

Guidance Notes for Flexible Hoses and Tubing for LPG Applications

Background

For many years two types of flexible hose for LPG vapour service have been supplied which complied with the recommendations of BS:3212 "Specification for flexible rubber tubing, rubber hose and rubber hose assemblies for use in LPG vapour phase and LPG/air installations"

Low pressure tubing is of single ply construction and conforms to Type 1 classification in the Standard. Tubing is black in colour and only suitable for use at pressures not exceeding 50mbar.

'High' pressure hose is of two ply construction and conforms to Type 2 classification and is double walled reinforced hose which for many years had a black external wall but in 1975 the standard changed to require the outer wall to be coloured orange. BS:3212 was amended in 1991 to allow black hose to Type 2, but only when supplied as an assembly. The heavy duty black hose now has a reduced bore, to the preferred 6.3mm and carries the appropriate BS:3212 type marking.

European standard BS:EN:1763 "Rubber and plastics tubing, hoses and assemblies for use with commercial propane, commercial butane and their mixtures in the vapour phase. Requirements for rubber and plastics tubing and hoses" specifies Type 1 tubing and Type 2 hose and includes two additional categories which are medium pressure (10bar) type 2 and a hose for external use only which is suitable for applications to -30°C.

European standard BS:EN:16436 "Rubber and plastics tubing, hoses and assemblies for use with commercial propane, commercial butane and their mixtures in the vapour phase. Requirements for rubber and plastics tubing and hose assemblies for use with propane, butane and their mixtures in the vapour phase (LP Gas) Hose & Tubing" has now come into force and is divided into 3 classes. Class 1 is for un-reinforced tubing with a maximum 0.2bar rating; Class 2 is reinforced hose with a maximum 10bar rating and Class 3 is reinforced hose with a maximum 30bar rating. Hoses and tubing in this Standard can be white, black or orange and all classes must be identified as LPG hose with an ORANGE stripe (if they are not orange in colour).

Convuluted Stainless Steel gas hose complying with EN:10380 have now become available and are rubber free hoses which eliminates the possibility of oily plasticiser residue from the rubber contaminating a regulator.

The armoured 'Lunken' hose, now called Braided Gas hose, has also been available for many years and its historic use has been as a flexible connector for cookers, Bitumen Boilers and other applications where there is a higher risk of mechanical damage and possible rodent attack. This hose has a thin LPG resistant inner tube, covered by metallic braiding which is protected by spirally wound metallic outer casing and integral end fittings. This hose is not covered by any current British Standard although the relevant parts of BS:3212 are applicable for its assessment.

A cooker flexible hose to BS669: Pt 1 "Flexible hoses, end fittings and sockets for gas burning appliances. Specification for strip-wound metallic flexible hoses, covers, end fittings and sockets for domestic appliances burning 1st and 2nd family gases" comprises of a spirally wound inner, sealed rubber bead and covered with a rubber outer sheath for a quick fit coupling and satisfies the Gas Safety (Installation and Use) Regulations. Whilst flexible hoses to this Standard with a 'YELLOW' band are **not suitable for use with LPG**, specific LPG cooker flexible hoses of a similar construction with a bayonet connector are available under a number of brand names and can be identified by a 'RED' band or strip and 'RED' labelling.

BS:6173 "Specification for installation of gas-fired catering appliances for use in all types of catering

Guidance Notes for Flexible Hoses and Tubing for LPG Applications

establishments (2nd and 3rd family gases)", the Catering Appliance Installation standard requires that catering appliances which are designed to be moved for cleaning are connected via a BS:699 type 2 "Flexible hoses, end fittings and sockets for gas burning appliances. Specification for corrugated metallic flexible hoses, covers, end fittings and sockets for catering appliances burning 1st, 2nd and 3rd family gases" flexible hose. This is a plastic sheathed all metal corrugated stainless steel pipe with a quick fit connector. This is a specific version for LPG applications.

SUMMARY OF TUBING AND HOSES				
Classification	Construction	External Colour	Max. Pressure	Typical Uses
BS:3212: 1991 Type 1 BS:EN:1763 Class A BS:EN:16436-1 Class 1	Tubing	Black	50mbar	Domestic low pressure applications
		White or Black with ORANGE stripe	200mbar	
BS:3212:1991 Type 2 BS:EN:1763 Class B BS:EN:16436-1 Class 2	Hose	Orange	17.5 bar	Cabinet Heaters, BBQ, Brooders
		Orange or White or Black with ORANGE	10 bar	
BS:3212:1991 Type 2 BS:EN:1763 Class B BS:EN:16436-1 Class 3	Hose used with end fittings. (assembly)	Black	17.5 bar	Pigtails between Cylinder & regulator
		Orange or White or Black with ORANGE	30 Bar	
Armoured Hose	Armoured & Braided Tubing	Metallic	50 mbar	Bitumen boilers Applications where excessive wear or vermin attack is possible
EN:10380	Stainless Steel convoluted hoses	Metallic	17.5 bar	30mbar caravan and marine regulators and Changeover Systems using the W20 connection
BS:669 Part 1	Spirally wound flexible hose	Black with red band/strip and labeling	50 mbar	Cooker connections
BS:669 Part 2	Convoluted Stainless Steel	White cover	50 mbar	Catering appliances

Securing tubing and hose

Vapour phase LPG hose and tubing should never be used unless it is properly secured to its end fittings by appropriate clips.

