

# Guidelines for Good Business Practices in the LP Gas Industry

GOOD  
INDUSTRY  
PRACTICES



WORLD LP GAS ASSOCIATION



International Chamber of Commerce  
*The world business organization*

## The World LP Gas Association

The World LP Gas Association was established in 1987 in Dublin, Ireland, under the initial name of The World LPG Forum.

The World LP Gas unites the broad interests of the vast worldwide LP Gas industry in one organization. It was granted Category II Consultative Status with the United Nations Economic and Social Council in 1989.

The World LP Gas Association exists to provide representation of the LP Gas use through leadership of the industry worldwide.

## The International Chamber of Commerce (ICC)

ICC is the world business organization, a representative body that speaks with authority on behalf of enterprises from all sectors in every part of the world.

The fundamental mission of ICC is to promote trade and investment across frontiers and help business corporations meet the challenges and opportunities of globalization. Its conviction that trade is a powerful force for peace and prosperity dates from the organization's origins early in the last century. The small group of far-sighted business leaders who founded ICC called themselves "the merchants of peace".

ICC has three main activities: rules-setting, arbitration and policy. Because its member companies and associations are themselves engaged in international business, ICC has unrivalled authority in making rules that govern the conduct of business across borders. Although these rules are voluntary, they are observed in countless thousands of transactions every day and have become part of the fabric of international trade.

ICC also provides essential services, foremost among them the ICC International Court of Arbitration, the world's leading arbitral institution. Another service is the World Chambers Federation, ICC's worldwide network of chambers of commerce, fostering interaction and exchange of chamber best practice.

Business leaders and experts drawn from the ICC membership establish the business stance on broad issues of trade and investment policy as well as on vital technical and sectoral subjects. These include financial services, information technologies, telecommunications, marketing ethics, the environment, transportation, competition law and intellectual property, among others.

ICC enjoys a close working relationship with the United Nations and other intergovernmental organizations, including the World Trade Organization and the G8.

ICC was founded in 1919. Today it groups hundreds of thousands of member companies and associations from over 130 countries. National committees work with their members to address the concerns of business in their countries and convey to their governments the business views formulated by ICC.

For information on how to join ICC, visit the ICC website ([www.iccwbo.org](http://www.iccwbo.org)) or contact the ICC Membership Department in Paris - see back cover for full contact details.

# **Guidelines for Good Business Practices in the LP Gas Industry**

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# Foreword

**By International Chamber of Commerce (ICC) Secretary General, Guy Sebban**

The fundamental mission of ICC is to promote trade and investment across frontiers and help business corporations and governments meet the challenges and opportunities presented by globalization. All ICC activities are directed to that major end.

ICC derives a unique legitimacy at the global level not only from its presence in 130 countries, among firms of all sizes and in all sectors, but also from its unswerving advocacy of open international trade and investment and the market economy system for almost 90 years. That policy stance has made an enormously effective contribution towards the healthy expansion of business and the improvement of living standards across large parts of the world.

But ICC has never limited itself to policy advocacy, waiting for governments to solve problems. Drawing on the expertise and experience of its worldwide membership, ICC has over time developed a large array of voluntary rules, guidelines, and codes – sometimes referred to as ‘trade tools’ – that facilitate business across borders and help spread best practice among companies.

Over recent decades, the world has become increasingly interdependent. National governments, even in rich and powerful countries, are clearly unable to resolve alone such global challenges as climate change and energy efficiency. This is an area of policy-making with a huge impact on business in which ICC will be increasingly active during 2008.

The way ahead must lie in increased multilateral cooperation among countries in intergovernmental forums, and it must be a major priority of ICC to promote that development. ICC is well positioned to take full advantage of both its close ties with intergovernmental organizations, and its unique ability to build policy consensus within the global business community, to ensure that the business voice is heard loud and clear where it will increasingly count.

ICC is pleased to collaborate with the World LP Gas Association on “Guidelines for Good Business Practices in the LP Gas Industry”. These guidelines, designed for use by companies, associations and policy makers, promote good business practices and pave the way to enhanced cooperation between business and government worldwide.

As it has done throughout its history, ICC will remain a steadfast rallying point for those who believe, like ICC’s founders, that strengthening commercial ties among nations is good for business, good for world living standards, and good for peace.

**Guy Sebban, Secretary General**

January 2008



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# Executive Summary

These Guidelines for Good Business Practices in the LP Gas Industry have been developed by the World LP Gas Association (WLPGA) for two specific purposes:

- To provide global LP Gas industry participants with a tool for ensuring the marketplace, and more importantly the customer, is not compromised by those in the industry who carry out 'bad practices'
- and
- To enlist the support of government in establishing and enforcing policies and regulations that creates a safe, equitable, and competitive environment for industry participants, and to ensure the benefits of LP Gas are not denied to those who rely on LP Gas for basic life needs

These guidelines serve as a voluntary framework for LP Gas companies and associations where there are no, or weak, regulations. They will also provide an operating framework where laws and regulations do exist, but are weakly, arbitrarily, or inequitably enforced. For more detail on the safety implications of good practice it is recommended to read the '[Guidelines for Good Safety Practice in the LP Gas Industry](#)', a publication of the United Nations Environment Programme and the World LP Gas Association.

The LP Gas industry accepts its responsibilities for operating its business in conformity with applicable laws, regulations and standards. Yet, there are some issues over which only government has authority to enforce. Governmental authorities should view these guidelines as a 'checklist' to ensure these issues and recommendations are considered in their own regulations. Government should also support industry's efforts for self-regulation.

Senior officials and policy makers will find this Executive Summary helpful in understanding the product, the basic operations of the industry, the rationale for government involvement, and a brief description of some of the more common practices that demand enforcement. Officials charged with development and enforcement of policies and regulations will find a detailed discussion of the industry, its operations, and recommendations for proper practices throughout the document.

## LP Gas - Its Uses and Benefits

LP Gas is a vital source of energy for tens of millions of people throughout the world. LP Gas consists mainly of propane and butane, which are gases at atmospheric temperature and pressure. When subjected to modest pressure or refrigeration, these gases liquefy making it possible to transport and store LP Gas as a liquid, yet use as a gas. This requires pressurised cylinders and containers, the care and handling of which is the subject of much of this document.

LP Gas is a clean and portable fuel. It provides heat and power in remote areas as well as in densely populated urban areas. Because of its portability, it is not dependent on transmission lines or pipeline grids. Its most popular use is for cooking, heating and water heating in the residential and commercial markets. The agriculture market uses LP Gas for crop and animal production, and powering farm equipment such as irrigation pump engines. Industry relies on LP Gas for heating, drying, and powering industrial trucks. In response to growing concerns of urban air pollution and greenhouse gas formation, LP Gas use as an automotive fuel (autogas) is rapidly increasing. The multitude of uses means great numbers of people are involved in its distribution. This also means there is the opportunity for unethical, unauthorised, or illegal practices to emerge putting innocent people and reputable companies at risk.

## Industry Practices

In part, the motive for this document is driven by the issue of ‘metal management’, a term describing the multi-functions of purchasing, supplying, maintaining and controlling cylinders and other containers used to store and transport LP Gas. LP Gas distribution, in particular LP Gas cylinder distribution, is unique in the energy industry. LP Gas is one of the very few common consumer products sold in a metal container that is often more costly than the product itself. In the distribution system many parties may physically handle the cylinder before it reaches the customer. Once the cylinder of LP Gas has been sold, the seller (who is frequently the cylinder owner) has no direct control over its subsequent use. This makes the importance of maintaining the cylinder or container integrity throughout the distribution chain an integral part of customer safety.

Some unscrupulous players elect to fill cylinders owned by others, steal others’ cylinders and pay little or no attention to proper procedures for filling and handling LP Gas and related equipment. Equally important, once the cylinder leaves the direct control of the owner, there is no guarantee as to when or if the cylinder will be returned. Yet, the owner is exposed to the risk that misuse of the cylinder could result in injury to personnel, loss or damage to property, and loss of customer business. Accidents caused by circumstances or people beyond the control of the owner can expose the owner to severe liability claims, damage the reputation of the owner, and damage the reputation of the industry.

These aspects of the LP Gas industry make it of special importance that the market framework within which the LP Gas is sold and delivered ensures that cylinders and containers are properly maintained. Maintenance of the cylinder and container is the responsibility of the owner; proper and safe use is the responsibility of everyone in the distribution chain including the customer.

## The Role of Government

Government plays a vital role for the LP Gas industry. Two essential areas of government involvement are the elimination of bad practices and providing a competitive business climate.

### A Elimination of Bad Practices

Within the market framework just mentioned there is a clear role for a partnership between industry and government. While industry works to provide a sustainable modern energy supply, government should be aware of, and work to rectify, some of the more egregious practices of unscrupulous operators including:

- Poorly designed and constructed storage facilities.

This is one of the more capital-intensive investments in the LP Gas industry. Poorly designed plants can result in unfair competition due to lower capital outlay by unscrupulous operators, and greater safety risk to employees, customers and the general public.

- Inadequate training of staff

Inadequately trained staffs lead to a high-risk environment, operational errors, and endangerment of customers and the general public.

- Allowing unauthorised premises to operate

LP Gas plants contain hazardous goods. It is essential they operate in accordance with approved procedures adapted to their environment. Unauthorised operation can lead to inequitable competition, the encouragement of bad practices by others, sub-standard equipment in service, danger to the general public and governments being deprived of legitimate revenue.

- Use of unsafe containers (cylinders and tanks)

LP Gas containers when constructed to established codes are durable and have a long useful life. When no longer safely usable, they should be made unserviceable. The use of unsafe containers results in unfair competition, a serious risk to the general public, and possible litigation for reputable manufacturers.

- Illegal filling (decanting) of cylinders

One of the more destructive practices in the LP Gas industry is the illegal filling (pirate filling) of cylinders by someone

other than the cylinder owner. This dangerous practice can result in (i) no control over the condition of the cylinder, (ii) no control over the quality or quantity of the product in the cylinder, (iii) serious risk of damage or injury to those handling including the customer, and (iv) inequitable competition.

- Unauthorised acquisition, reworking, and repainting of cylinders

This practice involves one company stealing the cylinder of another company, repainting it with the brand of the other company, and then re-introducing it into the market. This can result in (i) no control over the cylinder condition, (ii) serious risk exposure to those handling the cylinder including the customer, (iii) inequitable competition, and (iv) loss of assets of the legitimate owner.

- Under-filling of cylinders and containers

LP Gas is sold by weight in cylinders, by volumetric meter in larger containers. Under-filling can be a deliberate act or one of negligence. The customer is entitled to receive the product paid for.

- Over-filling of cylinders and containers

The over-filling of cylinders and containers is unlikely to be done deliberately but badly calibrated filling equipment might lead to this. Over filled cylinders and containers is a dangerous practice that increases the probability of an uncontrolled loss of product.

- Poor maintenance of trucks, plants and containers

Whether an operator chooses to have attractive equipment is a matter of choice. If the equipment is poorly maintained, however, it can lead to leakage of product, unsafe trucks on the road and hazardous plant conditions. All these conditions can result in risk to employees, personnel and the general public.

## **B Provide Competitive Business Climate**

LP Gas has a unique role for both developing and developed economies. It is often the first, and sometimes the only, modern energy available. In developing countries the first use is frequently for cooking. Here, LP Gas displaces wood, charcoal, kerosene and dung. Because LP Gas is a clean burning and portable fuel it:

- Brings the benefit of modern energy to many without the need for costly infrastructure in transmission lines or pipelines
- Saves precious forests, frequently the only source of fuel for many
- Improves the air quality of homes to which children and the elderly are particularly sensitive

However, LP Gas is used for more than just cooking. Over 1500 uses have been identified in the residential, commercial, industrial, agricultural, and automotive markets.

For the LP Gas industry to fulfill its role, it must operate within a framework of 'good business practices'. It also must rely on the establishment and enforcement of sound governmental practices that (i) ensure common rules for all participants in the market equally applied and enforced, (ii) clearly define the rights and responsibilities for all participants including the customer, (iii) offer those with investments an opportunity for financial return on those investments, and (iv) provides a redress for those aggrieved by 'bad practices'.

For private business to bring the benefit of LP Gas to those wanting or needing its products and services there must be a 'level playing field' where the rules are the same for all players. Only then will business take the risk of investment, provide jobs, and contribute to the economic welfare of the communities in which it operates. A business climate that favours some over others, either by lack of enforcement or inequitable enforcement of regulations, will ultimately prove a disincentive to the legitimate operators and encourage a drop in industry standards.

## The Role of Industry

It is important to note that WLPGA views the bad practices discussed herein as an industry issue, and is not relying on government to determine how the industry should operate. It is not only government that has responsibilities. During its nearly 90 years of existence, the LP Gas industry in cooperation with government and international organisations (CEN/ISO) has consistently developed standards of practices that, in many countries, have been incorporated into government regulations. The LP Gas industry works continuously to evolve these standards in response to new technologies and applications.

The LP Gas industry is also accountable, and accepts its responsibilities, for:

- Providing a safe, dependable energy to its customers
- Providing trained staff
- Operating its plants, transportation and equipment in a safe manner
- Treating employees, contractors and customers fairly
- Operating its business ethically
- Cooperating with local and national officials

The purpose of this document is not to encourage a global uniform business structure. Rather, its purpose is to create a solid common base on which LP Gas businesses can be built and compete fairly. The important element of differentiation within the industry is encouraged as companies continue to strive towards best practice. Only then will customers receive and enjoy the many benefits provided by LP Gas.

# Introduction and Purpose

## Introduction

LP Gas is a convenient, clean and highly efficient fuel and is used in many different applications in countries all over the world.

The global availability and popularity of LP Gas has driven widespread and increased usage resulted in it being used for the first time in many countries. Not just customers, but operators of LP Gas companies, distributors, retailers, government authorities and many other people with an involvement in the business. The versatility of the product enables it to be used in new applications in countries where it has already established itself as a popular energy source.

In all markets, wide varieties of practices are adopted in the marketing and distribution of the product and associated services. Some of these practices are not in the best interests of the industry, the companies or the customer.

Some of these practices are illegal. Others may be legal but unethical, others legal but unsafe. Where these practices exist they are putting people at risk, jeopardising the reputation of the LP Gas industry and threatening the long-term prospects for the industry.

