SingGas (LPG) Pte. Ltd.

1. IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND COMPANY

Product Identifier:	**Liquefied Petroleum Gas**
Other means of identification:	LPG
Recommended Uses:	LPG is used as a domestic, commercial, industrial and automotive fuel, a feedstock in chemical processes and as propellant in pressurised aerosol containers. If LPG is used for other purposes, please contact the supplier as listed below.
Known Misuses / Abuses:	Sniffing from aerosols, lighter refills and cylinders by young people.
Supplier:	SingGas (LPG) Pte. Ltd.
Address:	No. 31 Defu Lane 9 Singapore 539271
Contact numbers	
Telephone:	6280 4354/ 6863 4290
Fax:	6382 0350
Emergency Telephone:	6280 4354/ 6863 4290 (Office Hours) 6863 4292 (After Office Hours)

2. HAZARDS IDENTIFICATION

GHS Classification: Flammable Gas: Category 1

Pictogram:

Signal Word: Danger

Hazard Statements: H220: Extremely flammable gas

Precautionary Statements:

- **Prevention** P210: Keep away from heat/sparks/open flames/hot surfaces – No smoking.
- **Response** P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
  P381: Eliminate ignition sources if safe to do so.
- **Storage** P403: Store in well-ventilated place.

Other Hazard information:

- **Human health hazards** Exposure to high vapour concentrations can lead to nausea, headache, dizziness, and in extreme cases, loss of consciousness and death in oxygen deficient environments. Prolonged exposure to vapour may affect the central nervous system. Contact with liquid LPG can cause cold burns.
- **Safety hazards** Extremely flammable liquefied gas readily explodes in the presence of source of ignition or flame impingement on containers. The vapour is heavier than air, spreads along the ground and distant ignition is possible.
- **Environmental hazards** No specific hazards under normal use conditions. Liquefied Petroleum Gases are very volatile liquids, which on loss of containment will react rapidly with hydroxyl radicals and ozone.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Synonyms: Liquefied Petroleum Gas, LPG

Preparation Description: Complex mixture of hydrocarbons consisting predominantly of propane and butane plus some C_5 and higher hydrocarbons. Low concentrations of sulphur, hydrogen

sulphide and mercaptans may be present.

It may also contain one or more of the following additives: odorants (usually ethyl mercaptan), anti-icing agents. 1,3-butadiene, classified as a Category 2 carcinogen, may be present at a concentration of less than 0.1% (m/m).

Hazardous Components:

Component Name	CAS number	Concentration	GHS Hazard Codes
Petroleum gases, liquefied	68476-85-7	>99% (m/m)	H220, H280
1,3-butadiene	106-99-0	<0.1% (m/m)	H336, H350
Ethyl Mercaptan	75-08-1	<0.01% (m/m)	H225, H332, H336, H410

Other Information: Contains the following substances for which exposure limits apply: liquefied petroleum gas, butane, 1,3-butadiene, hydrogen sulphide, and ethyl mercaptan.

4. FIRST-AID MEASURES

Symptoms and effects: Liquid may cause skin and eye burns. Prolonged exposure to vapour concentrations above the recommended occupational exposure standard may cause headache, dizziness, weakness, nausea, confusion, blurred vision, asphyxiation, cardiac irregularities, unconsciousness and even death.

Protection of first aiders: Take appropriate steps to avoid fire, explosion and inhalation hazards.

Inhalation: Remove the affected person to fresh air. Keep warm and at rest. If the casualty is stupor, some physical restraint may be necessary to prevent injury. If breathing but unconscious, place in the recovery position. If breathing has stopped, apply artificial respiration. If heartbeats absent, give external cardiac compression. Monitor breathing and pulse. OBTAIN MEDICAL ATTENTION IMMEDIATELY.

Skin Contact: Drench affected parts with water to normalize temperature. Remove contaminated clothing, rings, watches, etc., if possible, but do not attempt to do so if they are adhering to the skin. Do not attempt to reheat the affected parts rapidly - reheat slowly. Cover with a sterile dressing. Do not apply ointments or powders. Note that contaminated clothing may be a fire hazard. Contaminated clothing should be soaked with water before being removed. It must be laundered before reuse.

Eye Contact: DO NOT DELAY. Flush eye with copious quantities of water to normalize temperature. Cover eye with a sterile dressing. OBTAIN MEDICAL ATTENTION IMMEDIATELY.

