## Office of the Technical Regulator

# Conversion of buses and trucks to motor homes

Gas Bulletin #26 Issued February 2023

The diagram below is typical of an LPG conversion of a Bus or Truck to a Motor Home (MH). Items 1 to 6 over the next pages are discussed with reference to AS/NZS 5601.2:2020





## 1. Cylinder Enclosure (Compartment)

A gas cylinder may be located in a cylinder compartment within the profile of the (MH). The compartment <u>shall only be accessible from outside</u> and house LPG cylinders and associated equipment only.



Where this is not structurally possible internal access to the cylinder compartment may be provided for removal and replacement of cylinders if the compartment holds no more than 2 x 15 kg cylinders and the bottom edge of the door opening is no less than 50 mm above the compartment floor.

LPG cylinders shall be upright and secured to withstand a load of 4 x the weight of the filled cylinders applied in any direction.

Cylinder compartments require identification with the appropriate label.



Cylinder compartments require a minimum 25 mm (unobstructed) drain at the base that terminates at a point facing to the rear of the motor home. The drain outlet termination should be 1 metre away from any openings in the motor home unless such openings are 150 mm above and ignition sources 1.5 metres away unless they are 500 mm above the drain pipe termination.

Alternatively, provide vents in the cylinder compartment door at both high and low levels. Each opening shall provide a minimum of 5000 mm2 (50 cm2) for every cylinder enclosed.

Cylinder compartments shall be water and corrosion resistant, prevent gas vapour from entering the motor home, mechanically fit for purpose and openable without the use of tools. A key is not regarded as a tool.

Integral two stage LPG regulators that provide OPP to 14 kPa should be used. They must be mounted inside the compartment, preferably above the cylinder valve with the vent facing downwards.

The LPG regulator shall be connected to the cylinder by a flexible hose assembly complying with AS/NZS 1869 Class C that incorporates an excess flow valve in the POL fitting, or, a 6 mm copper pigtail complying with AS 1572 of 1.22 mm thickness, formed into a loop or stainless steel proprietary pigtail to ASTM A269 grade 316 or 304. High pressure piping must be rated at 2.6 MPa and at least 500 mm in length.

## 2. Consumer Piping

Consumer piping shall comply with Table 5.1.4.3 and not be located where physical damage is likely to occur, unless adequate protection is provided.

There shall be no joints in consumer piping in inaccessible locations. Consumer piping is to run external to the motor home.

The pipe system should connect from the main run to each appliance separately and each branch pipe should enter the interior adjacent to the appliance. All appliances shall have their own accessible isolation.

Consumer piping should be sleeved to protect it from abrasion damage and contact with dissimilar metals. All penetrations through floors or structural members should be protected with a grommet.

Consumer piping should be substantially secured against vibration and designed to incorporate allowances for movement between sections of the motor home where necessary. Support spacing's shall be provided within 150 mm of every bend, elbow, tee or branch fitting excluding loops and elsewhere as follows.

### Table 5.2.11.2

Pipe material type	Vertical runs mm	Horizontal runs mm
Rigid	1 250	600
Flexible	750	300

## PIPING SUPPORT INTERVALS

Consumer piping should have at least 25 mm clearance from any electrical wiring and at least 100 mm clearance to any exposed live parts on electrical fittings.

A quarter turn manual shut-off valve is required on the inlet connection of each appliance. The valve shall be accessible for operation and the on-off position obvious or it shall be clearly marked where it is not.

Hose assemblies shall not exceed 1.5 metres length and conform to AS/NZS 1869 Class C. Hoses can only be used between regulators and rigid piping and between rigid piping and appliances, or where there is one appliance, directly between the regulator and the appliance. Consideration must be given to rodent attack, operating temperature, clearance to engine exhaust system to be >100 mm and protection from UV (sunlight).

Quick connect devices shall not be installed within a motor home. The following types of piping, joints and fittings are not permitted in the gas piping for motor homes. As per 5.1.4.4

- Croxed joints
- Compression fittings with non-metallic olives
- Longscrew connectors
- Capillary fittings containing soft-solder
- Plain nipples, e.g. running nipple with parallel threads except where no practical alternative is available. (Must then either weld the joint or use a hard setting joining compound and have a union adjacent for disconnection).
- Press-fit connections
- Semi-rigid connectors
- Composite piping
- Threaded and welded steel pipe and fittings

## NOTE: All appliances connected to the gas installation shall have flame failure on each burner, this includes BBQs when connected to an external bayonet fitting

### 3. Water Heaters 6.1.3

A gas water heater other than a room sealed type shall not be installed in a motor home. External gas water heaters may be installed outside a motor home providing the manufacturer and AS/NZS 5601.2:2020 requirements are met. Clearances to doors, windows, vent openings, combustibles, awning enclosures and LPG cylinders should be observed as required.