## Purpose

This document is produced by the World LP Gas Association to provide some guidelines for good business practices throughout the LP Gas industry for the benefit of all stakeholders in the industry, particularly LP Gas marketers/suppliers and regulatory authorities. This document will be helpful to LP Gas industry associations around the world to assist them in the promotion and application of good business practices in a fair and equitable manner for the benefit of all concerned, particularly the customer.

This Guide contains examples of good business practices that can be easily applied to any LP Gas business. It draws from the experience of people who have been involved with the product and industry for many years.

The first chapters provide some background of the LP Gas industry by briefly reviewing the stakeholders in the business, the product and the distribution chain. For those already familiar with the LP Gas industry, it is recommended they turn straight to Chapter Four – Good Business Practices. This section of the document discusses good business practices from the main storage facility to the final customer by considering some of the major market segments - domestic and commercial cylinder (or packed), reticulated, domestic and industrial bulk, and automotive. Chapter Four also highlights some of the more prevalent bad practices that are in evidence across the business and discusses the impact they have on the overall industry.

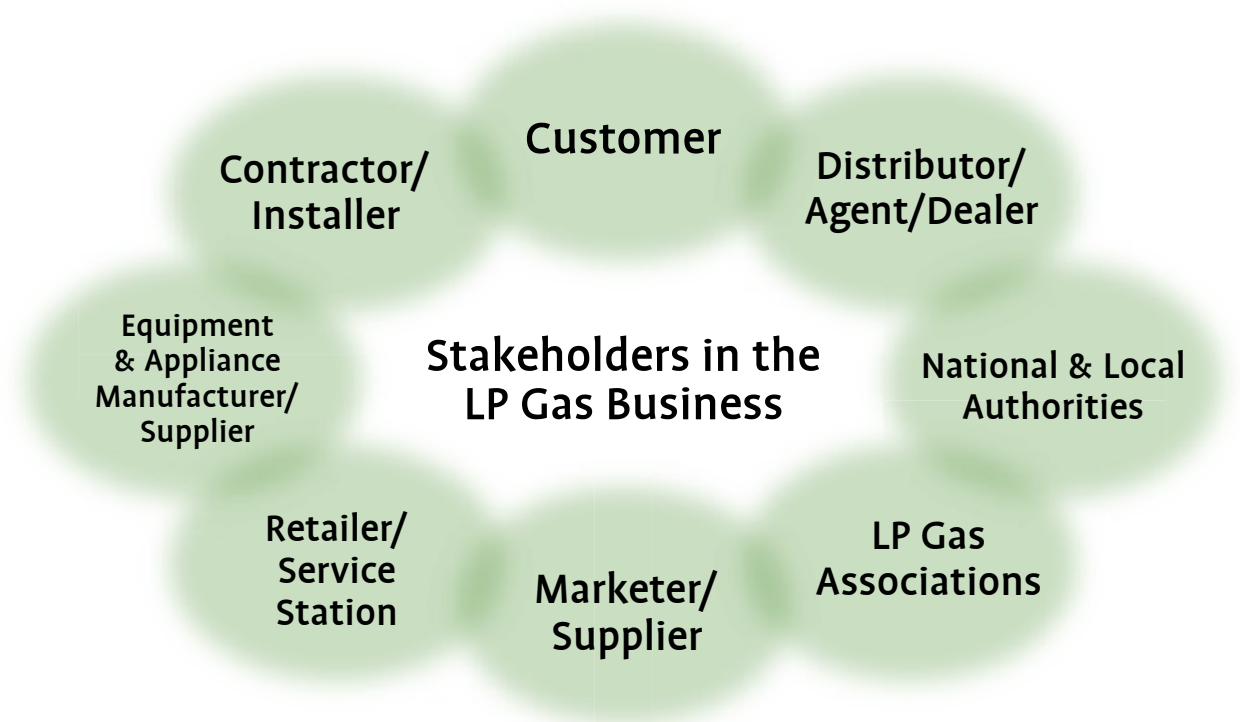
There are many examples in this document where bad business practices impact upon the safety and welfare of people. These will be discussed, but for more detail on the safety implications of good practices it is recommended to read the [Guidelines for Good Safety Practice in the LP Gas Industry](#), a publication of the United Nations Environment Programme and the World LP Gas Association.



# Stakeholders in the LP Gas Business

## 1.1 Stakeholders and Good Business Practices

- 1.1.1 LP Gas businesses around the world operate with a variety of different practices. Most of these are good but some are illegal, unethical or unsafe. These bad business practices damage the reputation of the industry and of reputable companies, undermine business profitability and can put lives of innocent people at risk by compromising on safety.
- 1.1.2 To counter bad practices, reputable players may have to spend more money to ensure safety and protect their business interests, a cost which is either passed on to the customer or undermines the financial foundation of the business.
- 1.1.3 There are many different interested parties, or stakeholders, involved in successfully running a safe and profitable LP Gas business.
- 1.1.4 Everyone involved has a responsibility and should collaborate to ensure that well informed decisions are taken. H A
- 1.1.5 Good business practices that are well designed and properly implemented benefit everyone. They help achieve public interest goals, attract customers and minimise regulatory intervention
- 1.1.6 Good business practices stimulate more efficient and cost-effective operations and minimise the impact of any negative social, safety, environmental or economic issues. Companies using good business practices attract better staff, making them more competitive.



- 1.1.7 The application of good business practices helps companies improve their public image and their credibility with government authorities, since good business practices compliment existing regulations and legislation.
- 1.1.8 Good business practices should be flexible enough to be workable, but detailed enough to prevent confusion. They should be the goal of all stakeholders.
- 1.1.9 In return for complying with these responsibilities, those with investment in the distribution chain are entitled to a return on investment. To ensure this, and encourage responsible investment in the LP Gas Industry, the company has the right to stipulate, where applicable, how employees, affiliates, and customers use the company's equipment. This includes the equipment being used only for the sale of the company's own gas, thereby providing the company with incentive to ensure that the equipment is maintained in a safe condition.
- 1.1.10 When others infringe the company's rights through theft or misuse of equipment, the company has a right to expect a regulatory framework that will protect its investment by allowing appropriate legal action and redress.

## 1.2 Marketer/Supplier

- 1.2.1 The LP Gas marketer/supplier is the primary link in the distribution chain and has ultimate responsibility for serving the customer. Marketers/suppliers also have responsibilities to their shareholders, their employees and society in general.
- 1.2.2 The marketer/supplier establishes the good business practices within the organisation that flow through the entire chain of distribution. Third parties that are contracted to the LP Gas marketer/supplier will be influenced by their view of business practices exhibited by the marketer/supplier.
- 1.2.3 It is vital that good business practices are an integral part of the organisations' culture. If not, bad practices will threaten not only the business but also the rest of the industry. Good business practice starts at the depot where storage, cylinder filling and bulk loading occur. It is here that a LP Gas marketer/supplier begins to set the example. It continues during the distribution process and culminates at the customer's installation.
- 1.2.4 In many cases, the marketer/supplier is responsible for the construction and operation of facilities, both at its own and at the customer premises. In such cases, the marketer/supplier has a responsibility for ensuring that these facilities are safe for use and fit for purpose, including training employees, customers and distributors, and developing contingency plans for emergency situations. However marketer/suppliers are not responsible for the misuse of these facilities by the customer.
- 1.2.5 The marketer/supplier is responsible for ensuring that the customer receives the quantity and quality of gas being paid for, with no under-or over-filling. A well-planned supply of gas to the customer is also necessary. This will reduce the need for additional LP Gas storage at the customer premises and/or reduce the number of service calls.

## 1.3 Equipment and Appliance Manufacturer/Supplier

- 1.3.1 The equipment and appliance manufacturer/supplier provides LP Gas equipment to store, handle and distribute the product. This equipment includes storage tanks, cylinders, filling plants, vehicles, pressure regulators, gauges and controls as well as the appliances and equipment that actually use LP Gas.
- 1.3.2 Both equipment and appliance manufacturers/suppliers need to act in a responsible manner and provide training along with a range of goods that are fit for purpose and operate safely and reliably with LP Gas. They should recognise the role they have in promoting good business practices and work closely with LP Gas companies to ensure this happens. They should also ensure that future technical needs are met by working closely with other LP Gas stakeholders.
- 1.3.3 There is a wide range of LP Gas equipment and appliance design codes and standards already developed. Some of these are listed in Appendix Three of the [Guidelines for Good Safety Practice in the LP Gas Industry](#).
- 1.3.4 The equipment used in a LP Gas business is likely in most cases to be owned by, and become part of, the asset base of the company. The way it performs will influence the success and reputation of the company as well as the level of customer satisfaction.
- 1.3.5 Customers are likely to own gas-consuming appliances such as stoves, cookers, burners and in some cases the container, the gas lines and regulators. They expect to receive clear operating instructions and advice on how to maintain and use the equipment and appliances properly in a safe environment (e.g. well ventilated) and how to act in case of incident.



## 1.4 Contractor/Installer

- 1.4.1 Contractors and installers are employed to carry out tasks throughout the storage, handling and distribution chain. They can be employed within the primary depot or cylinder-filling plants, assist in distributing the product, or involved with the construction and maintenance of customer installations.
- 1.4.2 Both contractors and installers should employ people who have achieved the required level of skill and competency. Often this is set down in law or described in codes of practice such as those listed in the [Guidelines for Good Safety Practice in the LP Gas Industry](#).
- 1.4.3 Contractors/installers may carry out work for more than one company; therefore, they are in a unique position to compare different work practices. They have a responsibility to undertake tasks according to their agreed contract conditions, but they are also in a position to promote good business practices within the industry.

## 1.5 Distributor/Agent/Dealer/Retailer

- 1.5.1 The distributor/agent/dealer/retailer is the next link in the distribution chain that supplies the customer with product and services.
- 1.5.2 The distribution chain may involve a number of different third party businesses that move the product from the LP Gas storage depot, cylinder filling plant or bulk loading plant to the customer. For many the distribution of LP Gas is their main activity. For others it is only part of their business.
- 1.5.3 The distributor/agent/retailer/dealer all have a common aim - to move the product in a safe and efficient manner to the end user, and assist in meeting both the needs of the marketer/supplier and the customer.
- 1.5.4 The distribution chain is where many bad practices occur. As the product moves further down the distribution chain from the depot to the customer, the control over business practices by the supplier and marketer becomes weaker. This is the point in the distribution chain where the customer interface occurs and it is critical that good business practices are in evidence here.

## 1.6 Customer

- 1.6.1 The customer is the final link in the distribution chain through the purchase and use of the product.
- 1.6.2 The range of different applications for the product means that LP Gas customers can be large industrial consumers or individual householders.
- 1.6.3 Customers clearly have a right to expect that they will be delivered the quantity and quality of LP Gas being ordered and paid for. Customers also have a right to expect that any equipment or storage container (including cylinders) on their premises be kept in a safe condition by the equipment owners. Customers also have a right to be informed of how to use LP Gas in a safe manner.
- 1.6.4 In order to ensure that these rights are respected, customers also have responsibilities. These include applying a duty of care to the equipment of the owner, complying with operating and safety instructions, ensuring that only LP Gas supplied by the equipment owner is used, and maintaining a safe environment (e.g. ensuring there is adequate ventilation for the equipment).
- 1.6.5 For a large industrial application it may also include emergency response actions and obligations to carry out any simulated fire fighting and emergency response training. Customers also have a duty to inform their supplier, particularly if it relates to the performance of the product. Customers are one of the most important stakeholders in the LP Gas business and can strongly influence the way the business is run.

## 1.7 Industry Associations

- 1.7.1 LP Gas industry associations are a common feature of LP Gas businesses worldwide. Their structures and roles may differ, but they all have an overriding objective of creating an environment for developing the LP Gas business in a safe, consistent and efficient manner. An industry association provides an opportunity for all the major stakeholders to discuss issues relating to safe standards of operation, good business practices and to act as the common voice of

the industry. Industry associations liaise with the national and local regulatory authorities. They may also produce standards and codes of practice in a self-regulating environment.

## 1.8 National and Local Authorities

- 1.8.1 National and local authorities are the governmental bodies that pass laws, and adopt and enforce codes of practice and standards of operation. They represent the public who has entrusted them to produce a sensible, workable framework, with the expectation of industry compliance.
- 1.8.2 Their role is primarily to protect the interests of both customers and industry. This protection is typically carried out by ensuring that a good legislative and regulatory framework is in place and enforced. Such a framework includes appropriate regulations and proper enforcement. These should be supported by codes of practice and technical and safety standards for all parts of the business, from supplier to appliance manufacturer to user. These codes and standards may frequently be adopted from other recognised international codes and standards rather than have them developed.
- 1.8.3 In the absence of adequate regulations or proper enforcement, a self-regulating LP Gas industry can work very well with the commitment and cooperation of all stakeholders. Regulatory authorities need to support self-regulation efforts if there are inadequate official standards and regulations.
- 1.8.4 Unrealistic high standards attract unnecessary costs that ultimately have to be passed onto the customer. They can also encourage unethical and unsafe practices because they provide an incentive for cheating and non compliance.
- 1.8.5 It is important for authorities to involve all stakeholders in the development of LP Gas standards. A sense of ownership of standards will encourage their application and compliance. There is also an important obligation of governments to inspect and audit operations, advise on any non compliance and to identify and close down those illegal activities that jeopardise legitimate businesses and the safety of the general public.
- 1.8.6 Governments should also be encouraged to follow developments in the LP Gas industry. Countries that have successfully introduced LP Gas should be used as models for other countries. LP Gas industry stakeholders can facilitate dialogue among various countries' legislative and regulatory authorities.
- 1.8.7 National and local authorities often have the authority to issue licenses and sanction approval for new or existing LP Gas storage, handling and distribution infrastructure. In order to ensure safe practices are maintained, it is important that authorities enforce regulations equitably and allow marketers/suppliers to seek redress against theft or misuse of their equipment.
- 1.8.8 As detailed later in this document, allowing marketers/suppliers to control equipment, cylinders and LP Gas storage facilities in which they have invested, allows them to generate a return from their investment and gives an incentive for them to ensure these are safe for use by customers.

