

Code of Practice for

HONG KONG

LPG

INDUSTRY

MODULE 7

Operating Procedures for Emergencies at LPG Compounds and Cylinder Stores

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Code of Practice
for
Hong Kong LPG Industry

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at LPG Compounds and Cylinder Stores**

PREFACE

This document is the seventh in a series of modules issued as the Code of Practice for the LPG industry in Hong Kong Special Administrative Region (HKSAR). The other modules that have been published so far include:

- LPG Compounds and Cylinder Stores
- Underground LPG Pipework
- Handling and Transport of LPG in Bulk by Road
- LPG Cylinders

This Module 7 lays down the recommended practice for the operating procedures for emergencies at LPG compounds and cylinder stores. This Module shall be read in conjunction with the Gas Safety Ordinance (Cap. 51) and subsidiary regulations (see Appendix A for Reference).

The basis of this document includes a number of codes of practice issued by Liquid Gas UK (formerly UKLPG) of United Kingdom, NFPA 58 Liquefied Petroleum Gas Code issued by the National Fire Protection Association of USA, the safety requirements issued by the Gas Standards Office of the Electrical and Mechanical Services Department and the Fire Services Department in Hong Kong over the past years, and other relevant international standards related to LPG.

The first issue of this module was prepared jointly by the Gas Standards Office of Electrical and Mechanical Services Department and the LPG Safety and Technical Committee (LPGSTC) represented by the Registered Gas Supply Companies of the LPG industry at that time, and it was published in April 2000. This Issue 2 is an update to capture the change in trade development and increasing public expectations since 2000 and to incorporate the experience of the stakeholders in the local LPG industry over the past years.

While this module tends to be specific in important aspects affecting safety and reliability, it shall be seen as offering guidance to engineers, operators and other users who will continue to exercise judgement and skill in the fulfilment of their obligations. It shall be borne in mind that practice may need changes with emerging technology and experience. The requirements listed in this document shall not be regarded as a set of rules that cannot be changed. It is expected that this document will be reviewed and updated as and when required in future.

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SECTION 1 DEFINITION OF TERMS

Emergencies - Unexpected events that require prompt actions to protect the safety of people or to limit damage to property.

Emergency response plan - a written document detailing actions to deal with emergencies.

Gas Authority – the authority appointed under Section 5 of the Gas Safety Ordinance (Cap. 51).

Gas emergency – any emergency involving LPG which has caused, or may cause, personal injury to an individual or damage to property. This includes gas escape, with or without fire.

Gas Standards Office (GasSO) – an office within government which is under the control of the Gas Authority to administer the Gas Safety Ordinance.

Gas supply company – the Registered Gas Supply Company (RGSC) that is supplying LPG to the installation as defined in the Gas Safety Ordinance (Cap. 51).

Major gas emergency – any gas emergency as defined as “major gas emergency” in the Gas Safety Ordinance (Cap. 51) in which there is

- (a) significant damage to a gas vehicle, or loss of containment of LPG from such a vehicle;
- (b) loss of containment of 250 kg of LPG in liquid or gaseous form, within an hour, outside the terminal;
- (c) loss of the supply of gas to more than 500 consumers;
- (d) explosion damage caused by gas where the damage extends beyond the immediate source of the explosion;
- (e) explosion damage to any notifiable gas installation where repair is required, irrespective of whether such installation is rendered inoperable by such explosion;
- (f) fire damage to any notifiable gas installation; or
- (g) any casualty, whether fatal or non-fatal, due to the inhalation of unburnt gas or the products of the combustion of gas,

and includes any similar accident.

Notifiable gas installation (NGI) – an installation, as defined in the Gas Safety (Gas Supply) Regulations, including all LPG compounds, cylinder stores and vaporiser rooms.

NGI owner – a person or company that has been granted construction approval and approval of use of the NGI and is deemed to own the NGI for the purpose under the Gas Safety Ordinance (Cap. 51).

Operator – a person or company handling gas emergencies for an LPG installation supplying gas to a piped gas system; the operator can be a gas supply company, NGI owner, gas distributor, agent, dealer or contractor.

SECTION 2 OBJECTIVES & SCOPE

2.1 Objectives

- 2.1.1 This Code of Practice has been prepared as a general outline of basic safety standards to be followed by gas supply companies, NGI owners and their operators so as to ensure, in carrying on their business, the safety at work of their employees and to conduct their operations in a safe manner so that members of the public are not exposed to undue risks from gas.

