

Liquefied Petroleum Gas on leisure craft

Roger Lorenz

This is Part 1 of a two-part article: the second part will appear in our next issue. Ed.

I was disappointed to read that yet another organisation, in this case the Irish Dept of the Marine [*in Marine Notice No 1 of 2002. Ed.*], was recommending that boaters find alternative fuels to LPG for cooking and heating on board their boats. In reality there are few viable alternatives on the grounds of cost and availability alone — and all suitable alternatives for use with small craft have their own safety considerations. I feel that it is unfair and unreasonable to single out LPG for such advice and am confident that properly installed and maintained LPG systems provide safe and convenient means by which one can lead a normal life on board.

As with all constructions, there are standards for guidance on the installation, maintenance and inspection of LPG systems. In the UK their use has been mandatory for some years and the introduction of the Recreational Craft Directive has imposed regulation on boat builders. In addition the Boat Safety Scheme operated on behalf of the Navigation Authorities (British Waterways, the Environment Agency, Broads Authority etc) has obliged boat owners to submit their craft for inspection every four years. A significant part of this Scheme involves a detailed examination and testing of all LPG systems, including those used for power generation and main propulsion. If the boat does not pass it cannot be licensed and must be removed from the waterway. In certain rare circumstances (eg if it has a major gas or petrol leak) it may be declared a "Dangerous Boat" and may be forcibly entered and removed by the navigation authority.

The relevant Standards for LPG on boats are:

- **EN ISO 10239:2000 Small craft — Liquefied petroleum gas (LPG) systems**, which is the international standard for new constructions
- **BS 5482 Part 3 (1999) Code of practice for domestic butane & propane gas burning installations — Part 3 Installations in boats, yachts and other vessels**, which has an Annex A that specifically allows "grandfather clauses" to be used for existing craft in certain circumstances.

There is an Irish standard dating back to 1988: **IS 810 Parts 1 & 2 1988 Butane and Propane Gas-Burning Installations in Boats, Yachts and Other Vessels**. Part 1 covers essential safety requirements and Part 2 design and performance. The Dept of the Marine circular did not refer to this standard. Many boats on Irish waters were built in Britain using the BS 5482 Part 3 standard.

Importance

You may ask "What has this got to do with me?" Well, if you own a boat with an LPG system, you will appreciate that gas is somewhat heavier than air and any leakage will collect in bilges. If this gas explodes and injures a third party, they may well have a case for legal redress unless you can prove that all reasonable steps had been taken to prevent such leakage and explosion. In my experience of such cases, a court will always take note of the degree of compliance of the gas system with a relevant standard. Remember that "third party" could include members of your family as well as members of the public and other boat-owners.

Having said that, I am more than content to have had LPG systems on my boats and I do not lose any sleep at night worrying about them. As with many things, a healthy respect for the safety implications is all that is required. I will briefly discuss some of the more usual problems with small craft systems; you can if you wish use this as a system check. If you are in doubt you should always consult the relevant standard and a competent gas fitter.

LPG cylinder storage

All gas cylinders (including the small Camping Gaz type, gas blow lamps etc) must be stored so that any gas leakage is led directly overside. If the cylinders are stored on deck they must be restrained from falling over and be at least 500 mm from any opening window, vent, exhaust etc.

Storage in cockpits is acceptable only if the cockpit self-drains and any access to the boat's interior is via a step higher than the level of the top of the cylinder. A dedicated gas locker must have an overside drainage point from the lowest convenient level. Ideally there should also be a high level vent to allow air circulation through the locker. If the locker drain takes the form of a pipe, it must not be able to be blocked by water (no U bends). It must have a minimum internal diameter of 15mm for up to 13Kg of LPG and be increased accordingly for larger stored amounts. The stored gas takes the form of a liquid and thus it is **very** important to keep the cylinders upright: they should never be stored or used on their sides in marine vapour withdrawal systems such as we have on our boats. Both propane and butane expand over 230 times in the liquid-to-vapour transformation and it does not take much leakage to reach the 2%+ gas explosive range.

Regulator

The regulator must be stowed in the gas locker along with the cylinders and may be cylinder or bulkhead mounted. LPG regulators are usually trouble free but should be checked every four years to ensure that the internal spring has not become tired and the gas is being delivered over pressure. One very important maintenance point is to check that the small air hole is clean and cannot be blocked by water or ice. **Never** paint an LPG regulator because of the risk of closing this hole. The regulator works by delivering gas at a set pressure above atmospheric and so needs to constantly monitor the ambient air pressure; hence the small hole. In the UK and Ireland, propane is delivered at 37mbar and butane at 28mbar (both less than 0.5 psi for those who still remember pounds and inches).

Part 2 of this article will cover pipework, appliances, ventilation and testing.

*Roger Lorenz, skipper of **Neptune**, has been on Irish waters for the last few years. He was the UK marine surveyor representative on the LPG working party for BS 5482 Part 3. He is a Fellow Surveyor member of the Yacht Designers & Surveyors Association and also a Surveyor for the British Boat Safety Scheme and for the UK Maritime and Coastguard Agency on Class V passenger vessels. He examines and tests gas systems most working days. He does not have shares in LPG suppliers or gas installation companies!*