# LP Gas - The Product

## 2.1 LP Gas - A Global Fuel

- 2.1.1 Worldwide LP Gas demand has grown by more than five per cent a year during the last decade. Currently, demand is around 220 million metric tonnes/year.
- 2.1.2 LP Gas is a global fuel. Although the majority of production is in North America and the Middle East, it is used in most countries of the world. Demand has been growing strongly in Central America, the Middle East and Asia although some African countries have also experienced particularly high growth rates. It is estimated that half the global LPG demand will arise in developing countries within 30 years.
- 2.1.3 Nearly fifty percent of the world's LP Gas demand is in the domestic and commercial markets where it is used for cooking, space heating and water heating. It is becoming increasingly popular as an automotive fuel.
- 2.1.4 The impact of this growth on society and the environment is significant as LP Gas is displacing solid fuels such as coal, wood, charcoal and cow dung. These traditional fuels produce dust, dirt and smoke, which may cause severe health problems. As a result LP Gas is making a significant contribution in improving air quality levels in the home, in commercial kitchens and in restaurants.
- 2.1.5 The use of LP Gas as an automotive fuel has led to significant improvements in street level air quality by displacing traditional automotive fuels such as diesel and gasoline. Automotive LP Gas offers considerable strategic and environmental benefits in the supply and economics of automotive fuel.
- 2.1.6 There are other social issues associated with this changing domestic fuel use. No longer does the household have to deal with the messy collection and storage of solid fuel, and prepare and clean appliances. LP Gas further eliminates the risk of burns from lingering fires.

## 2.2 Properties of LP Gas

- 2.2.1 LP Gas, or Liquefied Petroleum Gas, is the term widely used to describe a family of light hydrocarbons. The two most prominent members of this family are propane ( $C_3H_8$ ) and butane ( $C_4H_{10}$ ). LP Gas is derived from natural gas processing and crude oil refining.
- 2.2.2 Natural gas may contain up to 10% propane and butane, which has to be extracted out before it can be transported. LP Gas represents about 3% – 10% of typical crude oil refinery production. The refinery is designed to mainly produce other fuels such as diesel, gasoline, heating oil and kerosene.
- 2.2.3 LP Gas is lighter than water as a liquid but heavier than air as a gas. In their liquid state propane and butane have the appearance of water but with have only about half the density



**Fig. 2.1** In vapour state, LP Gas is heavier than air and tends to settle down

**Table 1** Typical Properties of LP Gas

Property	Propane	n-Butane
Chemical Formula	C <sub>3</sub> H <sub>8</sub>	C <sub>4</sub> H <sub>10</sub>
Boiling point at 101.3 kPa (°C)	-42.1	-0.5
Liquid density at 15 °C (kg/m <sup>3</sup> )	506.0	583.0
Absolute vapour pressure at 40 °C (kPa)	1510	375
Flash Point (°C)	-104	-60
Upper flammable limit (% vol. in air)	9.5	8.5
Lower flammable limit (% vol. in air)	2.3	1.9
Vol. vapour per vol. liquid	269	235
Relative vapour density (air = 1)	1.55	2.07
Coefficient of expansion (liquid) per 1°C	0.0032	0.0023
Minimum air for combustion (m <sup>3</sup> /m <sup>3</sup> )	24	30
Kinematic Viscosity (centistokes) @ 20°C	0.20	0.30
Latent Heat of Vapourisation (kJ/kg) @ 20°C	352	368
Specific Heat (kJ/kg/°C) @ 20°C - liquid	2.554	2.361
Specific Heat (kJ/kg/°C) @ 20°C - vapour	1.047	1.495
Minimum ignition temperature (°C) in oxygen	470 - 575	380 - 550
Maximum Flame temperature (°C)	1980	1990
Octane number	>100	92
Specific Energy (gross) kJ/kg	49.83	49.40

- 2.2.4 Propane and butane boil at different temperatures - propane at around – 42°C, butane at around 0°C. The gas produced when propane and butane boil (vaporise) is invisible and has no natural odour (although a disagreeable unpleasant odourant is added to aid the detection of a leak). A liquid leak will give the appearance of a white cloud (see photo above which illustrates this under controlled release conditions)
- 2.2.5 In liquid form the volume of LP Gas changes significantly in response to changes in temperature. As a result storage containers are never filled to capacity to allow expansion to take place without causing an uncontrolled release of gas or damage to the container.
- 2.2.6 LP Gas is easily stored as a liquid under moderate pressure. One unit of liquid expands to about 250 units of vapour.
- 2.2.7 The flammable range is a mixture of between 2 and 10 % LP Gas in air. This mixture needs around 24 times (for propane) and 30 times (for butane) the same volume of air for complete combustion which means LP Gas needs adequate ventilation for burning. The energy content is very high and it produces a very hot flame. For more details on the properties of LP Gas refer to [Guidelines for Good Safety Practice in the LP Gas Industry](#).

## 2.3 Product Benefits

- 2.3.1 The physical properties of LP Gas enable significant amounts of energy to be transported easily as a liquid under moderate pressure, yet when used it has the attributes of a gas. Because LP Gas consists of mixtures of propane and butane, specifications have been established for many different applications. For more information on this important subject see [Guidelines for Good Safety Practice in the LP Gas Industry](#).
- 2.3.2 LP Gas is a clean burning fuel. This allows it to be used in direct contact with food (e.g. ovens) and articles such as fine pottery.
- 2.3.3 LP Gas has environmental and health benefits. It is non-toxic and will not contaminate aquifers or soil. If spilt, LP Gas will evaporate and disperse into the atmosphere. Unlike methane, the constituents of LP Gas (Propane and Butane) do not contribute to the atmospheric greenhouse gas loading

- 2.3.4 LP Gas mixed with air produces a very hot flame when ignited and has good temperature control. The high flame temperature allows it to be used in the metal cutting industry and any application requiring precise temperatures.
- 2.3.5 LP Gas is portable. It does not rely on a distribution network of pipelines or transmission lines. Its portability allows it to be used in some of the world's most remote areas or in downtown urban areas.
- 2.3.6 LP Gas has an infinite life span (shelf life). Unlike some other liquid petroleum fuels, LP Gas will not deteriorate over time in storage.

## 2.4 Main Applications

- 2.4.1 LP Gas can power the smallest domestic appliance or the largest industrial application. In addition to its many applications as a fuel, LP Gas is also an important feedstock for the chemical and plastics industry.
- 2.4.2 Clean burning LP Gas is ideally suited for domestic and commercial cooking, space heating and water heating, and power generation, particularly in remote locations.
- 2.4.3 LP Gas assists farmers to increase their output, and improve the quality, of crop production through weed flaming, crop harvesting, and crop drying. LP Gas is also used to heat breeding houses for pigs and poultry, and powers farm equipment such as irrigation pump engines.
- 2.4.4 There are almost no limitations for LP Gas use in the industrial sector. Some common applications include heat treatment furnaces, direct firing of ceramic kilns, glass working, textile and paper processing, paint drying and cotton singeing, process heat (oil and steam) and forklift fuel.
- 2.4.5 The purity of LP Gas also enables it to be used as an aerosol propellant in unodourised form.
- 2.4.6 The clean burning nature and portability of LP Gas has led it to become one of the fastest growing transport fuels. Although it has been used for years as a low emission alternative to gasoline and diesel forklift trucks, recently LP Gas is being used more for on-road applications such as taxis, private cars and buses. The photo opposite is an example of a LP Gas fueled vehicle.



**Fig. 2.2 LP Gas is a popular alternative automotive fuel in many markets across the world**

- 2.4.7 Finally, the versatility of LP Gas allows users to rationalise on one form of energy eliminating the need for storing and handling several different types of fuel.



# LP Gas Distribution Chain

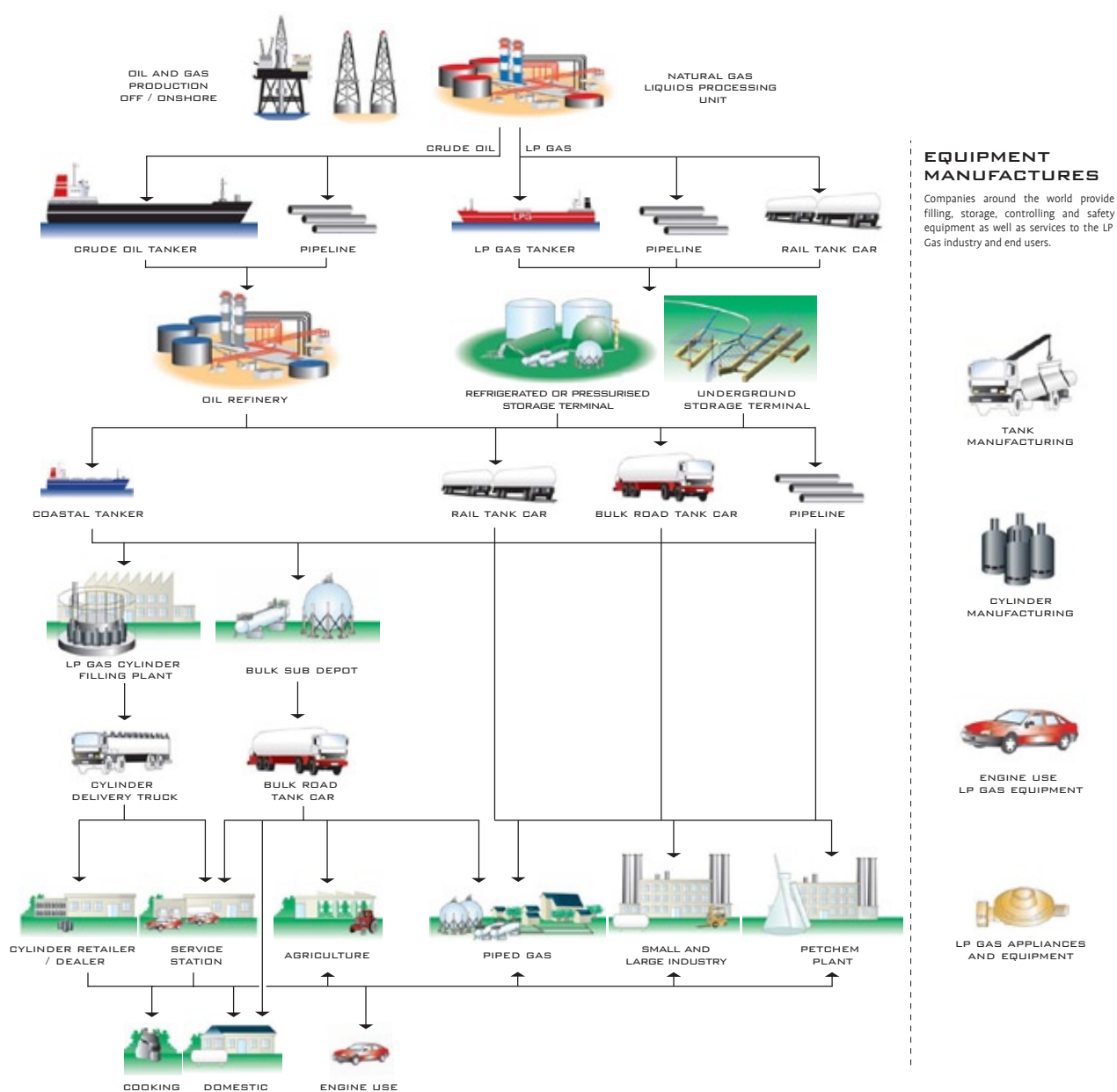


Fig 3.1 The LP Gas Distribution Chain

### 3.1 Primary Storage

- 3.1.1 The first stage in the local distribution chain of LP Gas is primary storage where product is received from the producer. Examples of primary storage are underground caverns, refrigerated tanks, and steel cylindrical shaped or spherical shaped tanks. The tanks may be underground, mounded (partly underground or partly above ground but covered) or totally aboveground. All tanks are either pressurised or refrigerated. Refrigerated storage enables the product to be kept as a liquid under minimal pressure.
- 3.1.2 Caverns can only be constructed where the ground configuration allows. Being underground they are less obtrusive to the landscape.
- 3.1.3 Mounded storage facilities are employed where it is difficult to achieve the degree of safety required in densely population areas. They also have the advantage of being less obtrusive and inherently better protected against fire.
- 3.1.4 Above ground cylindrical tanks and spheres are the most common symbols of LP Gas primary storage. Being aboveground they must be protected against fire and impact.
- 3.1.5 LP Gas can be distributed to and from primary storage facilities by various means. These include ship, barge, pipeline, rail tanker, road tanker, tank-container, and cylinders.

### 3.2 Cylinder-Filling Plants

- 3.2.1 From primary storage the product moves either to a bulk loading facility or to a cylinder filling plant. Cylinder-filling plants can be fully automatic, employing few people, or manually operated and heavily dependent on operators.
- 3.2.2 Empty cylinders enter the filling plant where they are visually checked for wear and damage – and if necessary repaired or disposed of – and then cleaned. Further inspection determines whether the cylinder is due for re-qualification. After filling, and checking for over or under filling, cylinders are then carefully checked for leaks before being sealed, applicable warning labels and protective coverings affixed and loaded onto distributor trucks or put into store.

### 3.3 Bulk Loading

- 3.3.1 Some applications for LP Gas consume large quantities of product making the use of cylinders inefficient and impractical. In such cases local bulk storage facilities are installed at customer premises to receive product in bulk, normally by road tanker.
- 3.3.2 Road tankers vary in size from around 1 metric tonne capacity to over 20 metric tonnes. They are filled in the LP Gas depot and deliver product in bulk to one or more customer facilities. Drivers are responsible for ensuring the vehicle is properly loaded and the correct amount of product safely delivered to the correct locations. They should be adequately trained and certified.
- 3.3.3 An LP Gas tanker is a pressurised vessel that must comply with rigorous specified standards of design, construction, operation and maintenance. In addition, there are other aspects of the design and operation that need to be considered because the vehicle is being driven on the roads, often through populated areas and busy traffic.
- 3.3.4 The actual bulk loading operation involves strict procedures to control the hazard of transferring several tonnes of product from primary storage to a vehicle. Similar procedures apply to the unloading of product at the customers' premises.
- 3.3.5 LP Gas can be sold to the customer by weight or by volume, but in the automotive sector it is always sold to the final customer (motorist) by volume to reflect the traditional fuels market.
- 3.3.6 The supplier of gas may own the storage and distribution facilities at customer sites through a loan or lease arrangement, or the customer may decide to purchase his own equipment. Whatever the arrangement, storage must be properly sited, designed, constructed and maintained through regular inspection.