### 4. Cookers 6.11

Cookers must have flame failure on all burners. They should be installed as per the manufacturer's instructions and be secured to minimise movement or vibration of the appliance and strain on the appliance connection. The requirements of Section 6.11 should also be considered, especially in regard to the protection of adjacent combustible surfaces.

Gas hobs / hotplates installed above a refrigerator, the shelf shall be vapour sealed so that if any gas escaped from the cooker it cannot be ignited by the refrigerator.

Warning labels are required adjacent to cookers regarding the use of cookers for comfort heating.

## WARNING

Ensure ventilation when the cooker is in use. Do not use for space heating.

## 5. Gas Fridges (ref 6.12)

Gas Fridges must be vented to outside. Flues may be inclusive of the venting system as supplied by the manufacturer. All gas fridges and proprietary flue systems must be installed in accordance with the manufacturer's instruction.

The appliance must be secured to minimise movement or vibration of the appliance and strain on the appliance gas connection.

Flue terminals shall be located as per section 6.12 below.



Purpose designed gas fridges may be installed into sealed recess apertures having two openings to the outside. One opening shall be at the top of the recess and the other at the bottom.



Refrigerator compartments shall be sealed off from inside the motor home. The compartment must be ventilated directly out to atmosphere, at high and low levels, at not less than the following requirement unless otherwise specified by the manufacturer.

Refrigerator compartment high level ventilation vent must be located entirely above the condenser / absorption fins and the low level vent at floor level so that any accumulation of leaking gas can escape to outside.

Refrigerator storage capacity (L)	Free area for ventilation (cm <sup>2</sup> )
Up to and including 100	325
101 to 200	450
Greater than 200	650

## 6. Space Heaters (ref 6.10)

Gas space heaters shall be of a room sealed type.

## 7. Ventilation (ref 7.3)

Where gas appliances are installed in motor homes there shall be a minimum of two ventilation openings to atmosphere. Ventilation is mandatory to prevent excessive condensation, build up of products of combustion, the accumulation of LPG from gas leakage and to assist in ambient temperature control.

The area of opening is calculated by:

where

**V** = minimum free ventilation area ( $cm^2$ ).

- **U** = total gas consumption of all appliances in MJ/h.
- **P** = the number of persons for whom the motor home is designed

Vent openings should be at opposite sides of the motor home and be located 150 mm down from the ceiling except that, if extraction is provided by an externally vented stove range hood the vent may then be no lower than 400 mm from the ceiling and 150 mm up from the floor

Where pop up roofs are incorporated on motor homes, ventilation shall be effective whether the top is up or down. The location of vents shall not be installed in the rear wall regardless of the location of the vehicle exhaust tailpipe.

## 8. Flueing (ref section 8)

Flueing must comply with AS/NZS 5601.2 Section 8, and the terminal shall have a minimum clearance of 300 mm to ventilators, open able skylight / hatch, door or windows, or greater than 500 mm from a refuelling point or fuel tank vent outlet.

There shall be at least 50 mm between the lowest opening of a flue cowl and the outer roof cladding of the Motor Home. The flue design shall prevent adjacent combustible materials exceeding 500C above ambient where the flue passes through a wall or a roof or alternatively those areas must be adequately protected.

Where combustible materials are adjacent to the flue a 25 mm clearance shall be provided between the flue and the combustible material. The cross sectional area of the flue shall be no less than the flue outlet of the appliance.

Flue materials shall conform to the following.

Material	Protective finish	Application and limitations		
Low temperature applications (not exceeding 300°C)				
Aluminium alloy 1100, 3003 complying with AS/NZS 1734 Minimum thickness 0.7 mm	None	Only where accessible for inspection and renewal		
Mild steel Minimum thickness 0.6 mm	Aluminized 122 g/m <sup>2</sup> , or Z275 zinc to AS 1397, or aluminium zinc complying with AS 1397	Only where accessible for inspection and renewal		
High temperature applications	(up to 500°C)			
Stainless steel Minimum thickness 0.5 mm	300 and 430 Series Grade			

Proprietary flue systems shall be suitable for the application and installed as per the manufacturer instructions.

## 9. General Requirements

### Instructions

Refer to appendix F for guidelines covering appropriate consumer instructions for gas installations. These should be suitable for the application and supplied to customer by the manufacturer and by warning labels where appropriate.

## Contact the Office of the Technical Regulator for more information

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