European Marine Surveys

Marine & Yacht Surveyors & Marine Consultants

LPG & Fuel Systems

LPG Gas:

On boats, the Liquefied Petroleum Gases in common use are, 'commercial butane', and 'commercial propane'. They exist as gases at normal temperatures, but become a liquid under moderate pressure. Propane turns into gas at a lower temperature than butane, so the storage pressure for liquid propane is slightly higher than butane.

One volume of liquid butane or propane produces approximately 250 volumes of gas and thus a leak of liquid is a grave hazard, especially on a boat. Since LPG vapour is denser than air, leaked LPG vapour will fall and flow along cockpit floors, bilges, etc and the vapour may travel some distance. The LPG will build up in low-lying parts of your boat and it may persist for some time. It only needs concentrations of 2–10% LPG in air to make a flammable mix. In a boat, a flammable mix will explode if ignited. It is also possible for gas/air mixtures from leaks or other causes to be ignited some distance from the point of leakage and the flames travel back to the source before exploding. In extreme cases, if the cylinder is lying on its side; if the cylinder valve is faulty; or if the exposure to the fire is extended, the cylinder may rupture leading to a violent explosion. Alternatively, the point could be reached where the pressure-relief valve releases LPG, causing a significant jet of burning gas. To help prevent incidents, a stenching agent is added to give LPG a strong odour, which most people can smell long before the gas reaches dangerous concentrations.

Comprehensive reference

http://www.boatsafetyscheme.com/downloads/BSS_Guide_chap7.pdf

Fixed Fuel Systems:

The watertight nature of boats means that they also act as good containers for leaks or overflows of flammable liquids and vapours!

Stored fuels such as diesel or petrol in confined and undrained spaces carry the risk of providing fuel for a fire or explosion. This chapter covers the need to keep fuel away from sources of ignition for as long as possible. It also covers why the fuel filling and fuel supply arrangements must not allow leaks to accumulate inside the confines of your boat. Thus, all fuel system components must be in good condition. They must also be fire resistant, suitable for the fuel being used and kept away or shielded from sources of heat. To avoid pollution, spilt fuel oils are normally prevented from being discharged into the waterway and the detail of prevention is in BSS Chapter 9. However, the overriding need to minimise the risk of fires, spread of fire and explosions, means that small amounts of overflowing fuel are better directed overboard than allowed to flow into the craft interior. These requirements and checks apply to all boats with inboard engines and to other fixed fuel systems supplying liquid-fuelled appliances such as diesel heaters. Further requirements relating to appliances and their installation and maintenance are in BSS Chapter 8. If you carry spare fuel in portable containers, the requirements related to the safe type and location of spare fuel containers is covered in BSS Chapter 5.

Comprehensive reference

http://www.boatsafetyscheme.com/downloads/BSS_Guide_chap2.pdf

Example of typical LPG Check List

Sect	Description	YES	NO	Comments
7.1.1	LPG cylinders stored where leakage is directed safely overboard			
7.1.2	LPG portable appliances stored so leakage directed safely overboard			
7.2.1	LPG locker tight up to the top of valves or other HP components			
7.2.2	LPG pipework sealing arrangements exiting of correct type & in good condition			
7.2.3	Side opening locker compliant with ISO 102397			
7.2.4	Arrangements of self draining locker prevent LPG entering vessel			
7.3.1	Is drain in locker and drain outlet above waterline			
7.3.2	Drain opening at or close to the bottom			
7.3.3	Is locker clear of any items that could block the drain			
7.3.4	Does the drain line fall continuously to outlet and are both ends clear			
7.3.5	Is drain line material & connections in good condition			
7.3.6	Drain line & drain opening have a min internal dia.12mm – 19mm See Table			
7.4.1	Cylinders secured & upright with valve at top			
7.4.2	Is the cylinder locker secure			
7.4.3	Are cylinders secured against falling objects			
7.4.4	Locker clear of any items that could damage LPG equipment			
7.4.5	Locker material of required thickness			
7.5.1	All openings to lockers outside of engine, battery, electrical spaces			
7.6.1	LPG shut-off valves in a readily accessible position			
7.6.2	LPG valve locations in open view or locations marked			
7.7.1	LPG HP components either inside the locker or in an open location			
7.7.2	Two or more cylinders connected each have a non return valve fitted			
7.7.3	HP hoses of pre-assembled lengths not exceeding 1m (39”) & to spec			

7.7.4	HP LPG components secure & in good order			
7.7.5	Regulators mounted directly on to cylinders or located to prevent damage			
7.7.6	Is the installation free of manually adjustable regulators			
7.8.1	LPG pipework of suitable material secured & free from damage			
7.8.2	LPG pipework protected where it passes through metal bhds or decks			
7.8.3	LPG pipe joints accessible for inspection & correct type			
7.8.4	LPG joints secure, in good condition and competently made			
7.8.5	Unused appliance spurs properly capped or plugged			
7.8.6	LPG pipes in petrol engine spaces or electrical spaces jointless & in gas proof conduit			
7.8.7	LPG piping at least 75mm (3”) from exhaust system & flue components			
7.9.1	LPG hoses accessible for inspection, correct material & in good condition			
7.9.2	LPG hose protected against damage passing through bhds, decks, walls			
7.9.3	LPG hose at least 75mm (3”) from exhaust & flue components			
7.9.4	LPG hoses connecting appliances to supply pipework < max 1m (39”)			
7.9.5	LPG hose connections accessible for inspection, correct type, condition			
7.9.6	Do all hosed comply with ISO 10239			
7.10.1	All portable appliance connections provided with isolation valve			
7.10.2	Portable appliances connected with bayonet, plug, or screwed fittings & complete and in good condition			
7.10.3	All unused screwed portable appliances properly capped / plugged			
7.11.1	Can all appliance supply hoses be isolated through individual shut off valves			
7.11.2	All appliance isolation valves of correct type			
7.11.3	All appliance valves readily accessible			
7.12.1	Is a LPG test point in the system, or bubble tester in locker			
7.12.2	Is LPG system free of leaks			