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Hydrogen Safety Code of Practice

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Resources Safety & Health Queensland

Overview

The Queensland Government is committed to developing an effective, risk-based safety regulation that will support a sustainable and safe Queensland hydrogen industry. A safety code of practice is a tool that can inform industry specific stakeholders about safety requirements and approvals.

In Queensland, the safety of fuel gases, including hydrogen, is regulated under the Petroleum and Gas (Production and Safety) Act 2004 (P&G Act) which is administered by the Petroleum and Gas Inspectorate of Resources Safety and Health Queensland (RSHQ).

RSHQ has published this Hydrogen Safety Code of Practice (the Code) for the purposes of providing a consolidated and accessible reference point for fuel gas requirements that apply to hydrogen applications. The Code provides certainty about legislative requirements for hydrogen as a fuel gas and guidance for compliance.

The Code has been developed in consultation with industry and government stakeholders and is designed to inform industry of approval pathways and safety requirements for operations that use hydrogen as a fuel.

Sections 1 to 7 of the Code, read in conjunction with relevant provisions of petroleum and gas safety legislation, set out current safety requirements and approval requirements for hydrogen activities. Appendices 1 to 9 include information about approvals, case studies and other resources.

The Code will be periodically revised with consideration of new standards, competencies and applications.

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Acronyms and terms

Table 1 describes the meaning of terms and acronyms used in this document. For terms defined in legislation (see Legislative Reference column), the description in Table 1 may be simplified. The P&G Act, P&G Safety Regulation and General Provision (GP) Regulation can be referenced for the full definition.

Table 1 Acronyms and terms.

Acronym / Term	Description	Legislative Reference
Acceptable level	The level of risk for the activities is within acceptable safety limits, having regard to each relevant safety requirement, and is As Low As is Reasonably Practicable (ALARP)	P&G Act s700 (1)
ADR 110/00	Vehicle Standard (Australian Design Rule 110/00 – Hydrogen-Fuelled Vehicles Safety Related Performance) 2023 Came into effect on 1 November 2024 for all new model vehicles. All vehicles must comply from 1 November 2026	ADR 110/00 legislation
AS/NZS 2885 series	The Australian Standard series for Gas and Liquid Petroleum Pipelines.	-
AS/NZS 4645 series	The Australian Standard series for Gas Distribution Networks	-
APGA CoP	APGA Code of Practice (CoP) upstream polyethylene gathering networks – Coal Seam Gas (CSG) industry *Published by the Australian Pipelines and Gas Association Limited ACN 098 754 324*	-
Appropriately authorised person	A person holding a GWL or GWA with approval to work with hydrogen	-
Container	tank, vessel, cylinder used for fuel gas storage and transport	-
Code	the Hydrogen Safety Code of Practice (this document)	-
Fuel cell gas device	A device that uses the chemical energy of fuel gas (hydrogen) to produce electricity. • Mobile fuel cells refer to fuel cells used in vehicles and vessels. • Stationary fuel cells refer to fixed applications for power generation and include portable units.	-
Fuel cell gas system	Fuel cell gas systems are type B gas devices that include a fuel cell and any of the following: • hydrogen production unit • hydrogen storage containers • pipes • fittings • flues • instruments • ventilation	-

Acronym / Term	Description	Legislative Reference
	• process controllers	
Fuel gas	hydrogen, or a hydrogen gas blend, used or intended to be used as a fuel to produce heat, light or power	P&G Act s.11
FGDN	*Fuel Gas Delivery Network.* Examples of fuel gas delivery networks: • the delivery of cylinders of fuel gas to a consumer or to a distributor • the filling and storing of cylinders of fuel gas • the bulk delivery of fuel gas to a container • the filling of a tanker for delivery of fuel gas • the maintenance of containers and storage equipment used for the supply of fuel gas • the dispensing of fuel gas to vehicles • storage associated with the FGDN	P&G Act Sch.2
Fuel gas network	A distribution system, including meters and meter regulators whether or not the meters or meter regulators are owned by the operator of the distribution system and A FGDN including a gas pressure regulator through which fuel gas is delivered to a consumer's gas system, whether or not the regulator is owned by the operator of the network.	P&G Safety Reg Sch.7
GCC	A *gas compliance certificate* certifies the installation of a gas system meets required standards. It is commonly referred to as a Gas System Compliance Certificate. Access here Gas Compliance Certificate	P&G Safety Reg Sch.7
Gas Device	In general, a gas device is a device used or designed or intended for producing heat, light or power using fuel gas and can be either a gas device (type A) or a gas device (type B)	P&G Act s724
Gas device (type A)	A gas device type listed in the P&G Safety Reg s12 and Sch.1 that uses or is designed or intended to use fuel gas for the production of heat, light, power, or for refrigeration	P&G Act s724 (1) P&G Safety Reg s12
Gas device (type B)	A gas device that uses or is designed or intended to use fuel gas for the production of heat, light, power, or for refrigeration and that is not listed in s12 or Sch.1 of the P&G Safety Reg	P&G Act s724 (3)
GDAA	A *Gas Device Approval Authority* is granted by the Chief Inspector and authorises the holder to undertake gas device approval work	P&G Act s731AA
Gas Fuel System	A gas system that supplies gas as a fuel to an engine or mobile fuel cell	P&G Safety Reg Sch.7
Gas Quality Agreement	An agreement between a supplier and recipient for the quality of the fuel gas to be supplied where the supply does not meet the prescribed quality and no gas quality approval is in place.	P&G Act s621
Gas Quality Approval	Quality of fuel gas approved by the Chief Inspector. The Chief Inspector may approve a quality that is outside the prescribed quality	P&G Act s622
Gas Work	The work of installing, removing, altering, repairing, servicing, testing or certifying a gas system	P&G Act s725

Acronym / Term	Description	Legislative Reference
GWA	A *Gas Work Authorisation* is granted by the Chief Inspector and authorises the holder, or an individual working under the holder's authority, to undertake gas work in relation to a gas device (type B).	P&G Act s727
GWL	A *Gas Work Licence* is granted by the Chief Inspector and authorises the holder to undertake gas work in relation to a gas device (type A) or a fuel gas refrigeration device	P&G Act s726
Gas related device	Means any of the following: • a gas device • a gas fitting • a gas system • a container of fuel gas • a device used to transfer fuel gas from one container to another	P&G Act Sch.2
Hydrogen fuel gas system	A gas system that uses hydrogen as the fuel	P&G Safety Reg Sch.7
Inspector	A public service officer appointed as an Inspector, Petroleum and Gas under s735(1)(c) of the P&G Act	P&G Act s735
LEL	The *Lower Explosive Limit* is the low end of the concentration range over which a flammable mixture of gas or vapour in air can be ignited at a given temperature and pressure	-
Low-risk hydrogen system	A low-risk hydrogen system is considered to be a gas device (type B) and is not considered to be a gas installation for the purpose of approval, supply and use under this Code of Practice.	Section **7.4**
Operating plant	A legislative label for petroleum and fuel gas activities, locations and facilities that are regulated under the P& G Act which includes a requirement for a Safety Management System For hydrogen, operating plant include: • production of hydrogen for use as fuel gas • storage of hydrogen for the purpose of use as fuel gas • production of regulated hydrogen • storage, transport, and treatment of regulated hydrogen • dispensing of hydrogen to a vehicle • transporting hydrogen fuel gas via fuel gas delivery networks • transporting hydrogen fuel gas via distribution systems and pipelines • blending of hydrogen with petroleum and/or fuel gas	P&G Act s670 (5) P&G Safety Reg s11 (3) P&G Act s11 (2) P&G Act s11A (c)
P&G Act	*Petroleum and Gas (Production and Safety) Act 2004*	-
P&G safety legislation	The following instruments: • the *Petroleum and Gas (Production and Safety) Act 2004* (P&G Act), • the Petroleum and Gas (Safety) Regulation 2018 (P&G Safety Reg), and	-

Acronym / Term	Description	Legislative Reference
	• Petroleum and Gas (General Provisions) Regulation 2017 (P&G GP Reg)	
P&G Safety Reg	Petroleum and Gas (Safety) Regulation 2018	-
Professional engineering service	an engineering service that requires, or is based on, the application of engineering principles and data to a design, or to a construction, production, operation or maintenance activity, relating to engineering, and does not include an engineering service that is provided only in accordance with a prescriptive standard	Professional Engineers Act sch.2 (Definitions)
Regulated hydrogen	Substances that are involved in (or produced for) storage or transport of hydrogen. The following are prescribed as regulated hydrogen (a) ammonia (b) dimethyl-ether (DME) (c) methanol (d) methyl-cyclohexane (MCH) (e) toluene	P&G Act s.11A P&G GP Reg s.6A
RPEQ	A *Registered Professional Engineer of Queensland* is a person currently registered as a registered professional engineer under the Queensland Professional Engineers Act 2002 A RPEQ is required for all professional engineering services supplied in QLD under the Professional Engineers Act 2002	-
Reference standard	A standard that can be used as a reference when designing a hydrogen device or system. Compliance with a reference standard will generally be accepted as meeting the safety outcome for the component to which the standard applies	-
Safety Outcomes	Fuel gas is used safely, and its use will not cause harm to persons, domestic animals or property. Note, the PG Safety Reg currently defines these as safety outcomes for the design of a gas device	P&G Safety Reg s138E(3)
SMS	A *Safety Management System* is a comprehensive and integrated system for managing health and safety risks. The P&G Act requires a safety management system for operating plant and sets out the matters which must be included	P&G Act s674, s675
UN R 134	Regulation No 134 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of motor vehicles and their components with regard to the safety-related performance of hydrogen-Fuelled vehicles (HFCV)	-
WHS Act	*Work Health and Safety Act 2011*	-
WHS Regulation	Work Health and Safety Regulation 2011	-

1.0 Introduction

The Code consolidates legislative requirements under the P&G safety legislation that apply to hydrogen when hydrogen is produced, used or intended to be used as a fuel gas. The Code identifies various activities and facilities regulated by the P&G safety legislation. It also provides clarity for how to apply the provisions of the P&G Safety Reg and provides safety requirements for the design and installation of hydrogen fuel gas systems to be supplied with unodourised hydrogen.

2.0 Objective

The objectives of this Code are to:

1. identify activities and facilities regulated by the P&G safety legislation relevant to hydrogen and regulated hydrogen.
2. provide guidance on how to comply with the P&G safety legislation requirements, and
3. provide safety requirements for Schedule 2 of the P&G Safety Reg in relation to hydrogen fuel gas systems that will use unodourised hydrogen

3.0 Scope and application

Figure 1 summarises the scope of hydrogen activities and facilities that are operating plant, gas devices, and gas systems subject to the P&G safety legislation and those that are outside of the scope and application of the Code.

Hydrogen facilities and activities not regulated by the P&G safety legislation include:

a) Aviation and space gas systems regulated by the Civil Aviation Safety Authority (CASA).
b) Marine applications regulated by the Australian Maritime Safety Authority (AMSA).
c) Vehicle applications where hydrogen is being used as a fuel enhancer at levels below LEL of hydrogen (i.e., 4% by volume in air), and where there is no storage of hydrogen on board the vehicle.
d) Applications where hydrogen is not used, or not intended to be used, as a fuel gas, including other substances used as hydrogen carriers (e.g., ammonia).
e) Production of hydrogen when produced hydrogen is intended to be used for non-fuel purposes.
f) Storage of hydrogen at sites determined to be Major Hazard Facilities.

