

GU17

**Government of HKSAR
Electrical and Mechanical Services Department
Gas Authority**

GUIDANCE NOTE 17

ON

**HOUSEHOLD REFRIGERATORS
CONTAINING LPG AS REFRIGERANT**

Issue 1, August 2009

機電工程署
EMSD



Index

1. Foreword	2
2. Scope and definitions	2
2.1 Scope	2
2.2 Definitions	3
3. Safety instructions and warning label requirements	4
3.1 Warning label	4
3.2 Nameplate	5
3.3 Safety instructions in the user manual	5
4. Storage and transportation	6
4.1 Storage	6
4.2 Transportation	6
5. Maintenance workshop	6
5.1 Location	6
5.2 Ventilation	7
5.3 Training for the maintenance workers	8
6. Safety of scrapping	9
7. Reference	9
8. Annex	10
Annex 1 Typical Plan Layout of Large Scale Maintenance Workshop for LPG Household Refrigerator	10
Annex 2 Typical Ventilation of Large Scale Maintenance Workshop for LPG Household Refrigerator	11

1. Foreword

1.1 This document covers the guidance on safety standard of storage, transportation, maintenance and scrapping of the household refrigerators containing liquefied petroleum gas (LPG) as refrigerant.

1.2 This guidance note does not include the safety requirements which relates to refrigerant of a household refrigerator other than LPG.

1.3 As LPG is one of the gases defined in the Gas Safety Ordinance Cap 51, the use of LPG in refrigerators as refrigerant is under the control of the Ordinance. The importers of LPG household refrigerators must ensure compliance with all other relevant safety standards and legislation under the Gas Safety Ordinance Cap 51.

1.4 Refrigerators using LPG as refrigerant fall under the definition of “gas appliance” of the interpretation of Gas Safety Ordinance Cap 51.

2. Scope and definitions

2.1 Scope

2.1.1 The purpose of this document outlines the minimum safety requirements for household refrigerators containing liquefied petroleum gas (LPG) as refrigerant marketed in Hong Kong. These safety requirements consist of warning label and notice, storage and transportation, maintenance and safety of scrapping.

2.1.2 This guidance note applies to household refrigerators only and does not include safety requirements for the industrial or commercial refrigerating or cooling system. Importers have to therefore ensure compliance with all relevant current statutory provisions under the Laws of the Hong Kong Special Administrative Region, with particular reference to the Gas Safety Ordinance, Cap. 51 and the following subsidiary legislation, and other related statutory provisions depicted in Section 2.1.3 :-

- (a) Gas Safety (Gas Supply) Regulations, Cap. 51;
- (b) Gas Safety (Installation and Use) Regulations, Cap. 51;
- (c) Gas Safety (Registration of Gas Installers and Gas Contractors) Regulations, Cap. 51;
- (d) Gas Safety (Registration of Gas Supply Companies) Regulations, Cap. 51;
and

(e) Gas Safety (Miscellaneous) Regulations, Cap. 51;

2.1.3 This Code must be read in conjunction with the manufacturer's instructions and shall not supersede such instructions unless the latter conflict with statutory provisions. Attention is also drawn to the current edition of the relevant regulations of the Laws of Hong Kong, code of practices and guidance notes, for example:

- a. The Electricity Ordinance (Cap. 406);
- b. Fire Services Ordinance (Cap. 95);
- c. Factory and Industrial Undertakings Ordinance (Cap. 59);
- d. Code of Practice for the Electricity (Wiring) Regulations;
- e. Guidance Notes for the Electrical Products (Safety) Regulation;
- f. Guidelines on Voluntary Recall of Electrical Products Not Complying with the Safety Requirements; and
- g. Code of Practice on Energy Labelling of Products

2.2 Definitions

2.2.1 Liquefied petroleum gas (LPG) – any gas which is a mixture of the hydrocarbons primarily consisting butanes, butylenes, propane or propylene;

2.2.2 LPG household refrigerators – any refrigerator makes use of R600a as refrigerant and being designed for food storage and used in domestic premises;

2.2.3 Cylinder wagon – a motor vehicle designed and constructed, or adapted, primarily for the conveyance of cylinders on roads;

2.2.4 Container – a bulk tank, mini tank or LPG cylinder;

2.2.5 In bulk – in relation to LPG, the containment of any amount of such gas in a vessel which has a water capacity of more than 150 litres;

2.2.6 Maintenance worker – any worker who has finished the training course on LPG household refrigerators provided by organization, such as VTC etc, in which the course syllabus has been agreed with EMSD;

2.2.7 Recognized safety standard – an international, or national safety design and manufacture standard recognized by the Gas Authority.

