

LPG Association Code of Practice

LPGA COP No 4

A Guide for Cabinet Heater Servicing

September 2005

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Users of this Guidance should pay regard to any relevant legislation or authoritative recommendations which may have evolved subsequently to the date of publication.

LPGA CoP's are not an authoritative interpretation of the Law, but if you do follow the CoP, you will normally be doing enough to comply with the Law.

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Section 1: Introduction, Objective and Scope

1.1 Introduction

This Code of Practice has been prepared by the LP Gas Association for those carrying out the servicing of Cabinet Heaters.

The production of this Code provides a focal point for the Industry to develop awareness of the need for servicing, backed up by a positive availability of local servicing arrangements.

Servicing and maintenance work on these appliances falls within the scope of the Gas Act 1992 and Gas Regulations 1993. All persons carrying out such work must be competent to do so.

The LPG Association strongly advises all users to have their heaters serviced regularly as recommended in the manufacturer's instructions and by a competent business or person. If used frequently, an annual service is prudent.

1.2 Scope

This Code of Practice describes procedures for the periodic servicing of cabinet heaters to ensure safe operation throughout the working life of the appliance.

It gives practical guidance on servicing and the identification of the need for repairs to appliances designed to EN449 for Radiant Cabinet Heaters and Catalytic Cabinet Heaters using LPG.

The Code takes the form of a standard servicing procedure, record form and appliance badge. It also gives generalised guidance on repairs, although a manufacturer's instructions will always take precedence in this respect.

Section 2: Facilities and Equipment

2.1 Facilities

The servicing of these appliances requires a clear, clean floor area where the appliance can be operated without endangering the operator or adjacent materials. The area should be well ventilated and provided with an appropriate compressed air supply (~300kPa). Adequate lighting should be available for the inspection of the appliance. It is desirable that this should be capable of being dimmed to allow the appliance to be observed when lit.

Eye and respiratory protection should be available for use when compressed air is being used.

Appropriate gas supplies for the appliances being serviced should always be available.

Appropriate safety equipment for the use of LPG and LPG appliances should be at hand, for example, suitable fire extinguishers and personal protective equipment.

2.2 Equipment

The following equipment is needed for basic cabinet heater servicing:

- pliers or crimping tool for removing and fitting crimp type hose clips;
- sharp knife for cutting/removing hose (a hacksaw should never be used);
- timer (stopwatch);
- lighting tapers;
- flat bladed screwdrivers;
- cross head screwdrivers (Pozidriv or Phillips);
- spanners or wrenches to suit fittings;
- nut drivers or sockets to suit injectors;
- soft paint brush.

When catalytic heaters are being serviced a vacuum cleaner with a high efficiency filter must always be used for cleaning. The filter supplier should be consulted to ensure that the model used is suitable for the purpose.

In addition to this, a means of safely detecting leaks, for example a bottle of soapy water and a brush, or an electronic sniffer, is required.

Section 3: Servicing Procedures

This Code of Practice presents the servicing procedures in a logical sequence of operations. Because there are a number of procedure steps that are common to both radiant heaters and catalytic heaters, this Code will separate any differing procedures for those two types when that step in the service procedure is reached.

3.1. Customer and Heater Information

Record details of the customer, the appliance and its condition as shown on the Service Report Form (a typical sample is given in Appendix C).

3.2 Visual Inspection of the Appliance

Check and record that the dressguard (mesh screen for catalytic appliances) and appliance panels including rear panel, are firmly attached.

If any are missing or damaged they must be replaced with authorised spare parts.

For radiant heaters, check and record any fault or damage found in relation to pilots, burners, ceramic plaques or fireclay cement.

Any such damage requires repair in accordance with the manufacturer's instructions.

For catalytic heaters, check and record any fault or damage found in relation to pilot or catalytic panel.

Any such damage requires repair.

On appliances more than five years old check if there is evidence of the pilot being replaced in the last five years.

If there is no such evidence the pilot will require verification or replacement in accordance with the manufacturer's instructions.

Depress the igniter several times and make sure that there is a reliable spark from the ignition electrode.

If there is no spark or it is erratic then the appliance requires repair.

Record the date of manufacture stamped on the regulator and printed on the hose.

Record if there is dirt or corrosion on the appliance.

3.3 Internal Cleaning

Remove the front or bottom kick plate from the appliance.

3.3.1 Radiant Heaters

Clean the tops of main burner injectors and pilots with a soft paintbrush taking care not to cause damage to delicate items such as pilot shutters.