Ingestion: In the unlikely event of ingestion, obtain medical attention immediately.

Advice to physicians: Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Specific hazards: Hazardous combustion products may include: carbon monoxide, oxides of nitrogen, oxides of sulphur, unburnt hydrocarbons. The vapour is heavier than air, spreads along the ground and distant ignition is possible. Sustained fire attack on vessels may result in a Boiling Liquid Expanding Vapour Explosion (BLEVE).

Extinguishing media: Dry powder, carbon dioxide may be used for small fires. Water fog should be used to assist the approach to the source of the fire.

Unsuitable extinguishing media: Water in a jet. Use of halon extinguishers should be avoided for environmental reasons.

Special protective actions for fire fighters: Shut off supply if safe to do so. If not possible and there is no risk to surroundings, let the fire burn itself out. Evacuate the area. Large fires should only be fought by properly trained fire fighters. Keep adjacent containers cool by spraying with water. All storage areas should be provided with adequate fire fighting facilities. Large storage should be equipped with purpose designed water sprays.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Vapour can travel along the ground for considerable distances. Remove all possible sources of ignition in the surrounding area and evacuate all personnel. Shut off leaks, if possible without personal risk. Do not enter confined spaces. Ventilate contaminated area thoroughly. Do not breathe: vapour. Avoid contact with: skin,

	eyes and clothing. Take off immediately all contaminated clothing - but do not attempt to do so if clothing is adhering to the skin. Contaminated clothing may be a fire hazard and therefore should be soaked with water before being removed.
Personal protection:	Wear monogoggle, chrome leather, neoprene or nitrile rubber gloves, safety shoes or boots.
Environmental precautions:	No specific measures.
Clean-up methods - small spillage:	Allow to evaporate. Do not disperse liquid using water.
Clean-up methods - large spillage:	Attempt to disperse the vapour or to direct its flow to a safe location, for example by using water fog sprays. Otherwise treatment same from small spillage.
Other information:	Test atmosphere for vapours to ensure safe working conditions before personnel are allowed into the area. Local authorities should be advised if significant spillages cannot be contained. Observe all relevant local regulations.

7. HANDLING AND STORAGE

Handling:	This product is intended for use in closed systems only. Do not use in confined areas. During handling, do not eat, drink or smoke. Do not breathe vapour. Sources of ignition must be used sensibly where liquefied petroleum gases are being used in properly designed equipment. Take precautionary measures against static discharges. Use cylinders in the upright position only unless specially designed for use in other orientations.
Storage:	Store only in purpose-designed, appropriately labelled pressure vessels or cylinders. Store outdoors or in adequately ventilated storerooms. Locate pressure vessels or cylinders away from heat and other sources of ignition. Do not store in the vicinity of cylinders containing compressed oxygen or other strong oxidisers. All storage areas should be provided with adequate fire fighting facilities. Keep out of reach of children.
Specific uses:	Fuel for use in suitably designed domestic and industrial combustion equipment (e.g. heating, drying), domestic and commercial cooking appliances and motor vehicles. Also used as an aerosol propellant and a feedstock for the petrochemical industry. This product must not be used in applications other than the above without first seeking the advice of the supplier.
Product transfer:	Electrostatic charges may be generated during pumping. Ensure electrical continuity by bonding all equipment. Avoid contact with equipment in view of the risk of cold burns. Do not use compressed air for filling, discharging or handling.
Tank cleaning:	Cleaning, inspection and maintenance of storage tanks is a specialist operation, which requires the implementation of strict procedures and precautions. These include issuing of work permits, gas-freeing of tanks, using a manned harness and lifelines and wearing air-supplied breathing apparatus. Prior to entry and whilst cleaning is underway, the atmosphere within the tank must be monitored using an oxygen meter and/or explosimeter.
Recommended materials:	For containers, use mild steel. For seals and gaskets, use compressed asbestos fibre or other materials specifically approved for use with this product. Spirally wound metal gaskets are also suitable.
Unsuitable materials:	With respect to metals, aluminium should not be used if there is a risk of caustic contamination of the product. Certain forms of cast iron are unsuitable. With respect to non-metallic materials, natural rubbers must not be used. Nitrile rubbers and certain plastics may also be unsuitable, depending on the material specification and intended use.
Other information:	Ensure that all local regulations regarding handling and storage facilities are followed. Where large quantities of liquefied petroleum gas are stored, emergency and disaster plans must be developed in conjunction with local authorities.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering control measures: Use only in well ventilated areas. Provide adequate ventilation in storage areas.