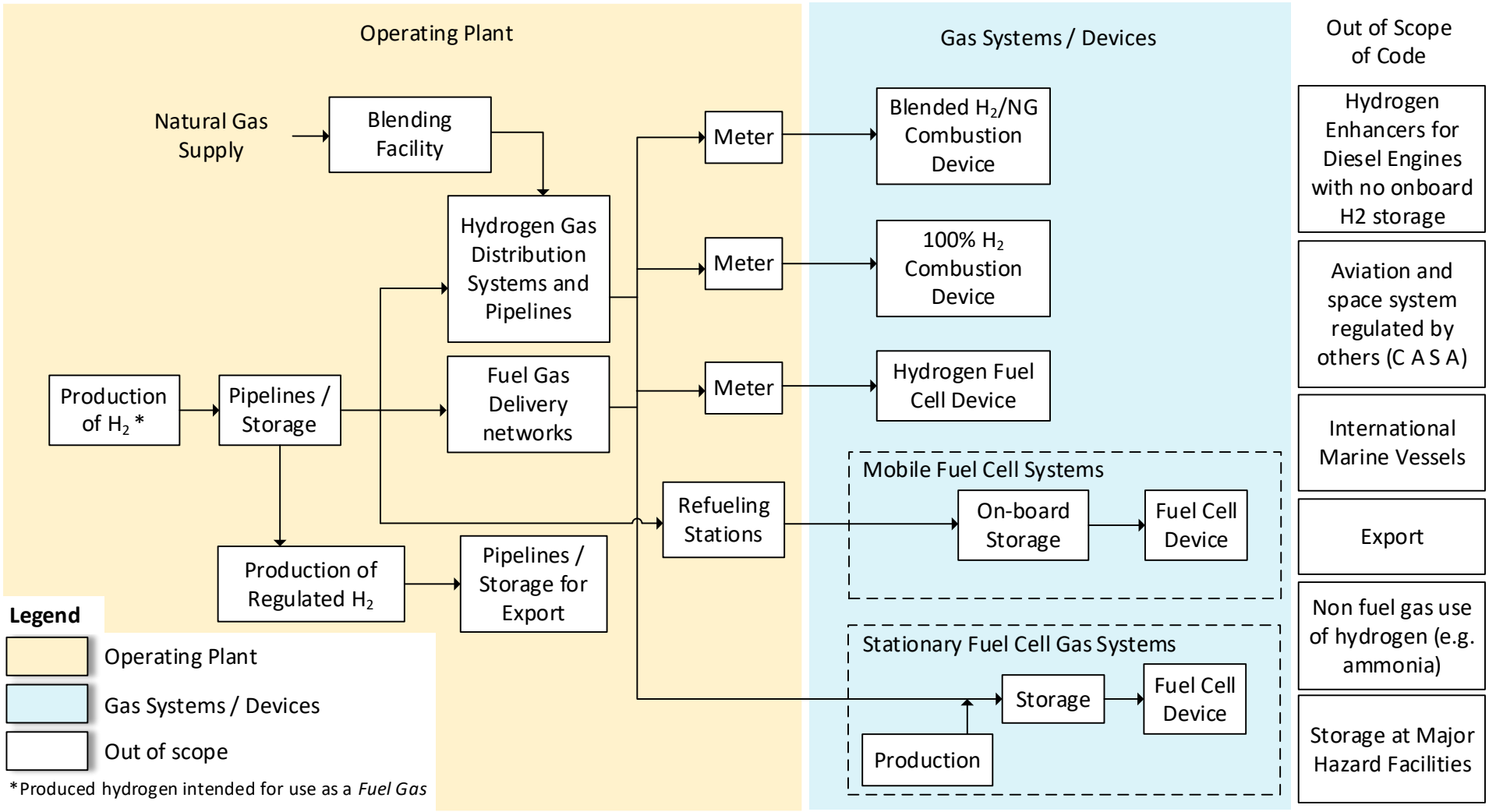

Figure 1 Scope of common operating plant and gas devices related to hydrogen.

4.0 How the Code works with legislation

4.1 P&G safety legislation

The P&G Act s3(1) prescribes as the main purpose of the P&G Act:

> "*to facilitate and regulate the carrying out of responsible petroleum activities and the development of a safe, efficient and viable petroleum and fuel gas industry*."

The Code has been developed to provide a consolidated document of requirements of the P&G safety legislation that apply to the production of hydrogen and its applications as a fuel gas. Sections 5 to 7 of the Code, read in conjunction with the provisions of the P&G safety legislation, set out minimum compliance requirements for activities and facilities that produce and use, or intend to use, hydrogen as a fuel gas.

4.2 Other relevant legislation

Other legislative instruments and frameworks also apply to the safety of hydrogen related activities. Appendix 1 references relevant statutory bodies and Appendix 2 outlines key elements of legislative frameworks for work health and safety, electrical safety, national heavy vehicles, rail safety and professional engineer requirements.

5.0 Operating Plant

Section 5 of the Code describes hydrogen activities that are operating plant and relevant obligations under P&G safety legislation. It also lists specific requirements for production, storage, distribution systems, pipelines, blending facilities and fuel gas delivery networks.

5.1 Hydrogen activities / facilities that are operating plant

Operating plant is defined in s670 of the P&G Act and includes fuel gas facilities, plants, places and activities. Table 2 summarises types of fuel gas operating plants that are relevant to hydrogen.

Table 2 Fuel gas operating plant relevant to hydrogen.

Operating plant type	**Examples of hydrogen operating plant**	**Legislative Reference**
Production of hydrogen Storage of hydrogen	An operating plant is a place, or a part of a place, at which hydrogen is produced. Some associated activities may include processing or treatment of hydrogen and storage of hydrogen. The production of hydrogen for the purpose of use as a fuel gas.	P&G Act s670(5)(d) P&G Safety Reg s11(3)(e)
Production of regulated hydrogen Storage of regulated hydrogen	An operating plant is a place, or a part of a place, at which regulated hydrogen is produced. Some associated activities may include processing or treatment of regulated hydrogen and storage of regulated hydrogen. The regulated hydrogen is produced for the purposes of storage or transport of hydrogen.	P&G Act s11A(c) P&G GP Reg s6A
Pipeline	A pipeline, or system of pipes, for transporting hydrogen. Such pipeline can also be used for storage of hydrogen. A pipeline, or system of pipes, for transporting regulated hydrogen (e.g. ammonia, methanol, methyl-cyclohexane (MCH), dimethyl ether (DME), and toluene). Such pipeline can also be used for storage of regulated hydrogen.	P&G Act s670(5)(d) P&G Act s16(1)(a) P&G Act s802 P&G Act s11A(c)
Distribution pipeline	A pipeline that transports hydrogen as part of a gas reticulation system from a gate station to the reticulation system, or as a single 'point to point' pipeline to a specific commercial or industrial facility direct from a well or processing plant to an industrial facility, for use as a fuel source.	P&G Act s670(2)(e) P&G Act s16A
Distribution System	Distribution system - a system of distribution pipelines, meters and other equipment used in the supply of fuel gas, including hydrogen, to more than one consumer within a fuel gas market. A distribution system may convey pure hydrogen or hydrogen blended with another fuel gas.	P&G Act s670(2)(f) P&G Act Sch.2

Operating plant type	Examples of hydrogen operating plant	Legislative Reference
Blending Facility	the blending of processed natural gas and hydrogen for the purpose of delivering or supplying fuel gas.	P&G Act s670(5)(d) P&G Safety Reg s11(3)(d)
Fuel gas delivery network (FGDN) Including hydrogen refuelling station	A FGDN includes any of the following: • Hydrogen fuel gas dispensing at a refuelling station to vehicles or vessels. This could include tanks, vessels, containers, piping, compressors, pumps and dispensers. • A network that transports hydrogen in containers, cylinders or tanks. May include: - Delivery by tube-trailer or tanker of hydrogen in bulk to fuel gas consumer or fuel gas supplier. - The bulk delivery of hydrogen to a container (e.g. storage tank, cylinders etc.). - Supply of hydrogen from containers to a distribution system. - Storage of hydrogen that is part of the FGDN	P&G Act s670(5)(a) P&G Act Sch.2 P&G Safety Reg s11(2)
Prescribed activities – gas utilisation	Activities prescribed in the P&G Safety Reg: • Use of gas devices with 50GJ/h or more gas capacity • Using fuel gas to produce theatrical or other special effects.	P&G Act s670(5)(d) P&G Safety Reg s11(3)(a) s11(3)(b)

5.2 Obligations for operating plant

Chapter 9, Part 1 of the P&G Act specifies safety obligations for petroleum and gas operating plant so that risk is managed to an acceptable level. These obligations include responsibilities of key persons.

Section 699 of the P&G Act states an operator of operating plant has an obligation for risk to person or property to be at an acceptable level. Section 700 of the P&G Act defines acceptable level of risk.

Under the P&G safety legislation the primary method for managing risk at operating plant is through implementation of an SMS. Section 674 of the P&G Act requires an operator to make, implement and maintain an SMS as part of the overall obligation to control risk to an acceptable level by eliminating or minimising hazards and implementing measures to minimise the likelihood and consequences of significant incidents.

Key obligations required for operating plant in the P&G Act are listed in Table 3. This should be read in conjunction with the relevant legislative sections and information at the Petroleum and Gas Inspectorate website and the web pages specified in Table 3.

Table 3 Operating plant obligations.

Operating plant obligations	P&G Act Reference
STATUTORY POSITION HOLDERS • Operator / operator's representative if operator is a corporation • Executive Safety Manager (ESM) • Site Safety Manager OBLIGATIONS OF STATUTORY POSITION HOLDERS • Notification requirements • ESM general obligation For more information, access: Safety & health notices for petroleum & gas	s673 s687 s692 s694A s688
SAFETY MANAGEMENT SYSTEM • Operator must ensure SMS is made or adopted • Content requirements (NOTE: If an existing SMS meets these requirements, a new SMS is not needed) • Operator to must take reasonable steps to ensure SMS obligation holders comply with their obligations • A person at an operating plant must take all reasonable steps to comply with SMS obligations.	s674 s675 s677 s702
PLANT & EQUIPMENT • Designers, importers, manufacturers and suppliers of plant and equipment for use at operating plant must take reasonable steps to ensure the plant or equipment complies with any relevant safety requirement • Installers must ensure plant and equipment they install at operating plant complies with all relevant safety requirements.	s696 s697
RISK MANAGEMENT • Risk to be kept to acceptable level by person with obligation under Act or SMS • Acceptable level of risk • Achieving acceptable level of risk	s699 s700 s701

Operating plant obligations	P&G Act Reference
• The SMS is to include a formal risk assessment consisting of the systematic assessment of risk and a description of technical and other measures to control the identified risk.	s675(1)(e)
COMMISSIONING / DECOMMISSIONING • The chief inspector is given notice at least 20 business days before a plant is commissioned / within 20 business days after it is decommissioned. For more information, access: Safety & health notices for petroleum & gas	s694A

WHS Act requirements (refer to Appendix 2) also apply to the hydrogen fuel gas related operating plant. Safety matters can be addressed under one SMS to avoid duplication.