### 3.4 Distribution

- 3.4.1 A distributor or dealer commonly handles the link between the LP Gas depot and the retailer. However, marketers/suppliers may deliver directly to the customer. Distributors may be subsidiaries of the marketer/supplier, or third-party companies



contracted by LP Gas marketers/suppliers. Distributors act on behalf of the marketer/supplier and in accordance with their instructions. Distributors will often interface with the customer.

- 3.4.2 Product title transfers from the LP Gas marketer/supplier to the customer through the distribution chain. Distributors may own vehicles to deliver and transfer product or rent them from transporters. These vehicles must comply with strict safety requirements because they enter the LP Gas depot.
- 3.4.3 Good business practices are very important in the distribution chain, but like the imposition of good safety practices, they are often less easy to control as the product travels further from the LP Gas depot

## 3.5 Retailing

- 3.5.1 The retailer is the point in the distribution chain where the customer is presented with the customer proposition. A retailer has a very important role to perform in ensuring the customer is informed about any safety instructions, is satisfied and continues to purchase and is well informed on safety instructions.
- 3.5.2 Customer Service Centres are a useful part of a retailing organisation that can support these aims.
- 3.5.3 The retail bulk delivery transaction may be performed by the marketer/supplier, or by the distributor directly from the storage depot to the customer location. Cylinder deliveries are usually made by the market/supplier subsidiary or by a contracted distributor.
- 3.5.4 Bad practices at retailer level are likely to be witnessed by the customer; therefore, it is especially important to promote good business practices at this level.

## 3.6 Customer Interface

- 3.6.1 The final link in the distribution chain is the customer. There will be occasions when the customer deliberately or unknowingly introduces some examples of bad business practices.
- 3.6.2 The customer is likely to be less familiar with the product, and the product benefits, than others in the distribution chain. Customers will rely heavily for advice from his supplier. It is extremely important that the customer receives this advice in a timely and accurate fashion.
- 3.6.3 The customer needs to understand that unethical or illegal practices, such as misapplication or using cylinders from other companies, can jeopardise personal or public safety, and any relationship with suppliers himself and his relationship with his supplier and put himself at risk.
- 3.6.4 Good business practices dictate that proper records are maintained of all educational and warning materials given to customers.



# Good Business Practices

## 4.1 The Market and Good Business Practices

Several LP Gas marketing segments - domestic and commercial packed (cylinders), reticulated, domestic and industrial bulk, and automotive - are examined below for common examples of bad practices at each stage of the distribution chain.

In examining the business in this way, some key issues are highlighted. The driving force behind this discussion is first and foremost the safety of the customer and the general public. The impact of bad practices adds unnecessary inconvenience and costs to a business that the customer ultimately has to bear.

Proper attention to good business practices is essential for maintaining:

- The customer proposition - including the quality of cylinders and the product itself
- Business assets - including hardware and personnel
- The reputation of the company
- The financial responsibility of the company
- Competition in the marketplace
- Other stakeholder interests.

Primary storage, cylinder-filling plants and bulk loading facilities are examined. The business practices discussed in these areas relate mainly to depot operation. However, their impact goes well beyond the depot through the entire distribution chain.

Business practices in the distribution chain and the customer interface are then examined. It is in the distribution chain that many of the endemic bad practices can occur. Some of the more important practices are discussed, including 'metal management' - the term that defines the integrated functions of owning, handling, and maintaining the cylinders and containers in which the LP Gas is stored. The issue of good cylinder business practices is so important that a separate review of the risks and remedies has been included in Appendix One.

First, here is a brief description of the marketing segments.

### 4.1.1 Domestic Packed

- 4.1.1.1 The most popular marketing segment found across the global LP Gas industry is the supply of a small domestic cylinder to a household through a distributor and retail network.
- 4.1.1.2 The domestic LP Gas market typifies the business for many people. The domestic customer is usually serviced with a 10kg up to 45kg LP Gas cylinder that supplies gas, via a pressure regulator, through a hose connection to a domestic appliance.
- 4.1.1.3 In some countries the cylinder/valve package is purchased outright by the customer, in others it is loaned on deposit or rented. Occasionally, it is provided free of charge as part of the customer proposition. The issue of cylinder ownership is critical to the success of a domestic LP Gas business, for both supplier and customer, and is covered in more detail later in this chapter.
- 4.1.1.4 Because of its durable construction, a cylinder may be refilled hundreds of times during its useful life if properly maintained.
- 4.1.1.5 A retailer or distributor in the neighbourhood generally services the customers. This arrangement may include a home delivery service, or the customer may take the cylinder to be filled or exchanged at a local outlet.

### 4.1.2 Commercial Packed

- 4.1.2.1 Small commercial applications can be serviced from a single large cylinder or several cylinders connected together with a manifold. These cylinders usually range from 12kg to 50kg capacity. Typically, the manifold is designed to have half the number of cylinders supplying the application, and the other half on standby waiting to replace empty cylinders.
- 4.1.2.2 The demand for LP Gas needs careful monitoring to ensure the application is properly serviced. With a number of cylinders in operation at the same time, the demand can normally be met through natural vapourisation. This is where the liquid vapourises inside the cylinder under ambient conditions. When the ambient temperature is too low, or the demand is too high, a small vapouriser can be fitted to artificially produce the vapour to meet demand.
- 4.1.2.3 The customer is supplied with cylinders from the filling plant usually via a distributor. The cylinders are normally owned by the LP Gas company and provided as part of the commercial proposition. As with domestic cylinders, maintenance is carried out at the filling plant when the cylinders are returned for refilling.

### 4.1.3 Reticulated

- 4.1.3.1 Piped - or reticulated – LP Gas and SNG (Synthetic Natural Gas) have been successfully introduced in a number of countries and is becoming increasingly popular. Customers are provided with an individual metered supply of LP Gas through a piped network. This type of service eliminates the need for individual cylinders or tanks.
- 4.1.3.2 In a reticulated system LP Gas is stored at a central storage compound and supplied through a series of distribution pipes to each household. The supply pressure at the central supply is reduced in stages as the LP Gas moves towards the customer. The eventual gas pressure at the appliance is similar to that from a regular cylinder supply making it possible to use the same gas appliances.
- 4.1.3.3 A significant financial investment is necessary to establish the storage facility and infrastructure of pipes to service each household with LP Gas. The company supplying the gas operates like a normal gas utility company.

### 4.1.4 Domestic Bulk

- 4.1.4.1 Individual domestic supplies can be serviced from either a facility similar to the commercial packed arrangement or from a small bulk tank adjacent to the point of use. The latter design is similar to a small industrial bulk facility where the domestic customer will receive and pay for the product in bulk after delivery.
- 4.1.4.2 These tanks are generally less than 2 metric tonnes in capacity, and will be located on the property. Access must be provided for the delivery vehicle and driver/operator.
- 4.1.4.3 The customer is responsible for the general housekeeping of the storage facility but maintenance will normally be the responsibility of the supplier. Demand will not be as high as with industrial customers but there will be periods of the day when demand peaks. These will coincide with the periods of high demand for cooking and heating.
- 4.1.4.4 This type of service is also typical for the agriculture market where LP Gas assists farmer in increasing output, and

improve the quality of crop production through weed flaming, crop harvesting and crop drying. LP Gas is also used to heat breeding houses for pigs and poultry, and power farm equipment such as irrigation pump engines.

#### 4.1.5 Industrial Bulk

- 4.1.5.1 A small bulk storage facility is installed when the demand from the industrial or commercial application is too high for service from large cylinders.
- 4.1.5.2 This facility may be similar to the one supplying a domestic bulk installation, typically consisting of a small storage tank of several tonnes capacity, a vapouriser, pressure regulators and a piped network to the application. An area for a bulk vehicle to park during the unloading procedure is required, as well as safe access to the unloading point by the driver/operator.
- 4.1.5.3 Industrial bulk facilities may also be installed to supply LP Gas in liquid form. One example is to provide liquid LP Gas to re-fill cylinders on site for fork lift trucks. In this case the customer must be properly trained to manage the re-filling operation safely, including the inspection and correct filling of cylinders,
- 4.1.5.4 These facilities will be normally designed, installed, maintained and operated by the LP Gas marketer/supplier. Demand may be several tonnes of LP Gas a day. Stocks need careful monitoring to ensure a continuous supply of LP Gas.
- 4.1.5.5 The customer will often leave the delivery scheduling to the LP Gas marketer/supplier but the actual delivery is sometimes contracted to a distributor.

#### 4.1.6 Automotive

- 4.1.6.1 Automotive LP Gas has become one of the fastest growing applications for the product and many countries are undertaking trials and developing new business opportunities. The environmental benefits of LP Gas mean that exhaust or tailpipe emissions can be significantly improved where the product has replaced diesel and gasoline as an automotive fuel.
- 4.1.6.2 The automotive LP Gas market requires a network of refueling consisting of bulk storage facilities, pumps and dispensers similar to the traditional gasoline fuel network. The photo below shows a dedicated LP Gas service station in Hong Kong.



**Fig. 4.1 Like gasoline and diesel, Autogas is dispensed to vehicles through retail stations in a safe and convenient manner**

- 4.1.6.3 Owners of fleet vehicles may arrange these facilities at their own premises, or for the automotive market to reach a wider customer base, the refueling outlets must be located with immediate access to high traffic areas. LP Gas vehicles using these outlets may be either converted from gasoline or be purpose - built factory - fitted units.
- 4.1.6.4 These refueling outlets are similar to a bulk industrial facility except the product is metered to the customer in liquid form through a dispenser.

## 4.2 Primary Storage

- 4.2.1 Section 3.1 describes Primary Storage as the first step in the distribution chain, the types of storage commonly used, and the various means of transportation used in receiving and distributing product at the primary storage facility. This Section 4.2 deals with some typical examples of practices to be followed within the primary storage area. However, there is an equally important aspect of primary storage relating to good practices required of transporters in delivering the product to and from the primary storage facility, or when delivering directly to the customer.
- 4.2.2 Much of the discussion in 4.4 Bulk Loading also applies to transporters. Good practices require that transporters have proper training in handling of the product, follow safe driving practices on the road as well as within the primary storage area, maintain the transport vehicle in good operating and safe condition at all times, follow correct loading and unloading procedures, protect the product from contamination, adhere to assigned schedules, and deliver the quantity of product required.
- 4.2.3 The remainder of this section deals with practices relating to the primary storage area since it is here where large quantities of LP Gas are stored. Bad practices can lead to serious incidents that can have a major disruptive effect on the business and the general public.

### (a) Properly Designed and Constructed Facilities

The storage facility is one of the most capital-intensive investments in a LP Gas depot. There are many well-established international standards and codes of practice that provide guidance for the design and construction of these facilities

Badly designed and constructed facilities results in...

- Greater operational risks
- Unfair competition as a result of lower capital outlay
- Higher maintenance and upgrading costs
- Construction delays and marketing plans not being met
- Reduced asset life
- Increased risk of downtime and delays in delivering the customer proposition
- Increased risk to the customer and the general public
- Increased liability exposure

and can be prevented by...

- Promoting proper industry standards
- Adoption of adequate industry design standards and codes of practice
- Use of proper materials and good project management techniques
- Use of qualified contractors
- Designing for propane rated vessels

- 4.2.4 Regulatory authorities need to ensure that sound consistent standards are rigorously applied across the industry. All similar storage facilities must meet the same proper risk assessment criteria in order that marketers/suppliers compete in a safe and equitable manner so customers are not compromised.
- 4.2.5 The project specifications should be clear and include sufficient detail of materials and processes to ensure complete compliance.
- 4.2.6 In particular, the design of pressure containers should include some type of over-fill protection such as fixed ullage gauges or automated level control. A remote operated valve system for control of product flow as well as a fail safe alarm system that isolates containers and pipings is also good practice. Pipework containing liquid should also be protected from overpressure by fitting hydrostatic relief valves.
- 4.2.7 The threat of overfilling brings the danger of product spillage and damage to the vessel or pipework. Product spillage in a depot or at a customer location is a dangerous event. Spillage coupled with any ignition source can lead to fire and explosion. This is not only hazardous to operators on site; such an event also risks the assets and operation of the company, and threatens the continuing supply of product to customers.
- 4.2.8 Having adequate firewater available is critical but so, too, is having the ability to activate the fire fighting facilities in the event of an incident occurring.

- 4.2.9 The use of salt water for fire protection should be avoided to minimise the risk of corrosion. Salt water dramatically shortens the effective life of the asset and threatens the integrity of the vessel. If salt water is used, the system and vessels should be thoroughly flushed with fresh water after use.
- 4.2.10 Good primary storage design should include corrosion and impact protection of vessels and pipework. Without this the life of the asset is shortened and the risk of product leakage through material failure increases.
- 4.2.11 The application of proper design standards for major LP Gas installations across the industry is an important issue that should be promoted and enforced by local and national authorities together with industry members and the LP Gas associations. For more detail refer to the [Guidelines for Good Safety Practice in the LP Gas Industry](#).
- 4.2.12 It is good practice to design storage vessels for propane since propane's pressure is higher than that of butane. This provides flexibility and reduces the risk of an error when receiving different mixtures of propane and butane.
- 4.2.13 Employing qualified contractors, using proper design standards and applying good project management will help ensure the customer is not burdened with unnecessary costs and delays.

#### **(b) Properly Sized Storage Capacity**

The amount of storage capacity required is an important issue that needs careful consideration. Too much, or too little capacity, can have an adverse effect on the business and the way the customer is serviced.

Incorrectly sized storage capacity results in...

- Under utilised assets and higher unit maintenance costs
- Over utilised assets and stock out
- Congestion at the jetty and loading bays (insufficient storage)
- Inadequate time for maintenance (insufficient storage) and...
- Unsafe facilities

and can be prevented by...