2.2 Scope

- 2.2.1 This Module covers the requirements on operating procedures for gas emergencies at LPG compounds and cylinder stores. When developing the operating procedures for gas emergencies, the situations of each NGI shall be reviewed case by case with the gas supply company, NGI owner and its operator taking into consideration of the specific characteristics of the NGI, including its design, installation and operations.

- 2.2.2 This Module does not cover

- a) emergency at gas supply companies' terminals;
- b) emergency involving road tankers or cylinder wagons; or
- c) emergency for installations outside LPG compounds/stores.

- 2.2.3 This Module does not cover the gas reinstatement procedures after emergency.

2.3 Interpretation of Terms

In this document, the terms "shall" and "should" have the following interpretations:

- 2.3.1 "Shall" (required by this module) is used to indicate a requirement which, it is intended, shall be complied with in full and without deviation.
- 2.3.2 "Should" (recommended by this module) is used to indicate a requirement which, it is intended, should be complied with unless, after prior consideration, deviation is considered to be acceptable.

2.4 Regulations

- 2.4.1 All operating procedures shall comply with statutory safety requirements. Particular reference shall be made to:

The Gas Safety Ordinance (Cap. 51)

The Gas Safety (Gas Supply) Regulations (Cap. 51B)

The Gas Safety (Registration of Gas Supply Companies) Regulations (Cap. 51E)

SECTION 3 PLANNING

3.1 Philosophy

- 3.1.1** All emergencies shall be treated with top priority over all other work and shall be attended as quickly as reasonably practicable.
- 3.1.2** Provision of adequate co-ordination and supervision, coupled with sufficient manpower and facilities (including equipment, tools and materials), shall be made for responding to emergencies.
- 3.1.3** Where the emergencies are serious or for major gas emergencies except mere loss of supply of gas, call “999” immediately.
- 3.1.4** In dealing with emergencies, the following sequences of actions shall be followed:
- a) safeguard life;
 - b) safeguard property;
 - c) find and stop gas escape;
 - d) report to the registered gas supply company (RGSC) and determine the cause of the incident; and
 - e) review the procedures of emergencies with RGSC where required.
- 3.1.5** Regular liaison shall be maintained with Gas Standards Office (GasSO), Fire Services Department (FSD), Police and other relevant parties for emergency handling.
- 3.1.6** All reported or suspected emergencies shall be treated as real emergencies and emergency response procedures shall be carried out. The emergency response procedures shall only be discontinued when it is confirmed that the case is a false alarm.
- 3.1.7** Resources nearest to the site of emergencies, such as the trained staff of the operator of the installation or the gas supply company, shall be despatched to the site at the earliest opportunity.
- 3.1.8** A trained staff shall be identified and despatched to the site at the earliest opportunity who shall assume full responsibility on the necessary actions.

- 3.1.9** The developed operating procedures for emergencies of an NGI shall comply with all the requirements of this Code of Practice. Where necessary, the NGI owners should engage the gas supply company to offer the services.

3.2 **Emergency Response Plan**

- 3.2.1** An emergency response plan shall be developed by the owner(s) of an NGI to deal with emergencies covering situations of LPG leakage, fire or explosion occurring at the LPG compound or cylinder store or at neighbouring properties.
- 3.2.2** The emergency response plan shall cover organisation and resources (Section 4.1), communication (Section 4.2), reporting (Section 4.3), actions in emergency (Section 5) and administration (Section 6).
- 3.2.3** The emergency response plan shall be contained in a manual that is updated and accessible to relevant employees as per Section 6.2.
- 3.2.4** Procedures in the emergency response plan shall include provisions for all actions in the discovery and reporting of the emergencies, receiving calls and despatch of trained personnel, supply interruption and reinstatement, and reporting.

SECTION 4 LOGISTICS

4.1 Organisation and Resources

- 4.1.1** A person shall be identified to be responsible for the development and administration of the emergency response plan. The person shall have the authority to ensure that adequate attention is given to all aspects of the plan and to the needs of all personnel (as well as their organisation) involved in the plan.
- 4.1.2** All personnel resources required to effectively respond to an emergency shall be identified.
- 4.1.3** Record, such as site drawings to identify the locations of main isolation valves, LPG equipment such as tanks, cylinders and/or vaporisers and main switches of vaporisers , shall be identified.
- 4.1.4** Equipment such as signs, flammable gas detectors, gas sampling kits, road cones, flashing lights, ropes, etc. for emergency handling shall be provided.
- 4.1.5** Gas pipes and fittings such as valves, gauges, pressure-regulators, connections etc. for system testing, commissioning and gas supply reinstatement after emergency shall be provided.
- 4.1.6** Routine maintenance and inspection shall be carried out to ensure that all equipment resources are in a state of readiness.
- 4.1.7** Clearly defined procedures shall be written to mobilise the various resources as needed during the emergency.