Hose or tubing with an internal diameter of 8mm or greater and operated at a pressure of up to, but not exceeding, 50mbar may be secured using either crimp clips or swaged fittings or worm drive clips.

Only crimp clips of the correct size for the hose or tubing



Worm drive should secure the hose or tubing but not be over-tightened

Hose or tubing with an internal diameter of less than 8mm and hose operated at a pressure exceeding 50mbar should always be secured by crimp clips or swaged fittings. Worm drive clips should not be used.

Guidance Notes for Flexible Hoses and Tubing for LPG Applications

Conditions of Service

The useful service life of flexible hose will vary dependent upon a number of influences including exposure to sunlight and UV, exposure to rain, pressure cycle, flexing, abrasion, twisting, together with a range of abusive conditions.

Black BS:3212 Type 1 tubing & BS:EN:1763 Class A hose can be remarkably durable in service and there are numerous examples of properly maintained tubing/hose being in use for several years.

The orange BS:3212 Type 2 & BS:EN1763 Class B hose has proven less durable and resistant to weathering and ageing than the former black hose, particularly, when used in external unprotected applications e.g. pigtailed.

Experience to date with the heavy duty black hose have improved weathering resistance over the orange version.

Service Life

BS:3212 or BS:EN:1763 or BS:EN:16436 hoses should bear the year and name of manufacturer.

We have no specific recommendation for the exchange interval for vapour hoses, but it is considered that the normal useful service life of such hoses is 5 years.

It is essential that LPG hose/tubing and end connections are regularly inspected and replaced if showing signs of:

- Physical damage such as - cuts or abrasion, cracking, stretching, flattening, kinking and, where fitted, missing/worn sealing washers, damaged cylinder connections;
- Environmental deterioration such as - stiffening, cracking, de-lamination of outer covering, chemical degradation i.e. softening of outer coating by contact with oil;
- Hose service failure such as - blistering, soft spots, rupture and, for pre-assembled end fittings, corrosion or loosening of swaged fittings attaching hose.

If the User has doubts about hose integrity then arrangements should be made for a competent person to check and if necessary, fit a replacement(s).

Dealers and Calor Centre delivery persons, caravan park operators, fitters and others who regularly come into contact with flexible hose applications may also participate in this regular visual inspection and make appropriate recommendations to the customer/owner of the hose concerned.

Certification and Quality Assurance

Hoses and tubing are relatively vulnerable equipment that plays a vital and uniquely valuable role in the LPG Gas installation and they should be selected and stored with care. Any supply should be confirmed as having valid certification and have been manufactured under a quality system registered to BS:EN:ISO9000.

Stock should be stored carefully, avoiding bright sunlight, dampness, abrasion and excessive loading. Although no specific shelf life is usually quoted strict rotation should be maintained to avoid shortening the useful service life.

Guidance Notes for Flexible Hoses and Tubing for LPG Applications

References

BS:3212 Specification for flexible rubber tubing, rubber hose and rubber hose assemblies for use in LPG vapour phase and LPG/air installations

BS:669 Pt 1 Flexible hoses, end fittings and sockets for gas burning appliances. Specification for strip-wound metallic flexible hoses, covers, end fittings and sockets for domestic appliances burning 1st and 2nd family gases

BS:669 Pt 2 Specification for corrugated metallic flexible hoses, covers, end fittings and sockets for domestic appliances.

BS:EN:1763 Part 1 Rubber and plastics tubing, hoses and assemblies for use with commercial propane, commercial butane and their mixtures in the vapour phase. Requirements for rubber and plastics tubing and hoses.

BS:EN:16436 Part 1 Rubber and plastics tubing, hoses and assemblies for use with propane, butane and their mixtures in the vapour phase. Hoses and Tubing

BS: EN:10380 Pipework. Corrugated metal hoses and hose assemblies.

UKLPG User Information Sheet no. 005 'LPG Hose and tubing for Use with Vapour Offtake Cylinders'

UKLPG User Information Sheet no. 017 'Use of clips to secure vapour phase LPG hose and tubing to BS: 3212 and EN: 1763 to end fittings'

UKLPG User Information Sheet 028 'Safe Use of Propane and Butane Cylinders and Cartridges'

N.B. This guidance given here is solely applicable to vapour service hoses and is not applicable to liquid duty hoses which come within the requirements of BS: EN: 1762 "Rubber hoses and hose assemblies for liquefied petroleum gas, LPG (liquid or gaseous phase) and natural gas up to 25 bar (2,5 MPa)". This Standard has replaced BS: 4089 "Specification for metallic hose assemblies for liquid petroleum gases and liquefied natural gases".

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