- Proper planning and stock control
- Sharing of facilities

- 4.2.14 For sea-fed depots, insufficient storage may lead to congestion at the jetty as the arriving vessel is delayed waiting for sufficient ullage in the receiving storage. Matching storage capacity with vessel size to optimise parcel size and reduce unit freight costs may be justified.
- 4.2.15 Insufficient storage capacity leads to a busy facility and inadequate time for proper maintenance. Poorly maintained facilities are not only a danger to operators but their useful life is shortened.
- 4.2.16 Inadequate storage also affects the cylinder-filling plant and bulk-loading gantry where vehicles queue for product. This leads to traffic congestion within the plant and increases the risk of accidents.
- 4.2.17 Unplanned stock outs, resulting from excess demand due to unseasonable weather conditions or unforeseen customer demand, can be rectified through 'borrow and loan' agreements with other LP Gas companies. These practices are sensible arrangements and benefit of the whole community.

### **(c) Proper training of staff**

Training of staff throughout the entire distribution chain is good business practice. However, primary storage contains large amounts of LP Gas and the consequences of operator error can be more serious than in some other links of the chain.

Inadequate training of staff results in...

- A high risk environment
- Operational errors
- Risk to assets
- Lowly motivated staff
- Higher staff turnover
- Possible litigation

and can be prevented by...

- A thorough understanding of staff skills and job requirements
- Regular on-going training programmes including...
- On the job training
- Assessment of the competence of critical staff

- 4.2.18 Previous driving records and drug use screening will result in identifying less-than-desirable candidates for employment and reduce future liability exposure.
- 4.2.19 Well-structured and on-going training encourages an active and knowledgeable workforce that will enhance workplace standards. Training should include product safety and emergency response procedures.
- 4.2.20 Training reduces the risk of error and creates an environment for improvement with the opportunity for feedback. Training of emergency response teams also reduces the risk of minor incidents turning into major incidents.
- 4.2.21 Training and competence assessment are essential for those staff performing critical activities or working in critical areas.
- 4.2.22 On the job training can expose bad work practices and lead to tighter procedures. With input from individual's own experiences, these procedures are more likely to be followed.
- 4.2.23 The application of sensible procedures and well-trained staff also reduces the risk of an incident and will mitigate litigation that may arise from a workplace injury. But most importantly, a well-trained staff protects the customer and the general public from incidents and accidents.

### **(d) Proper product specification and quality control**

Product specifications need to be sufficiently tight, and checked for compliance, to ensure the product can be stored, handled, distributed and used safely in the application for which it is intended.

Poor product quality control results in...

- Off-specification or unusable stock
- The customer proposition not being met
- Customer complaints and possible litigation
- Clean up costs
- Risk of stock out

and can be prevented by...

- Adopting fit-for-purpose product specifications
- Regular checking of product specification
- Proper and clear procedures
- Regular housekeeping



- 4.2.24 The customer proposition depends on the product meeting the desired specification and performing as promised. LP Gas generally consists of mixtures of propane and butane. Each product has a distinct vapour pressure. Cylinders and tanks constructed to specific design criteria for one product may not be suitable for the other. It is not only good business practice but also an essential practice that cylinders and tanks are used only in the type of service for which they are constructed.
- 4.2.25 Applying unnecessary additional controls in the specification adds costs and limits availability, both of which are undesirable for the customer.
- 4.2.26 LP Gas may contain unwanted components from processing. These need monitoring to avoid problems with equipment in the distribution chain as well as problems with customer owned equipment powered by LP Gas, especially automotive engines.
- 4.2.27 The distribution chain may also introduce undesirable forms of contamination such as rust and scale. Rust originates from pipework and storage vessels, and scale may form in pipework. If allowed to accumulate, rust can block filters and interfere with pressure control systems in the distribution chain.
- 4.2.28 Adopting good product quality control checks helps avoid the need for the cleaning of distribution systems, prevents customer complaints and reduces the risk of product recall from the market.

**(e) Good housekeeping and maintenance**

Poor housekeeping and maintenance reveals a neglectful attitude but is not difficult or expensive to remedy. Generally, ownership motivates proper maintenance.

Inadequate housekeeping and maintenance results in...

- Untidy facilities
- Increased risk of fire, accident, incident or obstruction
- Damage to the company image and brand

and can be prevented by...

- Programmed maintenance
- Clearly stated procedures
- Regular audits and inspections
- Incentives
- Assessment of critical assets

- 4.2.29 Keeping the facilities clean and tidy will encourage a tidier work ethic and help eliminate unwanted items that could fuel a fire, create an obstruction, or cause personal injury. Clean and tidy facilities will also improve the efficiency of operations.
- 4.2.30 Regular audits and inspections by personnel from other job functions create opportunities for a better understanding of all other processes involved.
- 4.2.31 Programmed maintenance helps to avoid an unplanned shutdown of plant as well as extending the life of the assets.
- 4.2.32 Maintenance should be carried out regularly and records kept ensuring there is a full understanding of operating costs. Accurate measurement of the effects of maintenance will also assist in predicting component failure

## 4.3 Cylinder Filling Plants

- 4.3.1 Practices in cylinder-filling plants affect the efficiency of the principal activities of receiving, checking and filling cylinders. They also impact the safety of the plant, the cylinders in the market, the operation of the distribution chain and, ultimately, the safety of the customer and general public.
- 4.3.2 The recommended practices described relate both to new and existing plants. These practices have a major influence on the way cylinders are distributed through the chain to the customer where some of the more invasive practices can occur.

### (a) Good plant design and layout

The investment in a filling plant, and the manner in which it operates, ultimately reflects in what the customer pays. The customer is best served with a well-designed and constructed plant that operates efficiently and safely.

Bad plant design and layout results in...

- Operational problems and reduced safety levels
- Increased operating expenses that are ultimately passed on to customers
- Dissatisfied customers and employees

and can be prevented by...

- Planning for the future, training of personnel
- Using temporary facilities initially or...
- Contracting out cylinder-filling process
- Rationalising the cylinder portfolio - but not at the expense of the customer proposition
- An integrated approach to design
- Liaising with local authorities

- 4.3.3 Having adequate parking space and good traffic flow for vehicles moving through the plant reduces the risk of a collision. Clear directional signs and driver training also helps in minimising the risk of a traffic accident inside the facility and on the roads outside the depot. Crash protection devices should protect any piping or storage tanks that are exposed to vehicular traffic.
- 4.3.4 Matching vehicle design with loading and unloading platforms improves the overall efficiency of the plant and reduces the risk of damage to cylinders. Ensuring the filling plant platform is the same height as the vehicle will make the unloading and loading of cylinders easier and reduce work place injuries.
- 4.3.5 Some automated plants with high throughput levels utilise pallets and forklift trucks to load and unload cylinders. These practices reduce cylinder damage, eliminate the physical effort of handling cylinders, and reduce risk of personal injury.
- 4.3.6 In automated cylinder-filling plants padding the conveyors will reduce damage to the paint of cylinders. Damage to cylinders creates a risk of leakage, affects the appearance and shortens the asset life.
- 4.3.7 Cylinder-filling plants can be noisy facilities. It is important to protect the workforce from high noise levels, and to liaise with the local authorities during the planning stage to ensure there are no complaints about the future operation.
- 4.3.8 There is inevitably some product loss within the filling plant. It is good practice to design well-ventilated plants and locate them in well-ventilated areas. This creates a more agreeable work environment for operators and reduces fatigue. It also reduces the risk of creating flammable mixtures within the work area. It is important to eliminate any sources of ignition.
- 4.3.9 Many bad practices can be minimised by having an effective licensing procedure in place that is properly enforced.

#### **(b) Adopting good operational processes**

The procedures in a cylinder filling plant must ensure the cylinder leaves the plant in good condition and is correctly filled - two of the most important features of the cylinder proposition. Some of these processes are carried out manually and sometimes automatically

Adopting poor processes results in...

- Bad examples being observed by employees and distributors
- Damage to cylinders
- Poor metal management
- Plant congestion
- Operational errors and reduced levels of safety for employees and the general public

and can be prevented by...

- Understanding the functions
- Good scheduling
- The use of conveyors and pallets (if justified)
- Job rotation
- Training of all operational staff

- 4.3.10 Good cylinder plant practices include checking vehicles carefully upon entry to ensure compliance with depot regulations. Removing cigarette lighters permanently from the dashboard of vehicles sends a clear message to drivers that smoking is strictly prohibited in the vicinity of LP Gas cylinders. Many sites impose a policy of instant dismissal of any employee found with any source of ignition (lighters and matches).
- 4.3.11 Strictly controlling inventory of cylinders entering and leaving the plant ensures that unfit-for-service cylinders will not leave the plant. Cylinders should be closely inspected upon entering the plant for condition and conformance, and then maintained in good serviceable condition. Cylinders should be carefully handled. Poor cylinder handling causes unnecessary damage to the assets that can result in premature cylinder leakage and poor safety.
- 4.3.12 Set good examples for distributors observing operating practices within the plant. Distributors are likely to emulate the same practices observed in the plant in carrying out their own distributor function. Proper scheduling of distributors arriving at the depot will avoid congestion at the entrance and create a more orderly sequence of activity. This results in the market being better served, reducing the potential for vehicle accidents, and minimising risk to personnel.
- 4.3.13 Segregating cylinders as they arrive at the depot according to degree of work required will ensure a consistent cylinder finish to reinforce the brand image. This might involve washing, cosmetic painting or a complete repaint.
- 4.3.14 If warning labels are used they need to be legible to provide clear advice to customers in order to avoid misuse, risk of injury and possible litigation.
- 4.3.15 Using conveyors that have been designed for cylinders will minimise damage as cylinders travel through the filling plant. Conveyors also reduce the need for handling by personnel. This reduces the risk of hand, foot and back injuries.
- 4.3.16 Cylinders must be accurately filled. Overfilled cylinders that leave the plant can be a threat to the cylinder construction and put the customer and the general public at risk. Under-filled cylinders leaving the plant exposes the company to litigation from weights and measures authorities, generates customer complaints and damages the reputation of the company.
- 4.3.17 Fitting cylinder-filling plants with post-filling control checks to ensure the contents meet the necessary fill tolerances is necessary. Inaccurate filling causes delays to the production schedule as rejected cylinders are removed and corrected.
- 4.3.18 Tare weights should be accurately and clearly marked on the cylinder, weigh scales regularly checked and calibrated, and operators fully trained in the correct procedures as to the correct procedures. Rotating jobs within the filling plant reduces boredom and fatigue and lessens the risk of operator error.
- 4.3.19 There are various ways of determining whether the cylinder/valve package is gas tight. Some involve the use of equipment - others, the use of soapy water and a visual check.

- 4.3.20 If the process of checking the integrity of the cylinder/valve component is overlooked, the whole business is threatened. Leak detection is often combined with the application of a security seal or shrink-wrapping around the valve. This good practice is a visual signal to the customer of the integrity of the company. The security seal is also a deterrent for those seeking to interfere with the product in the distribution chain.

**(c) Allowing only authorised premises to operate**

LP Gas filling plants contain dangerous goods and need to operate with approved procedures. One way of ensuring proper procedures is a licensing procedure that authorises the operation.

Allowing unauthorised facilities to operate results in...

- Inequitable competition
- The encouragement of other bad practices
- Sub-standard cylinders in circulation and...
- An increased risk of product leakage and reduced safety of employees and the general public
- Governments being deprived of legitimate taxes

and can be prevented by...

- An industry approach to sound metal management policies
- An integrated effort by the LP Gas industry and government
- Penalties for operating unauthorised operators

- 4.3.21 If regulatory authorities do not apply strict controls, then unauthorised filling plants will proliferate with a potential consequence of putting the customer and general public at risk.
- 4.3.22 Some operators of unauthorised facilities may be heavily involved in other illegal activities such as decanting (the act of transferring product from one cylinder to another), illegal filling, and the stealing and repainting of competitor's cylinders.
- 4.3.23 Unauthorised filling plants likely will have little in the way of processes to maintain cylinders. They tend to survive by cheating on the legitimate marketers through illegal acquisition of cylinders, retailers and customers. They are also likely to deliberately cheat customers by under-filling.
- 4.3.24 It requires a consolidated effort by all concerned, for the welfare of customers and the industry, to support the regulatory authorities in eliminating illegal and invasive practices. They jeopardise the reputation of the industry and deprive governments of legitimate taxes.

**(d) Prevent re-issuing of scrap cylinders**

When cylinders are eventually scrapped they should be disposed of in such a manner as to prevent them being re-issued into the market. If this is not done, they present a serious threat.

Re-issuing of scrap cylinders results in...

- Unfair competition
- A serious risk of product leakage and injury
- Reputable manufacturers facing litigation

and can be prevented by...

- An industry approach to permanent disposal and metal recycling practices
- Regular monitoring of the distribution chain
- An integrated effort by the LP Gas industry and government

- 4.3.25 A common bad practice by some illegal operators is the cutting and fabrication of scrap cylinders. When cylinders are eventually scrapped because they can no longer be used in the market it is good practice to destroy all components of the construction.
- 4.3.26 Two and three piece cylinders are effectively taken out of the market by pressing a large hole across the welds. If this is not done, it is possible for illegal operators to rescue parts of the scrapped cylinder and re-issue it into the market with false markings in a cut down form. This type of cylinder is extremely dangerous because it will have had no heat treatment process to relieve stresses from the welding operation making it particularly vulnerable to cracking.

- 4.3.27 Customers acquiring these illicit cut-down cylinders are likely to have them illegally refilled. These cut-down cylinders, and others that have exceeded their re-certification date, are able to circulate freely in the market with no proper check on condition.
- 4.3.28 A sound metal management policy that is adopted by the whole industry will make it difficult for this type of activity to flourish.
- 4.3.29 Any participation in a scheme that supports the purchase or use of cylinders acquired illegally, or supports the practice of under-filling is bad practice and should be avoided.

## 4.4 Bulk Loading

- 4.4.1 The bulk loading of product at a depot involves the transfer of LP Gas into a vehicle that is destined for customer storage. In many cases this transfer takes place near the general public. In the majority of cases this transfer is into a road vehicle, but railcars are used to transport large quantities over long distances.
- 4.4.2 The bulk-loading gantry is where product is transferred in bulk from primary storage to a road vehicle, rail tanker or barge. Pumping rates are normally quite high. An incident during the transfer of product could result in a significant product release and create a serious danger to the operators and the general public. The photo above illustrates a LP Gas loading bay in Australia.