4.2 Communication

- 4.2.1** A 24-hour reporting centre shall be established to receive and handle emergency calls at any hour of the day. The 24-hour reporting centre shall be able to, upon receipt of a report of gas emergency, despatch personnel, competent by virtue of their training and practical experience, to arrive at the place where the emergency occurs and deal with the emergency (see Gas Safety (Registration of Gas Supply Companies) Cap. 51E Regulation 16 (a) and (b)).
- 4.2.2** Telephone numbers for the 24-hour reporting centre shall be notified to customers, company employees, staff, dealers, contractors, GasSO, and other emergency services agencies. The telephone number shall be posted in a clearly visible location on the outside wall of an LPG compound or cylinder store.

4.2.3 Line of communication for key personnel who have emergency response duties in the plan shall be clearly defined. Flowcharts for communication should be provided. A sample of flow chart for communication chain is shown in Appendix B.

4.2.4 All personnel (internal and external) included in the telephone contact list shall be aware that they are on the list and know their emergency response duties.

4.3 **Reporting**

4.3.1 Responsibilities for reporting shall be clearly defined in the emergency response plan. The plan shall include:

- a) who is responsible for reporting;
- b) to whom reports are to be made
 - internally (e.g. management); and
 - externally (e.g. GasSO);
- c) when reports are to be made (e.g. immediately, within 24 hours); and
- d) how reports are to be made (e.g. written, oral).

4.3.2 The gas supply company shall keep a record of each report of gas escape and retain the record for not less than 2 years after the report is made. The record shall specify:

- a) the date and time of receipt of the report;
- b) the location of the incident;
- c) the date and time of despatch of personnel to deal with the gas escape;
- d) the time when such personnel arrived at the place of the gas escape; and
- e) the action taken by such personnel to deal with the gas escape.

4.3.3 For major gas emergency, the gas supply company shall notify the Gas Authority so soon as possible, but not later than the next working day after the emergency occurs. The company shall be required to provide the Gas Authority with such information and details in relation to the major gas emergency as the Gas Authority requires.

4.3.4 For gas emergency that will attract public attention, the gas supply company shall notify the Gas Authority as soon as possible and should be not later than 30 minutes upon the confirmation of the incident. Continuous update to the Gas Authority with incident ongoing development, including but not limited to the below information, should be provided.

- a) the date and time of receipt of the report;
- b) the location of the incident;
- c) the date and time of despatch of personnel to deal with the incident;
- d) the time when such personnel arrived at the place of the incident;
- e) the nature of and the action taken by such personnel to deal with the incident;
- f) the number of gas accounts affected/suspended and the time of gas supply suspension;
- g) the details of the NGI (e.g. storage capacity, age, etc.);
- h) the time of gas supply resume;
- i) the time when the dealing personnel left the place of the incident; and
- j) the follow-up actions required with planned completion date, if the gas supply is not fully resumed normal after the incident.

4.3.5 The gas supply company shall, within 28 days after the occurrence of the major gas emergency, furnish the Gas Authority with a written report stating, so far as is reasonably practicable:

- a) the cause of the emergency; and
- b) the actions which are or have been implemented to prevent, so far as is reasonably practicable, the recurrence of any similar emergency.

SECTION 5 ACTION IN EMERGENCY

5.1 General

5.1.1 The trained operator staff or gas supply company staff arriving at the scene of an emergency first shall take immediate action to protect people and property (See Section 3.1.4) in accordance with Sections 5.3. to 5.5.

These immediate actions may include the following:

- a) determining the scope of the emergency in order to ensure proper reaction, call "999" where the emergency is serious;
- b) cordoning off the area where required;
- c) preventing accidental ignition;
- d) reporting to the appropriate supervisor on the situation, and requesting further instructions or assistance where needed, and
- e) shutting off LPG supply to the area (e.g. by closing isolation valves where the affected area is downstream of the valves)

5.1.2 Gas escape shall be cut off at the earliest possible moment.

5.1.3 When tackling a fire or a gas escape, the personnel shall approach the fire or the leak from the upwind position.

5.1.4 Actions shall only be carried out by trained personnel.

5.2 Receiving Calls

5.2.1 The staff on duty at the 24-hour reporting centre shall be knowledgeable and fully trained for responding to all emergency calls that are within the responsibility of the centre. A copy of the operation manual of the 24-hour reporting centre together with appropriate flowchart, telephone list and checklist, shall be available at the 24-hour reporting centre to assist the staff to perform their duties.

5.2.2 When receiving a report of emergency, the staff answering the call shall obtain as much information as possible. Where it is identified that the emergency is serious, the staff shall call "999".