If they cannot be cleaned in this matter then they must be repaired or replaced.

If the pilot is damaged in any way it must be changed. Pilots cannot be unblocked or repaired without affecting their calibrated cut-off point.

If possible cover the tops of jets and pilot (masking tape is ideal for this but take care with other types of tape), blow out the inside of the appliance using compressed air.

Eye protection and respiratory protection must always be worn when blowing out the inside of the appliance with compressed air.

Ensure that the plaque ports (holes) and venturis are clean of dust, dirt and fluff/lint. Take care not to damage ceramic plaques, particularly soft ceramics and flame effect beds, electrodes and pilots.

When the appliance has been thoroughly cleaned replace the front or bottom kick plate.

3.3.2 Catalytic Heaters

Clean the top of the pilot with a soft paintbrush taking care not to cause damage to delicate items such as pilot shutters.

If they cannot be cleaned in this manner then they must be repaired or replaced.

If the pilot is damaged in any way it must be changed. Pilots cannot be unblocked or repaired without affecting their calibrated cut-off point.

Use a vacuum cleaner to clean the inside of the appliance. Ensure that the appliance is clean of dust, dirt and fluff/lint. Take care not to damage the catalytic panel, electrodes and pilots.

In no circumstances should the heater be blown out to remove dust as damage to the catalytic panel could occur. A vacuum cleaner with a high efficiency filter must always be used.

If the face panel mesh has been dented or pushed inward then pull or spring it out to the original position.

When the appliance has been thoroughly cleaned replace the front or bottom kick plate

3.4 Hose Replacement

Note: The hose and regulator assembly on a cabinet heater is required to be permanently fitted to the appliance. Permanent fitting is taken to mean that it is fastened with crimp type hose clamps at the hose connections to both the appliance and the regulator. Screw or worm drive hose clips are not acceptable.

The hose should be replaced by a similar length of new approved LPG hose to BS3212, AS1869, ISO 2928, ensuring that the hose is long enough to fit the regulator on to the cylinder with the cylinder outside the appliance, if it is:

- unmarked or not marked with any of the approved standards;
- damaged, chafed or worn;
- more than five years old.

To remove the hose, undo screw or worm type clips or use pliers to cut crimp type clips and then shave the hose along the length of the tail(s) sufficiently to allow the hose to be pulled off the tail. Do not cut with the point of a blade. Damage or score marks on the surface of the tails may cause leaks.

Discarded hose should be cut into small lengths to prevent re-use.

When fitting hose, it should be pushed fully over the nozzles of the appliance and regulator and must be secured firmly in position with correctly sized crimp shells or eared (Oetiker) crimp rings.

3.5 Regulator Replacement

See note in 3.4.

The regulator must be replaced using an approved clip-on or QCC type LPG regulator having an outlet pressure of 2.75kPa (28mbar) and of a type appropriate to the gas cylinder in use, if it is:

- damaged;
- showing signs of corrosion;
- not of a type appropriate for the gas cylinder;
- not date marked on the regulator body or cover;
- not an approved type;
- over 10 years old.

Note that the use of POL regulators is not permitted with cabinet heaters.

Remove the regulator by cutting the hose as close to the regulator nozzle as possible, if the hose is to be re-used.

When attaching the hose to the regulator it should be pushed fully over the regulator tail and secured firmly in position with correctly sized crimp shells or eared (Oetiker) crimp rings.

If a new regulator is fitted, the customer must be given any instructions which were provided with the regulator.

3.6 Gas Check

Note: *The appliance must be operated with the bottom panel on, as absence of the panel may affect the performance of plaques (or catalytic pad) or pilots.*

3.6.1 Radiant Heaters

Connect the appliance to a full LPG cylinder using the appliance regulator fitted.

Check for smooth ignition when the appliance is operated in accordance with the manufacturer's instructions.

If the appliance does not light or cross light smoothly then it requires repair.

Check that the flame supervision device "holds in" within 20 seconds.

If there is a problem with "hold in," check that the thermocouple nut into the control is tight.

Check for free smooth and correct operation of the control.

If the control is difficult to operate then the appliance requires repair.

Set the control to the HIGH position and let the appliance warm up for five minutes then observe the appearance of the plaques.

If plaques show flare, are dull or show a blue, then the appliance requires repair .

3.6.2 Catalytic Heaters

Connect the appliance to a full LPG cylinder using the appliance regulator fitted.

