



1 Introduction

- 1.1 The purpose of this Public Advice Note is to give an appreciation of the standards that will apply where auto gas facilities are provided at a petrol filling station.
- 1.2 Petrol filling station designers, oil company engineers and site operators will, of necessity, need to be conversant with the relevant codes of practice and applicable legislation. It must be stressed that designers and site operators should not rely solely on this Public Advice Note when respectively drawing up plans and operating/maintaining an auto gas installation at a petrol filling station.
- 1.3 The installation of an auto gas facility within the curtilage of a petrol filling station may only be carried out with the written approval of the West Yorkshire Fire & Rescue Service acting in its capacity as both the petroleum licensing authority and the enforcing authority for the Dangerous Substances & Explosive Atmospheres Regulations 2002¹.
- 1.4 In order to obtain this approval it will be necessary to submit a revised scale plan of the petrol filling station showing the location of the various storage vessels, pumps and dispensers.
- 1.5 The conditions of the petroleum licence may be supplemented with additional conditions where an assessment determines that controls and restrictions commensurate with those imposed on petrol storage and dispensing are necessary to ensure that the storage and dispensing of LPG does not adversely affect the safe operating of the petrol filling station.

Note: Only in respect of the activities related to the fuelling of motor vehicles with petrol and any other fuel (e.g. LPG) that falls within the purview of DSEAR

2 Storage

- 2.1 The storage vessels should be designed, constructed and installed to a recognised pressure vessel design code (e.g. EN 13445² and PD5500³) and fitted with appropriate pressure relief, excess flow valves and other safety devices in accordance with LP Gas Association Code of Practice 1: Part 1 Section 3.1.⁴
- 2.2 The vessels should normally be installed above ground and in an external, freely ventilated area. They can, however, be buried underground or mounded. They must never be installed in buildings, open pits or depressions in the ground.
- 2.3 Tables 1 & 2 given in this document, outline the minimum separation distances that should be maintained, to protect the LPG vessels from radiated heat or the effects of a fire in other buildings or features of a petrol filling station. These separation distances also help to minimise the risk of escaping LPG being ignited before it can be dispersed.
- 2.4 Where the tanks are situated in such a position that they may be subject to vehicle impact damage, then suitable protection should be provided (e.g. crash barriers or bollards).

¹ The Dangerous Substances and Explosive Atmospheres Regulations 2002

² BS EN 13445:2002

³ PD 5500 – Previously BS5500, PD 5500 is a published document which specifies requirements for the design, manufacture, inspection, testing and verification of compliance for unfired fusion welded pressure vessels

⁴ Code of Practice 1: Bulk LPG Storage at Fixed Installations: Part 1: Design, Installation and Operation of Vessels Located Above Ground: 2001

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Table 1: Distances from Buildings, Boundaries and Sources of Ignition

(Above Ground Vessels)

Maximum LPG Capacity			Minimum Separation Distances Above Ground Vessels		
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 (a)	With fire wall (b)	Between vessels (c)
			<i>M</i>	<i>m</i>	<i>m</i>
0.05 to 0.25	150 to 500	0.8	2.5	0.3*	1
>0.25 to 1.1	>500 to 2500	3.5	3	1.5*	1
>1.1 to 4	>2500 to 9000	12.5	7.5	4	1
>4 to 60	>9000 to 135000	200	15	7.5	1.5
>60 to 150	>135000 to 337500	460	22.5	11	¼ of sum of the diameter of 2 adjacent vessels
>150 to 300	>337500 to 675000	1000	30	15	As above

Notes:

For vessels up to 1.1 tonnes LPG capacity, the fire wall need be no higher than the top of the vessels and may form part of the site boundary. The fire wall for a vessel up to 1.1 tonnes LPG capacity may form part of a building wall in accordance with Figure 1. Where part of the building is used for residential accommodation the wall, including overhanging but excluding the eaves, against which the LPG is stored should be imperforate and of 60 minutes fire-resisting construction to the current British Standard or equivalent European Standard.

LPG capacity is based on maximum capacity i.e. based on filling to the maximum volume (86.6% for commercial propane)

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Table 2: Separation Distances between Components of a Petrol Filling Station.