5.2.3 Upon receipt of calls, the 24-hour reporting centre staff shall contact the operator in charge, in accordance with the communication chain as per the operation manual. Where appropriate as listed in the manual, the staff shall also call the duty staff of the gas supply company.

5.2.4 Once the duty staff is contacted, the duty staff shall take full control of the emergency response and react according to the emergency response plan. The duty staff shall keep the 24-hour reporting centre informed of the result.

5.3 Gas Leakage in LPG Installations Without Fire

5.3.1 When the extent of gas leak is not substantial, i.e., no vapour cloud has already been formed, the following actions shall be taken:

- a) Locate the source of leakage.

Note: *The detection may be made by visual inspection, soapy solution test, smell, noise or refrigeration (hoarfrost) at leak source; never use naked flame*

- b) When leak source is ascertained, whenever possible, isolate, close or plug the leak by non-flammable means. Care shall be taken not to generate any spark during the operation.

5.3.2 When the leak cannot be controlled or where a vapour cloud has already been formed such that it is unsafe to enter the compound or store to locate and stop the leak, the following actions shall be taken:

- a) When safe, remove all ignition hazards in the vicinity, extinguish fires and naked light, switch off (remote from source of leakage) electrical equipment and vehicle engines. In the affected areas, phone or camera shall not be used.
- b) Isolate the area around the gas leakage, and evacuate all persons from the area (with the assistance of the Police when necessary).

5.3.3 When a fire fighting water spray system is available, the personnel on site shall actuate the system to disperse the gas cloud.

5.3.4 When LPG road tanker is in the LPG compound, stop all operations, close all valves and remove the road tanker where situation allows.

5.3.5 For cylinder stores where the gas leaks are from cylinders, the leaking cylinders shall be identified. Where the leakage cannot be stopped by closing the cylinder valve, remove the cylinder to a safe place where the contents could disperse to the atmosphere.

- 5.3.6** Any LPG cylinder wagon next to cylinder store should be removed in a safe manner where situation allows.

5.4 Gas Leakage in LPG Installations with Fire

- 5.4.1** Where there is a small fire, the first person on site shall take the following actions:

- a) For LPG fire, extinguish the fire by isolating or shutting off the gas supply to the fire.

Note : *Do not put out a leaking LPG fire without cutting off the gas supply to the fire.*

- b) For fire that does not involve LPG, extinguish the fire by fire extinguishers or other means.

- 5.4.2** Where the fire is severe, cannot be extinguished or is not appropriate to extinguish, call "999" and then try to tackle the fire in accordance with Section 5.4.1. Actuate the water spray system, where available, to cool the equipment nearby, such as vessels or vaporisers.

- 5.4.3** Where there is a sign of possible rupture of vessels, all personnel shall be evacuated immediately.

Notes: *Signs of possible rupture include (a) sudden increase of noise and (b) sudden increase in flowrate of vented LPG or flame.*

- 5.4.4** Special attention shall be given to direct flame impingement on vessels, as this will increase the pressure and at the same time weaken the metal. Every effort shall be made to extinguish the source of flame impingement. In all cases of exposure, copious supply of water in the form of spray or fog shall be applied in order to keep the vessel cool to minimise the danger of rupture, and also to regulate the rate of gas generation, so reducing the intensity of fire.

- 5.4.5** For cylinder stores, where bursting of cylinders is not imminent, they shall be removed to a safe place, or where such an action is not possible, the cylinders shall be kept cool by applying jet or spray water.

5.5 Fire in the Vicinity

- 5.5.1** Where the risk of fire spreading to the LPG compound or cylinder store is not immediate, the person on site shall:

- a) report the fire by dialling "999",

- b) notify the duty staff,
- c) for cylinder stores, prepare to move the cylinders to a safe place where situation allows.

5.5.2 Where the fire is in the immediate vicinity of the LPG compound or cylinder store, the following actions shall be taken by the trained personnel on site after the completion of actions in Section 5.5.1:

- a) shut off the electrical supply and stop all facilities in the LPG system, close isolating valves and stop any motors, engines, etc. (not essential to fire fighting) in the immediate vicinity;
- b) monitor the vessel pressure, cool vessel as required by jet or spray water on the vessel, and ensure that vessel supports are also cooled;
- c) where the functioning of pressure relief valves is triggered, the area shall be sprayed with water to assist dispersion of the escaping gas. Where escaping gas is ignited, do not extinguish flames, but allow to continue burning, provided that the flames are not impinging on vessels; and
- d) for cylinder stores, move cylinders to a safe place. Before disconnecting or cutting pipelines, check that the isolating valves on the cylinders and pipelines are closed.

