6 0NL, England
Telephone Ipswich (01473) 830030 Fax (01473) 831664

The storage and use of LPG on construction sites

HEALTH & SAFETY EXECUTIVE GUIDE LINES

Connecting LPG cylinders

42 Before connecting any cylinder or container of LPG to equipment it is essential that all fires, flames or other sources of ignition in the vicinity, including cigarettes and pilot lights, are extinguished. Where reasonably practicable cylinders should be changed in the open air. The cylinder should be examined and any damaged or faulty cylinder should ***not*** be used. No attempt should be made to connect to defective cylinders.

43 If a cylinder is found to be leaking and the leak cannot be stopped, the cylinder should be carefully removed to a well ventilated open space free from sources of ignition. It should be left with the leak, usually at the valve, uppermost, marked faulty and notices displayed prohibiting smoking or other naked lights. General access should be prevented by barriers or otherwise. The supplier of the cylinder should be informed immediately. Under no circumstances should users attempt to dismantle or repair defective cylinders.

44 All valves of cylinders and equipment should be turned off before a cylinder is connected or disconnected unless the installation is fitted with an automatic change-over device. Before connecting it is essential to check that the connections are compatible and correct for the equipment. If in doubt the manufacturer's instructions should be checked. If a connection to an appliance or regulator relies on sealing washers it should be checked not only that they are present but also that they are in good condition and correctly positioned. Crimped proprietary hose clamps should be used for all high pressure applications and are recommended for all uses. Worm drive hose clips may only be used for low pressure applications i.e. for below 35 mbar (14 in watergauge).

45 After connecting the equipment by hand those connections designed to be secured by means of a hand tool should be tightened. The correct size tool should always be used, particular in the case of spanners. Connections should be tightened firmly but should not be over-tightened as this can lead to damage of threads.

46 Before use the equipment should be checked for leaks. These can be detected by sound, smell or the use of soapy water. A lighted match or naked flame must ***never*** be used to check for a leak.

47 If cylinders are used in tandem then they should be installed in the open air and manifolds should incorporate non return valves which will permit one cylinder to be removed for changing without shutting off both cylinders. If it is ever necessary to remove one of these cylinders for any length of time then reliance should not be placed on the non-return valve, but the open end should be properly blanked off.

Regulators

48 Regulators should be suitable for the gas and pressure in use. Checks for leaks at the regulator nuts should be made only by using soapy water. In the event of a defect or of any damage to a regulator, no attempt should be made to repair it. Such repairs should only be carried out by specialists.

Hoses

49 Flexible tubing should only be used for final connections to appliances. Flexible hoses should comply with BS 3212, BS 5120 or other nationally recognised standard

They should be additionally protected or of steel braid reinforced construction wherever they might be subject to damage by abrasion and so sited that they are not exposed to excessive heat. The length of hoses should be kept as short as reasonably practicable. Hoses should conform to the accepted colour coding practice set out in BS 3212 and 5120, i.e. black for flexible tubing for installations not exceeding 50 mbar operating pressure and orange for hoses.

Lighting up

50 The lighting up procedure recommended by the makers of the equipment should always be followed. Before turning on the gas supply at the cylinder or the main, the equipment valves should be checked to ensure that they are closed.

51 If gas has escaped from a burner accidentally or due to an unsuccessful attempt to light it, subsequent attempts to light up may give rise to an explosion. In such circumstances therefore it is essential that any gas that has escaped is allowed to fully disperse before any further attempt is made to light the equipment. If a mistake is made in the lighting up procedure, it is significantly interrupted, or is incomplete - e.g. only some burners have lit, the gas must be turned off, any unburnt gas allowed to disperse and any fault rectified before the light up sequence is restarted. Except in the case of very simple equipment where it is patently unnecessary, a written lighting up procedure should be drawn up and displayed by the equipment.

Use

52 Only properly constructed and maintained equipment should be used. The instructions provided by the manufacturer or suppliers should be followed.

53 If there is any smell of gas from the equipment after ignition or during use, it should be turned off and the cause investigated.

54 If the burner flame goes out or dies down the burner should be shut off immediately. The main valve of the cylinder should be closed and any unburnt gas allowed to disperse before the cause is determined and any attempt is made to re-light the burner.

55 If equipment has to be used in an enclosed space it is essential to ensure that there is adequate ventilation. Not only is this necessary to ensure full combustion but also to make certain that the products of combustion, other fumes and excess oxygen from cutting apparatus are removed and that the atmosphere remains respirable. Wherever practicable cylinders used in connection with operations in confined spaces should be located in a safe position outside the space and preferably in the open air. The gas supply should be reduced to the smallest reasonably practicable pressure before it enters the space. Where cylinders have to be taken into a confined space or below ground level, the number must be kept as small as possible. All cylinders and/or hoses etc. should be removed as soon as work in the space has finished or is interrupted for a substantial period. Under no circumstances should cylinders or hoses be left in such spaces or areas over night. Oxygen may never be used to 'sweeten' the atmosphere of a confined space. Oxygen enrichment has resulted in many fatal and serious accidents. Advice on the use of LPG in pressurised workings will be included in a separate guidance note.