**Fig. 4.2 A bulk LP Gas road tanker under filling at an LP Gas Depot**

- 4.4.3 Here are some brief examples of recommended practices found in the bulk loading of LP Gas followed by some recommended ways to carry out this important task.

### **(a) Unobstructed vehicle access**

Poor access at the bulk-loading gantry not only causes problems during the loading operation; it also hinders access to emergency vehicles.

Poor vehicle access results in...

- Increased risk of vehicle collision
- Congestion at the loading bay
- Delays to deliveries
- Increased driver hours and tiredness

and can be prevented by...

- Segregating traffic movements
- The use of clear directional signs within the plant
- Good planning and driver training and instruction

- 4.4.4 The bulk loading of road vehicles requires a well-planned layout allowing clear and unhindered access to, and exit from, the loading gantry.

- 4.4.5 It is good practice to segregate the movement of bulk vehicles away from the often-busier cylinder filling plant. Clear painted directional signs set out in a one-way system will minimise the risk of vehicle accidents inside the plant.
- 4.4.6 There should be clear instructional signs at the loading gantry where there may be one or more vehicles either waiting to load or parked up.
- 4.4.7 The loading gantries should be planned to match demand. Failure to do this may result in congested loading bays, the risk of shortages and customer complaints.

**(b) Correct loading and accurate metering**

The accurate and correct loading of product requires well-designed equipment, clear operating procedures and well-trained staff.

Incorrect loading and inaccurate metering results in...

- Overloading and damage to plant and vehicle
- Dissatisfied customers
- Possible regulatory violations
- Unscheduled product releases and reduced safety to the operator

and can be prevented by...

- Clear operating procedures
- Well trained staff
- Regular audits and monitoring
- Accurate scheduling

- 4.4.8 Good business practice is essential when loading bulk LP Gas. Barges, road tankers and rail cars must be secure and unable to move until the loading operation has been completed.
- 4.4.9 The vehicle should be loaded to no more than its rated capacity. Loading through a pre-set control system can prevent overloading. Overloading can cause structural damage to the tank and introduces a real risk of product spillage through the pressure relief valves. Any unplanned release of LP Gas is a serious event and one that must be avoided. Operational staff is put at risk and the threat of fire seriously jeopardises the entire business.
- 4.4.10 Personnel must be trained in proper loading procedures. Overloading is a clear illustration of procedural lapses or system failure and can lead to prosecution.
- 4.4.11 Accurate scheduling and understanding customer demand profiles reduces distribution costs by proper load planning. If this is not done, there may be temptation for occasional deliberate overloading in order to meet demand.
- 4.4.12 Thoroughly check and calibrate meters and weighbridges. Scrutinise procedures to ensure that overloading never occurs.
- 4.4.13 Accurate meters ensure correct deliveries are made and the customer receives the correct quantity of product.

**(c) Good safe condition of bulk vehicle, rail car or barge**

The condition of any equipment in an LP Gas business is essential. However, vehicles, rail cars and barges are involved in transferring large quantities of product at high discharge rates, thus any incident can be particularly serious.

Poor condition of bulk vehicle, rail car or barge results in...

- Increased risk of product leakage and reduced safety to employees and the general public
- Risk of injury and litigation
- Damage to the company image and brand

and can be prevented by...

- Sensible investment
- Good planned maintenance programmes
- Sound procedures such as thorough pre-and post-trip inspections
- Accurate meters and weighbridges

- 4.4.14 Rail cars and barges should be checked for condition and compliance, and secured before loading.
- 4.4.15 On entry to the plant bulk vehicles should be carefully checked and weighed to ensure compliance with depot regulations. It is good practice to load only empty vehicles. Any residue in a returning vehicle should be drained. Vehicles should comply with proper design standards and be roadworthy.
- 4.4.16 Vehicles travel on highways and share roads with the general public. The condition of the vehicle and the way it is driven will be a statement to the public, customers and society. Therefore, implementation of good business practice within this activity is important.

**(d) Thorough focus on operator skills and training**

Drivers should be properly trained, competent and fully understand the procedures involved for loading and unloading product and on road driving skills.

Insufficient focus on operator skills and training results in...

- Increased risk of major product leakage
- Risk of injury and litigation
- Damage to the company assets and image

and can be prevented by...

- Careful recruitment policies and regular training
- Simulated emergency exercises with de-briefing sessions
- Clear and easily understood instructions
- Regular audits
- Safety incentive programmes
- Involvement in journey management
- Maximum working and driving hours

- 4.4.17 The best preventative measure to ensure good business practices is the careful recruitment of qualified employees. In addition to effective interviewing techniques during the application stage of employment, companies should review the applicant's driving record, and conduct pre-employment testing and screening for use of illegal substances.
- 4.4.18 It is good practice to remind drivers of their obligations by conducting regular audits during operations at the loading bay. Drivers should be aware of what to do in an emergency, both within the depot and at the customers' facilities.
- 4.4.19 Drivers should be encouraged to extend their normal driving activities to include journey management, especially the reporting of road and traffic conditions, and the reporting of unsafe customer storage facilities.
- 4.4.20 Involving drivers in any emergency response exercises is good practice. It is also good practice to also involve them in any de-briefing sessions held with fire fighting personnel.
- 4.4.21 Recognising drivers with good safety records demonstrates senior management commitment to safety and the adherence to company procedures.

## 4.5 Distributors/Dealers

- 4.5.1 The distribution chain is where some of the worst cases of bad practice are found; many have a major influence on the business and society.
- 4.5.2 Following are examples of practices to be avoided in the Distributor/Dealer link of the distribution chain. The impact of each is discussed and some recommendations of good practice are offered.

### **(a) Illegal filling (decanting) of cylinders**

One of the more destructive practices in the LP Gas business is the illegal filling - or pirate filling - of cylinders in the distribution chain. Cylinders belonging to one company are used without permission by another company and refilled.

Illegal filling results in...

- No control over cylinder condition
- No control over the quality or quantity of product
- Serious risk of damage and injury from leaking cylinders
- Injury and damage compensation claims difficult to process
- Inequitable and illegal competition
- Industry reputation being threatened
- Assets being degraded

and can be prevented by...

- Designs that make it difficult to illegal fill (e.g. self sealing valves/security seals)
- Alerting authorities and take action to eliminate practice
- Customer awareness programmes - highlighting risks & consequences
- Keeping a close control of the distribution chain; monitoring and auditing

- 4.5.3 Illegally filled cylinders are a major threat to a company. Branded cylinders are issued into the market with no control over the cylinder condition, the quality of LP Gas or the quantity of product in the cylinder. In the event of an incident, the blame will unfairly come back to the original owner of the cylinder because the illegal filler will be difficult to trace (see also Appendix One [b]).
- 4.5.4 The practice creates a serious risk to the general public, creates inequitable and illegal competition, and damages the reputation of the industry.
- 4.5.5 In some countries the practice of swapping different brands of cylinder is condoned. Exchange centres are established where cylinders are returned to their original owners. Alternatively, swap arrangements are made to periodically exchange and reconcile stocks.
- 4.5.6 This is dangerous practice because it tempts pirate filling, especially when a company's cylinder stocks are low. It also means that at any one time there are competitor's cylinders at the depot over which there is little control of condition.
- 4.5.7 The price differential between small and large cylinders can create an incentive to illegally decant. Customers are often cheated with illegally filled cylinders because the opportunity to under-fill creates a further incentive for the activity.
- 4.5.8 Fitting of valves to cylinders that inhibit the filling process, coupled with the use of security seals, can make the illegal filling process more difficult.
- 4.5.9 It is important that authorities are fully aware of the consequences of this behaviour and every effort is made to eliminate it. However, the individuals that carry out these activities are often determined enough to overcome such obstacles. There has to be a concerted approach by all concerned to be successful in wiping out this invasive practice.
- 4.5.10 The exception to this practice is where both companies support legitimate cross filling and the practice is closely monitored and controlled. There may be good reasons to have an exchange filling arrangement in a country where there are large distances between filling plants. A contracted agreement to fill each other's cylinders makes good logistical sense to minimise distribution costs.





**Fig. 4.3 Poorly maintained cylinder steel LP Gas cylinder with a badly corroded base - a potential safety hazard**

- 4.5.11 Aside from the commercial disadvantages of illegal overfilling, it remains a potential risk. Overfilled cylinders left out in the sun or subjected to excessive heat put severe stress on the vessel causing the relief valve to discharge and ultimately distort the cylinder under hydraulic pressure. These cylinders are then rendered useless and have to be scrapped when they eventually do return to the filling plant. In extreme cases they could fail, resulting in a serious safety incident.
- 4.5.12 Some customers may be unaware of the fact they are buying illegally filled cylinders. Others may see it as an opportunity for sourcing cheap product. Active customer awareness and education programmes that point out the risks and damage that illegal filling does to the business can be an effective deterrent.
- 4.5.13 Frequent audits and monitoring programmes in areas where the activity is known to be prevalent is also a useful practice.
- 4.5.14 The use of single brand dealers that only represent one company may help stamp out the practice through the application of greater control and commitment.
- 4.5.15 Generating a concerted approach with the whole industry through the local LP Gas Association can be a powerful weapon against illegal filling. Ultimately the power of the law can be the biggest deterrent but often this only happens after a major incident.

**(b) Unauthorised acquisition, reworking and repainting of cylinders**

This is where one company illegally acquires cylinders from another company and repaints and re-brands them in their own colours before re-issuing them into the market.

Unauthorised acquisition, reworking and repainting of cylinders results in...

- No control over cylinder condition
- No control over the quality or quantity of product
- Serious risk of damage and injury from leaking cylinders
- Injury and damage compensation claims difficult to process
- Unfair and illegal competition
- Industry reputation being threatened
- Assets being degraded

and can be prevented by...

- Training personnel to recognise cylinder ownership
- Permanently identifying ownership on the cylinder
- Using only authorised facilities for reworking cylinders
- Destroying beyond repair when scrapping cylinders
- Tight controls at country borders
- Regular monitoring and inspection throughout distribution chain
- Cooperating with regulatory authorities

- 4.5.16 The effect of this practice is more permanent than simply re-filling. Assets are lost to the company that originally owned the cylinders.
- 4.5.17 Having clear, permanent markings on the cylinder is a useful deterrent to this practice. This can be done when the cylinders are manufactured. Markings should be difficult to remove, are not concealed by painting or galvanising, and do not affect the cylinder specification.
- 4.5.18 Another example that falls within the scope of this practice of illegal cylinder acquisition is the smuggling of cylinders from neighbouring countries. Cylinders from other countries may have been manufactured to different standards and specifications, and likely have no permanent markings. They may have already been scrapped and are being illegally disposed of in a new market.
- 4.5.19 The markings on a cylinder must describe its history. It is in effect its 'birth mark'. Cylinders from cross border countries will not have markings of the new country and can be easily identified. If these cylinders are circulating illegally they will never return to a legitimate filling plant to be checked for compliance. It is important, therefore, that checks on cylinders are carried out in the distribution chain, including customers' premises. It is even possible for this type of cylinder to be used in vehicles for the illegal conversion from gasoline to LP Gas.
- 4.5.20 Apart from vigorous checking of cylinders in the distribution chain, cross border controls need to be imposed to stop this activity at source. Government authorities from both countries can assist with this.
- 4.5.21 Illegally smuggled cylinders can impose a serious risk to a legitimate LP Gas business, to the industry, and most importantly, to the customer.

### **(c) Under filling of cylinders**

LP Gas is sold by weight. Customers expect to buy a full cylinder of gas. Under filling can be either a deliberate act or caused through negligence.

Under filling of cylinders results in...

- Dissatisfied customers
- Possible claims and litigation

and can be prevented by...

- Monitoring and auditing of the distribution chain
- Regular calibration of weighing equipment
- Regular drainage of storage tanks to avoid a build up of 'heavy ends'
- Regular training on proper filling procedures

- 4.5.22 Customers pay for and expect a properly filled cylinder. Cylinders that are illegally filled are often under-filled. They can also be tampered with and contents removed to cheat customers. When the contents of a LP Gas cylinder have been totally used the vessel should be empty. All the liquid LP Gas should have evaporated, leaving behind an empty cylinder containing no more liquid. If the cylinder contains any product that cannot readily evaporate it will remain there after all the gas has been used.
- 4.5.23 If a domestic cylinder has been deliberately contaminated with, for example, water or diesel fuel, then customers are paying for that product and are unable to use it. Because the cylinder is opaque and can weigh several kilograms, it is possible the customer is unaware of the state of the contents. This type of contamination of cylinders is well known in some unethical distribution chains and filling plants. The practice is serious and cheats customers and may reduce customer safety. Authorities can assist by prosecuting those responsible.
- 4.5.24 Another more common issue relating to this practice is the steady accumulation of 'heavy ends' in cylinders. 'Heavy ends' is material heavier than butane that will not readily boil off under ambient conditions. In this case the addition of contaminated product is more through negligence than a deliberate act and correction may be needed frequently.
- 4.5.25 It is good practice to randomly sample empty cylinders for contaminants throughout the distribution chain, including the cylinder filling plants. If a significant amount of contamination is evident, then product quality control procedures need to be tightened. This can often be achieved by regular tank draining.

### **(d) Poor 'metal management'**

Metal management is the term used to describe the management of the cylinders and storage tanks in the business. They represent a significant investment, and if badly managed can have a serious impact on the efficiency of the business and the customer proposition.

Poor metal management results in...

- Under-utilised assets
- An inefficient operation
- Lower standards of operation and badly maintained assets
- Damage to the customer proposition
- The encouragement of bad practices

and can be prevented by...