5.5.3 Where fire is encroaching on the LPG storage area, actions as per Sections 5.4.3 to 5.4.5 shall be followed.

5.6 Follow-up Actions

5.6.1 Where the gas supply to consumers is interrupted during emergency, the NGI owner, gas supply company, or its operator, shall make every effort to restore the supply as soon as practicable in a safe manner.

5.6.2 The defective parts of the systems shall be repaired and tested in sound operating conditions in accordance with the applicable requirements of Module 1 and Module 2, prior to the reinstatement of gas supply.

5.6.3 The emergency shall be reported in accordance with the requirements of Section 4.3.

SECTION 6 ADMINISTRATION

6.1 Training

- 6.1.1** Personnel required to handle gas leakage emergencies for NGI owner or gas supply company shall be trained in their respective roles.
- 6.1.2** Training shall include the fundamentals, such as knowledge of LPG characteristics, emergency response procedures and use of equipment. The following topics shall be included:
- a) properties and behaviour of LPG as related to types of potential hazard;
 - b) evaluation of hazardous situations;
 - c) co-ordinated implementation of emergency response procedures;
 - d) tools and equipment;
 - e) reporting; and
 - f) record-keeping.
- 6.1.3** Personnel who are assigned to receive emergency calls shall be trained to handle these calls and shall have sufficient knowledge to determine action priorities. They shall have clear instructions as to the information to be obtained from the caller and shall have sufficient knowledge to advise callers of any action that should be taken.
- 6.1.4** Personnel who may be involved in handling emergency shall be fully trained of the necessary skills and acquainted with requirements of the emergency procedures.
- 6.1.5** All relevant personnel shall be kept informed immediately of any revisions to the emergency response plan and shall be trained to be familiar with the revised procedures where appropriate.

6.2 Plan Distribution and Update

- 6.2.1** The emergency response plan shall be distributed and accessible to employees and external parties having responsibility in the plan. Copies of the plan shall be available at offices and locations where these personnel can have quick access.
- 6.2.2** A record of distribution and amendments of the emergency response plan shall be kept.
- 6.2.3** The emergency response plan shall be kept current. This shall be updated whenever there are changes of procedures or change of key personnel or their telephone numbers. In addition, a regular review at least once a year shall be carried out to ensure the plan is updated.

6.3 Testing and Drills

- 6.3.1** Emergency response plan shall be tested regularly at least once a year to ensure it is current, comprehensive and effective.
- 6.3.2** The testing for the emergency response plan shall fulfill the following objectives:
- a) orientation of personnel to a new plan or to the revisions of an existing plan;
 - b) introduction of newly appointed personnel;
 - c) assessment of resources available;
 - d) identification of potential problems and conflicts in emergency; and
 - e) evaluation of risks to the public.
- 6.3.3** For drills on communication, the objectives shall be to verify all the key personnel and telephone numbers listed are correct and up-to-date and the callers are aware of their roles. Actual phone calls and surprised calls shall be made to check whether the personnel responding to emergencies are available.
- 6.3.4** For the drill on site, the key personnel and staff shall be on site with the necessary equipment deployed. Each procedure listed in the emergency response plan shall be carried out to confirm that it is valid, relevant and effective, taking into consideration the actual site condition.
- 6.3.5** All drills shall be recorded and followed by critical review to identify areas for improvement. Where appropriate, the emergency response plan shall be revised accordingly.

**APPENDIX A RELEVANT SECTIONS IN RELATION TO THE GAS SAFETY
(REGISTRATION OF GAS SUPPLY COMPANIES) REGULATIONS**

Cap. 51E Gas Safety (Registration of Gas Supply Companies) Regulations	Relevant Sections in Module 7	Sections Quoted in Module 7
Reg. 2: Interpretation	1	
Reg. 3: Only registered gas supply company may carry on business of gas supply company, etc.	1	1
Reg.15: Registered gas supply company to report major gas emergencies	4	4.3.3
Reg.16: Reported escape of gas	4	4.2.1

APPENDIX B SAMPLE FLOW CHART FOR LINE OF COMMUNICATION IN EMERGENCY RESPONSE PLAN (For reference only)

Notes:

1. Staff of NGI owner or the operator may call duty staff of a gas supply company.
2. Where appropriate, a staff should be assigned with responsibilities on specific sites.
3. Duty staff shall maintain a 2-way communication with the 24-hour reporting centre throughout the emergency actions.
4. Communicating with other agencies may be arranged by the 24-hour reporting centre, but the responsible duty staff shall ensure that these are done.