5.3 Quality

When hydrogen is supplied as fuel to a consumer it must either:

- meet the prescribed quality; or
- the quality must be approved by the Chief Inspector; or
- there must be a gas quality agreement in place.

Where hydrogen is the fuel gas the prescribed quality is:

- *AS/ISO 19880.8 Gaseous hydrogen fuelling stations Part 8: Fuel quality control clause 8 - Hydrogen quality assurance methodology;* or
- *SAE J2719 - Hydrogen Fuel Quality for Fuel Cell Vehicles*

Clause 8 of AS/ISO 19880.8 enables suppliers to use a risk-based methodology to meet the requirements of ISO 14687-2 *Hydrogen fuel – Product specification*.

Application

While the scope of AS/ISO 19880.8 relates to hydrogen fuelling stations, it is prescribed for the supply of hydrogen to all consumers with gas devices.

Appendix 9 sets out how to apply AS/ISO 19880.8 to all fuel applications, including a table of terms used in Clause 8 of AS/ISO 19880.8 and alternate terms for their application under the P&G Safety Reg.

5.3.1 Hydrogen Blends and other fuel gases

Fuel gas including hydrogen or hydrogen blends that do not meet the requirements of the prescribed quality for processed natural gas, LPG or hydrogen require a separate ***gas quality agreement*** or ***gas quality approval***.

Note: Hydrogen and natural gas blends that meet the quality requirements of natural gas as outlined in AS 4564 meet the prescribed quality of processed natural gas and do not require further approval.

The P&G Act sections 621 and 622 outlines the requirements for obtaining a ***gas quality agreement*** or ***gas quality approval***.

5.4 Safety Requirements for gas distribution systems and pipelines

5.4.1 Gas distribution systems

For the purposes of section 81 of the P&G Safety Reg the operator of a fuel gas distribution system that proposes to supply gas through a distribution network with more than 15% hydrogen, must include a formal safety assessment.

The operator must give the chief inspector notice stating that the formal safety assessment has been completed for supply of fuel gas that is outside the allowed limits of AS/NZS 4645. The notice must be supplied within 20 days of the formal safety assessment being completed.

Operation, maintenance and abandonment of the distribution system must comply with AS/NZS 4645 plus any additional considerations determined through the formal safety assessment process.

5.4.2 Pipelines

Section 67(2) of the P&G Safety Reg specifies that the operator of the pipeline must ensure the design, construction, operation, maintenance and abandonment of the pipeline comply with one of the listed standards. Standards relevant for hydrogen and regulated hydrogen in pipelines will be the AS/NZS 4645 series, AS/NZS 2885 series or the APGA CoP.

Hydrogen and regulated hydrogen pipelines are defined as operating plant and require a Safety Management System that complies with s675(1) of the P&G Act.

In addition to compliance with AS/NZS 2885, companies may use the Hydrogen Pipeline Code of Practice developed under the Future Fuels CRC for guidance.

5.5 Safety requirements for fuel gas delivery networks

Hydrogen fuel gas delivery networks (FGDN) are activities as prescribed in s11(2) in the P&G Safety Reg and places or parts of places where FGDN are carried out are operating plant under s670(5)(a) of the P&G Act.

Operators of places or parts of places where FGDN are carried out must have an SMS that complies with requirements of the P&G Act s675(1). Risk must be identified, assessed and controlled As Low As Reasonably Practicable. This includes, where relevant, the risk of storing and handling of unodourised fuel gas.

Note: The prescribed odour requirement only applies legislatively when fuel gas is supplied to a consumer. Section 7 outlines the safety requirements for operators supplying unodourised fuel gas to a consumer.

5.6 Training and Competencies at Operating Plant

There are no mandatory competencies prescribed for working on hydrogen operating plant. However, competencies have been developed and are available for companies and training organisations to deliver.

The Australian Government has developed six new Units of Competency (UEGNSG902 – 906), three new Skill Sets and updated 13 units. The new Units of Competency and Skill Sets have been drafted specifically for hydrogen gas, and the existing units were updated to allow for hydrogen contextualisation as well as other gases. The revised Training Package addresses the skills needs of gas technicians working with hydrogen.

Appendix 8 outlines the approved UEG Gas Industry Training Package that has been updated to include hydrogen competencies.

Companies may use these qualifications and competencies to deliver training and satisfy relevant training related requirements of the Safety Management System under section 675(1)(h) of the P&G Act.

5.7 Safety Requirements for production facilities, hydrogen and/or regulated hydrogen

Where a facility that is operating plant produces hydrogen and/or regulated hydrogen for use as a fuel as an integral part of its operation, the safety of the production process should be included in the Safety Management System.

This includes hydrogen production at refuelling stations and blending facilities. The production and storage of regulated hydrogen at or near the port is also included.

Section 696 of the P&G Act states that the person designing, importing, manufacturing and supplying plant or equipment that is part of an operating plant must ensure it complies with relevant safety requirement. The person also must inform the operator or proposed operator of the operating plant if they become aware of any defect or hazards associated with the plant or equipment and any relevant controls or modifications that have been developed or implemented for managing the risk.

Section 697 of the P&G Act states that the person installing a plant or equipment that is part of an operating plant must not install unless the installation complies with relevant safety requirement. The person must notify the operator of the operating plant if they become aware of a safety risk related to the plant or equipment or the installation.

Section 675(1)(e) of the P&G Act mandates a formal safety assessment that captures all associated risks and control measures. Section 675(1)(i) of the P&G Act mandates that safety standards and standard operating and maintenance procedures be applied in each stage of the plant.

6.0 Gas devices, gas systems and gas work

Section 6 of the Code describes hydrogen activities that are regulated by provisions of the P&G safety legislation for gas devices, gas systems and gas work. This part of the Code also describes the following requirements and provides guidance on how to comply with them:

- approval of gas devices that use hydrogen as fuel gas
- installation and certification of gas systems that use hydrogen as fuel gas
- holding a Gas Device Approval Authority (GDAA) for gas devices that use hydrogen as fuel gas
- obtaining a Gas Work License (GWL) and Gas Work Authorisation (GWA) in relation to gas devices and gas systems that use hydrogen as fuel gas
- conducting gas work on a gas system that uses hydrogen as fuel gas
- periodic inspections of gas systems that use hydrogen as fuel gas, and
- workshop requirements.

6.1 Gas devices that use hydrogen as a fuel gas

Section 724 of the P&G Act defines gas devices (type A) and gas devices (type B). In general, both are designed for producing heat, light, power or refrigeration using fuel gas. Section 724 also sets out specific devices for each type and provides for gas devices (type A) to be prescribed under the P&G Safety Reg (refer to s12 and Sch.1). A gas device which falls within the categories listed in Sch.1 of the P&G Safety Reg that uses hydrogen as fuel is a gas device (type A). Table 4 lists some examples of gas devices that use hydrogen as the fuel.

Table 4 Examples of gas devices that use hydrogen.

Gas device	Description
Catalytic reactor gas device	Catalytic reactors are not listed in the P&G Safety Reg Sch.1 and are gas devices (type B)
Combustion gas device	A combustion gas device uses hydrogen in a combustion reaction and hydrogen applications could be: • hydrogen blended with natural gas, or • pure hydrogen For hydrogen blends: • If an approved device is to be supplied with fuel gas within the gas quality specification for which the gas device is approved, no additional approval is required • Where an approved device is to be supplied with fuel gas outside the gas quality specification for which the device is approved, a new device approval is required A gas device type listed in the P&G Safety Reg s12 and Sch.1 that uses hydrogen as fuel is a gas device (type A). Common gas device (type A) which uses fuel gas by way of combustion include cooktops, BBQs and hot water systems A device that is not listed in the P&G Safety Reg s12 or Sch.1 is a gas device (type B)
Fuel cell gas device	Fuel cells are not currently listed in the P&G Safety Reg s12 or Sch.1 and therefore are a gas device (type B) A fuel cell gas system is a gas device (type b). Mobile fuel cell gas systems refer to fuel cells used in vehicles and vessels Stationary fuel cell gas systems refer to fixed applications for power generation and include portable units A fuel cell gas system device may be a ***designed packaged system*** or ***construct and install in place*** A ***designed packaged system*** device is built by the manufacturer with no, or very minimal, site installation requirements. Examples of designed packaged gas systems include FCEV and self-contained hydrogen energy storage systems

Gas device	Description
	A ***construct and install in place*** device is installed onsite by the holder of an appropriate gas work authority. The fuel cell gas devices, pipework and related instruments and controls are installed on site. Examples of construct and install in place gas systems include hydrogen power systems that are not supplied in a package, hydrogen supplied to a combustion device

6.2 Approval of gas devices for installation, use, and supply

Section 731AA of the P&G Act requires:

- all gas devices (type A) and gas devices (type B) to be approved before installation or use; and
- all gas devices (type A) to be approved before being supplied (which includes selling, offering for sale, advertising, gifting, or swapping).

The process for approval of a gas device using hydrogen is shown in *Figure 2*. The fuel cell gas device is approved as part of the fuel cell gas system.

The P&G Safety Reg requires that gas devices are designed and approved to a preferred standard. If a preferred standard is not used compliance can be achieved by following the process outlined in section 15 of the P&G Safety Reg. Preferred standards are listed in Schedule 2 of the P&G Safety Reg.

Gas device approval for a ***construct and install in place*** device takes into consideration location specific elements including ventilation and hazardous area requirements, public access and proximity to the device, vehicle movements near the gas system etc

Gas device approval for a ***designed packaged system*** should consider location requirements for where the device will be used and ensure relevant information is included in installation instructions. For example, vent locations, protection requirements.
Parts 7.2 and 7.3 of this Code are safety requirements in Schedule 2 of the P&G Safety Reg for the design, installation and operation of hydrogen fuel gas systems and gas devices that use hydrogen as a fuel gas. This ensures there has been adequate consideration of safety in the design and installation of hydrogen fuel gas systems that will use unodourised hydrogen.

6.3 Installation and certification of gas systems

Section 734 of the P&G Act sets out requirements for gas systems to be installed in compliance with applicable safety requirements and for the gas system installation to be certified by the installer. The proposed process for approval of a gas device and installation and verification of a gas system using hydrogen is shown in Figure 2.

AS/NZS 5601 is the preferred standard for gas system installation. Section 2 of AS/NZS 5601.1 provides an outcome-based approach and should be considered when developing installation instructions for hydrogen systems.

Part 7.3 of this Code is a safety requirement in Schedule 2 of the P&G Safety Reg for the installation of hydrogen fuel gas systems and devices that use unodourised hydrogen. This ensures there has been adequate consideration of safety for installation of gas systems that will use unodourised hydrogen as a fuel gas.

Where the process outlined in the Code is followed there is no need to follow the section 15 process in the P&G Safety Reg.

