1 LIQUEFIED PETROLEUM GAS (LPG)

LPG is a mixture of commercial butane and commercial propane having both saturated and unsaturated hydrocarbons. LPG marketed in India shall be governed by Indian Standard Code IS-4576 (Refer Table 1.0) and the test methods by IS-1448.

1.2 PHYSICAL PROPERTIES AND CHARACTERISTICS

1.2.1 DENSITY

LPG at atmospheric pressure and temperature is a gas which is 1.5 to 2.0 times heavier than air. It is readily liquefied under moderate pressures. The density of the liquid is approximately half that of water and ranges from 0.525 to 0.580 @ 15 deg. C.

Since LPG vapour is heavier than air, it would normally settle down at ground level/ low lying places, and accumulate in depressions.

1.2.2 VAPOUR PRESSURE

The pressure inside a LPG storage vessel/ cylinder will be equal to the vapour pressure corresponding to the temperature of LPG in the storage vessel. The vapour pressure is dependent on temperature as well as on the ratio of mixture of hydrocarbons. At liquid full condition any further expansion of the liquid, the cylinder pressure will rise by approx. 14 to 15 kg./sq.cm. for each degree centigrade. This clearly explains the hazardous situation that could arise due to overfilling of cylinders.

1.2.3 FLAMMABILITY

LPG has an explosive range of 1.8% to 9.5% volume of gas in air. This is considerably narrower than other common gaseous fuels. This gives an indication of hazard of LPG vapour accumulated in low lying area in the eventuality of the leakage or spillage.

The auto-ignition temperature of LPG is around 410-580 deg. C and hence it will not ignite on its own at normal temperature.

Entrapped air in the vapour is hazardous in an unpurged vessel/ cylinder during pumping/ filling-in operation. In view of this it is not advisable to use air pressure to unload LPG cargoes or tankers.

1.2.4 COMBUSTION

The combustion reaction of LPG increases the volume of products in addition to the generation of heat. LPG requires upto 50 times its own volume of air for complete combustion . Thus it is essential that adequate ventilation is provided when LPG is burnt in enclosed spaces otherwise asphyxiation due to depletion of oxygen apart from the formation of carbon-dioxide can occur.

1.2.5 ODOUR

LPG has only a very faint smell, and consequently, it is necessary to add some odourant, so that any escaping gas can easily be detected.

Ethyl Mercaptan is normally used as stenching agent for this purpose. The amount to be added should be sufficient to allow detection in atmosphere 1/5 of lower limit of flammability or odour level 2 as per IS : 4576.

1.2.6 COLOUR

LPG is colourless both in liquid and vapour phase. During leakage the vapourisation of liquid cools the atmosphere and condenses the water vapour contained in them to form a whitish fog which may make it possible to see an escape of LPG.

1.2.7 TOXICITY

LPG even though slightly toxic, is not poisonous in vapour phase, but can, however, suffocate when in large concentrations due to the fact that it displaces oxygen. In view of this the vapour posses mild anaesthetic properties.

LPG SPECIFICATIONS

Salient Features as per IS:4576

S.No.	Characteristic	Requirement for commercial Butane-Propane Mixture	Method of Test Ref. to Page(P) of IS:1448
1.	Vapour pressure at 65 deg. C kgf/cm.g.	16.87 Max.	P:71
2.	Volatility: evaporation temperature in deg.C, for 95 per cent by volume at 760 mm Hg pressure, Max.	2	P:72
3.	Total volatile sulphur percent by mass, Max.	0.02	P:34
4.	Copper strip corrosion at 38 deg.C for 1 hour	Not worse than No.1	P:15

5.	Hydrogen Sulphide	Absent	P:73
6.	Dryness	No free Entrained water	P:74
7.	Odour	Level 2	P:75