Occupational exposure controls: ACGIH threshold limit values are given below. Lower exposure limits may apply locally.

Component name	Limit type	Value	Unit	Other information
Propane	TWA	2500	ppm	Nil
Butane	TWA	800	ppm	Nil
1,3-butadiene	TWA	2	ppm	Nil
Hydrogen sulphide	TWA	10	ppm	Nil
Hydrogen sulphide	STEL	15	ppm	Nil
Ethyl mercaptan	TWA	0.5	ppm	Nil

Note: ACGIH - 'Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices', American Conference of Governmental Hygienists, Cincinnati, Ohio, 2002(1996) edition.

Respiratory protection: Not normally required. Inhalation of LPG vapours should be minimised. If there is a risk of exposure to high vapour concentrations, respiratory protection / breathing apparatus should be worn.

Hand protection: Wear neoprene or nitrile rubber gloves or chrome leather. Gloves must maintain flexibility down to the atmospheric boiling point of this product. It may be necessary to increase frequency of changing gloves if immersion or prolonged contact is likely.

Eye protection: If splashes are likely to occur, wear goggles or full-face visors.

Body protection: Protective footwear (chemical resistant) should be worn when handling cylinders. If splashes are likely to occur, wear long-sleeved overalls made of cotton (100%) or other natural fibres.

Environmental exposure controls: No specific measures. Because of its high volatility, LPG is unlikely to cause ground or water pollution.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state: Liquefied gas

Colour: Colourless

Odour: Distinctive and unpleasant when stench, odourless if not stench

Boiling point: circa - 45℃ to 0℃

Vapour pressure: circa 4.1 – 6.9 bar at 37.8°C

Density: circa 0.56 kg/l at 15℃

Vapour density (air=1): circa 1.8 at 15℃

Flash point: - 40℃

Flammability limit - lower: 1.9% (V/V)

Flammability limit - upper: 9.5% (V/V)

Auto-ignition temperature: > 410℃

Explosive properties: In use, may form flammable/explosive vapour-air mixture

Oxidizing properties: Not applicable

Solubility in water: Data not available

n-octanol/water partition coefficient: Log P_{ow} = 2.8 (estimated value)

Evaporation rate: Data not available

10. STABILITY AND REACTIVITY

Stability:	Stable.
Conditions to avoid:	Heat, flames and sparks.
Materials to avoid:	Strong oxidizing agents.
Hazardous decomposition products:	The substances arising from the thermal decomposition of these products will largely depend upon the conditions bringing about decomposition. The following substances may be expected from normal combustion: carbon dioxide, carbon monoxide, polycyclic aromatic hydrocarbons, unburnt hydrocarbons, unidentified organic and inorganic compounds, particulate matter, and nitrogen oxides.

11. TOXICOLOGICAL INFORMATION

Basis for assessment:	Toxicological data have not been determined specifically for this product. Information given is based on data on the components and the toxicology of similar products.
Acute toxicity - oral:	Data not available.
Acute toxicity - dermal:	Data not available.
Acute toxicity - inhalation:	LC50 >5 mg/l (Gas).
Eye irritation:	Not irritating. Liquid causes cold burns.
Skin irritation:	Not irritating. Liquid causes cold burns.
Respiratory irritation:	Not irritating (Gas).
Skin sensitization:	Not expected to be a skin sensitizer.
Carcinogenicity:	This product has not been evaluated in long-term chronic exposure tests. May contain 1, 3-butadiene, classified as a Category 2 carcinogen, at a concentration of less than 0.1% (m/m). Other components are not known to be associated with carcinogenic effects.
Mutagenicity:	Not considered to be a mutagenic hazard (gas).
Human effects:	See Section 4 for information regarding acute effects to humans.

12. ECOLOGICAL INFORMATION

Basis for assessment:	Eco toxicological data have not been determined specifically for this product. Information given is based on data on the components and the toxicology of similar products.
Toxicity:	Low acute toxicity to mammals.
Mobility:	Evaporates extremely rapidly from water or soil surfaces. Disperses rapidly in air.
Persistence/degradability:	Oxidizes rapidly by photochemical reactions in air.
Bio accumulative potential:	Does not bio accumulate.
Sewage treatment:	Not applicable.
Other information:	In view of the high rate of loss from solution, the product is unlikely to pose a significant hazard to aquatic life.