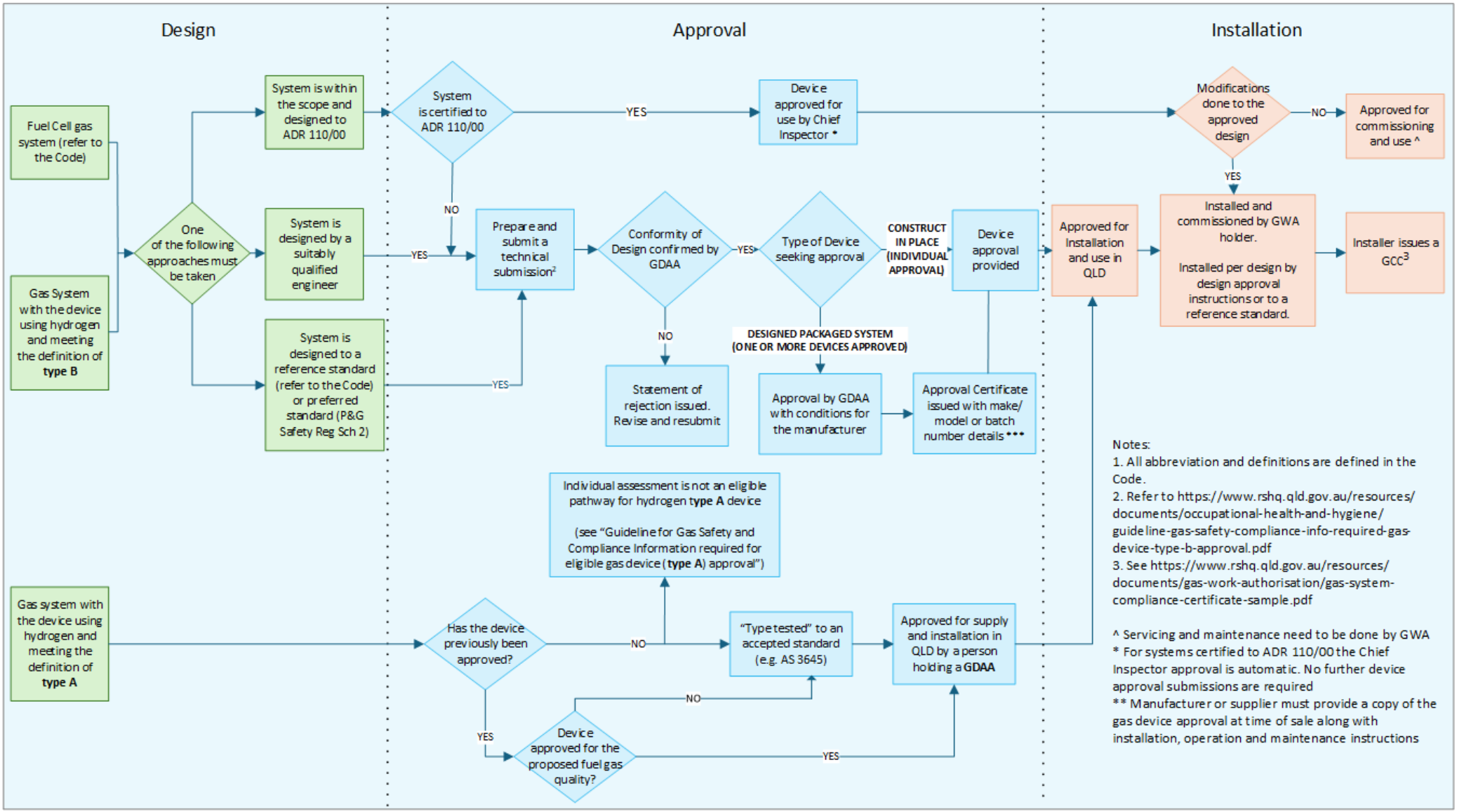

Figure 2 Proposed Gas device and gas system approval pathway.

6.4 Holding a GDAA

Under section 731AD of the P&G Act, the chief inspector may grant a GDAA that authorises the holder to undertake gas device approval work with the scope specified in the granted authority. GDAA applications must be in the approved form which can be accessed at Application to become a gas device approval authority.

A *GDAA type B Class FC* is able to approve a hydrogen fuel cell gas system. Specific information to support making an application can be accessed at Gas device approval authority's requirements. Information and conditions for holders of a GDAA type be accessed at Gas device approval authority holders – Queensland code of practice.

To apply for a GDAA with fuel cell gas systems included in the scope, a person must have:

- the appropriate engineering qualifications (e.g. RPEQ with appropriate registration) (For more information, access: Gas device approval authority's requirements),
- a qualification in risk management, and
- the skills and knowledge (experience) to perform approval work under the authority described in Table 5.

Table 5 GDAA types relevant for hydrogen gas devices/systems.

Type	**GDAA category**	**Skills and knowledge**
Fuel Cell Gas Systems[1]	type B Class FC	Examples of skills and knowledge that would support an application are: • Previous experience working on similar devices • Formal training and qualifications on similar systems • Knowledge of hazardous area and electrical equipment requirements for hydrogen and/or other similar gases. • Knowledge of electrical systems and electrical safety requirements • Knowledge of the characteristics and properties of hydrogen hazard identification and risk management – general WHS and hydrogen specific (qualifications and experience) • Knowledge and training on selection of appropriate material, tubing, and fittings. • Training on high pressure tubing, leak detection, and maintenance.

[1] Fuel cell gas system include the fuel cell and system into which it is installed. Storage, piping, instruments and controls are to be considered and assessed as part of the device approval.

Type	GDAA category	Skills and knowledge
Hydrogen Catalytic reactor system	type B Class C	For GDAA type B, requirements are as per the existing with additional information to support hydrogen use. For more information, access: Gas device approval authority's requirements. Examples of the additional skills and knowledge that would support an application are: • Knowledge of characteristics of hydrogen • Knowledge of suitable materials, components and fittings for use in hydrogen service. • Training on high pressure tubing, leak detection, and maintenance.

6.5 Obtaining a GWL and GWA for hydrogen

Under s725 of the P&G Act gas work is the work of installing, removing, altering, repairing, servicing, testing or certifying a gas system. Sections 725 and 726 requires gas work to only be undertaken by a person that holds a GWL or GWA that authorises the person to carry out the work.

Gas systems using hydrogen must be installed by a person who has hydrogen in the scope of their GWL or GWA. For type A devices, a GWL is required and for type B devices, a GWA is required.

Section 124 of the P&G Safety Reg prescribes the qualifications or experience required to obtain a GWL or GWA. Mostly, applicants meet the requirements of s124 of the P&G Safety Reg by completing a listed qualification (refer also Sch.5 of the P&G Safety Reg and the Gas Work Licence Requirements and Gas Work Authorisation Requirements).

Until the qualification framework is established, a person that wants to undertake gas work on hydrogen systems must be able to demonstrate a need for the GWL or GWA and skills and demonstrate skills and knowledge to work safely with hydrogen.

Evidence of skills and knowledge that would support an application for a GWL or GWA conditioned for hydrogen gas work could include:

- Previous experience working on similar devices and systems
- Formal training and qualifications working on similar device and systems
- Knowledge of the characteristics and properties of hydrogen hazard identification and risk management – general OHS and hydrogen specific (qualifications and experience)
- Knowledge of the suitable materials, components and fittings for use with hydrogen and/or other similar gases

- Knowledge of the storage and handling of hydrogen
- Working with (storage, transportation and use) gas pressures greater than 200kPag
- Awareness of hazardous area classification and requirements of electrical equipment to be installed in hazardous areas for hydrogen and/or other similar gases.

The application must be in the approved form with the chief inspector assessing applications on a case-by-case basis process that may include:

- a desktop review of the evidence provided,
- a meeting or discussion with the applicant, and
- as per s124(4) of the P&G Safety Reg, completion by the applicant of a written, oral or practical examination.

Under s728C(3) of the P&G Act, the chief inspector may limit the type of gas work or impose conditions. The chief inspector will provide the applicant with details of this at the time of application. As a practical example, the chief inspector may impose the condition that the holder completes the relevant qualifications within a reasonable timeframe when they are available. These conditions will be determined on a case-by-case basis.

6.6 Periodic Inspection

For commercial vehicles, and vessels, the owner must ensure annual inspections of the fuel cell gas system as required by s107 of the P&G Safety Reg are completed by an appropriately authorised person. Appendix 4 provides further detail on periodic inspections.

6.7 Workshop Requirements

Requirements for safe workshops are a condition of GWAs issued for vehicle workshops. Installation, conversion and maintenance of vehicles using hydrogen as a fuel must be undertaken in a workshop that complies with the conditions of the GWA and as set out in the Queensland gas work authorisation requirements document. Appendix 4 provides further detail on workshop requirements.

7.0 Process for supply and use of unodourised hydrogen as fuel

Section 627 of the P&G Act provides for a regulation to prescribe an odour for fuel gas when it is supplied for consumer use. Section 73 of the P&G Safety Reg prescribes the odour requirements for fuel gas when supplied through a fuel gas network.

Section 7.1 outlines requirements for supplying fuel gas to a consumer without odour, for example, a hydrogen refuelling station.

7.1 Safety Requirements for supplying unodourised hydrogen as fuel

A person can supply unodourised hydrogen as fuel to a consumer, if:

- the supply is to a vehicle or vessel through a dispenser, or
- they have obtained a copy of the gas compliance certificate (GCC) for the hydrogen fuel gas system being supplied, **and**
- that GCC shows that the gas system being supplied to is:
    - designed and installed to use; and
    - safe for use with,

  unodourised hydrogen fuel gas.

Note: When supply is to a vehicle or vessel through a dispenser the person supplying the unodourised hydrogen does not require a copy of the GCC prior to supply.

7.2 Safety Requirements for a consumer being supplied unodourised hydrogen

Stationary and Portable Systems

Where hydrogen fuel gas is to be supplied unodourised to a hydrogen fuel gas system that is not a vehicle or vessel with a Gas Fuel System, the system owner must:

- obtain approval for the gas device from an appropriate GDAA
- ensure the hydrogen fuel gas system is designed by a suitably qualified engineer to use unodourised hydrogen fuel gas
- have an appropriately authorised person install the hydrogen fuel gas system in line with

system design and device approval and issue a GCC

- operate and maintain the hydrogen fuel gas system in line with the approval requirements including any conditions imposed, and
- retain evidence of the approval and GCC for the operating life of the hydrogen fuel gas system.

For the purpose of this section a suitably qualified engineer is a Registered Professional Engineer of Queensland (RPEQ) registered in the appropriate area of engineering, or equivalent.

Note: equivalent to RPEQ with appropriate registration could be a chartered engineer with appropriate expertise. Note also that requirements of the Queensland Professional Engineers Act (2002) apply in addition to requirements of this Code.

Gas Fuel Systems in vehicles and vessels

Where hydrogen fuel gas is to be supplied unodourised to a Hydrogen fuel gas system in a vehicle or vessel, the owner of the vehicle or vessel containing the Hydrogen fuel gas system must:

- ensure the gas fuel system is certified (approved) to ADR 110/00 or approved by an appropriate GDAA
- retain evidence of the ADR 110/00 certification or GDAA approval for the life of the gas fuel system, and
- for commercial vehicles and vessels, retain records of the twelve-monthly inspections of the gas fuel system.
- All vehicle classes that are covered by ADR 110/00, must comply to ADR 100/00 standard within 1 November 2026.
- All vehicle classes that are not covered by ADR 110/00, must go through the GDAA process as specified within this Code.