Check for smooth ignition when the appliance is operated in accordance with the manufacturer's instructions.

If the appliance does not light smoothly then it requires repair .

Check that the flame supervision device "holds in" within 20 seconds.

If there is a problem with "hold in," check that the thermocouple nut into the control is tight.

Check for free smooth and correct operation of the control.

If the control is difficult to operate then the appliance requires repair .

Set the control to the HIGH position and let the appliance warm up for five minutes, then observe the front face of the catalytic panel. On most appliances the panel will have to be viewed through the facing mesh, as this may not be easily removed; subdued lighting may make inspection easier. Inspect for bright spots, damage, and wear such as holes, "bald" patches and cuts.

If the panel shows such features, then the appliance requires repair in accordance with the manufacturer's instructions.

3.6.3 Check for Leakage:

A leakage check should be carried out whenever a heater is presented for service or repair, and must be carried out when any components are removed and replaced.

Check that all unions are tightened and that internal pipe work is undamaged. Connect the appliance to a gas supply, light the appliance, select HIGH setting, and check all joints of gas carrying components for leakage, using a soapy water solution and soft brush, or electronic sniffer. Rectify any leaks as necessary and retest.

3.7 Flame Supervision Device Drop Out Time (FSD)

When the appliance has warmed up, turn off the gas supply at the regulator or cylinder valve. The time until the FSD is heard to click shut should be measured.

The time for the FSD to close will normally be 30-50 seconds. Sixty seconds is the maximum allowance.

If the flame supervision device takes more than 60 seconds to close then the appliance requires repair.

After the FSD has closed, turn on the gas at the regulator or cylinder valve and check that no gas is passing to the burners by attempting to re-light with a taper.

If gas passes to the burners then the appliance requires repair.

Turn off the gas, and disconnect the regulator.

3.8 Oxygen Depletion Sensor (ODS) pilot

In the absence of instructions to the contrary, provided for the ODS pilot by the manufacturer, consideration should be given to replacing the ODS pilot if it is over 5 years old.

It is essential that the pilot/thermocouple/electrode assembly is undamaged and clean, and their relative positions are correct. If the thermocouple and/or the spark electrode are substantially obstructing the pilot orifice, the pilot lift will be delayed. Any obstruction will act as flame retention and in this respect the thermocouple tip will have greater effect than the spark electrode because it is larger. Misalignment should have been detected in carrying out the 'gas-check' and 'Flame supervision check' (3.6 and 3.7). If necessary, adjust the electrode but check that a reliable spark which will light the pilot is still obtainable, and that the thermocouple is not positioned too near the plaques, nor touching the top of the pilot.

3.9 Castors and Door Catch

Re-align and/or replace each component as necessary.

3.10 Final Preparation

Clean the appliance thoroughly.

Secure the regulator with tape to the valve or door to prevent it rattling around and causing damage in transit.

Complete and affix an appliance service badge (see Appendix D).

It is strongly recommended that persons servicing cabinet heaters maintain a true and correct record of work carried out. This may be a carbon copy or photocopy of the customer sheet and repair record, or it could be a separate logbook.

NOTE: Special requirements for catalytic Heaters

When completing the general information form, it should be noted that after 10 years of normal service the heater will be near the end of its serviceable life and should not be subject to further servicing. In this case, recommend that the customer should purchase a replacement.

Catalytic heaters, which were produced before 1983, may be fitted with an asbestos-based catalytic bed. Any work involving asbestos is subject to the Health and Safety in Employment (Asbestos) Regulations, which require that suitable precautions are taken to control exposure. When disposing with this type of heater the following procedures must be used:

- overalls and a mask of approved design must be worn. Advice should be sought from personal protective equipment suppliers to identify suitable respiratory protection;
- the complete unit must be sealed in a strong plastic bag, or enclosed in strong plastic sheeting which is securely taped up. If necessary, double walled bags, or two sheets of plastic should be used, especially if there is a chance of the heater chaffing through a single layer;
- the enclosed package must be clearly labelled "Asbestos Waste" and arrangements made with the Local Authority for its removal as special waste.

Section 4: Repairs

4.1 General

Wherever possible repairs must be carried out in accordance with the appliance manufacturer's recommendations.

The manufacturer or his agent's contact addresses are often included on the appliance or in the instructions. Alternatively, technical advice and contacts are available through the LPGA.