- Fully understanding and controlling the cost of the metal in the business
- Clearly identifying ownership
- The introduction of a cylinder or tank deposit scheme
- Controlling some of the bad practices outlined above
- Controlling the maintenance of cylinders and tanks
- Assisting householders with refundable deposits

- 4.5.26 Apart from the financial cost of employing under-utilised assets, poor metal management will lead to an inefficient operation, lower standards of operation and further bad practices. These all eventually have a detrimental impact on the business and the customer.
- 4.5.27 There are two principal methods of cylinder and container ownership: LP Gas company owned and customer owned.
- 4.5.28 When the company owns the container, the company either loans or leases it to the customer. The customer exchanges an empty cylinder for a full one paying only for the gas. The company is responsible for filling and supplying safely maintained cylinders. Frequently, the owner's investment is secured through a refundable deposit system.

#### **The Refundable Deposit System**

When the cylinder is owned by the LP Gas company, the investment, replacement and working stock costs of cylinders are borne by the LP Gas company. In order to ensure that these costs are recovered, the LP Gas company will often charge a refundable deposit to the customer, the amount of which will be adequate to finance the initial investment, and the subsequent maintenance activities for the remainder of the cylinder's life.

This is typically around 130% of the replacement cost of the cylinder. If the deposit is too high, a market for second-hand cylinders can emerge, possibly resulting in pirate filling. Also, if the amount of the deposit is too low, inactive cylinders can accumulate since there is little incentive to return the cylinder.

The liability, should defective cylinders enter the market place, is often with the LP Gas company whose responsibility it is to maintain them. It is unlikely that LP Gas companies will invest in the maintenance of competitors' cylinders for which they are not liable.

Therefore, it is essential that cylinders are only returned to filling plants operated by the cylinder owner, or plants with which the owner has a separate 'hospitality' agreement to fill and maintain others' cylinders. In order to ensure that this system functions correctly, it is vital that all cylinders clearly identify the company that owns them.

Should the customer wish to change gas suppliers, the deposit is usually refunded in return for the empty cylinder, although often the voucher given as a receipt for the original deposit is required. Voucher systems prevent cylinder thefts since the cylinder is worthless to a thief without the appropriate paperwork. Usually a condition of the refund is a return of a cylinder of only the same brand originally supplied.

The purpose of the deposit is to encourage the customer not to lose the cylinder, to recover the cost of continuing cylinder investment and to recover the cost of inactive cylinders. The refundable deposit provides the LP Gas company a level of assurance that it will not incur a large loss nor make a significant profit from the maintenance and replacement of the metal.

- 4.5.29 In many countries, deposits are not common practice, even where it is the LP Gas company who owns the cylinder. Especially in developing countries, this is because the initial outlay by the customer for the deposit is too costly, thus discouraging development of an LP Gas market. In these countries, bad practices such as cylinder thefts have the negative effect of reducing the incentive companies have to implement maintenance procedures. In such cases an effective enforcement of cylinder controls is even more important to ensure safety. An alternative is for authorities, or local communities, to assist households in the financing of the deposit.
- 4.5.30 It is also common for unscrupulous marketers to 'kidnap' competitor's cylinders in order to prevent a competitor from operating in a particular area. This reduces competition and imposes costs on reputable marketers that ultimately must be passed on to the customer.
- 4.5.31 In the case of customer owned cylinders, two common practices occur. In the first, the customer has a personally identified cylinder where the customer brings the cylinder to the plant or to a retailer to be filled, then taken away. The customer is responsible for any maintenance cost or replacement if the cylinder has reached the end of its useful life. Since maintenance is the responsibility of the customer, the fill plant or retailer's diligence in ensuring the cylinder is acceptable for refilling is particularly important.
- 4.5.32 In the second the customer exchanges a legally owned cylinder for one of like kind. Since the customer does not have physical possession of the same cylinder brought to the exchange transaction, the customer is not responsible for its replacement at the end of the cylinder's useful life. In this instance the LP Gas supplier has the responsibility of maintenance and replacement since the initial cylinder is somewhere in the inventory 'float'.
- 4.5.33 Regardless of ownership, there is a constant need for fill plant and retailer diligence to make sure that only properly maintained and qualified cylinders are filled.
- 4.5.34 Labels can be removed so there should be some form of permanent marking such as embossing on the cylinder to identify ownership. This is preferably done on the cylinder as the shroud can be illegally replaced, especially if it is bolted on.
- 4.5.35 Recently the use of bar codes and microchips on cylinders has been introduced in some markets to assist in the monitoring of cylinder assets. These are good examples of techniques that can be used to know how many cylinders there are in the business and where they are.

- 4.5.36 Metal management is equally important in the bulk segments. Tanks and equipment provided by LP Gas marketers/suppliers to customers on free loan, or through some form of financial arrangement, should be used only for product supplied by owner. Discrete filling connections and restricted access to the bulk compound are some other methods to avoid the illegal filling of bulk tanks by other suppliers.

**(e) Poor cylinder handling**

Although cylinders are constructed to withstand a certain amount of misuse their appearance and function can be badly affected by poor handling. Severe improper handling will result in damage to the cylinder.

Poor cylinder handling results in...

- Damage to the appearance and customer proposition
- Increasing risk of product leakage
- Potential hazardous condition

and can be prevented by...

- Correct cylinder design
- Distributor training and monitoring
- Good vehicle, equipment and facility design
- Remuneration programmes linked to cylinder condition

- 4.5.37 The use of correct cylinder handling equipment assists the efficient operation of the business and also minimises the risk of injury to staff.
- 4.5.38 Distributors handling cylinders should design their premises in a manner that makes it easy to load and unload the vehicles without damage to the cylinder or injury to the operator. Cylinders should also be stored in areas that offer protection from damage.
- 4.5.39 It is good practice to link distributor remuneration to cylinder condition through inspection of cylinders on entry to the filling plant and a regular monitoring programme.

**(f) Overstorage of cylinders**

The storage of cylinders in the distribution chain is carried out in much smaller premises than filling plants and the restrictions are tighter. There may be local requirements outlining the maximum amount of product to be stored and these should not be exceeded.

Overstorage of cylinders results in...

- A danger to people and facilities
- The threat of litigation
- Under-utilised assets

and can be prevented by...

- Well designed storage areas
- Distributor awareness and training programmes
- Regular on-site monitoring

- 4.5.40 The manner in which cylinders are stored should allow easy access to any single cylinder in the event of a leak. It is good practice to have a clear walkway between each pair of rows.
- 4.5.41 Premises should be well ventilated, well lighted and have clear access for emergency vehicles. Exit points should be clearly marked and not require personnel to pass large concentrations of stored product in order to exit the premises. It is also good practice to link distributor remuneration to working stock levels. The photo on the following page shows a number of new palletised LP Gas cylinders awaiting filling at a Hong Kong depot.

**Fig. 4.4 Storage of LP Gas cylinders in pallets**



#### **(g) Inefficient planning and scheduling**

The distribution chain can seriously affect the consistency of offering to the customer through inefficient planning and scheduling.

Inefficient planning and scheduling results in...

- Increased operating costs
- Longer delivery times
- Higher levels of working stock
- Dissatisfied customers

and can be prevented by...

- Monitoring of demand patterns
- Planned maintenance programmes
- Coordinated planning with the distributor network

- 4.5.42 The initial business plan can rapidly become redundant in a growing business. As the business develops there is a need to carefully monitor and adjust the plan and the network.
- 4.5.43 Depots and stores can be in the wrong location, leading to excessive transport costs, longer delivery times and increased inventory. Delivery trucks can be wrongly sized for the loads and demand profile of the market.
- 4.5.44 Careful planning of distributor delivery schedules can reduce operating costs, shorten delivery times and limit the amount of working stock. This is a particularly important issue because if the distribution chain is working efficiently it has a beneficial effect across the whole business.

#### **(h) Lack of understanding of the role of the distributor and the customer proposition**

The consistency of customer service can be seriously affected by a lack of understanding as to what is required at the distributor level. A distributor network may consist of many different companies carrying out similar tasks. Inconsistencies in the quality of customer service can lead to customer dissatisfaction.

Lack of understanding of the role of the distributor and the customer proposition results in...

- Disagreements
- An inconsistent brand image
- Dissatisfied customers
- Damaged reputations
- Risk of litigation

and can be prevented by...

- A dedicated distributor network
- Clear and simple distributor agreements
- Good communication throughout the chain
- Regular training of all distribution and service personnel



- 4.5.45 In some countries distributors and dealers are contracted by LP Gas companies to carry out certain services through the distribution chain. They are often small family businesses sometimes with a long history of association with the industry. On occasion, they may carry out tasks on behalf of more than one company.
- 4.5.46 One of the most important business practices in the distribution chain is to have clear agreements describing the services to be carried out, the remuneration for those services and the level of performance expected. The agreement should promote good practice, prohibit cylinder swapping of different brands and require adequate stocks. It should describe the extent of their activities, either geographic or sometimes by type of market serviced, in order to avoid confusion leading to customer dissatisfaction.
- 4.5.47 For industrial/commercial distributors these activities might include the responsibility for maintaining customer storage installations in which case there needs to be clear written procedures outlining what is to be done and when it is to be done. This activity requires different skills and training.
- 4.5.48 The agreement should describe the level of competency required for their staff. This is particularly important for drivers who have a significant role in carrying out many of the tasks. There should be recognition in the agreement of the need for training and the obligation of the LP Gas company to provide this. Elimination of bad practices in the distribution chain is a key training issue.
- 4.5.49 The information outlined in the [Guidelines for Good Safety Practice in the LP Gas Industry](#) provides a good basis for distributor, dealer and retailer training.
- 4.5.50 One of the roles of distributors and dealers is to educate retailers and customers about the safe storage, handling and use of the product. In addition, by providing distributors and dealers with proper education and on-going training, the LP Gas industry will minimise the risk of litigation and unnecessary oversight by local authorities.
- 4.5.51 The customer proposition needs to be fully understood by all those involved in marketing the product. If the distribution chain is unaware of what has been promised, there may be dissatisfied customers. Reputations are then damaged and disagreements arise.

#### **(i) Fraudulent acts**

Fraud is criminal deception and the consequences are very serious. There are some activities in the LP Gas business where fraud can occur if not checked.

Fraudulent acts result in...

- Loss of product and revenue
- Damaged reputations
- Expensive investigations and litigation

and can be prevented by...

- Sound business processes
- Procedures that make fraud difficult
- Involvement of the customer during product transfer
- Regular calibration of meters

- 4.5.52 One example of fraud in the distribution chain involves the deliberate inaccurate metering of product.
- 4.5.53 Bulk deliveries of LP Gas to industrial and domestic customers, or reticulated domestic installations, should always involve the customer witnessing and agreeing to the amount of product transferred. This reduces the possibility of disputes.
- 4.5.54 Fraud can also take place in bulk domestic installations where product is individually metered to customer households. Either the distributor or customer can be cheated if meters are tampered with.
- 4.5.55 Regular checks and calibration are required on all metering equipment right through the distribution chain. This close monitoring signals to all concerned that there are procedures in place to prevent fraud occurring.

## 4.6 Retailers

- 4.6.1 Retailers are generally used only to service the domestic packed LP Gas business. However, this represents one of the largest of the LP Gas market segments.
- 4.6.2 Occasionally distributors and dealers will integrate their business and become retailers. Some typical examples of good practices to be followed the retail chain are as follows:

### **(a) Thorough knowledge of the customer proposition**

At the retail interface it is important to adopt good business practices and know all details relating to the customer proposition.

Inadequate knowledge of the customer proposition results in...

- Customer expectations not being met
- Disagreements and complaints
- Lost confidence

and can be prevented by...

- Careful explanation of what is required
- Training
- Clear service agreements
- Performance measures and follow up
- Incentives

- 4.6.3 It is vital that the customer proposition is clearly understood by the retailer. If this doesn't happen customer expectations will not be met and complaints will arise. There will be disagreements with retailers and confidence will be lost.
- 4.6.4 The retailer needs to have a clear understanding as to what is being presented and what is expected of the retailer and the expectations of the customer. If requested by the customer, the retailer should provide delivery of the cylinder and connection to the appliance. This may require training and some form of service agreement setting out clearly what is required.

### **(b) Safe and legal storage, handling and distribution of the product**

The retailer has an obligation to store, handle and distribute product in a correct and legal manner. Working stocks will be smaller than those at distributor premises.

Poor storage, handling and distribution of the product results in...

- Risk of product leakage
- Damage to assets
- Damage to the customer proposition
- Safety risk to the community
- Damage to the company image
- Risk of litigation

and can be prevented by...

- A detailed analysis of what is required
- Training of retailers and providing of literature
- Clearly defined service agreements

- 4.6.5 There must be a clear understanding of what is required legally. The same good practices that were mentioned in the distributor/dealer network apply here. Cylinders should be stored in well-ventilated and secure areas that have good access for emergency removal in the event of an incident. Any damage to cylinders at retail premises may result in product leakage and pose a danger to the public. Retail premises should be equipped with at least the minimum fire-fighting equipment required by legislation or regulation.



- 4.6.6 Unlike distributors and dealers, retail premises are often in crowded and heavily populated areas. It is important that strict controls are imposed on the storage of working stock.
- 4.6.7 It is good practice to regularly train and monitor the activities of retail outlets to ensure there is no activity that would threaten the image of the company or public safety.
- 4.6.8 The retailer has an opportunity to illegally decant product in the same way as a distributor. The presence of weigh scales in retail premises should be treated as suspicious. They might be used for illegal decanting.

## 4.7 Service Stations

- 4.7.1 The application of good business practices at the service station is particularly important. With the growth in the autogas market sector, the LP Gas service station population is increasing quickly.
- 4.7.2 The success of an automotive LP Gas business depends largely on the strength of the network. Planning and operation of a network can have lasting impact on the effectiveness of the business. Some typical examples of good practices include:

### (a) Good network planning

One of the key success factors of a retail fuel business is having a good network plan. The introduction of LP Gas autogas (automotive) necessitates integrated planning.

Poor network planning results in...

- Poorly located and difficult to access service stations
- Inadequate facilities for the customer
- Higher unit costs
- Difficult to access dispensers on forecourt

and can be prevented by...