It should be noted that the service, repair, and recommissioning of a gas system within an approved vehicle (or type B device) must be done by a GWA, as shown in Figure 2 of this Code. Modification of an approved device must go through appropriate approval process.

7.2.1 Guidance on Meeting Regulatory Requirements – Hydrogen Fuel Gas System Owners

The owner of a hydrogen fuel gas system must ensure the system is safely installed, operated and maintained.

Section 97 of the P&G Safety Reg outlines the General obligations of the owner of a gas system:

"The owner of a gas system must take all reasonable steps to ensure a suitably qualified person carries out the installation, servicing, repair, decommissioning and disposal of all or part of the gas system, and if a suitably qualified person or an inspector notifies the owner that the gas system is unsafe, the gas system is not used until it is safe."

The owner of a hydrogen fuel gas system must:

- use authorised installers when installing the system
- retain the Gas Compliance Certificate provided by the installer for the installation of the system
- follow manufacturer's instructions for operation of the system
- engage authorised persons to service or maintain the hydrogen fuel gas system as required in the manufacturer's instructions

7.3 Safety Requirements for design and installation of a hydrogen fuel gas system using unodourised hydrogen

Figure 2 gives an overview of the process for approval of hydrogen fuel gas systems (including the gas device) to enable supply of unodourised hydrogen.

The design of a hydrogen fuel gas system must achieve an acceptable level of risk in the P&G safety legislation. One way to achieve the safety outcome for a hydrogen fuel gas system is to meet the requirements of a reference standard.

Reference standards for stationary and mobile fuel cell gas systems are listed in Table 6.

Note: preferred and mandatory standards in Schedule 2 of the P&G Safety Reg continue to apply where relevant. The reference standards provided below may be used where a preferred standard does not apply or in addition to a preferred standard.

It should be noted that the P&G legislation requires the use of the latest version of a standard, unless the date is prescribed. An alternative pathway to comply with a preferred standard is available under Section 15 of the P&G Safety Regulation.

Table 6 Reference standards for fuel cell gas systems.

System Type	Reference Standard
Stationary fuel cell gas systems	• AS 62282 series • AS/NZS IEC 60079 series • AS ISO 16111:2020 Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride • AS 26142:2020 Hydrogen detection apparatus – Stationary applications

System Type	Reference Standard
	• AS 22734:2020 Hydrogen generators using water electrolysis – Industrial, commercial, and residential applications • AS 16110 series Hydrogen generators using fuel processing technologies • AS 4041-2006 Pressure piping
Mobile fuel cell gas systems	• ADR 110/00 • AS ISO 19881:2020 Gaseous hydrogen – Land vehicle fuel containers
Hydrogen fired systems	• AS 3814 Industrial and commercial gas-fired appliances • SA TS 5390 Gas appliances - Hydrogen-fired gas appliances • AS/NZS 60079 series • AS 5601.1 section 2 for performance-based design

The design of a hydrogen fuel gas system using unodourised hydrogen must include appropriate:

- leak detection and automatic shut-off, and
- risk assessment and controls.

The design of a hydrogen fuel gas system must consider hazardous area and ventilation conditions to ensure unsafe concentrations of hydrogen gas cannot accumulate undetected.

Design documentation for a hydrogen fuel gas system submitted for approval must include:

- Installation instructions
- Operating instructions
- Maintenance instructions

To allow for the development of novel hydrogen fuel gas systems, information on range of operating conditions, expected variability in the surrounding/operating environment, possible limitations in ventilation etc. could be considered and a conditional approval could be provided. Such conditions may specify certain operating window based on the specific risks, may also impose time limit for triggering a formal review of the approval.

Specific guidance on the proposed process for the design of a fuel cell gas system using unodourised hydrogen is described below.

7.3.1 Safety Requirement for design of a fuel cell gas system using unodourised hydrogen

A typical stationary fuel cell gas system is shown in Figure 3. Where applicable, design of a stationary gas system for use with hydrogen as a fuel should consider the performance requirements in AS/NZS 5601.1 Section 2.

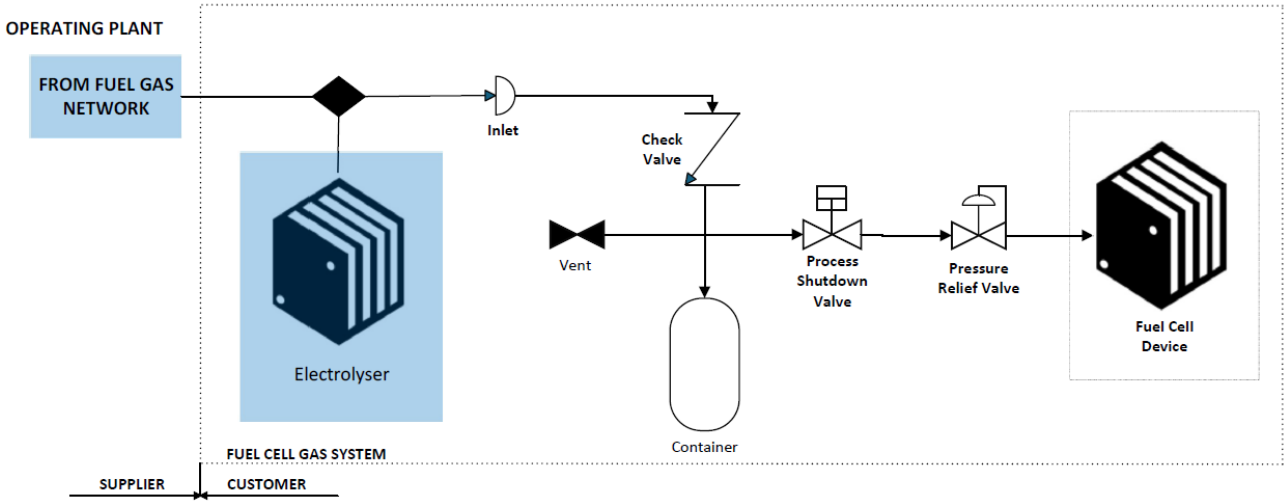

Figure 3 Typical stationary fuel cell gas schematic.

A typical mobile fuel cell gas system is shown in Figure 4.

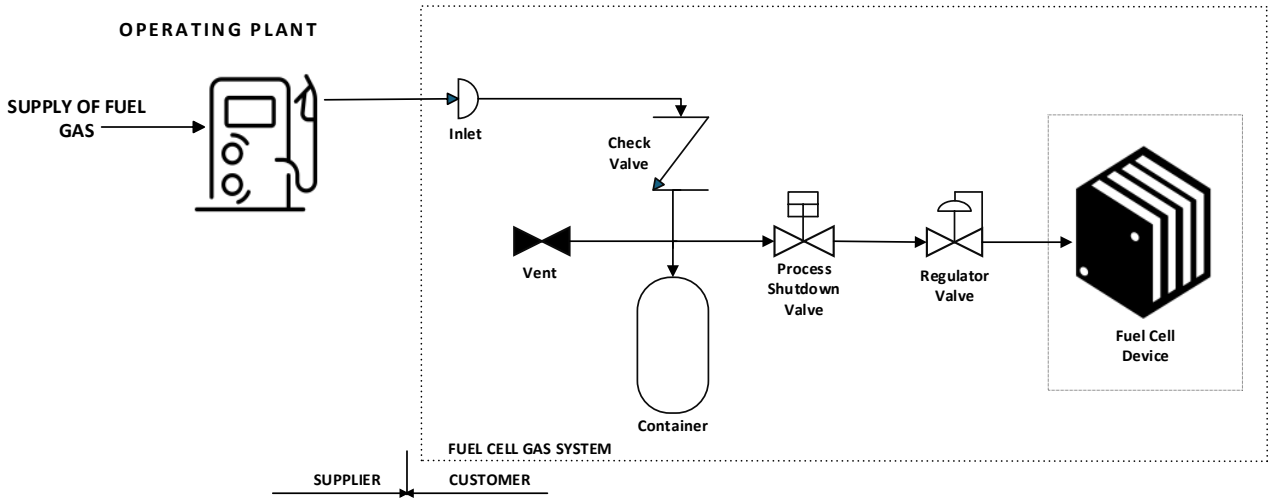

Figure 4 Typical mobile fuel cell gas system schematic.

There are two options proposed for mobile fuel cell gas system designs to be approved:

1. be certified to ADR 110/00 (see Chief Inspector approval for vehicles type approved to ADR 110/00) or,
2. GDAA approval of system designed by a suitability qualified engineer. This pathway will apply to the vehicle classes that are out of ADR 110/00 scope.

Reference standards for a fuel cell gas system are listed in Table 6.

Table 7 provides a summary of the approval methods for gas systems using unodourised hydrogen. Figure 2 summarises the approval process for gas devices and gas systems generally, including hydrogen fuel gas system.

Table 7 Approval of fuel cell gas systems using unodourised hydrogen.

System Type	Approval Process
Stationary fuel cell gas system	• The system must be approved by an appropriate GDAA. • To obtain gas system approval, a technical submission is required to be submitted to an appropriate GDAA. • An example technical submission for a fuel cell gas system is at the following link Fuel Cell Gas System Example Technical Submission. For more information, access: Gas Device Approval Authority List.
Mobile fuel cell gas system using option 1	The system must comply with ADR requirements.
Mobile fuel cell gas system using option 2	• The system must be approved by an appropriate GDAA. • To obtain gas system approval, a technical submission is required to be submitted to an appropriate GDAA. • An example technical submission for a fuel cell gas system is at the following link Fuel Cell Gas System Example Technical Submission. • For more information, access: Gas Device Approval Authority List.

The gas device approval must indicate that the system is approved for supply of unodourised fuel gas.

7.3.2 Safety Requirement for installation of a hydrogen fuel gas system for unodourised hydrogen

- Hydrogen fuel gas systems must only be installed by an appropriately authorised person.
- The installer must install the hydrogen fuel gas system as per the approved design.
- The installer must conduct a commissioning check of the hydrogen fuel gas system as part of the installation process.
- The commissioning check must test all controls associated with the unodourised fuel gas, including:
    - Leak detection

  - Automated shut-off
  - Mechanical ventilation, and
  - Interlocks, where installed.
- The installer must issue a gas compliance certificate (GCC) for the installation, which must indicate that the hydrogen fuel gas system is approved and safe for supply of unodourised hydrogen as a fuel gas.

The GCC shall reference or include a copy of the system design, technical submission and commissioning information.

7.4 Safety Requirements for low-risk hydrogen systems using unodourised hydrogen

7.4.1 General

This section applies to devices (*low-risk hydrogen systems*) manufactured in accordance with various national and international standards and guidelines and that is supplied to users for educational purposes. A *low-risk hydrogen system* is considered to be a gas device (type B) and is not considered to be a gas installation for the purpose of approval, supply and use under this Code of Practice.

