



**Resources Safety & Health**  
Queensland

# Recreational Vehicle Gas System Project

Petroleum and Gas Inspectorate

March 2023 | Project Report

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## Purpose statement

This document is intended for industry associations, recreational vehicle manufacturers and gas work licence holders who have participated in the RSHQ Recreational Vehicle Gas System (RVGS) Project and forms the Final Report scheduled for March 2023.

It provides an overview of the project, identifies findings, and makes recommendations to improve gas safety and compliance.

## Background

Gas safety requirements for recreational vehicles are stipulated in the *Petroleum & Gas (Production & Safety) Act 2004* (PG Act), and Petroleum and Gas (Safety) Regulation 2018 (PG Regulation) administered by the Petroleum and Gas Inspectorate (PGI) within Resources Safety and Health Queensland.

Relevant legislative provisions are outlined below:

- Gas devices (appliances) to be approved for installation and/or use
  - *See section 731AA of the Act.*
- Gas work to only be conducted by appropriately licensed or authorised persons
  - *See section 726 and 727 of the Act.*
- Gas work to be carried out in compliance with safety requirements
  - *See section 734 of the Act and Schedule 2 of the Regulation.*

The current safety requirement for gas system installation for recreational vehicles (caravan, camper trailer or motorhome), is the 2020 edition of AS/NZS5601.2 Gas installations Part 2 LP Gas installations in caravans and boats for non-propulsive purposes.

A unique provision within the Queensland legislation (s116 of the P&G Regulation) requires gas systems in used recreational vehicles to be inspected and certified prior to re-sale. This provision generates a large volume of enquiries and complaints from gas work licence holders (GWLH) and the public each year in relation to gas safety and compliance. In addition, several incidents involving gas systems in recreational vehicles have been investigated by PGI.

## Project overview

The objective of the RVGS project was to identify if non-compliance exists at the point of original installation (manufacturing stage) and investigate causal factors. PGI considered all elements that may affect compliance. These include GWLH training, gas appliance designs, gas system installation practices and data analysis to determine potential improvements and make recommendations to improve gas safety and compliance in recreational vehicles. Further, it is anticipated that improvements in gas safety and compliance created through the project will result in a future reduction of enquiries and complaints.

The project was supported and promoted by the Caravan Trade Industry Association of Queensland (CTIAQ) and included consultation with training providers, Australian standard committees and state and territory gas technical regulators.

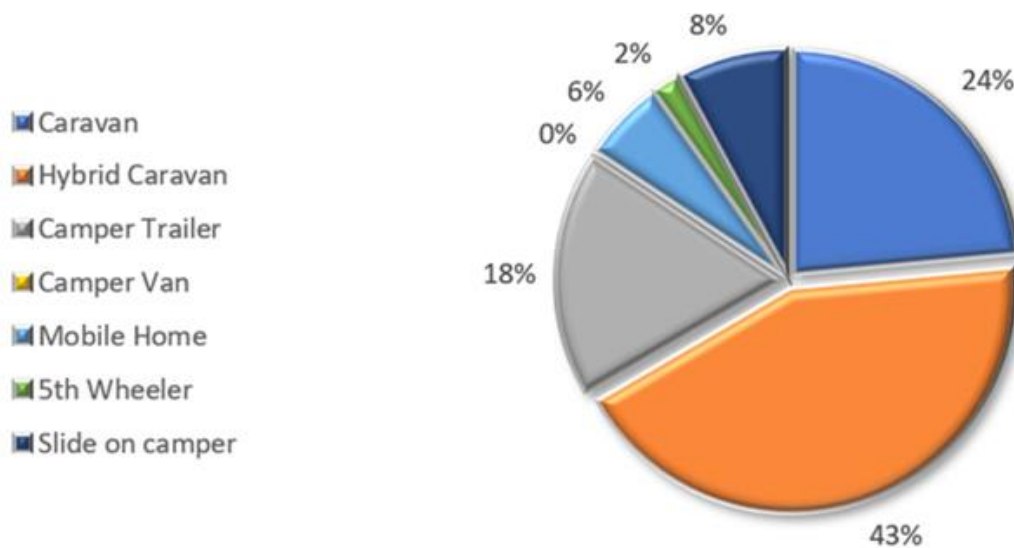
The process included identifying recreational vehicle manufacturers based in Queensland and in collaboration with their GWLH scheduling inspections prior to vehicles being sold to the public.

To ensure continual improvement for the duration of the project, a number of engagements have been held with stakeholders and an interim report and guidance materials were shared and published on a dedicated webpage. ([www.rshq.qld.gov.au](http://www.rshq.qld.gov.au))

A total of 63 manufactures participated in the project and it was identified that of the 7000 ( $\pm 7400$ ) GWLH in Queensland only 54 identified installers carryout gas system installation work across the 63 manufacturers.