Petrol Filling Stations - Minimum Separation Distances						
	Petrol Filling Station Components	LPG Storage Vessel	Storage Vessel Fill Connection	LPG Pump	LPG Dispenser	Vehicle being filled
1	LPG Storage vessel or Manway Assembly for buried/mounded vessels	see column (c) of table 1	Nil	Nil but not beneath tank	0.5m	3m
2	Storage vessel filling connection	Nil	-	Nil	1.0m	3m
3	LPG Pump	Nil ²	Nil	-	Nil	1.5m
4	LPG meter or dispensing hose anchoring point	0.5m	1m	Nil	-	Nil
5	Vehicle being filled	3m	3m	1.5m	Nil	-
6	U/G Petrol tank Manhole with fill connections	7.5m	7.5m	7.5m	7.5m	Nil
7	U/G Petrol tank Manhole without fill connections	3m	3m	3m	3m	Nil
8	Above ground tank for liquids with a flash point <65°C	As per LPG Association: Code of Practice 1 Part 1 Table 2 : Safety Distances from other flammable liquids				
9	Off set petrol tank fill connections	7.5m	7.5m	7.5m	7.5m	Nil
10	Petrol tank vents	7.5m	7.5m	7.5m	7.5m	Nil
11	Petrol dispensers - explosion protected	7.5m	7.5m	7.5m	Nil	Nil
 Diesel dispensers - explosion protected	3m	3m	Nil	Nil Nil
12	Powered vehicles etc under control of site operator. ³	6m or separation distance in Table 1	6m or separation distance in Table 1 if less	1.5m	Nil	Nil
13	Site Boundary Buildings, fixed sources of ignition	As Table 1 of this Information Note			4.1m	N/A (defined by filling hose)

² But not beneath tank.

³ Powered vehicles not under the control of the site operator should not be parked within the separation distance given in Table 1 Column 'A'

Security Compound

- 2.5 To prevent unauthorised access and interference, the storage vessel should be located in a compound constructed from non-combustible materials and designed to incorporate the following features:
- adequate free ventilation (in accordance with the separation distances given in Table 1). Industrial open mesh or palisade fencing are the most suitable materials to use;
 - is at least 1.8m high;
 - is a minimum of 3m from the storage tank (where there is uncontrolled public access);
 - has a minimum of 2 means of exit from the compound, which should be outward opening and operable from inside; and
 - is not located under any structures, overhanging projections or electric power cables.

Fire Walls

- 2.6 Fire walls may permit separation distances to be reduced. They should be of such a length that the distance from the storage vessel to a boundary or fixed ignition source measured around the end of the wall is not less than the separation distances specified in Table 1, Column 'B'.

3 Pumps

- 3.1 Pumps should be situated in the vessel compound but not underneath the storage vessel. They should be suitable for Zone 1 use.
- 3.2 Pumps should be adequately secured to a concrete foundation or bolted to a structural steel vessel support.

4 Pipelines

- 4.1 Steel pipelines used for LPG liquid and vapour lines should be to BS 3601⁵ or equivalent European standard.
- 4.2 Pipework should be run as directly as is practicable from one point to another and with as few restrictions (such as elbows, bends etc), as conditions will permit.
- 4.3 The repeated movement of pipework from hydraulic reaction (sometimes referred to as 'hammer' or 'shock' that occurs in some systems when a dispenser is turned-off, must be taken into account at the time of installation and/or when alterations are carried out.
- 4.4 Above ground pipework should be adequately supported, protected against possible impact damage painted or otherwise treated to protect against corrosion.
- 4.5 Buried pipework carrying LPG must be fully welded and suitably protected against corrosion. This is normally achieved by wrapping with a suitable material, plastic coating or cathodic protection. (Galvanising is not considered to be adequate).
- 4.6 Trenches should be left open until pipework has been leak-tested and then back-filled with suitable material; for example clean dry sand. Corrosive substances, rocks or large stones liable to damage the pipe or its coatings should not be used. Pipework should not be embedded in concrete.

⁵ BS 3601:1987 – Specification for carbon steel pipes and tubes with specified room temperature properties for pressure purposes
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- 4.7 Pipelines carrying LPG should have electrical continuity and be effectively connected to earth and bonded to comply with a recognised electrical code (e.g. BS 7671⁶)

5 Road tanker deliveries

- 5.1 There should be a designated position, within the confines of the filling station, for the road tanker to park when it is unloading LPG into the storage vessel(s). The following points will need to be taken into consideration when deciding the most suitable unloading position:
- to avoid any undue tension being imposed on the delivery hose, the distance between the road tanker and the storage vessel filling connection should allow for at least one turn of hose remaining on the tanker's reel;
 - there should be unrestricted access for the driver between the road tanker and the storage vessel(s) or remote filling facility;
 - there should be a clear line of sight for the driver to see both the road tanker and the storage vessel(s);
 - if deliveries are to take place during the hours of darkness, adequate artificial lighting should be provided to illuminate the road tanker and the storage vessel; and
 - there should be unrestricted access for vehicles approaching and leaving the dispensing area and a clear escape route must be maintained for the LPG tanker.
- 5.2 At some small filling stations, this may involve suspending dispensing activities for the period of time that the LPG tanker is on site.