13. DISPOSAL CONSIDERATIONS

Precautions:	See Section 8.
Product disposal:	Given the nature and uses of this product, the need for disposal seldom arises. If necessary, dispose by controlled combustion in purpose-designed equipment. If this is not possible, contact the supplier.
Container disposal:	Return part-used or empty cylinders to the supplier.
Local legislation:	Fire Safety Act

14. TRANSPORT INFORMATION

UN Number:	1075
UN Class/Packing Group:	2.1, Packing Group not applicable
UN Proper Shipping Name:	Petroleum Gases, Liquefied (Propane / Butane Mixture)
UN Number (sea transport, IMO):	1075
IMO Class/Packing Group:	2.1, Packing Group not applicable
IMO Symbol:	Flammable Gas
IMO Marine Pollutant:	No
IMO Proper Shipping Name:	Petroleum Gases, Liquefied (Propane / Butane Mixture)
ADR/RID Class/Item:	2F
ADR/RID Symbol:	Flammable Gas Shunt With Care (RID only)
ADR/RID Kemler Number:	23-1075
ADR/RID Proper Shipping Name:	Petroleum Gases, Liquefied Mixture AO1, Mixture AO2 and Mixture AO (Trade name: Propane / Butane)
ADNR Class/Item:	
UN Number (air transport, ICAO):	1075
IATA/ICAO Class/Packing Group:	2.1, Packing Group not applicable
IATA/ICAO Symbol:	Flammable Gas
IATA/ICAO Proper Shipping Name:	Petroleum Gases, Liquefied (Propane / Butane Mixture)
Local regulations:	Fire Safety Act
Other information:	Transport of this product on passenger aircraft is forbidden.

15. REGULATORY INFORMATION

Label name:	Contains petroleum gas
EC Classification:	Extremely Flammable
EC Symbols:	F+
EC Risk Phrases:	R12 Extremely flammable
EC Safety Phrases:	S2 Keep out of the reach of children. S9 Keep container in a well-ventilated place. S16 Keep away from sources of ignition – No Smoking.
National legislation:	Workplace Safety and Health Act Workplace Safety and Health (General Provisions) Regulations Maritime and Port Authority of Singapore (Dangerous Goods, Petroleum and Explosives) Regulations Fire Safety Act Fire Safety (petroleum and Flammable Materials) Regulations
Compliance to Chemical Inventory requirements:	AICS, DSL, IECSC, ENCS, TSCA, EINECS, KECI, PICCS

16. OTHER INFORMATION

Recommended restrictions on use:	Abuse involving repeated and prolonged exposures to high concentrations of vapour ('sniffing') may cause death by either asphyxiation or cardiac arrest. Abuse involving direct ingestion of the liquefied gas may cause death by freezing the larynx and causing the lungs to fill with fluid - an effect similar to drowning.
Technical contact point:	SingGas Operation
Technical contact number:	6863 4290
Telephone:	6280 4354/ 6863 4290
Fax:	6382 0350
SDS history:	Edition number: 1.5 First issued: 31 December 2010 First revision: 28 September 2011 Second revision: 28 Nov 2012 Third revision: 10 Oct 2015 Fourth revision: 13 July 2018
Revisions highlighted:	Nil
SDS distribution:	This document contains important information to ensure the safe storage, handling and use of this product. The information in this document should be brought to the attention of the person who is a professional user of this product.
Other information:	The meaning of the Risk phrases quoted in Section 2 of this safety data sheet that relate to the classification of 1,3-butadiene and ethyl mercaptan but that do not apply to the classification of this product are: R20 Harmful by inhalation R45 May cause cancer R50 Very toxic to aquatic organisms R53 May cause long-term adverse effects in the aquatic environment
References:	Useful references include the following: The Institute of Petroleum, London, 'Model Code of Safe Practice', Part 9, current edition. The UK LP Gas Association Codes of Practice. CONCAWE, Brussels, 'Liquefied petroleum gas'. Product Dossier No 92/102, 1992. Fire Safety Act, Latest Revision

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not be construed as guaranteeing any specific property of the product.