Of the gas systems inspected, 92 percent were found to be non-complaint. The sample of gas systems inspected were across the range of recreational vehicles available.

#### Type of recreational vehicles inspected.



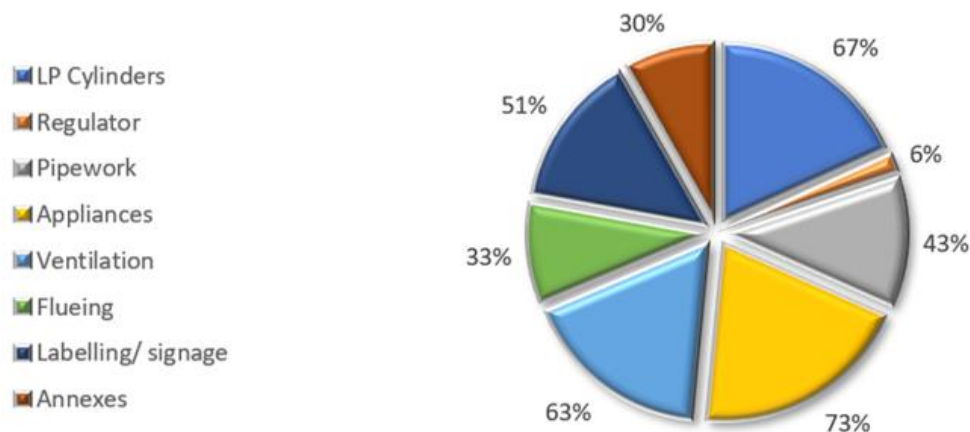
A sample of nine interstate gas systems in recreational vehicles were inspected, which also found the same high percentage of non-compliance.

# Findings

## 1. Non-compliance

The project found a high percentage of non-compliance, which were not limited to one area of the gas system but existed in all areas from cylinder locations through to annexes provided as optional extras. The areas of non-compliance and the related clauses are detailed in the graph and table below.

### Areas of non-compliance identified.



Non-compliance	Clause from AS/NZS5601.2
Clearances surrounding LP gas cylinders from ignition sources and internal openings	3.1.8
Inadequate sealing and separation of LP gas compartments & lockers	3.3
LP gas drains not terminating in compliant locations and undersized	3.3.1
Piping undersized for gas system demand	5.1.2
Insufficient pipework protection through penetrations	5.2.1
Insufficient pipework support when connecting to the appliance	5.2.1
Gas hose assemblies not as short as practical and adequately protected	5.2.5
No means to ensure gas cannot flow when appliance is in the stowed position (lids, doors, covers)	6.3.2
Gas device air intakes and flue outlets obstructed by aftermarket covers	6.3.2
Incorrect gas appliance supplied/ installed as part of gas system (e.g., Portable hot water system)	6.5
Gas devices not installed as per installation instructions supplied	6.5
Annex provisions adversely affecting flueing and ventilation	6.15 ,6.5, 7.1, 8.4.2
Gas cooking appliance clearances to combustible materials	6.11.1
Ventilation missing, undersized or enclosed/covered	7.3
Flue terminal clearances to openings and combustible materials	8.1, 8.4.1
Labelling and signage information missing and not durable	7.7, 10.3.1
GSCC not fully completed	Approved form PGA734

It was identified that non-compliance may be influenced by a multitude of causal factors including:

- Installation practices and assessment of compliance appears to follow industry practices rather than the requirements of the safety requirement (AS/NZS5601.2). The RV manufacturing industry and those GWLH who work in the sector believe what they are doing is compliant. This belief results in compliance issues not being identified, or questioned, in the initial stages of the installation process, or before significant quantities of vehicles have been produced.
- GWLH have mistaken the interpretation and application of the clauses within AS/NZS5601.2. It was raised that wording within clauses was not clear. The standard states, the reader is to be familiar with the properties and characteristics of LP gas and the principles of combustion, ventilation and flueing applicable to the safe installation and operation of appliances. Vehicle designers, manufacturers and GWLH did not consider these fundamental principles and how they apply to recreational vehicle gas systems.
- Non-compliant gas systems are repeated across multiple manufacturers and models as a result of the limited numbers of GWLHs carrying out the work and due to the high visibility of competitors at shows and industry expos, providing an opportunity for duplicating designs and solutions. This is exacerbated by the move towards offshore manufacturing within the same overseas production facility, and the same vehicle design offered to multiple importers with differing branding.
- Recreational vehicle design is not sufficiently considering gas system compliance and relying on the GWLH to adapt gas system requirements to suit vehicle layout once built. Early consultation and involvement of a GWLH, at the design stage, may reduce the likelihood of non-compliance in the final product.
- Gas devices (appliances) selected for some installations may not suit their chosen location, some appliances were being modified not in line with the installation instructions. GWLH should challenge if appliances need to be altered or modified and consider if these actions are consistent with the manufacturer's installation instructions and may adversely affect the approval of the appliance.