6 Dispensers

- 6.1 There are at present no recognised construction standards for LPG dispensers, therefore construction details, electrical components and safety features should be submitted by the manufacturer with CE marking.
- 6.2 Dispensers should not be located closer than 0.5m from the LPG storage vessel. Electrically powered dispensers must not be located in a more hazardous classified zone than that for which they are certified.
- 6.3 Dispensers should be located in the open air where they will be adequately ventilated. The centre lines of these housings should be not less than 4.1m from any public thoroughfare, boundary or fixed source of ignition.
- 6.4 Dispensers should be separated by at least 9m from residential accommodation, or 6m from other types of occupied buildings, unless the openings to such buildings are adequately protected.
- 6.5 Dispensers may be placed on the island adjacent to a petrol dispenser and should be protected against impact by the provision of a crash barrier or bollards surrounding the dispenser.
- 6.6 Each dispenser hose should be provided with a safe break connection with a secure mounting point to avoid damage to the installation in the event of a vehicle driving off whilst still connected to the dispenser.
- 6.7 Comprehensive written and graphic dispenser operating instructions should be provided for use by customers, displayed on or near the dispenser.

⁶ BS 7671:2001 – Requirements for Electrical Installations

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- 6.8 The vapour return line from the dispenser to the tank should be provided with a non-return valve.
- 6.9 All dispensers should be capable of being isolated from the installation for servicing and removal by the installation of isolation valves.
- 6.10 At attended self-service stations, dispensers should be sited where they can be adequately viewed and supervised from the control point.

7 Electrical wiring to pumps and dispensers

- 7.1 Wiring and cables which may be exposed to a flammable atmosphere must be suitably enclosed and should comply with a recognised electrical apparatus code.
- 7.2 The number and location of emergency switches are detailed in Section 14.6.4 of the Blue Guide (2nd edition)⁷
- 7.3 In the case of filling stations where 'driver unassisted deliveries' take place, the ACoP (L133)⁸ requires the provision of an isolation switch capable of cutting off the power supply to all pumps including the LPG pumps and dispensers.
- 7.4 The electrical circuits to the LPG pump and dispenser should be arranged so that, on the operation of an emergency switch on the filling station, the LPG pumps' dispensers and also the petrol pumps' dispensers are all electrically isolated. These should only be capable of being reset from inside the console area.

A means of communication from the console position to the LPG dispenser should be provided, via the loudspeaker system used for petrol pumps.

8 Ducting

- 8.1 The effective sealing of all underground ducts containing cables or pipework, to prevent the migration of LPG, is an essential element in the construction, modification and maintenance of auto gas installations; particularly those with underground connections.

9 Fire Protection Measures

- 9.1 All above ground tanks should be situated to provide means of access for fire fighting vehicles. In addition adequate water supplies to maintain an application rate according to the risk for at least 60 minutes, these may be taken from the public water supply (e.g. hydrants).
- 9.2 Means should be provided to isolate the tank, pump and dispenser from each other in the case of fire, or other emergency situation. This may be achieved by the provision of automatic solenoid valves situated in the compound and at the dispenser.
- 9.3 Dry powder fire extinguishers complying with BS EN 3⁹ not less than 9kg and suitable for LPG fires with a rating of at least 21A and 183B should be available at strategic locations.

⁷ Design, Construction, Modification, Maintenance & Decommissioning of Filling Stations' (2nd edition) ISBN 0 85293 419X.

⁸ Approved Code of Practice and Guidance (L133)

⁹ BS EN 3:2009 – Portable fire extinguishers

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10 Notices

10.1 All notices must be conspicuous and easily understood. Where possible they should conform to BS 5378¹⁰ and, where relevant, the Health and Safety (Safety Signs and Signals) Regulations 1996¹¹.

