

Safe use of liquefied petroleum gas (LPG) at small commercial and industrial bulk installations

When the risks are properly identified and managed, LPG can be safely used as a fuel source for many applications. This information is aimed primarily at users of LPG to provide information and help to ensure it is used safely. Users may wish to consider recording information about their installation, such as the route of any pipework, risk assessments they may make and any maintenance undertaken. Initially the site will concentrate on people using small bulk LPG installations. Included in this is information on the bulk storage tank and service pipework.

Bulk LPG storage tank

Safety of your LPG storage tank

This is the bulk storage tank for the LPG used on this site. For the type of installations covered in this example, this tank can store up to four tonnes of LPG. In some cases, more than one tank may be used to store the LPG.

In the vast majority of cases the tank will be owned by the company that supplies the gas, but if you are unsure then you should check this with your own supplier. In general, the supplier will look after the tank and its fittings (their integrity and maintenance) but again check this with your supplier if you are unsure, as legally it needs to be maintained in a safe condition.

The user of the LPG (ie the person operating the site) does have responsibilities in relation to the tank including:

- [Siting of the tank](#)
- [Ventilation and conditions around the tank](#)
- [Tanker access](#)
- [Security](#)
- [Impact protection](#)
- [Emergency arrangements](#)

The [legal framework](#) provides more information on the background to these responsibilities.

Siting of the tank

There should be a minimum distance (called the [separation distance](#)) between the tank and any building, boundary line or fixed source of ignition. This should have been checked when the tank was first installed and the supplier will know what the distance should be if you are unsure.

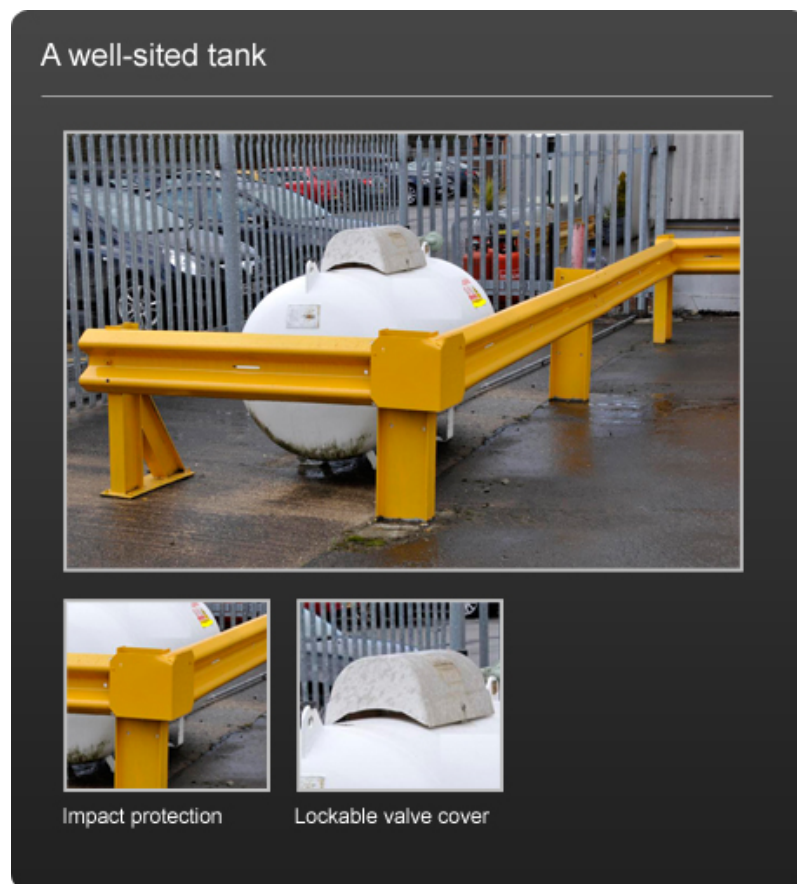
Modifications to the area may have been made since the tank was installed. These could include altering walls, building sheds or fences, installing electrical equipment near the tank or planting trees or shrubs nearby. These should not be any closer to

the tank than this minimum distance and, if they are, then arrangements need to be made to move them.