## **2. Currency of skills and knowledge**

There is a lack of technical support to ensure GWLH who carryout gas work in recreational vehicles remain current with standards and appliance design. Innovations in vehicle designs, changes in consumer expectations and intended use of vehicles, requires specialised knowledge and skills to achieve compliance within this industry.

It was also noted, through engagements with registered training organisations, that current training environments may not reflect realistic recreational vehicle gas system installations required for the variety of vehicle styles.

### **3. Understanding of gas work**

The project found that there is a 'blurred' understanding of what is and what is not gas work. Due to the nature of the recreational vehicle manufacturing process, several trades, skills and activities are involved. Some activities directly impact on the gas system and the line between what work can be completed by unlicensed persons and what work requires a licensed person is not clear. Some GWLH facilitate unlicensed persons carrying out gas work by certifying the finished installation they haven't personally completed.

### **4. National compliance of recreational vehicles**

It was confirmed, through a sample of inspections on recreational vehicles manufactured in other states and territories that similar non-compliance exists in vehicles manufactured outside Queensland.

However, non-compliance in Queensland is raised more often with PGI due to the provisions under the PG Regulation for used recreational vehicles to be inspected and certified prior to sale or change of ownership.

## **Recommendations**

The following recommendations are proposed and separated for PGI and external being other industry stakeholders.

### **PGI**

- 1. Continue regulatory focus on new recreational vehicle gas systems.**  
It is recommended that PGI integrate a sample of GWLH that carry out gas work in this sector into the annual compliance assurance program to monitor and ensure a trend towards greater compliance.
- 2. Provide ongoing compliance guidance material and awareness sessions for AS/NZS5601.2.**  
It is recommended that PGI maintain the recreational vehicle dedicated web page, increase the range of compliance guidance material published and continue recreational vehicle dedicated awareness sessions.

### **External**

- 1. Improvements to GWLH training (RTO) + non-accredited training (CITAQ + manufactures)**  
Training providers to review current training provided and consider using RV industry representatives or experienced RV installers to facilitate training or learning material. In addition, there is an opportunity for appliance manufacturers to offer 'real life' training at the point of RV manufacturing to improve installation awareness and practices and thus improve compliance of their products.

2. **Continued clarification of AS/NZS 5601.2 – review and amend.**

The RV industry to improve group representation inclusive of GWLH, through industry associations, to assist AG006 and GTRC committees to review the standard reflecting changes in vehicle usage and design, and to inform how and where clarification is focussed within the standard.

3. **Industry lead (CTIAQ) register of recognised installers (e.g., RACQ repairer)**

The RV industry should consider establishing a register for approved gas installers through state and national associations similar in concept to the RACQ approved repairers. This could increase confidence in GWLH carrying out gas work at the manufacturing stage. A requirement of being included on the register could also improve the understanding of the standard and lead to a more consistent application of the requirements.

4. **Consultation with GWLH or other consultants for all new RV design changes**

The RV industry should consider a consultation process during the design phase of any new models or variations to gas system designs to ensure compliance during any production phase. The consultation process could include GWLH and association compliance engineers and consider the use of a checklist to ensure compliance.

5. **All states and territories encouraged to undertake similar project and consider inspection requirements.**

The RV industry should approach other state and territory regulators to encourage them to undertake proactive activities or projects to ensure gas compliance in their own jurisdiction to improve national consistency.



## Examples of compliance issues

This section provides examples of compliance issues including a brief description of the requirement, the compliance issue and sample images.

**Clearances from gas cylinders to ignition sources and openings** (Clause 3.1.8) LP gas cylinders mounted on the draw bar require minimum clearances from ignition sources. Sources of ignition placed within the controlled area (such as cooking appliances, fridges, and electrical equipment) were not considered sources of ignition by GWLH. This is contributed by insufficient design consultation with GWLH and a failure to identify the raised level of risk. Cylinder compartments and vapour barrier options can be used to achieve the required clearances. Images 1,2 and 3 offer examples of electrical equipment introduced into the controlled area including when compartments housing electrical equipment is opened.



Image 1



Image 2



Image3

**Cylinder compartments and lockers** (Clause 3.3.1) Shall be designed to house the LP gas cylinders and associated equipment only and control gas vapour in the event of a gas leak. Compartments and locker lids and doors are designed to seal off separated areas when in the closed position. In addition, positioning, sizing, and labelling of compartment/ locker vents and LP gas drains were often not compliant. Images 4 and 5 show examples of compartments with lids and doors not creating a vapour seal and not meeting minimum required clearances from openings and sources of ignition.