It should be borne in mind that if an appliance is in overall poor condition the customer will often be better advised to purchase a replacement.

The customer should always be given an indication of the cost of repairs and the options available.

Damaged burners must be repaired in accordance with the manufacturer's instructions. If such instructions are not available no repair should be attempted. Be aware that the cost of re-cementing and replacing ceramic burners may approach or exceed the cost of a new heater.

Taps and pilots/pilot assemblies must be replaced, not repaired.

Spare parts must be supplied from the manufacturer or authorised spares stockists.

Some spare parts for appliances from manufacturers who no longer trade in New Zealand may be available from reputable spare stockists.

Spare parts must always be of the type intended for the particular appliance.

Where no specific manufacturer instructions are available but where the appliance is in overall good condition, in particular there being no damage to the burners, ceramics or fire clay cement the following repairs or verification may be practicable.

4.2 Check for Leakage:

A leakage check should be carried out whenever a heater is presented for service or repair, and must be carried out when any components are removed and replaced.

Check that all unions are tightened and that internal pipe work is undamaged. Connect the appliance to a gas supply, light the appliance and check all joints of gas carrying components for leakage, using a soapy water solution and soft brush, or electronic sniffer. The hose connections, regulator and cylinder valve connection and regulator vent must be included in this check. Rectify any leaks as necessary and retest.

4.3 Ceramic Plaque Burners

If the plaque shows flare, is dull, shows a blue flame or shows evidence of sooting, the reason could be:

- obstructed plaque ports (lint);
- obstructed injector;
- obstructed venturi/mixing tubes;
- leaking jet;

- misaligned jet;
- defective regulator.

Obstructed plaque ports may usually be cleared using compressed air (see Section 2), or by passing a stiff bristle through the ports. A wire should never be used.

Obstructed jets may usually be cleared by passing a stiff bristle through the orifice. A wire should never be used.

Obstructed venturis/mixing tubes can usually be cleared using compressed air (see Section 2), or by using a bottle brush.

Leaking injectors should be removed, cleaned and replaced using a suitable jointing paste on the thread.

Misaligned injectors may be realigned so long as this does not introduce any stress into the pipe work or injector carrier.

Defective regulators and hoses must be replaced (see 3.4, 3.5).

4.4 Catalytic Pads

Take note of Special Requirements for Catalytic Heaters (page 9)

Catalytic pads are not a serviceable item.

Generally, all that can be done in the case of a faulty pad, if diagnosed in the Gas Check, is to replace it entirely, with a genuine replacement part. Do not attempt to use non-original catalytic pads for repairs.

4.5 Oxygen Depletion Sensor (ODS) pilot

If no test procedure is given in the manufacturer's instructions then the ODS should be replaced if it has been in service for 5 years or more. See 3.8.

Appendix A: Safe Handling of LPG

Safe Handling of LPG

The LPG supplied in New Zealand is typically a mixture of propane and butane.

As supplied at the service station pump, it is generally a 60:40 blend of propane and butane, respectively. Some locations may be supplied with a mix having a higher percentage of propane, such as 80:20, and it is occasionally possible to get 95% (commercial) propane.

The combustion of LPG produces harmless carbon-dioxide (CO₂) and water vapour, but sufficient air must be available. Inadequate appliance flueing and/or ventilation, or poor air-gas mixing, e.g. due to lack of servicing, can result in the production of toxic carbon monoxide.

Everyone concerned with the storage and handling of LPG should be familiar with the following characteristics and potential hazards:

- a) LPG is stored as a liquid under pressure. It is almost colourless and its weight is approximately half that of an equivalent volume of water.
- b) LPG vapour is denser than air, butane is about twice as heavy as air and propane about one and a half times as heavy as air. Consequently, the vapour may flow along the ground and into drains, sinking to the lowest level of the surroundings and be ignited at a considerable distance from the source of leakage. In still air, vapour will disperse slowly.
- c) LPG can form a flammable mixture when mixed with air. The flammable range at ambient temperature and pressure extends between approximately 2% of the vapour in air at its lower limit and approximately 10% of the vapour in air at its upper limit. Within this range there is a risk of ignition. Outside this range any mixture is either too weak or too rich to propagate flame. However, over-rich mixtures can become hazardous when diluted with air. At pressures greater than atmospheric, the upper limit of flammability is increased but this increase with pressure is not linear.
- d) Escape of even small quantities of the liquefied gas can give rise to large volumes of vapour/air mixture and thus cause considerable hazard. A suitably calibrated explosimeter may be used for testing the concentration of LPG in air.