2.2.8 Ignition source – material, devices or equipment which, because of their modes of use or operation, are capable of providing sufficient thermal energy to ignite a flammable gas mixture when in contact with them;

2.2.9 Maintenance workshop – an premise designated for any activity which may lead to release of LPG, such as repair, maintenance works, purging and disassembly of refrigerant circuit of LPG household refrigerators in same time.

2.2.10 Purging – replacing the content in a refrigerant circuit of a LPG household refrigerator by a gas before carrying out any works on the circuit.

3 Safety instructions and warning label requirements

3.1 Warning label

3.1.1 The warning label shall be printed or affixed on the compressor of the LPG household refrigerator to show the flammability.

3.1.2 According to the rules for warning sign in EN 60335–2–24:2003, the yellow triangular label shall be printed on the warning label. The name of the refrigerant should also be included in the warning label.

3.1.3 The letters of the yellow triangular label shall be not less than 5mm and the triangle shall be not less than 15 mm in height. The warning label is as follows:



3.2 Nameplate

3.2.1 Apart from clause 3.1.1 above and general technical specifications for refrigerators, a nameplate serving as safety notice shall be provided. It shall consist of yellow flame triangle label, name and chemical symbol of the refrigerant in both Chinese and English language "異丁烷", "iso-butane" and "R600a".

3.2.2 The above nameplate shall be permanently affixed to LPG household refrigerator so they are clearly visible for anyone who will transport, maintain or dispose the refrigerator.

3.2.3 The nameplate shall be made of a material that is durable so they are clearly legible.

3.2.4 The nameplate shall show in both Chinese and English language "此冰箱必須由受過訓練的技師在工場進行維修。" and "Maintenance work must only be carried out at workshop by well-trained maintenance worker."

3.3 Safety instructions to be shown in the user manual

3.3.1 The user manual shall include the warning label (3.1.2) and safety notice (3.2.1) to remind users and the maintenance workers of safety issues. Moreover, the user manual should also include the following basic safety instructions. Manufacturers of the refrigerators may include other safety instructions and/or revise these safety instructions to suit for their products.

3.3.2 The refrigerator contains flammable refrigerant (R600a: iso-butane). The user manual shall include the following requirements to ensure gas safety and safe use of refrigerators:

3.3.2.1 The refrigeration system behind and inside the refrigerator contains refrigerant. Do not allow any sharp objects to come into contact with the refrigeration system.

3.3.2.2 Do not use other electric appliances inside the refrigerator.

3.3.2.3 Children should be supervised to ensure that the refrigerator should be used properly.

3.3.2.4 Do not use the mechanical devices or other means to accelerate the defrosting process, unless they are of the type recommended by the manufacturer.

3.3.2.5 Do not block the openings on the circumstances of the refrigerator.

3.3.2.6 In case of having damaged the refrigerant circuit, do not use electric

items or fire equipments nearby, and open all windows to provide good ventilation. Please also contact your local maintenance agent to follow up.

3.3.2.7 The warning labels mentioned above should be kept throughout the life of the refrigerator. The user manual should be handed over to any person who would use or handle the refrigerator whenever the refrigerator would be transferred to another location and delivered to a recycling plant.

4 Storage and transportation

4.1 Storage

4.1.1 Under the Gas Safety (Gas Supply) Regulations, the aggregate water capacity of LPG from all refrigerators should not be over 130 litres inside the storage room. If aggregate water capacity of the LPG from all refrigerators exceeds 130 litres, prior approval must be sought from the Gas Authority for construction and use of an NGI in accordance with Regulation 3 of the Gas Safety (Gas Supply) Regulations. (The permitted number of stored LPG refrigerators may vary according to LPG storage water capacity of each LPG refrigerator.)