There should not be any drains or gullies near to the tank unless a water trap is provided to prevent gas entering the drains. This is because LPG is heavier than air and if a leak were to develop from the tank or its controls or pipework or when it is being filled then the vapour could accumulate in an untrapped drain or gully. Ignition of these vapours could then lead to fire/explosion.

The tank should also not be painted in any colour other than originally supplied as this may increase the amount of heat it absorbs from the sun.

This picture shows a well-sited tank:



Ventilation and conditions around the tank

In case of leaks there should be plenty of room around the tanks to ensure good air flow so that pockets of heavier-than-air LPG vapours cannot build up around them. It is also very important to keep the area around the tank free of rubbish, particularly if it is combustible or could reduce the levels of ventilation. For similar reasons keep weeds and grass cut down around the tank. If you choose to use a weed killer then you should not use something that is chlorate-based (as this can make the dead plants easier to ignite).

Poorly-sited tank with clutter around it



Tank with grass around it



Tank in overgrowth



Tanker access

There should be a dedicated flat parking area for the tanker delivering LPG. This parking area should be clear on a delivery day and people should be kept away from the tank and tanker while the transfer of LPG is taking place. The supplier of the LPG will need to make sure that the tanker cannot drive away with the supply hose still connected, that there is no risk of an electrical spark being generated from static electricity or by other means. The LPG suppliers should ensure that their drivers are suitably trained and have the correct procedures to follow.

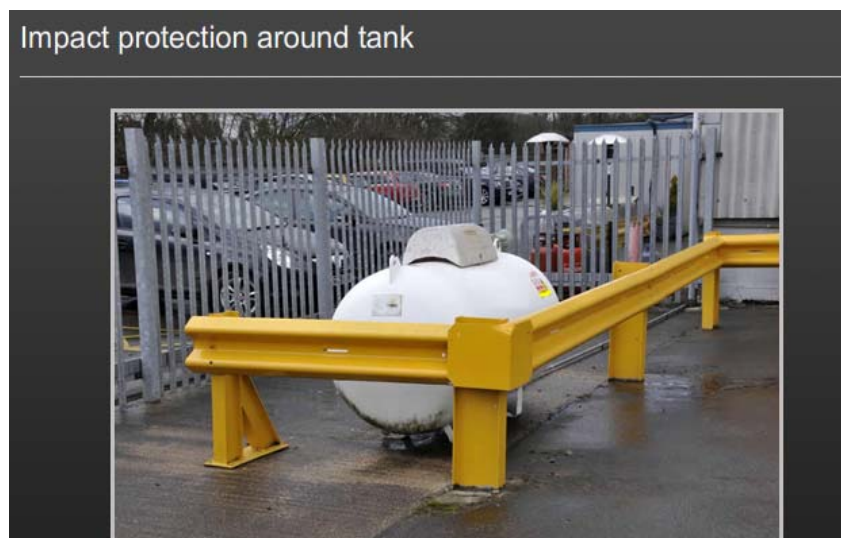
Security

People not involved with the installation, for example workers with no responsibility for the LPG or visitors to the site, should be kept well away from it. No one should smoke, use electrical equipment or park vehicles near the tank. 'No smoking' and other signs should be clearly displayed and maintained. Ignition sources, eg bonfires and barbecues, should not be allowed near the tank. Temporary use of grass-cutting equipment within the vicinity of the tank is permitted.

The tank should be protected from unauthorised access to reduce the chance of intentional or accidental interference. For larger tanks (ie four tonnes or higher LPG capacity) a security fence is required to keep it secure. This fence should allow natural air flow (eg made from wire mesh) and should be kept in good condition. Any gates should be kept locked unless access to the tank is required. For tanks below four tonnes LPG capacity, there may be certain circumstances where a fence may not be necessary. This can only be justified where the risk of interference is low, and there is no uncontrolled public access - for example due to tank location or other accessibility factors. Tank valve covers should be kept locked whether or not the tank is fenced.

Impact protection

If possible, the tank (and its associated piping) should not be located in areas where there is motor traffic. However, where this is not possible, then protection from a motor vehicle hitting the tank is required such as crash barriers or bollards. A security fence and/or road markings (eg 'no-parking' notices, double yellow lines) are unlikely to provide this protection.