A NAKED FLAME SHOULD NEVER BE USED TO SEARCH FOR A LEAK.

- e) At very high concentrations in air, LPG vapour is anaesthetic and subsequently an asphyxiant by diluting or decreasing the available oxygen.
- f) Commercial LPG is normally odorised before distribution by the additional of an odorant such as ethyl mercaptan or dimethyl sulphide, to enable detection by smell of the gas at concentrations down to one-fifth of the lower limit of flammability (i.e. approximately 0,4% of the gas in air). However in certain cases where the odorant may be detrimental to a process (for example in aerosol applications) the LPG is not odorised.
- g) Escape of LPG may be noticeable other than by smell. When the liquid evaporates, the cooling effect on the surrounding air causes condensation and even freezing of water vapour in the air. This effect may show itself as frost or fog at the point of escape, and thus make it easier to detect an escape of LPG. Because the refractive index of LPG differs from air, leaks can also sometimes be seen as a 'shimmering'.
- h) Owing to its rapid vaporisation and consequent lowering of temperature, LPG, particularly liquid, can cause severe frost burns if brought into contact with the skin.

Personal protective equipment (e.g. hand and eye protection) should be worn if this hazard is likely to occur.

- i) A container, which has held LPG and is 'empty' may still contain LPG in vapour form and is thus potentially dangerous. In this state the internal pressure is approximately atmospheric and if a valve is leaking or is left open, air can diffuse into the container forming a flammable mixture and creating a risk of explosion; alternatively, LPG can diffuse to the atmosphere.

Note: These properties are general characteristics of LPG and items such as (h) should not occur in normal cylinder usage.

Appendix B: Typical Properties of LPG

Relative Density of Vapour		1.58	2.06	1.73
Boiling point at atmos. pressure		-45	-2	
Vapour pressure for products at their maximum specified vapour pressure				
-10		256	-4	185
0	kPa	388	40	292
10	Gauge	552	95	424
20		757	172	593
30		1004	266	796
37.8		1218	362	870
Specific Energy (vapour)				
Gross	MJ/kg	50.4	49.5	50
Nett		46.3	45.7	46.1
Calorific Value (energy density) of vapour at 15C and 101.325 kPa				
Gross	MJ/cu.m	100	125	110
Nett		92	114	101
Wobbe Index		80	87	84
Air required for combustion vol. air/vol. vapour		24.5	31	28
Flammability limits at 15C and 101.325kPa in air				
Lower Limit		2.2	1.9	2.1
Upper Limit		9.5	8.5	9.2
Motor Octane Number		96	93	95
Research Octane Number		102	95	99

Appendix C: Typical Cabinet Heater Servicing Report

CUSTOMER DETAILS
Name:
Address:
Daytime Contact No:

HEATER DETAILS	
Make:	
Model:	
Serial No:	
Approx. Age:	
Hose Type:	Last replaced:
Reg type:	Last replaced:
Pilot condition:	Last replaced:

RADIANT HEATERS

CATALYTIC HEATERS

Initial Inspection		Initial Inspection
Panels/Dressguard		Panels/Front Mesh Screen
Burner & Plaques		Catalytic Pad
Pilot/ODS		Pilot/ODS
Operation of Piezo unit		Operation of Piezo unit
Internal Cleaning		Internal Cleaning
Regulator		Regulator
Hose		Hose
Satisfactory Ignition		Satisfactory Ignition
Time for FSD to hold in		Time for FSD to hold in
Operation of Control		Operation of Control
Appearance of each Plaque		Appearance of Catalytic Pad
FSD Drop-out Time		FSD Drop-out Time
Castors		Castors
Door/Rear Panel and Catch		Door/Rear Panel and Catch
Secure Regulator		Secure Regulator
Clean Down		Clean Down

REPAIRS REQUIRED, COMMENTS, RECOMMENDATIONS TO OWNER		
Service Carried Out By:	Date:	Dealer:

Appendix D: Typical Heater Service Label

HEATER SERVICE
HEATER MODEL:
SERIAL NUMBER:
<i>Serviced and tested to LPGA COP 4</i>
Last Hose Replacement:
Last Regulator Replacement:
Last pilot Replacement/Test:
Serviced By:
Date of Service:
<div style="border: 1px solid black; padding: 5px; text-align: center;">Servicing Co. Logo or details</div>