Disclaimer: Section 7.4 provides guidance for suppliers and users of low-risk hydrogen systems. Work is underway to incorporate this section as a safety requirement in Schedule 2 of the P&G Safety Regulation.

7.4.2 What is a Low-risk hydrogen system

A *low-risk hydrogen system* means a system of component parts designed and used or intended to be used as a package and includes any of the following, in any combination:

- hydrogen production unit (e.g. electrolyser) that incorporates an auto-shutoff feature.
- hydrogen compression unit
- metal hydride hydrogen storage unit limited to 0.5 litres water capacity and compliant with AS 16111:2020 or an equivalent standard (e.g. CE ISO 16111 and UN 3479).
- piping system consisting of tubing and fittings designed to include compatible quick-connect or push-on style connections.
- hydrogen fuel cell

7.4.3 Locations and instructions for use

7.4.3.1 Location

Where *low-risk hydrogen system* is to be used indoors the user must ensure the volume of the room is adequate to ensure any release of hydrogen does not accumulate and create any risk of explosive atmosphere and no ignition sources are within the area.

The volume of the room must ensure the quantity of hydrogen produced, stored or used cannot achieve 20% of the lower explosive limit (LEL) of hydrogen in the event of a full release.

Note 1: LEL for hydrogen is 4% hydrogen in air or 40,000 ppm.
Note 2: 20% of the hydrogen LEL is 0.8% or 8000ppm
Note 3: Hydrogen concentrations within a room can be estimated as follows:

- A 0.5-litre canister can store 18.9 g of hydrogen (based on technical specifications).
- Converting 18.9 g of hydrogen to milligrams: 18,900 mg.
- A classroom with dimensions 10 × 6 × 2.5 m (L × W × H) has a volume of 150 m^3.
- The concentration of hydrogen is 126 mg/m^3.
- Thus, concentration in ppm is 1525, which is significantly lower than the 0.8% or 8000 ppm.

Conversion formula for hydrogen at 1 atm and 25°C is as follows:

$$ppm = \frac{24.45 \times (mg/m3)}{2.02}$$

Additionally, there must be no ignition sources near the hydrogen storage canister or potential leak points. Hydrogen is 14 times more buoyant than air and dissipates very quickly, however the risk of ignition at the source of a leak remains a possibility.

If a low-risk hydrogen system is used in an educational setting, the safety of staff and vulnerable populations should be managed through the organisation's safety management system.

Other location considerations include, but are not limited to:

- Pure hydrogen and oxygen produced by an electrolyser package are vented outside, maintaining a safe distance between vent ports.
- Recharging of storage canisters is performed in a well-ventilated area.
- Hydrogen-related activities, such as its use in a fuel cell, are conducted in a well-ventilated area.
- Hydrogen canisters stored away appropriately when not in use.

7.4.3.2 Instructions

Manufacturer's Instructions supplied with a *low-risk hydrogen system* should include information on the safe and correct operation of the system, including, but not limited to:

- location, positioning and clearance requirements.

- correct methods of system assembly, including how to make and check pipe and fitting connections.
- Safe use of the system.
- Appropriate disassembly and storage of the system.
- Any maintenance, service or repair requirements.

7.4.4 Approval of Low-risk hydrogen systems.

A *low-risk hydrogen system* must be approved as a gas device (type B) in Queensland.

Suppliers of *low-risk hydrogen systems* must obtain device approval before supplying them to customers in Queensland. The supplier must provide all necessary information to the customer or operator to ensure the safe operation and use of the device.

They can be assessed and approved for supply and use by the holder of an appropriate GDAA under section 138E of the P&G Safety Regulation.

Low-risk hydrogen systems are considered to be a gas device and not a gas system, therefore the assembly and positioning is not considered to be gas work and a gas compliance certificate (GCC) is not required. The assembly, positioning and use can be performed by an appropriately trained person, or the system manufacturer, or manufacturer's agent, in accordance with the instructions supplied with the system.

The users of a *low-risk hydrogen system* must ensure the following:

- The device is approved for use in Queensland. If a system does not come with an approval certificate, the owner must engage a GDAA to obtain approval.
- The device is operated by an appropriately trained person in accordance with any instructions, safe operating procedure, and any condition of the approval.
- The device is equipped with an emergency shut-off.
- Appropriate venting of produced gas or ventilation is in place to prevent the accumulation of hydrogen.

  Note: Hydrogen flammability limits are 4–95% in oxygen environment and 4–75% in air.

Appendix 1 - Relevant Statutory Bodies and Contact Details

Table 8 summarises the key relevant statutory bodies. This list is not exhaustive.

Table 8 Relevant statutory body.

Statutory Body	**Responsible for**	**Website contact details**
Resources Safety and Health Queensland (RSHQ)	Safety of fuel gas and regulated hydrogen	https://www.rshq.qld.gov.au/contact/petroleum-gas-inspectorate
Workplace Health and Safety Queensland (WSHQ)	Safety of workplaces	https://www.worksafe.qld.gov.au/contact
Queensland Electrical Safety Office (ESO)	Safety of electrical equipment and installation	https://www.electricalsafety.qld.gov.au/contact-us
Board of Professional Engineers of Queensland (BPEQ)	Regulating the engineering profession	https://bpeq.qld.gov.au/
Civil Aviation Safety Authority (CASA)	Regulation of civil aviation	https://www.casa.gov.au/about-us/contact-us
Department of Environment and Science (DES)	Avoiding, minimising or mitigating impacts to the environment. Developing and delivering programs supporting climate action Delivering scientific expertise to protect and manage our environment and natural resource base	https://www.des.qld.gov.au/contactus/general
Department of Transport and Main Roads (TMR)	Planning, managing and delivering Queensland's integrated transport environment	https://www.tmr.qld.gov.au/contactus

Statutory Body	Responsible for	Website contact details
Australian Maritime Safety Authority (AMSA)	Regulation and safety oversight of Australia's shipping fleet and management of Australia's international maritime obligations	https://www.amsa.gov.au/about/contact-us
Department of Energy and Public Works	Delivering projects to provide safe, secure, reliable, affordable, and sustainable energy resources to Queensland households and businesses	https://www.epw.qld.gov.au/contact/find
Department of Resources	Regulating mining, and resources in the state	https://www.resources.qld.gov.au/
Department of State Development, Infrastructure, Local Government and Planning	Economic strategy, industry stimulation, and infrastructure, local government and planning in Queensland	https://www.statedevelopment.qld.gov.au/about-us/contact-us
Department of Infrastructure, Transport, Regional Development and Communication	Delivering Australian Government policy and programs for infrastructure, transport, regional development, communications, cultural affairs, and the arts	https://www.infrastructure.gov.au/contact-us
Department of Climate Change, Energy, the Environment and Water	Leading Australia's response to climate change and sustainable energy use, and protect our environment, heritage and water.	www.dcceew.gov.au

Appendix 2 - Guidance on interaction with other legislation

A2.1 – Queensland Work Health and Safety Legislation

The work, health and safety legislation provides a framework to protect the health, safety and welfare of all persons in the conduct of a business or undertaking and other personnel who might be affected by the business or undertaking.

This legislation includes:

- the Work Health and Safety Act 2011 (WHS Act)
- the Work Health and Safety Regulation 2011 (WHS Reg).

When both the P&G and WHS legislative frameworks apply, safety matters can be addressed under one safety management system approach with minimal duplication.

Particular items under WHS legislation that may have applicability to hydrogen projects include:

- Hazardous Chemical requirements. Refer:
  - WHS Reg Chapter 7
  - Managing risks of hazardous chemicals in the workplace code of practice 2021.
- Pressure vessel design and registration. Refer:
  - WHS Reg Chapter 5 Part 5.3 and Sch.5
  - Managing the risks of plant in the workplace Code of Practice.

A2.2 – Electrical Safety Legislation and Requirements

The purpose of the *Electrical Safety Act 2002* (the Electrical Safety Act) is to establish a legislative framework for preventing persons from being killed or injured by electricity and preventing property from being destroyed or damaged by electricity.

During the design, construction, installation and operation of hydrogen operating plant the requirements of the Electrical Safety Act 2002 and *Electrical Safety Regulation 2013* must be met.

The Electrical Safety Act includes requires the duties of care relevant to the situation are met (a person or business may have more than one duty). This includes:

- primary duty of care on all businesses that they operate in a way that is electrically safe,
- duties on designers of electrical installations and electrical equipment to ensure the equipment or installation is designed to be electrically safe and information is provided about the way the electrical equipment or installation must be used or installed to ensure the equipment or installation is electrically safe,
- duties on manufacturers and importers of electrical equipment when made is electrically safe and is tested and examined to ensure it is electrically safe, and

- duties on installers and repairers of electrical equipment or electrical installations to ensure the electrical equipment or installation is electrically safe and is tested to ensure it is electrically safe.

Refer to *Electrical Safety Act 2002* Part 2 for all duties.

Where equipment is suitable for household, personal or similar situations the requirements of the in-scope electrical equipment safety system (EESS) also apply.

All electrical installations are required to comply with *AS/NZS 3000 – electrical installations (also known as the wiring rules)*.

It is electrical work to install electrical equipment in an electrical installation or to repair electrical equipment or electrical installations. All electrical work must be performed by a suitably licensed electrical worker and if the performance of electrical work is conducted under a contract of work, it must be performed under a Queensland electrical contractor licence.

The Electrical Safety Act specifies the requirements of the following key Australian electrical safety standards must be met:

- AS/NZS 3000:2018 – *Electrical installations (known as the Australian/New Zealand Wiring Rules*,
- The AS/NZS 60079 series for hazardous areas equipment and installations, and
- AS/NZS 3820 – *Essential safety requirements of electrical equipment.*

A2.3 – National Heavy Vehicle Legislation

The National Heavy Vehicle Regulator (NHVR) administers one set of laws (the HVNL, Heavy Vehicle National Law) for heavy vehicles over 4.5 tonnes gross vehicle mass. The HVNL consists of the Heavy Vehicle National Law and five sets of regulations.

The HNVL does not regulate new vehicles. This is captured by the Australian government legislation and the requirement are set in the Australian Design Rules (ADR). Generally, the HVNL applies to vehicles having modifications post being supplied for use.

The HVNL s84 defines that a modification to a vehicle includes:

- the addition of a component, or
- a change to the vehicle from the manufacturer's specification.

A modification under NHVL could include:

- Addition of a gas system, supplied by an on-board hydrogen canister that delivers hydrogen to the existing diesel engine for blending
- Removing and replacing a diesel engine with a hydrogen fuel cell from a vehicle that has been approved for use under ADR.

For the modifications above, under the HVNL s85, approvals must be approved by:

1. An approved examiner under the HVNL s86, or
2. The National Heavy Vehicle Regulator.

In addition to the provisions in the NHVL, requirements under the P&G safety legislation apply.

The requirements under WHS legislation also need to be considered, for example, design and plant registration for pressure vessels.

A2.4 – Professional Engineers Legislation

To carry out a professional engineering service in Queensland or for Queensland, engineers are required to be registered with the Board of Professional Engineers Queensland (BPEQ). The only exceptions are if an unregistered person carries out the professional engineering service under the direct supervision of an RPEQ or the service is carried out only in accordance with a prescriptive standard. Once an engineer is registered they are awarded the protected title RPEQ.