Emergency arrangements

The LPG tank will have printed on it the supplier's emergency number that should be called if there is a leak. If a fire breaks out then the user should have in place an emergency plan which includes evacuating people from the premises. In general, leave tackling any fire near the tank to the fire brigade unless it is judged that it can be put out without endangering anyone. In the event of an emergency, and where it is safe to do so, the shut-off valve on the top of the tank and the emergency control valve (ECV) should be closed.

Service pipework

Looking after your service pipes

The pipe that carries the LPG vapour from the bulk storage tank to the building is called the service pipework. This is most likely to be owned by whoever owns the premises using the LPG – this could be the landlord if the premises are rented. It is normally not owned by the LPG supplier, even though it may have been installed by them. If you are not sure about ownership of the pipework, then you should check with your supplier and/or landlord if you do not own the property or land yourself.

The main concern with service pipework is that if it is damaged it is likely to release the LPG it is carrying. If the escaping LPG vapours were to ignite, the LPG could then cause a fire or explosion. Damage to the pipework could be caused by physical impact or through chemical means, for example corrosion of a metal service pipe.

Owners of service pipework therefore have some important responsibilities and should consider the following:

- [Installation route](#)
- [Materials of construction](#)
- [Pressure](#)
- [Inspection and maintenance](#)
- [Replacement](#)
- [Entry into the premises](#)

The [legal framework](#) provides more information on the background to these responsibilities.

Installation route

Ideally, LPG service pipework should be run above ground using a route that minimises the possibility of physical damage, for example from vehicles, and away from excessive heat or cold. Where damage can be foreseen, protective barriers, bollards etc should be provided. If it is not possible to run the pipework above ground, then it can be buried underground and, in such cases, it is important to know its route and to mark it so that others are aware of it. Where traffic or other heavy loads pass over the pipe, protection should be provided, such as load-bearing slabs or covers.

For the majority of premises, it is likely that service pipework will already be installed. If this is the case then for buried pipework it is important to ensure that its route is known, recorded and, where possible, clearly marked. If the pipework is to be replaced, then think about replacing it with pipework that runs above ground if at all possible. If not then it should be replaced with non-corroding pipework made of material such as polyethylene (PE).

Materials of construction

The material the pipework is made from is very important, particularly if it is buried. In general, steel or copper can be used for pipework that runs above ground. Where pipework needs to be buried then it should be made of material, such as polyethylene, that is non-corroding. This is important because corrosion of buried metallic pipework can result in leaking of LPG and this could lead to a fire or explosion if it accumulates and is ignited.

Buried pipework installed within the last 15 years is likely to be made of non-corroding material, such as polyethylene. Older installations, though, may have buried metallic pipework. In these cases, the pipework is likely (but not always) to have some form of corrosion protection provided (for example it may have been wrapped in a special protective tape). This protection will not last indefinitely and the pipes will corrode over time. This may also happen more quickly in certain types of soil, for example waterlogged clay soil. If buried pipework is metallic then it will need to be [replaced](#). This should be done as part of a pipework replacement programme being developed by the UKLPG [http://www.uklpg.org/latestnews_one.php?id=47].