10.2 The notice to be displayed on the storage tank or on the compound

Highly Flammable – Propane – No Smoking

10.3 The notice to be displayed at the LPG dispenser:

Liquefied Petroleum Gas
Extremely Flammable
Switch off Engine
Apply Handbrake
No Smoking - No Naked Lights
Switch off Mobile Phones

10.4 The notice to be displayed at the emergency pump isolation switch:

LPG Pump - Switch Off Here

11 Operations

Dispensing

11.1 At 'attended service' petrol stations, the LPG dispenser may only be operated by the licensee or nominated employees (attendants).

11.2 At 'attended self-service' petrol stations the authorisation for use of any LPG dispenser should only be carried out by the attendant in charge of the forecourt control point. The operation of the dispenser once authorised should be via a button on the dispenser that must be held in during operation of the pump. Releasing the button will stop the flow of LPG.

11.3 The 'self-service' of auto gas at retail petrol filling stations that are unmanned is not allowed.

¹⁰ BS 5378:1980 – Safety signs and colours

¹¹ Health and Safety (Safety Signs and Signals) Regulations 1996

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Road Tanker Deliveries

11.4 LPG tanker deliveries are not normally permitted at the same time as a petrol tanker delivery.

12 Staff Training

12.1 Forecourt attendants will need to be given additional training (to that they have received on petrol deliveries and dispensing) on the hazards, risks, safety controls and emergency procedures for LPG. A training programme should be developed to cover the following topics:

1 Safe Handling of LPG	4 LPG Tank Compound: <ul style="list-style-type: none">• Tank level gauge• Isolation valve• LPG delivery drivers emergency stop• Housekeeping• Access gates• Safety signs• Delivery procedures
2 Hazardous Characteristics of LPG	
3 Emergency Procedures: <ul style="list-style-type: none">• Emergency shut-down switches• Isolation valves• Telephone numbers/contacting the Fire Brigade• Customer Safety	5 Dispenser: <ul style="list-style-type: none">• Safety whilst refuelling• Break away coupling• Adaptors
	6 General Maintenance: <ul style="list-style-type: none">• Daily/Weekly checks• Fault/Incident reporting procedures

12.2 The site operator must prepare a written emergency procedure on the actions to be taken should there be a fire or leak involving LPG.

13 Periodic Examination and Maintenance

13.1 Designers, manufactures, installers and suppliers of auto gas LPG tanks or other equipment which will operate under pressure have duties under the Pressure Systems and Transportable Gas Containers Regulations 1989¹². This includes determining safe operating limits and preparing a written scheme of examination. The site operator of the installation and equipment under pressure has duties under these Regulations that require that a written scheme of periodic examination is produced by a competent person, or certified as being suitable by a competent person. The site operator must ensure that the installation system is properly maintained so as to prevent danger.

13.2 A responsible person must carry out routine examination of installation equipment at least once during each working day.

¹² Pressure Systems and Transportable Gas Containers Regulations 1989.

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- 13.3 An annual inspection of the storage vessel, pipework, earth bonding, pumps, dispensers, hoses, safety break connection and nozzles must be carried out in accordance with the manufacturer's instructions or equivalent European standards.
- 13.4 The electrical part of the installation should be maintained annually in accordance with a recognised electrical apparatus code (e.g. BS 5345 or 7671).
- 13.5 Fire Extinguishers must be maintained annually in accordance with BS 5306: Part 1: 1985.¹³

Note: - Vegetation should be removed from inside the compound to allow the dispersal of any gasses following a leak, this should be checked weekly and cleared accordingly.

14 Other Enforcing Authorities to be consulted

- 14.1 The Planning Authority (for planning application).

15 Relevant Codes of Practice and Statutory Regulations

- 15.1 Detailed guidance on storage and dispensing of LPG as an automotive fuel may be obtained from the UKLPG website.
- 15.2 The following legislation (not enforced by the Petroleum Licensing Authority) will apply at premises with automotive LPG refuelling facilities:
 - The Health & Safety at Work etc Act 1974¹⁴
 - The Electricity at Work Regulations 1989¹⁵
 - The Pressure Systems and Transportable Gas Containers Regulations 1989 SI 1989¹⁶

¹³ BS 5306: Part 1: 1985

¹⁴ The Health & Safety at Work etc Act 1974

¹⁵ The Electricity at Work Regulations 1989

¹⁶ The Pressure Systems and Transportable Gas Containers Regulations 1989 SI 1989