Shutting down

56 After use it is essential that not only should the valve on the equipment be turned off, but also the service valve on the supply line. If a single item of equipment is connected directly to a cylinder, the cylinder valve should also be turned off.

57 When it is not in use portable equipment should be stored in a secure place to prevent unauthorised tampering.

Disconnecting cylinders

58 The cylinder valve and all other valves must be closed before any attempt is made to dismantle equipment for any reason including the changing of 'empty' cylinders. Such 'empty' cylinders and other cylinders no longer required for use must be returned to the storage area as soon as practicable. So-called empty cylinders almost invariably contain some residual gas and should be stored in the same manner as full cylinders. The valves should therefore be turned off before disconnection and the cylinders handled with the same care as full cylinders. After disconnection valve protection caps and plastic thread caps or plugs should be replaced.

Transport of cylinders

59 Small quantities of LPG may be transported in closed vehicles providing the vehicles are adequately ventilated, particularly at low level. Substantial quantities of LPG should always be carried in open vehicles. Cylinders should have their valves uppermost and be adequately secured irrespective of whether they are full or nominally empty.

60 No equipment should be moved whilst it is alight, other than blow torches or other equipment specifically designed to be moved in use.

Inspection and maintenance

61 All equipment including cylinders, valves, piping and hoses should be regularly inspected for leakage. Any suspected leak can be checked by brushing with soapy water. Such tests should be carried out at specified intervals which take into account the severity of the conditions under which the equipment is used and the manufacturer's recommendation. In many cases weekly inspections would be appropriate. Leaking cylinders should be dealt with as described in para 43.

62 In addition to regularly checking equipment for leaks users should also regularly check equipment for other damage and to ensure that it is complete; washers and hose clips are only too frequently found to be missing.

63 It is most important that burners are regularly cleaned. Blocked or partially blocked burners can lead to incomplete combustion as well as inadequate flames or flame failure. Burners should also be adjusted as necessary.

64 Any faulty equipment should be taken out of service immediately.

65 Apart from routine running adjustments and maintenance which can be undertaken by competent operators, all repairs, modification or installation of equipment should be carried out by competent trained personnel.

Training and instruction

66 Many accidents involving LPG are due to ignorance of simple basic precautions. It is essential that all persons using LPG are suitably instructed about the hazards of LPG and the precautions to be taken in its use. Particular emphasis should be placed on correct lighting up procedures and the necessity to shut off the supply after use. While such instructions may be very simple in the case of gas rings on cookers, considerably more information and suitable training will be necessary for more complex and sophisticated plant.

FIRE PRECAUTIONS AND PROCEDURES

Fire precautions

67 Smoking or other sources of ignition should be prohibited in all LPG storage areas. Suitable prohibition notices should be prominently displayed. Smoking and other sources of ignition should also be prohibited in the vicinity of the loading or unloading of LPG cylinders. If pictorial signs are used, they must comply with the Safety Signs Regulations 1980.

68 A sufficient number of first-aid fire-fighting appliances of adequate size suitable for use on LPG should be provided in a conveniently accessible position at all LPG storage areas and wherever LPG is in use. Where fire extinguishers are provided these should be of the dry powder type and conform to BS 3465. Operators should be trained in their use. Foam extinguishers are not suitable for LPG fires.

69 Provision should be made in the vicinity of LPG stores for an adequate supply of water for fire protection purposes.

70 The fire brigade should be informed of the location of all bulk LPG storage tanks and storage areas of more than 1,000 kg of LPG in cylinders when they are established. Suitable clear access for fire-fighting purposes should be provided at all LPG storage areas

Procedures in case of fire

71 In an emergency it is important to avoid endangering human life. The following action should be taken by persons discovering a fire:

(a) Summon the fire brigade immediately. On arrival the Fire Officer must be informed of the location of all cylinders in the vicinity of the fire or that may be affected by the fire.

(b) Providing it is safe to do so, turn off all valves to extinguish the flame, and remove cylinders from the danger area or cool them by copious spraying with water.

(c) If the flame from a leak cannot be extinguished e.g. by turning off the valve, fire fighting should be left to the fire brigade. If the flame is extinguished but the vapour continues to escape there will be a risk of re-ignition of the vapour cloud. If the flame from a burning leak impinges on a cylinder and the flame cannot be removed from the cylinder immediately, the area should be evacuated forthwith.

(d) All persons not concerned with fire fighting should be evacuated from the area involved in accordance with the general procedure in case of fire drawn up for the site.

72 Cylinders without relief valves which are involved in a fire may explode in less than five minutes and blow pieces over a considerable distance. Cylinders with relief valves although less likely to explode may emit jets of LPG several metres long which will be ignited by the fire. Cylinders which have been exposed to fire must be thoroughly cooled with water before any attempt is made to remove them; they should subsequently be returned to the suppliers. Under no circumstances should they be used or any attempt be made by the user to remove or tamper with the valve.