Polyethylene (PE) pipe enclosed in glass-reinforced plastic (GRP) sheath



Pipe with Denso tape wrapped round its base

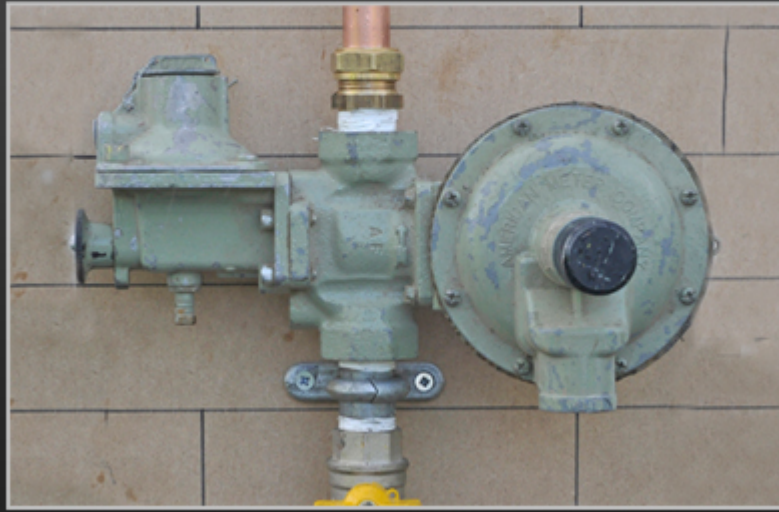


Pressure

The LPG in the service pipework will be under pressure to drive the gas through the system. Generally, the pressure may be low (less than 75 millibar) or medium (between 75 millibar and 2 bar gauge). Pipework at medium pressure is of greater concern if leaks should develop as the amount of LPG that could be released is likely to be greater than at low pressure.

The pressure of the LPG in the pipework may be influenced by the rating of appliances in the premises that it is supplying. For example, factories using LPG in manufacturing processes may need a higher volume of LPG to run their appliances and so may require medium pressure to meet this need. In contrast, commercial premises, such as pubs, hotels and care homes may only be using the LPG to provide heating and cooking appliances and this can be met by low pressure. You can tell if your pipework is under low or medium pressure by the type of regulators that are attached to the pipework. If the pipework has only a single regulator on the tank and one near where it enters the building then it is probably under medium pressure. If a second stage regulator is located at the tank then this indicates that the pipework is under low pressure. If you are not sure about the pressure in your pipework then you should consult someone who can help such as your supplier or an independent expert.

Pipework under medium pressure - second stage regulator at point of entry into building



Service pipework under low pressure - 2 regulators on the tank



Combined valve & regulator



Regulator & filling point



Lockable valve cover

Inspection and maintenance

It is very important that service pipework is regularly inspected and maintained whether it is above or below ground. It is the responsibility of the owner of the pipework to ensure it is regularly inspected and maintained. This is likely to be the owner of the site, not the LPG supplier, even though it may have been installed by a supplier originally (check your supply contract).

A competent person should review the state of the pipework and establish the length of time for which it can be used safely before its next inspection, taking into account the time since it was last checked and any action taken at that time. For buried pipework, the only really effective inspection method currently available is to excavate the pipe for examination, particularly if it is metallic. Care should be taken when excavating pipe to prevent damage to the pipe or its corrosion protection. For metallic buried pipework that is likely to corrode, a specialised expert in corrosion of metal pipework would be required to assess its state on excavation.

Other tests are available for investigating the state of the pipework at the time of the test but these cannot give any assurances about its condition in the longer term.

Further, more detailed guidance on inspection and maintenance of pipework [http://www.uklpg.org/lpg_property/UIS015.pdf] is available from UKLPG.

Replacement

It is known that buried metallic pipework, even if it was protected when it was first installed, will corrode over time. Corrosion can result in LPG leaking from the pipe and can lead to a fire or explosion if ignited. Buried metallic pipework will therefore need to be replaced with pipe made from non-corroding material such as polyethylene. The suppliers of LPG have developed a prioritised replacement programme for buried metallic pipes. If you are contacted by your supplier about replacing buried metallic pipework then you should discuss this with them and make the necessary arrangements to have the pipework replaced.

Entry into premises

Pipework should enter a building above ground and it should be contained in a sleeve sealed to the structure. This will protect the pipe and help to stop any passage of LPG vapour into the building should the pipe develop a leak. Within the building, any pipework should ideally not travel through any unventilated void (eg underfloor space, cellar or basement). Where it passes through a cavity wall it should be sleeved to prevent gas entering the cavity should it leak.

Where buried pipework leaves the ground to feed into the building (the so-called 'riser'), if it is made of polyethylene (the preferred material that is being used to replace underground metallic pipework) it should be protected with a glass-reinforced plastic sleeve. This protects the pipe from physical damage and from UV light which will make it brittle over time. Entry into the building from the riser should be above ground. This should be checked in case at some point in the past it was covered by other building work (for example raising the level of a yard or garden). If the buried pipe is made from polyethylene, then before it enters the building there should be a transition to steel or copper piping which then enters the building.