4.1.2 In case of aggregate water capacity of the LPG from all refrigerators exceeding 130 litres (approximate 50kg of LPG, or 830 nos. of refrigerators in one storage area if 60g LPG for each refrigerator etc), the safety requirement stated in "Code of Practice for Hong Kong LPG Industry, Module 1 LPG Compounds and Cylinder Stores" shall be followed.

4.2 Transportation

4.2.1 Under the regulation 25(2) of the Gas Safety (Gas Supply) Regulations, no person shall use a motor vehicle to carry on a road (a) any cylinder which has a water capacity of not less than 130 litres; or (b) any combination of cylinders which have a combined water capacity of not less than 130 litres, unless (i.) the vehicle is a cylinder wagon; and there is valid permit issued in respect of the wagon. Therefore, it is required to transport LPG household refrigerators in bulk with total aggregated water capacity more than 130 litres by a valid motor vehicle and to comply with all relevant gas safety regulations.

4.2.2 There is no statutory requirements specified for transportation of small quantity of LPG household refrigerators. (The permitted number of transported LPG refrigerators shall vary according to water capacity or quantity of LPG contained in each LPG refrigerator. Please refer to 4.1.2 for estimation of permitted number.)

5 Maintenance workshop

5.1 Location

5.1.1 In normal circumstances, there is no specified workshop requirement for maintenance and servicing of small quantity of LPG household refrigerators, provided that the maintenance work is carried out in good ventilation condition.

5.1.2 If a large scale of workshop would be designed for repair and maintenance work involving LPG refrigerant circuit of a large quantity of LPG household refrigerators in a same time, such as over 50 numbers of LPG household refrigerators being temporarily stored and maintenance/ servicing in one premise, safety requirement should be provided in view of gas safety concern. The following safety requirement and clause 5.2.1, 5.2.2 and 5.2.3 shall be considered in workshop design.

5.1.2.1 If the workshop is located in upper floors which should be considered under special circumstances with a well-ventilated access road and safe ventilation system.

5.1.2.2 The maintenance workshop shall not be built below ground level and should ensure good ventilations.

5.1.2.3 The special equipment required for repair/ maintenance of LPG refrigerant circuit in the maintenance workshop has to be maintained well to ensure their workability and reliability. The special equipment should be tested and calibrated in according to their user manual in order to make sure that they can work properly.

5.1.2.4 Drains or unventilated pits shall be avoided in the workshop floor area or 1 meter from the workshop to prevent accumulation of the heavier-than-air vapor. If a gully or drain is unavoidable, the opening/drain shall either be securely covered or suitably sealed.

5.2 Ventilation

5.2.1 Natural ventilation

5.2.1.1 In view of large quantity of LPG household refrigerators of the condition required for repair and maintenance and temporarily stored in a premise in a same time, the maintenance workshop should be well ventilated. The safety advices for natural ventilation could be referred to Clause 4.8.2 of Code of practice for Hong Kong LPG industry (module 1) LPG compounds and cylinder stores.

5.2.2 Mechanical ventilation

5.2.2.1 The maintenance workshop should have adequate ventilation capacity for general ventilation. Apart from this, the maintenance workshop which could not meet the requirement in Clause 5.2.1 above should provide mechanical ventilation system for maintenance works of the LPG refrigerant circuit.

5.2.2.2 One of typical design and provision of the maintenance workshop and mechanical ventilation system are illustrated in Annex 1 & 2 as reference.

5.2.2.3 A set of spot extraction system servicing the maintenance area of the workshop is demonstrated in Annex 1 & 2.

5.2.2.4 The mechanical ventilation system should be separated from other general ventilation systems. All exhaust ducts of mechanical ventilation system should be air-tight to prevent from any leakage.

5.2.2.5 The inlet apertures of the spot extraction system shall be located at less than 150 mm above the floor level.

5.2.2.6 The spot extraction system shall be switched on before the work commences and be kept operating during the entire working period. Preferably audio and alarm system should be provided for any failure of the spot extraction system detected.

5.2.3 Gas detection system

5.2.3.1 The gas detectors calibrated for the detection of LPG should be installed in the workshop at no more than 150 mm above the floor.