The Professional Engineers Act 2002 provides for the registration of professional engineers, and for other purposes. It is an offence to provide a *professional engineering service* while unregistered (unless supervised).

Further guidance is provided at this link: BPEQ.

A2.5 – Rail Safety Legislation

The main purpose of the Rail Safety legislation is to provide for safe railway operations in Australia through effective management of safety risks associated with railway operations. The rail safety legislation includes:

- Rail Safety National Law (Queensland) Act 2017
- Transport Infrastructure (Rail) Regulation 2017

For hydrogen powered rolling stock, the requirements of the Rail Safety National Law (Queensland) Act 2017 and Transport Infrastructure (Rail) Regulation 2017 must be met as well as gas safety requirements under P&G safety legislation.
Where hydrogen gas systems are installed on rolling stock requirements for gas device approval and authorised installers apply.
The Rail Safety National Law (Queensland) Act 2017 contains rail safety duties that are a shared responsibility of, rail transport operators, rail safety workers and the Rail Safety Regulator (ONRSR) as well as other persons.
This includes:

- Managing risks associated with the carrying out of rail infrastructure operations or rolling stock operations
- Managing risk to eliminate or minimise risk so far as is reasonably practicable.

Refer to Rail Safety National Law (Queensland) Act 2017 Part 3 for all duties.

Appendix 3 - Case Studies

Table 9 summarises hydrogen project cases studies in Queensland.

Table 9 Hydrogen project case studies.

Type	**Approvals Pathway**
Packaged power generation unit including small electrolyser, hydride storage canister and fuel cell.	The fuel cell is a type B device and is part of a fuel cell gas system [P&G Act s724 (3)]. A packaged unit is typically contained in one enclosure and assembled by one manufacturer. The fuel cell gas system must be designed by an appropriately qualified engineer As there are no prescriptive standards, the proponent is required to submit a technical submission of the design to an appropriate GDAA Electrical and other approval requirements were assessed separately to the gas device approval
Small demonstration scale packaged units that may include electrolyser, hydrogen storage canister or cylinder, and fuel cell.	The packaged unit is a type B device and considered as a fuel cell gas system [P&G Act s724 (3)]. A packaged unit is typically contained in one enclosure and assembled by one manufacturer. The fuel cell gas system must be designed by an appropriately qualified engineer As there are no prescriptive standards, the proponent is required to submit a technical submission of the design to an appropriate GDAA. The review process should consider relevant safety issues such as ventilation, separation distances, emergency shutoff etc. Electrical and other approval requirements were assessed separately to the gas device approval
Low-risk Hydrogen System	An educational training aid defined in section 7.4 of this code. Approval pathway described in section 7.4.4 of this code.

Type	Approvals Pathway
Imported hydrogen fuel cell light vehicles which met ADR for use on roads.	RSHQ determined that the device within the vehicle was a type B device and in the legislative jurisdiction of the P&G Act [P&G Act s724 (3)]. The hydrogen fuel system in the vehicles is designed and certified to ADR 110/00. The installation had been completed by competent persons. It was determined that ADR 110/00 addresses gas safety risks. The Chief Inspector has approved vehicles that are certified to ADR 110/00 for use in Queensland. No further gas device approvals are required.
A hydrogen refuelling station including onsite hydrogen production and storage.	RSHQ determined that the refuelling station supplied via an onsite electrolyser is operating plant [P&G Act s670, P&G Safety Reg s11]. The operator prepared an SMS [P&G Act s674]. A commissioning notice was submitted to RSHQ. The relevant requirements for WHS and Electrical Safety also apply.
Hydrogen facility that injects hydrogen gas into an existing gas distribution pipeline system.	A blending facility is a type of operating plant [P&G Act s670, P&G Safety Reg s11]. The operator is required to prepare a SMS [P&G Act s674]. A commissioning notice must be submitted to RSHQ. The relevant requirements for WHS and Electrical Safety also apply. The operator also needs to ensure the gas quality requirements are met [P&G Act 620, P&G Safety Reg 72]. The operator consulted with RSHQ on safety and quality control throughout the planning stages of the project.

Type	Approvals Pathway
Hydrogen production facility that does not meet MHF criteria	A production facility is a type of operating plant [P&G Act s670(5)(d), P&G Safety Reg s11(3)(e)]. The operator is required to prepare a SMS [P&G Act s674]. A commissioning notice must be submitted to RSHQ. The relevant requirements for WHS and Electrical Safety also apply. The operator consulted with RSHQ on safety throughout the planning stages of the project.
Large scale hydrogen production facility for export.	The production facility which includes storage is a Major Hazard Facility (MHF). The hydrogen production is a manufacturing activity. For these reasons the production facility is regulated by WHS. Relevant hydrogen pipeline may be operating plant under the P&G safety legislation.
Pipeline transporting hydrogen fuel or regulated hydrogen from the production facility to the port liquefaction facility.	RSHQ have determined that the hydrogen transport can utilise pipeline and/or distribution pipeline as defined in P&G Act s16 and s16A respectively. Both pipelines and distribution pipelines are operating plants and require Safety Management System. Note: There is a difference between a pipeline and a distribution pipeline – A pipeline has a pipeline license (PPL) and a distribution pipeline does not. Both are operating plant but if a pipeline license is issued then some WHS provisions are excluded

Appendix 4 - General hydrogen safety considerations

A4.1 – International standards for mobile fuel cell gas systems

A number of international standards exist that may provide guidance for the design, installation and use of a fuel cell gas system.

- SAE J2578 Recommended Practice for General Fuel Cell Vehicle Safety.
- SAE J2579 (R) Standard for Fuel Systems in Fuel Cell and Other Hydrogen Vehicles.
- SAE J2600 Compressed Hydrogen Surface Vehicle Fueling Connection Devices
- IEC 63341 series Railway applications – Rolling stock – Fuel cell systems for propulsion
- Gaseous Hydrogen Installations (published by ANZIGA)

These documents are not reference standards.

A4–2 - Hydrogen refuelling stations standards

Hydrogen refuelling stations are a critical component to unlocking the opportunity for hydrogen mobility and while a number of standards exist, the framework is evolving.

In Australia, hydrogen refuelling stations have been built to a number of standards. While development of a complete safety framework is well underway in Australia, there is further work to be completed.

A number of existing Australian Standards apply to refuelling stations using hydrogen e.g. *AS 3000 – The wiring rules*.

To support the uptake of hydrogen in the mobility industry, the *ME-093 Hydrogen Technologies Committee* has adopted thirteen ISO (International Organization for Standardization) standards specific to hydrogen refuelling stations shown in Table 10.

Table 10 ISO standards that have been adopted as Australian Standards relevant for hydrogen refuelling stations.

Standard	**Designation**
AS 22734	Hydrogen generators using water electrolysis – Industrial, commercial, and residential applications
AS 16110.1	Hydrogen generators using fuel processing technologies, Part 1: Safety
AS ISO 16110.2	Hydrogen generators using fuel processing technologies, Part 2: Test methods for performance
SA TS 19883	Safety of pressure swing adsorption systems for hydrogen separation and purification

Standard	Designation
AS ISO 16111	Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride
AS ISO 19881	Gaseous hydrogen – Land vehicle fuel containers
AS 19880.1	Gaseous hydrogen - Fuelling stations, Part 1: General requirements
AS 19880.3	Gaseous hydrogen – Fuelling stations, Part 3: Valves
AS 26142	Hydrogen detection apparatus – Stationary applications
AS ISO 14687	Hydrogen fuel quality – Product specification
AS ISO/TR 15916	Basic considerations for the safety of hydrogen systems
AS ISO 19880.8	Gaseous hydrogen — Fuelling stations, Part 8: Fuel quality control
AS ISO 19880.5	Gaseous hydrogen - Fuelling stations, Part 5: Dispenser hoses and hose assemblies

There are a number of International Standards that exist for hydrogen refuelling stations. Key standards include:

- the ISO 19880 Series (Except the standards listed in Table 10)
- Guidance on hydrogen delivery systems for refuelling of motor vehicles, co-located with petrol fuelling stations (published by Energy Institute, London)
- NFPA 2 - Hydrogen Technologies Code
- EIGA Doc 6/02 - Safety in storage, handling and distribution of liquid hydrogen
- EIGA Doc 211/17 - hydrogen vent systems for customer applications
- SAE J2799, SAE J2600 and the SAE J2601 series
- ASME B31.12 - Hydrogen Piping and Pipelines. Gaseous Hydrogen Installations (published by ANZIGA)
- Hydrogen Cylinders and Transport Vessels (published by ANZIGA)
- Hydrogen Pipeline Systems (published by ANZIGA)
- Hydrogen Vent Systems for Customers Applications (published by ANZIGA)

The International Standards listed above have not been adopted in Australia; they may be used for guidance while ensuring compliance with relevant Australian requirements.

A4.4 – Periodic inspection

For mobile gas systems, periodic inspections should be carried out to verify ongoing safety of the installation. Typical items that should be inspected include:

- Gas tightness
- Container test date

- Pressure vessel external inspection
- Leak detection instrument
- Automatic shut-off operation

A4.5 - Workshops

When parking and storing a hydrogen vehicle the workshop, garage and carpark need to be considered to ensure a safe work environment.

Currently, there are no Australian Standards for hydrogen workshops specifically; however, following standards may provide some guidance:

- *AS 2746 – Working areas for gas fuelled vehicles*, while hydrogen is not currently within the scope of the standard it provides good information on the considerations for workshop design that may be applied when designing hydrogen workshops

The National Fire Protection Agency (NFPA*)* has also produced the following codes:

- *NFPA2 - Hydrogen Technologies Code* (NFPA2) Chapter 18, which provides guidance on minor repair garages, and
- *NFPA30 - Flammable and Combustible Liquids Code*, which provides guidance on major repair garages.

Requirements or recommendations from NFPA standards should be taken in context with other requirements that might apply in Australia. Including application of the AS/NZS 60079 series for ventilation and requirements of electrical equipment in hazardous areas.

General considerations for workshops include the following:

- design of the facility
- requirements for electrical installation and hazardous areas
- requirements for ventilation, and
- specific considerations for industrial truck repair garages.

Other Considerations:

During normal operation, hydrogen gas is expected to permeate through the walls of plastic materials such as the tank liners of all-composite tanks and through O-ring seals. This is known as fuel system permeation.

A limit of the fuel system permeation rate is set to control the risk of fire in confined spaces such as vehicle garages.

Internationally, the method for calculating the limit is based on typical air changes in the garage and the lower flammability limit of hydrogen in air. The resultant fuel system permeation limit rate is specified to be 46 millilitres per hour per litre water tank capacity for each tank in the fuel system for ventilated enclosures.

For non-ventilated enclosures, the limit should be calculated and compared against the fuel system permeation rate.

A4.6 - Pipelines and gas distribution networks

For pipelines outside of the scope of AS 4645, the AS 2885 series applies. The AS 2885 series is predominantly for hydrocarbon fluid or carbon dioxide and was not developed with consideration for hydrogen service. The AS 2885 series does allow for transport of other fluids, including non-hydrocarbon gases, under AS 2885.0, Clause 1.2.2, but special considerations are required.