Pipework sleeving through wall



Valves

Know about the valves in your installation

All bulk LPG installations providing LPG as a vapour must be provided with:

- a regulator to maintain the gas supply pressure within the range at which the appliance has been designed to operate safely;
- where an installation is subject to the Gas Safety Installation and Use Regulations (GSIUR) [over-pressure shut-off](#) and [under-pressure shut-off](#) valves which provide back-up protection should the regulator fail or the gas supply pressure falls to a dangerously low level, for example if the bulk tank becomes empty for some reason.

OPSO (over-pressure shut-off valve) – This device must be re-set only by the gas supplier if it trips out and shuts off the gas supply when over-pressure conditions exist.

UPSO (under-pressure shut-off valve) – This device may be re-set by the gas user if it trips out and shuts off the gas supply when the gas pressure drops below its set pressure value.

A pressure relief valve (PRV) is a valve fitted to the top of a bulk tank to relieve internal pressure within the tank if this were to increase due to external influences, such as thermal radiation impact from a fire.

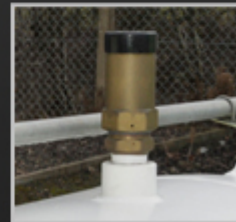
Tank with Pressure Relief Valve



Lockable valve cover



Regulator



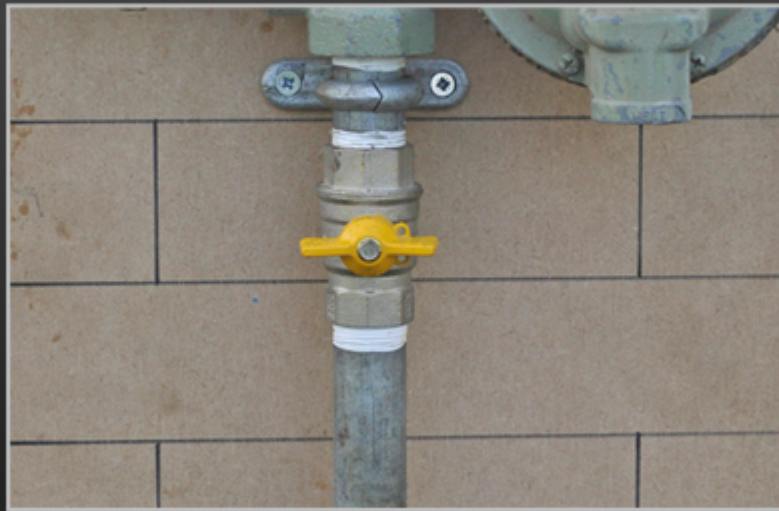
Pressure release valve

Emergency control valve (ECV)

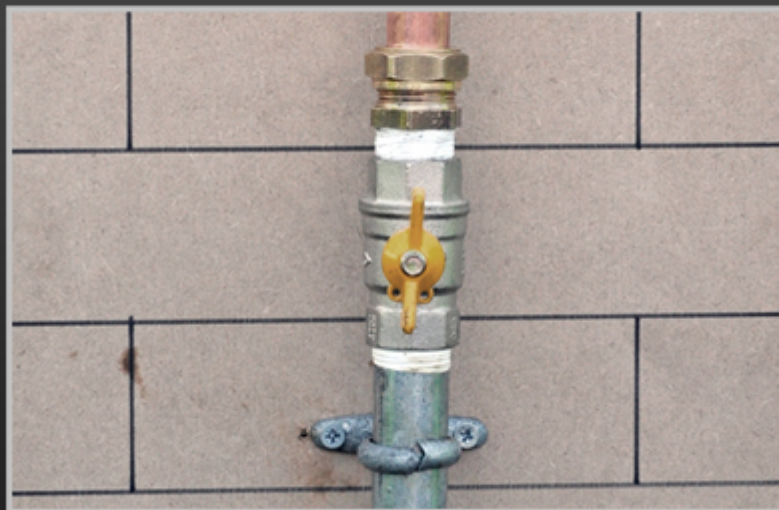
An ECV is intended to allow the gas user to shut off the supply of gas in the event of an escape. Where an installation is in the scope of GSIUR, the ECV must be within reach and situated as near as reasonably practicable to the point where the pipe supplying gas enters the premises. ECVs are required under GSIUR but we recommend that these are fitted also at factory premises.