5.2.3.2 The layout plan showing the gas detection system should be placed in the obvious position of the workshop.

5.2.3.3 If there is a flammable mixture with the concentration reaching 20% of the lower limit, an audible and visible alarm should be given by the gas detection system. The alarm shall be maintained workable in case of interruption of main electricity supply.

5.2.3.4 All the gas detection system parts including the fixed and portable ones must be examined and revalidated annually in order to make sure the workability.

5.3 Training for the maintenance workers

5.3.1 All maintenance workers should finish the safety training course of LPG refrigerator provided by an organization, such as VTC etc, and obtain the recognized certificate which is retained for reference.

5.3.2 Maintenance workers should attend refresher course periodically.

5.3.3 Maintenance workers should be trained in emergency procedures, use of the fire extinguishers and means of escape in the workshop in case of accidents.

6 Safety of scrapping

6.1 Where a LPG household refrigerator is to be scrapped, all LPG in refrigerant circuits should be removed before disposal of the refrigerator.

6.2 Prior to disposal of the refrigerator, it shall be purged with an inert gas or water to remove all LPG content inside the refrigerant circuit of the refrigerator to ensure safety. No fire works should be carried out before properly purging.

7 Reference

(a) EN 60335-2-24:2003

Specification for safety of household and similar electrical appliances and particular requirements for refrigerating appliances, ice

(b) ISO 3864-1:2002

Safety identification colors and design principles for safety signs to be used in workplaces and in public areas for the purpose of accident prevention, fire protection, health hazard information and emergency evacuation.

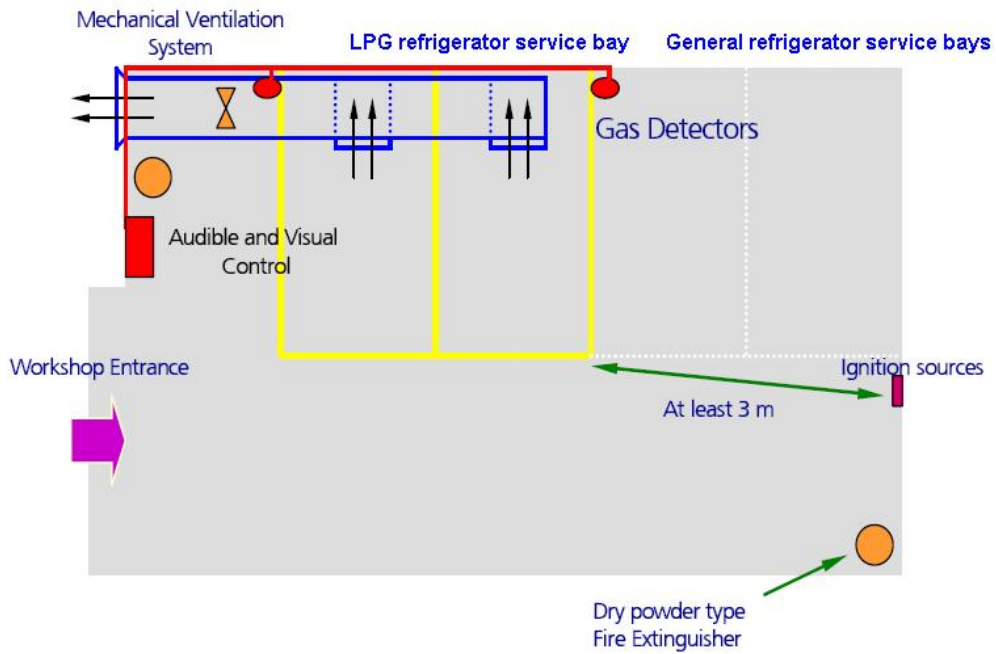
(c) Code of practice for Hong Kong LPG industry (module 1)
LPG compounds and cylinder stores

8 Annex

Annex 1

Typical Plan Layout of Large Scale Maintenance Workshop for LPG Household Refrigerator

Typical Plan Layout of a LPG Refrigerator Workshop



Annex 2
Typical Ventilation of Large Scale Maintenance Workshop for LPG Household Refrigerator

Typical Mechanical Ventilation System Plan Layout