- Good market research and regular tracking studies
- Creating awareness
- Proper forward planning
- Liaising with local authorities

- 4.7.3 Service stations need to be highly visible, easy to access and easy to exit for approaching traffic. Difficult access results in traffic congestion and possible queues onto the main roads.
- 4.7.4 Refueling delays create a bad image and lead to customer dissatisfaction. This can be avoided with the installation of efficient dispensers with fast pumps. Customers new to automotive LP Gas may need assistance with refueling. The use of forecourt personnel, even for self serve stations, is good practice. If forecourt personnel are used they must be properly trained.
- 4.7.5 Busy automotive LP Gas sites have large throughputs and frequently have daily bulk deliveries. It is good practice to ensure the bulk vehicles are allowed easy access to the site and can park unhindered during discharge and away from the forecourt traffic.
- 4.7.6 LP Gas associations can play a key role in effectively promoting infrastructure development by advertising, and by working with local authorities in developing regulations that provide safe, easily accessible customer-friendly facilities.

#### **(b) Safe and reliable equipment**

The use of good quality and reliable dispensing equipment, which is regularly checked and calibrated, will ensure trouble free operation at the point of sale.

Inadequate and unsafe equipment results in...

- Risk of product leakage on forecourt
- Difficulty of making re-fuelling connection to vehicle
- Queues on forecourt
- Risk of customer complaints and litigation
- Dissatisfied customers
- Damage to brand and industry reputation

and can be prevented by...

- Installing approved dispensing equipment
- Regular checks, and maintenance of dispensing equipment
- Regular calibration programmes
- Use of approved contractors

- 4.7.7 LP Gas storage tanks on retail service stations are often positioned underground to accommodate the required safety distances and improve overall site appearance.
- 4.7.8 In view of the number of vehicle movements on site, it is good practice to erect sturdy barriers to eliminate the risk to pipework and other equipment from potential impact damage.
- 4.7.9 Good housekeeping and maintenance of the storage, handling and distribution facilities will not only protect the assets; it will also project an image of care and responsibility.

#### **(c) Good control of forecourt activities**

It is important that the activities on the forecourt are properly managed to ensure an efficient operation and eliminate some of the bad practices that can infiltrate the business.

Poor control of forecourt activities results in...

- Risk of product leak
- Congestion on site
- Conflict on site

and can be prevented by...

- Strict rules with station operator banning illegal practices
- Customer awareness and education programmes
- Frequent audits and monitoring
- Specific autogas LP Gas dispenser nozzles

- 4.7.10 The pricing structure for LP Gas in some markets creates an incentive for using automotive LP Gas for domestic and commercial purposes. There are also situations where the pricing structure encourages the misuse of domestic or commercial LP Gas in automotive vehicles. In either instance this is not only bad practice, but also a dangerous practice and the public must be informed of those dangers
- 4.7.11 These activities may result in propane, with a higher vapour pressure than butane, being dispensed into butane vessels. This can lead to overstressing and ultimately failure of the vessel risking injury to personnel and property.
- 4.7.12 Automotive dispensing equipment is not designed for filling domestic cylinders and should not be used in this manner. The connection between dispenser and vessel will not be secure resulting in product leakage in a public area.
- 4.7.13 The illicit refueling of domestic cylinders on service stations creates a safety risk and prevents the proper maintenance of cylinders. Clear service agreements outlining what is expected of the operator are essential for any control.
- 4.7.14 Regular checks and audits will help create a disciplined environment, but the need for proper training of service station staff is a vital additional element in the quest to promote good business practice on the forecourt.
- 4.7.15 Creating customer awareness of the risks involved in illegal forecourt filling is essential in stopping the practice.

## 4.8 Customers

- 4.8.1 Customers rely heavily for good advice and information about LP Gas and its application. They expect to receive the product in a timely fashion, in good order and expect that it will perform as promised.
- 4.8.2 In return, the supplier will expect to be paid for the product in accordance with the terms and conditions agreed. Some typical examples of good practice necessary at the customer interface are:

### **(a) Good product knowledge**

Customers have rights and obligations that are often described as a 'duty of care' or 'duty to inform'. In order for them to carry this out they must be well informed.

Inadequate product knowledge results in...

- Customers unable to handle emergencies
- Poor response to maintenance of storage facility
- Under-utilised benefits of LP Gas
- Risk of accident, incident and litigation
- Dissatisfaction with using LP Gas

and can be prevented by...

- Customer awareness and education programmes
- Simulated emergency training at customer's premises with distributor and retailer

- 4.8.3 Customers need to have simple and clear instructions about the storage, handling and use of LP Gas in order to exercise their obligations.
- 4.8.4 For domestic customers, it is good practice to make these instructions available with the cylinder. Sometimes this is done with a sticker or label, or it might be made available through leaflets. It is also wise to support this material with some form of customer support centre where anybody can access information about the product.
- 4.8.5 For larger customers, the erection of signs at storage installations and conducting training programmes can assist in transferring this information.
- 4.8.6 Illegal activities at consumer level are easier to prevent if the consequences are fully understood.

### **(b) Safe and legal installations**

Some customers may be tempted to install appliances and equipment themselves. This may not only be dangerous; it can also be illegal.

Illegal installations result in...

- Risk of incident and danger to other users
- Loss of asset to other markets (e.g. domestic cylinder used in auto application)
- Inefficient application or loss of production
- Insurance and litigation implications
- Possible public relations impact

and can be prevented by...

- Cost effective customer propositions
- Tamperproof devices
- Available resources to provide proper installations
- Proper supervision of installations
- Customer education and training
- Regular monitoring and inspection
- Support from regulatory authorities

- 4.8.7 In the event of an incident involving illegally installed appliances or equipment, the company supplying the product will likely deny any responsibility. Insurance is also likely to be voided leaving customers and the LP Gas supplier vulnerable.

- 4.8.8 Poorly installed appliances may also result in inefficient operation causing damage to the process, loss of production and increased energy costs.
- 4.8.9 Providing an easy and cost effective alternative for customers that discourages ‘do-it-yourself’ activities is good practice. This can be achieved by instructing retailers and dealers to provide appliances and equipment in a total package that includes installation, but at an attractive cost.
- 4.8.10 Engine conversions should be carried out by professionally trained personnel and in workshops properly equipped for the task, using components and systems which are approved for automotive applications
- 4.8.11 The cost of a proper engine conversion to LP Gas involves the purchase of tank, pipework, vapourisers and control equipment. Cheaper, illegal and unsafe conversions are sometimes done that involve the illicit use of small domestic or industrial cylinders modified to fit the boot (trunk) of a vehicle (see photo adjacent). This is a very dangerous practice.



**Fig. 4.4 Removable LP Gas cylinders as source for automotive fuel should not be used in vehicles**

- 4.8.12 A private car running on LP Gas may consume more product in a day than a domestic household does in a month. This high level of consumption attracts illegal decanters that are prepared to service illicit vehicle conversions. The whole practice leads to a very unsafe industry and one where cylinders are again being misused and not maintained.
- 4.8.13 It is important to establish a comprehensive network of well designed and conveniently located refueling outlets together with a chain of authorised and registered conversion workshops. This can only be done with the close cooperation of authorities and government regulators to stamp out anything that compromises this objective.

**(c) Customer friendly equipment**

LP Gas equipment can sometimes be very difficult for the customer to use. Designs need to ensure ease of use by customers of all ages and abilities.

Difficult to use and unfriendly equipment results in...

- Dissatisfied customers
- Risk of incident
- Loss of customer business

and can be prevented by...

- Well designed equipment and appliances
- Customer service support
- Clear operating instructions to customer

- 4.8.14 One of the most common areas of difficulty for domestic and commercial customers is making the connection safely and securely between cylinder valve and regulator.
- 4.8.15 The distribution chain can provide an important customer service when the product is being delivered. There is an excellent opportunity at the point of delivery for developing customer relationships and strengthening the proposition through demonstrations and giving advice to the customer.

**(d) Well maintained facilities**

The maintenance responsibility rests with the owner of the installation unless this has been transferred by contract to another party.

Difficult to use and unfriendly equipment results in...

- Dissatisfied customers
- Risk of incident
- Loss of customer business

and can be prevented by...

- Guidelines on housekeeping to customer
- Clear description of roles and responsibilities for customer and distributor
- Distributor responsibilities linked to remuneration
- Frequent auditing and monitoring programmes at customer installations

- 4.8.16 For small installations the customer may own the facilities. The larger ones are more likely to be owned by the LP Gas supplier.
- 4.8.17 It is important that the facilities are kept properly maintained to ensure the product remains safe and secure. Good maintenance also protects the assets of the customer or supplier and the overall business.
- 4.8.18 This includes the cylinder in the case of a domestic customer. If the customer owns the cylinder, ongoing maintenance may be neglected. Maintenance is always best undertaken at the cylinder filling plant where facilities and procedures exist. With the company owning the cylinder, there is a vested interest in protecting that asset by making sure it receives proper and regular inspection and maintenance every time it comes back to the plant to be re-filled



## Chapter Five

# LP Gas Safety

LP Gas by nature is a hazardous product until it has been safely used, and the products of combustion disposed of properly.

This document has focused on the business implications of good practice in LP Gas but that should not be at the expense of safety. Reference has already been made to the [Guidelines for Good Safety Practice in the LP Gas Industry](#). It is recommended these documents be read together.

Safety should be at the top of any agenda when discussing LP Gas. An unsafe LP Gas business is a bad LP Gas business.

Almost all examples of good business practice in the LP Gas industry can have some linkage back to safe practice and the promotion of safe practice cannot be over emphasised.

# Good Cylinder Practices Review

Issue/Bad Practice	(a) Illegal acquisition and re-branding of cylinders	(b) Illegal filling (decanting) of cylinders
	<p>A variant of (b) where cylinders are repainted with the identification mark/brand of another company, and subsequently marketed under this brand. This often occurs across international borders, or by transporting cylinders to a region in which the original owner does not operate.</p>	<p>One of the more destructive practices in the LP Gas business is the illegal filling (or pirate filling) of cylinders in the distribution chain. Cylinders belonging to one company are used without permission by another company and refilled. This practice sometimes involves cylinders that have been scrapped as no longer safe for use and is therefore particularly dangerous.</p>
Risks	<ul style="list-style-type: none"> <li>• Legitimate operators lose effective control over the condition of their cylinders. Pirate fillers have no incentive to adequately maintain stolen cylinders bearing the identification mark of the cylinder owner. Product Quality or quantity difficult to identify.</li> <li>• Serious damage and injury from badly maintained cylinders.</li> <li>• Injury and damage compensation claims difficult to process since it will be impossible to identify the original filler with certainty.</li> <li>• Industry reputation threatened, customer less willing to use gas.</li> </ul>	<ul style="list-style-type: none"> <li>• Legitimate operators lose effective control over the condition of their cylinders. Pirate fillers have no incentive to adequately maintain stolen cylinders bearing the identification mark of the cylinder owner. This also applies to product quality or quantity since customers will find it difficult to identify who the filler actually was.</li> <li>• Serious damage and injury from badly maintained cylinders</li> <li>• Injury and damage compensation claims difficult to process since it will be impossible to identify the original filler with certainty</li> <li>• Industry reputation threatened, customers less willing to use gas.</li> </ul>
Remedy	<ul style="list-style-type: none"> <li>• Permanently identifying ownership on the cylinder.</li> <li>• Tighter controls at country borders.</li> <li>• Regular monitoring and inspection throughout distribution chain.</li> <li>• Cooperating and assisting regulatory authorities in enforcing regulations and identifying non compliance.</li> </ul>	<ul style="list-style-type: none"> <li>• Industry and government to clearly identify cylinder ownership, be vigilant against cylinder thefts, support legal action in case of malpractice.</li> <li>• Enforce industry/state regulations relating to maintenance of cylinders and tanks, identify non compliance operators, and establish mechanism for enforcement.</li> <li>• Governments/local communities assist householders with refundable deposits</li> <li>• Licensing of new LP Gas operators, regular inspection of facilities</li> <li>• Designs making it difficult to illegally fill (e.g. self sealing valves/security seals)</li> <li>• Customer awareness programmes of risks and consequences of pirate filling</li> <li>• Destroying beyond repair when scrapping cylinders</li> </ul>



<p><b>(c) Re-use of scrapped cylinders</b></p> <p>Using cylinders that have been scrapped (usually due to their no longer being safe for use)</p>	<p><b>(d) Under filling of cylinders</b></p> <p>Customers expect a full cylinder of LP Gas. Under filling or filling when impurities are in the cylinder</p>	<p><b>(e) Filling of cylinders at autogas service stations</b></p> <p>Depending on relative pricing in the market, there may be an incentive for customers to purchase LP Gas at an autogas service station rather than from an authorised LP Gas dealer, e.g. by filling an empty cylinder.</p> <p>Relative pricing in some markets may encourage the reverse, e.g. the use of domestic LP Gas cylinders in vehicles. This practice can also be hazardous but is not discussed in detail here.</p>
<ul style="list-style-type: none"> <li>• Cylinders that are known to be unsafe enter the market</li> <li>• Accidents occur but it is difficult to determine liability</li> </ul>	<ul style="list-style-type: none"> <li>• Customers are cheated</li> <li>• If due to poor operation/management at the filling plant, overfilling may be likely with potentially disastrous consequences in the event of vessel rupture</li> </ul>	<ul style="list-style-type: none"> <li>• The filling connection will not necessarily be suitable for LP Gas cylinders and there is a risk of leakage</li> <li>• Cylinders will have bypassed the normal inspection, repair, requalification procedures at the filling plant. As they degrade with normal use the probability of accidents due to faulty cylinders will increase</li> <li>• The cylinders will not necessarily be suitable for autogas use, largely propane, whereas the cylinder may be rated for butane</li> </ul>
<ul style="list-style-type: none"> <li>• Destroying beyond repair when scrapping cylinders</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring, calibration of equipment and audit of the distribution chain</li> <li>• Regular drainage of storage tanks to avoid a build up of 'heavy ends'</li> <li>• Regular training on proper filling procedures in filling plants</li> </ul>	<ul style="list-style-type: none"> <li>• Licensing regime for autogas sites to include safe equipment checks and rules ensuring only suitable autogas tanks are filled.</li> <li>• Industry/authority cooperation in ensuring rules are followed and enforced</li> <li>• Strict rules with station operator banning illegal practices</li> <li>• Customer awareness and education programmes</li> <li>• Frequent audits and monitoring</li> <li>• Specific autogas LP Gas dispenser nozzles</li> </ul>



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