73 It is proposed to issue a separate guidance note on fire precautions in pressurised workings.

Cutting and heating torches, roofing irons and other hand tools

84 The LPG containers of portable equipment should always be used in an upright position. The container should be wedged, lashed or otherwise adequately secured as necessary to ensure that it cannot be knocked over or fall on its side. In the case of cutting equipment, etc, a purpose-made trolley to which cylinders can be secured should be used whenever possible.

85 Equipment should be operated at the manufacturer's recommended pressure and only hoses suitable for LPG gas service at that pressure should be used to connect the equipment to the regulator. Owing to the severe conditions to which hoses of portable hand-operated tools are often subjected it is particularly important that the hoses are regularly inspected by the operator both for wear and accidental damage. Special attention should be paid to the ends of hoses at connections where maximum flexing occurs.

86 Hoses should never be kinked to cut off the gas supply when changing torches.

87 Hose check valves (non-return valves) should be provided in both the oxygen and gas lines to torches. Such valves are now often supplied with torches. In addition the use of suitable flash back arrestors is recommended.

88 The flame of a hand tool should never be directed onto LPG cylinder.

89 Many fires are caused by careless use of hand-held equipment. It is essential that the working area be kept clear of combustible material. Where it is not possible to remove all combustible material, temporary insulation shou be used between the work and the combustible material. It very important that checks be made to ensure that there is no fire or smouldering material, not only immediately after the use of a hand torch, but also after a suitable period of time following completion of the operation. Particular attention should be paid to the far side of non-fire resisting walls, floors, ceilings etc. and to any intervening voids. Control of such work by 'Hot Work Permits' will be essentia in some circumstances.

90 Further guidance on the use of LPG for cutting is given in Health and Safety at Work booklet No. 50.

Bitumen boilers

91 The cylinders of LPG at bitumen boilers or cauldrons should always be at least 3 metres from the burner. The boiler and cylinders should be located where they are not likely to be struck by site traffic including wheelbarrows etc. Particular care should be taken to ensure that the flexible hose between the cylinder and burner is not damaged by site equipment or heavy foot traffic and that it does not act as a tripping hazard.

92 The boiler should not be overfilled or allowed to boil over. If however a boiler does boil over, the cylinder valves should be turned off immediately and the cylinders remove to a safe place well clear of any burning bitumen. Any flexible hose that may have become damaged by bitumen should be replaced. The consequences of any such incider should be borne in mind when locating boilers or cauldrons on site.

93 A boiler or cauldron should never be left unattended with the burner alight.

94 A boiler or caldron should never be transported or towed with the burner alight.

Mastic mixers

95 Any cylinders not in use, whether full or empty, should be kept at least 6 metres away from the mixer at any time when it is in operation.

Drying operations

96 If LPG-fired equipment is being used for drying operations care should be taken to avoid local overheating which could result in scorching and fire. Heaters in drying rooms should be fitted with protective cages and care taken to ensure that clothing being dried does not restrict the ventilation. LPG cylinders should never be exposed to the hot air currents from forced air type heaters. It is particularly important during such operations to ensure that there is adequate ventilation of the area or space.

BITUMEN BOILERS IN CONSTRUCTION - FIRE HAZARDS

Every year a number of construction workers are injured in accidents with bitumen boilers used in roofing work, road repairs etc.

Don't be one of them!

Protect yourself and your workmates by following a few simple rules. If in doubt, **ask.**

SETTING UP

Stand the boiler on a firm, level surface.

Set up the gas cylinders at least 3 m away.

Don't use more cylinders than you need.

Make sure that gas hoses are properly connected and in good condition.

Don't smoke.

Keep other ignition sources away, e.g. naked flames; electrical equipment.

Have a fire extinguisher close by (preferably foam or dry powder).

HEATING

Follow the maker's instructions on lighting up.

If a thermometer is fitted, don't exceed the recommended operating temperature.

Avoid splashing when adding more bitumen.

Keep water away from hot bitumen.

USE

Use the draw-off tap to remove bitumen, never a ladle.

Wear safety glasses and gloves.

Keep the lid on the boiler as much as possible.

Regularly check the boiler temperature and level.

Keep bitumen away from ignition sources.

Carry bitumen in proper containers, e.g. lidded buckets.

Have a clear, safe route from the boiler to where the bitumen is used.

AFTER USE

Turn off the gas at the cylinders.

Empty the boiler and remove drips or splashes from the outside.

AT ALL TIMES

Make sure the boiler doesn't overheat or run low.

Turn the gas off before leaving the boiler unattended, even for a short time.

Never apply direct heat to pipes or valves, or to the outside of the boiler.

Turn off the burner before towing the boiler on a lorry or trailer.

HSE
Health & Safety Executive