Image 4



Image 5

**Stowed appliances** (Clause 6.3.2) Require a means of stopping gas flow when the appliance is in the stowed position and/or when aftermarket lids and covers have been fitted. (*Stowed* means to pack, store, or put away). Inspections identified examples of stowed appliances where enclosing appliances could create an unsafe situation. Raised levels of risk were not identified by the GWLH and the definition of stowed was not fully understood. Images 6 and 7 show an example of a gas cooking appliance installed inside an enclosure with no gas interlock system fitted stopping gas flow when the door is closed.



Image 6



Image 7

**Flue and air intakes covered** (Clause 6.3.2) Other examples of stowed appliances through the introduction of aftermarket covers (to reduce dust and water ingress during offroad use) these require a safety interlock or provisions to prevent appliance operation when cover is in place. Images 8, 9 and 10 offer examples of flues and air intakes covered potentially damaging the gas device or vehicle, producing high levels of CO through incomplete combustion, when covers are closed. There is also an opportunity for any unburnt LP gas to accumulate, reaching lower explosive levels when in the closed position.



Image 8



Image 9



Image 10

For further information on stowed appliances guidance documents can be found on the PGI website.

**Ventilation** (Clause 7.1) Is necessary for combustion, ambient conditions and for the proper use of gas devices. This is provided via upper and lower vents installed to supply air direct from outside into the living space. Minimum ventilation is required if gas appliances are installed in the living space. Inspections identified ventilation was absent, undersized, located incorrectly and intentionally covered. A variety of RV models are designed for off road use and therefore, open vents create an entry point for dust and water potentially damaging the interior of the vehicle. Images 11 and 12 offer examples of aftermarket covers installed with no safety interlocks or provisions to ensure ventilation is uncovered when gas devices are in use.



**Image 11**



**Image 12**

**Annex and awnings** (Clause 6.1.4) Ventilation and flueing requirements must be considered when an annex system is supplied with the vehicle. Insufficient air supply and air dilution direct to outside can create toxic conditions within this living space. When an annex is not supplied at the point of sale, a warning label is required to alert the RV user to consult a GWLH if an aftermarket annex is to be installed. Image 13 is an example of an annex with no ventilation installed and image 14 offers an example of a compliant vent stitched into the annex wall including warning label.



**Image 13**



**Image 14**

**Gas devices/appliances installations** (Clause 6.5) Not installed in accordance with manufacturers' instructions. Specific non-compliance includes not following instructions for mounting and securing appliances, clearances to combustibles, locations, flueing and ventilation requirements. Images 15 and 16 offer an example of a gas cooking appliance modified to suit a slide out kitchen installation not as per installation instructions provided. Installer should consider the suitability of the appliance for the location Image 17 offers an example where clearances have not been considered.



Image 15



Image 16



Image 17

**Gas device approvals** (Clause 6.5) Gas devices installed onto the gas system must be approved. Portable gas devices approved for external use are being supplied by manufacturers intended to be connected to the consumer piping on a recreational vehicle. Images 18 and 19 show examples of portable devices installed and connected to the gas system not as per their approved use.



Image 18



Image 19



## What's next?

Due to the high percentage of non-compliance identified, PGI reasonably believes there is a high volume of recreational vehicles in circulation that do not comply with the standard.

Non-compliant gas installations currently in circulation will need to be addressed in the future as identification of non-compliance is expected to increase when awareness of non-compliance is better understood.

**Gas system installers and certifiers** – All gas work must comply with AS/NZS 5601.2 and manufacturer installation instructions. Non-compliance will need to be rectified prior to RV resale and it is recommended, the product manufacturer is contacted to assist to address non-compliance if found to be an issue with the original installation.

**Manufacturers and importers** – Support their GWLH to rectify non-compliant gas installations when found to be the original gas system installation to provide the best outcome for the vehicle owner. If a conflict arises with the understanding of the standard contact the inspectorate for further clarification.

**RV Industry Association** – Support RV owners and manufacturers to resolve non-compliance issues as they arise. Produce and publish guidance on the process of addressing non-compliance when non-compliance stems from the original gas installation.

**PGI** – To assist when resolving installation non-compliance disputes and take compliance and enforcement action, if necessary.

**RV owners** – You are advised to contact your RV manufacturer directly if non-compliance is identified for the original gas installation. Further information relating to consumer rights and advice can be obtained through the Australian Competition and Consumer Commission (ACCC) website found [here](#) and the Office of Fair Trading website found [here](#).