The Future Fuels Cooperative Research Centre has recently published hydrogen pipelines Code of Practice that is currently available to member organisations and will be made public soon. This document provides guidance on the design, construction and operation of hydrogen pipelines in Australia. Further guidance on this document is provided at this link: Hydrogen Pipeline Code of Practice: Design, Construction and Operation.

Other resources:

- Hydrogen Pipeline Systems (published by ANZIGA)

A4.7 - Separation distances for hydrogen facilities

Currently, no Australian Standards provide guidance for hydrogen separation distances. The provision of adequate distances or separation zones around equipment is a fundamental consideration for a safe layout of plant, equipment, and buildings. However, work is underway for converting SA TS 5359 to a full Australian Standard.

Separation distances are used to:

- Protect people from harmful events
- Protect buildings, structures and sensitive receptors from damage
- Prevent escalation (of events) within the facility.

Hydrogen in air has a wide explosive range and hydrogen itself has a very low ignition energy. In the event of a leak, these properties can lead to the any of the following:

- jet fire (the leak is ignited after release, resulting in the formation of a long, stable flame from the source of the leak)
- flash fire (a flash fire occurs when a cloud of flammable gas mixed with air is ignited)
- vapour cloud explosion [VCE] (the leak is within a confined area, accumulates, and is subsequently ignited). *Note, confinement should be avoided; hydrogen is significantly lighter*

than air and can readily disperse if there is adequate ventilation.

For each credible event (ignoring likelihood), the unmitigated consequences are evaluated to determine the separation distance. Typically, event contours are added to layout drawings showing the separation distances associated with each event and each source.

The location of facility plant and equipment should ensure populated buildings, critical assets, and public access are outside the worst case event contour zones (refer State Code 21). Where this is not possible, the likelihood of the events and their consequences will need to be evaluated using risk assessment techniques. Engineering controls should be implemented to reduce the risk to as low as reasonably practicable (ALARP) and to demonstrate that the risk is below the tolerable risk target applicable to the land use.

Thus, the final layout and separation distances take into account the following:

a) The nature of the hazard(s)
b) The equipment design and the operating conditions (pressure, temperature, inventory) and/or physical properties of the substance under those conditions
c) Any external mitigating protection measures (e.g., fire walls, diking, deluge system, etc.) which reduce the escalation of the incident
d) The "object" which is protected by the separation distance, i.e., the harm potential (e.g., people, environment or equipment).

Table 11 summarises useful international standards and codes for evaluating separation distances and consequences.

Table 11 Standards that provide guidance on separation distances.

Standard	**Guidance Provided**
Guidance on hydrogen delivery systems for refuelling of motor vehicles, co-located with petrol fuelling stations (published by Energy Institute, London)	Separation distances for hydrogen dispensing facilities
NFPA 2 Hydrogen Technologies code	Minimum separation distances based on pressure and maximum pipe size.
API 521	Defines heat radiation levels (of interest) and their consequences.
API 752 / 753	Management of Hazards Associated With Location of Process Plant Permanent / Portable Buildings

A4.8 - Pressure Vessel Design Registration

The WHS Act Sch.5, provides the relevant information for plant and plant design registrations.

An indicative list of the documents that are required for design registration:

- Basis of Design
- Calculations
- Drawings
- Datasheets
- Technical specifications
- Bill of materials
- Statement signed by the designer
- Design verification statement.

Further guidance on the design registration for plant items is provided at this link: Plant Design Registration.

Appendix 5 - Resources

Table 12 provides a list of useful hydrogen related resources.

Table 12 List of useful hydrogen related resources.

Resource	Description	Details
HyResource	Hydrogen related research.	https://research.csiro.au/hyresource/
Hydrogen Investor Toolkit	Hydrogen project development in Queensland.	https://www.statedevelopment.qld.gov.au/__data/assets/pdf_file/0023/17843/queensland-hydrogen-investor-toolkit-24.pdf
Standard Australia ME-093 Hydrogen Technologies	Australia standards for hydrogen.	https://www.standards.org.au/getmedia/da6c6fcb-96bb-4b45-a1b0-1f2882c03ec4/ME-093-Hydrogen-Technologies-Strategic-Work-Plan.pdf.aspx
Future Fuels CRC	Hydrogen related research.	https://www.futurefuelscrc.com/
Fuel Cell Standards	International standards for hydrogen.	https://www.fuelcellstandards.com/
H2Tools	International website for hydrogen safety.	https://h2tools.org/
ISO/TC 197 Hydrogen technologies	ISO standards for hydrogen.	https://www.iso.org/committee/54560.html
ANZIGA	Publication of EIGA Hydrogen Documents	Publications – Australia New Zealand Industrial Gas Association (anziga.org)
ADG	Australian Dangerous Goods Code for transport of Dangerous Goods (including hydrogen)	https://www.ntc.gov.au/codes-and-guidelines/australian-dangerous-goods-code
HIAD 2.1	The Hydrogen Incident and Accidents Database – European Commission	https://minerva.jrc.ec.europa.eu/en/shorturl/capri/hiadpt

Appendix 6 – Contributors, Reviewers and Advisors

Table 13 is a list of the Contributors, Reviewers and Advisors involved in the preparation of the Code.

Table 13 List of Contributors, Reviewers and Advisors.

Contributors, Reviewers and Advisors	
AECOM Australia	Hyundai Motor Company Australia
Ark Energy	Hyzon Motors Australia
Armarna Energy	Kandls Engineering
Australian Gas Networks	Master Plumbers Association of Queensland
Australian Marine Safety Authority	National Heavy Vehicle Regulator
Assure International	North Queensland Hydrogen Industry Work Group
Australian Hydrogen Council	Origin Energy
Board of Professional Engineers of Queensland	Plumbing and Pipe Trades Employees Union Queensland
Department of Resources (Queensland)	Queensland Electrical Safety Office
Endua	Queensland University of Technology
Energy Safe Victoria	Risk and Energy Services
Federal Chamber of Automotive Industries	Standards Australia
Foton Mobility Australia	Stanwell
Gas Energy Australia	TfA Project Group
Gas Technical Regulator Committee	Vehicle Standards – Department of Infrastructure, Transport, Regional Development and Communications
GHD	Viva Energy
GPA Engineering	Western Australian Department Industry and Mines
H2Q	Workplace Health and Safety Queensland
H2H Energy	Advanced Type B Gas Solutions

Appendix 7 –Legislative Amendments

Appendix 7 collates the legislative amendments that were progressed to implement the Code. The amendments were informed by stakeholder feedback to address shortcomings of previous legislative provisions.

- Updated definition of gas fuel system to: "A gas system that supplies gas as a fuel to an engine or mobile fuel cell"
- Where hydrogen is the fuel gas the prescribed quality is:
    - AS/ISO 19880.8 Gaseous hydrogen fuelling stations Part 8: Fuel quality control clause 8 - Hydrogen quality assurance methodology; or
    - SAE J2719 - Hydrogen Fuel Quality for Fuel Cell Vehicles
- If an operator proposes to supply gas through a distribution network with more than 15% hydrogen, they may meet the safety requirement by giving the chief inspector notice stating that the supply is outside the allowed limits of AS/NZS 4645 and that they have conducted a formal safety assessment ensuring that an equal or less level of risk has been achieved.
- All hydrogen fuel gas delivery networks are operating plant.
- This Code is added as a safety requirement in Schedule 2 of the P&G Safety Reg for the design of gas systems and devices.
- No odour is prescribed for hydrogen when safety requirements of this Code are met.

Appendix 8 – UEG Gas Industry Training Package

The following qualifications that have been updated to include hydrogen:

- UEG20122 Certificate II in Gas Supply Industry Operations
- UEG30122 Certificate III in Gas Supply Industry Operations
- UEG40222 Certificate IV in Gas Supply Industry Operations

These include the following new and revised units:

- UEGNSG102 Prepare safe design specifications of a gas system
- UEGNSG205 Commission or decommission gas distribution pipelines
- UEGNSG206 Construct and lay copper and stainless steel gas distribution pipelines
- UEGNSG208 Construct and lay large copper gas distribution pipelines
- UEGNSG209 Construct and lay polyethylene gas distribution mains
- UEGNSG211 Construct and lay steel gas distribution pipelines
- UEGNSG214 Coordinate and conduct gas distribution pipeline repair and modifications
- UEGNSG215 Coordinate construction, laying and testing of gas distribution pipelines

- UEGNSG303 Carry out transmission pipeline construction work activities
- UEGNSG304 Commission or decommission gas transmission pipelines
- UEGNSG306 Control gas processing, storage or regasification operations in an LNG storage facility
- UEGNSG307 Coordinate the operation of relevant plant and equipment for transmission pipeline construction
- UEGNSG309 Coordinate transmission pipeline construction operations
- UEGNSG312 Inject gas into underground storage
- UEGNSG313 Monitor and operate flow control, pressure measuring and regulating devices for gas transmission
- UEGNSG315 Withdraw gas from underground storage
- UEGNSG316 Work in proximity of transmission pipeline construction plant and equipment
- UEGNSG509 Remotely monitor and operate gas transmission flow and pressure measuring and regulating devices
- UEGNSG701 Disconnect and reconnect data logging equipment
- UEGNSG702 Disconnect and reconnect small capacity gas meters
- UEGNSG703 Fault find and repair data logging equipment
- UEGNSG704 Install and commission data logging equipment
- UEGNSG707 Process data logging information
- UEGNSG709 Process meter reading information using appropriate technology
- UEGNSG710 Read and record meter readings
- UEGNSG715 Use data logging equipment
- UEGNSG901 Apply safety practices, procedures, and compliance standards for handling hydrogen gas
- UEGNSG902 Commission, operate and maintain electrolysers
- UEGNSG903 Fault find and repair hydrogen storage equipment
- UEGNSG904 Inject hydrogen gas into distribution networks
- UEGNSG905 Monitor and control hydrogen in gas distribution networks
- UEGNSG906 Undertake routine hydrogen storage operations

Information from this appendix is sourced from:

National Training Register - UEG Gas Industry Training Package

Appendix 9 – Interpretation of AS/ISO 19880.8 for Prescribed Quality

Table 14 sets out terms in Clause 8 of AS/ISO 198810.8 and alternate terms for their application under the P&G Safety Reg

Table 14: Alternate terminology for applying AS/ISO 19880.8 Clause 8

Term used in AS/ISO 19880.8 Clause 8	**Term to be applied under the P&G Safety Reg**
fuelling station	hydrogen fuel supplier
fuelling station nozzle	supply point
fuel cell vehicle FCV fuel cell powertrain fuel cell car car	consumer
fuelling events	instances of supply
vehicle	gas device

Considerations in applying AS/ISO 19880.8 Clause 8 to determine gas quality

- Resulting risk must be as low as reasonably practicable
- Performance impact should also consider any potential emissions and safety or health risks to air quality
- Table 4 in Clause 8.4 of AS/ISO 19880.8 can be applied to supply of hydrogen from refuellers to vehicles but for other consumers consideration should be given to the impact of impurities on the device(s) being supplied