In the case of rented property, the landlord or managing agent should ensure that the tenant(s) are aware of the location of the ECV.

ECV in closed position



ECV in open position



The legal framework

Any business which operates an LPG installation has responsibilities under the Health and Safety at Work etc Act (HSW Act) 1974 [<http://www.hse.gov.uk/legislation/hswa.pdf>] and the subsidiary legislation outlined below to ensure that the installation is safe to operate and does not present a risk to their employees and members of the public. Because some of the duties in relation to the storage tank may be addressed by its supplier, it is important for the user to work closely with their supplier in assessing and addressing any risks.

Management of Health and Safety at Work Regulations 1999

[<http://www.opsi.gov.uk/si/si1999/19993242.htm>]

These require an employer to make a suitable and sufficient assessment of the risk that the installation could present and to identify suitable preventative measures; they also require the employer to appoint one or more competent persons to assist the employer in complying with the law.

Pressure Systems Safety Regulations 2000

[<http://www.opsi.gov.uk/si/si2000/20000128.htm>]

The user of a pressure system should not operate it unless they have established a written scheme for the periodic examination by a competent person for certain parts of the system and have it examined as described in this scheme. For an LPG installation, this would include the storage tank and possibly pipework in some cases. However, where the installed system is supplied under lease or hire and the supplier agrees in writing that they will undertake these responsibilities, then the user will be considered as having discharged them. This may often be the case with the storage tank, where the supplier may lease out the tank to the user.

Provision and Use of Work Equipment Regulations 1998

[<http://www.opsi.gov.uk/si/si1998/19982306.htm>]

As the LPG tank and associated fittings and pipework may be considered as work equipment, it will require maintenance. Also, as work equipment exposed to conditions causing deterioration liable to result in a dangerous situation, it will require an inspection regime to ensure health and safety conditions are maintained and that any deterioration can be detected and remedied in good time. You should liaise with the supplier of the LPG about maintenance since they are likely to own the tank and will have their own duties with respect to it and may maintain it. Applicable duties under the Regulations cannot be delegated.

Dangerous Substances and Explosive Atmospheres Regulations 2002

[<http://www.opsi.gov.uk/si/si2002/20022776.htm>]

These Regulations apply to work situations when a dangerous substance is present and presents a risk to physical safety from, in particular, fire or explosion. For LPG, when the supplier has provided an installation (eg a tank) that meets the relevant standards, then the duties that fall to the user will be to ensure that the necessary

conditions under these Regulations for ensuring safety are maintained, provide measures to deal with emergencies and make sure their own activities do not adversely affect the storage tank.

Gas Safety (Installation and Use) Regulations 1998

[<http://www.opsi.gov.uk/si/si1998/19982451.htm>]

These cover LPG storage vessels and pipework only where the work premises themselves are covered by the Regulations – mainly commercial premises such as offices, shops, hotels, schools, hospitals and similar places. These Regulations do not apply to gas fittings used for the purposes of industrial processes carried out on industrial premises; nor do the Regulations generally apply to agricultural premises, factories, mines and quarries (but, if part of the premises is used for domestic or residential purposes or as sleeping accommodation then they do apply to these parts).

Separation distances

Maximum LPG Capacity			Minimum Separation Distances		
Of any single vessel in a group		Of all vessels in a group			
LPG Capacity (Tonnes)	Typical Water Capacity (Litres)	LPG Capacity (Tonnes)	From buildings, boundary, property line or fixed source of ignition - without fire wall	From buildings, boundary, property line or fixed source of ignition - with fire wall	Between vessels
			Metres	Metres	Metres
0.05 to 0.25	150 to 500	0.8	2.5	0.3	1
> 0.25 to 1.1	>500 to 2,500	3.5	3	1.5	1
> 1.1 to 4	> 2,500 to 9,000	12.5	7.5	4	1

For further guidance on location and spacing for vessels and requirements concerning fire wall provision reference should be made to LP Gas Association - COP 1 part 1 and with respect to buried or mounded vessels LP Gas Association COP 1 part 4.