



Guideline for Gas Safety and Compliance  
Information required for gas device (type B) approval

**Fuel Cell Gas System**

Petroleum and Gas Inspectorate

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# Summary

This guideline outlines the technical content and format of information required for assessment and approval of gas device type B (Fuel Cell Gas System) in Queensland.

The document or file that provides information for assessment and approval of a gas device type B is traditionally referred to as a 'technical submission'.

The Petroleum and Gas Inspectorate regulates the gas industry by applying the *Petroleum and Gas (Production and Safety) Act 2004* (the Act).

The purpose of the Act is to facilitate, regulate and develop a safe, efficient and viable fuel gas industry.

This includes ensuring minimum standards for the design, construction and safe operation of gas devices (type B).

For the purpose of this guide, the term a 'Fuel Cell Gas System' means a gas device (type B).

There are other devices defined as 'type B' under the Act, but the technical content and format required for the process of approval differ from that for a Fuel Cell Gas System. Further information is available on the Inspectorates website.

A Fuel Cell Gas System (FCGS) is a device that uses the chemical energy of fuel gas (hydrogen) to produce electricity. They can be:

- Mobile FCGS, used in vehicles and vessels to power an electric motor for propulsion.
- Stationary FCGS, in fixed applications or packaged units for electrical power generation.

FCGS are type B gas devices that include a fuel cell and any of the following:

- hydrogen production unit and storage containers
- pipes, fittings and/or flues
- ventilation
- instrumentation and process controllers

The process of FCGS design approval is based on an independent review framework, including;

1. the development of design documentation that provides appropriate and adequate information to demonstrate compliance with the legislative *safety outcome* requirement, through:
  - appropriate hazard identification, risk management and mitigation;
  - reference to applicable safety requirements, reference standards and guidance standards; and
  - detailed installation, operation, and maintenance instructions.

**Note:** *Safety outcome* for the design of gas device means that the device is designed to use fuel gas safely and its use will not cause harm to persons, domestic animals, or property<sup>1</sup>.

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<sup>1</sup> Petroleum and Gas (Safety) Regulation 2018 s138E

2. submission of the information (technical submission) to an appropriate Gas Device Approval Authority for assessment and approval for installation and use; and
3. installation and commissioning of the FCGS in compliance with the approved technical submission and any other legislative requirements (standards and/or code of practice).

## Technical Content

The information required for the purpose of assessment and approval of a FCGS (gas device type B) will depend on the design, complexity, location, and application of the device. However, as a minimum and where relevant, the following should be provided:

- Device type, manufacturer, model, and serial number
- Name, qualifications, registration, and contacts of device designer
- Address and location where device is to be installed
- Contact details of owner, operator, or proposed operator
- Name and authority of installer (and commissioning person if different)
- Name and contact for risk assessment author (including participants)
- Instructions for installation, operation, and maintenance
- Device markings, including details of data plate
- Description of device operation and process
- Process and instrumentation diagrams
- List and details of Fuel Cell Gas System components
  - Hydrogen production unit
  - Storage type, volume, and pressure
  - Fuel cell type and details
  - Leak detection provisions
- Nominal gas consumption rate
- Purge flow rate during purge periods
- Details of any pressure reliefs and discharge vents; including location, cross-sectional area
- Schematic drawing of the system and fuel valve train specifying all components
- Schematic electrical wiring diagram showing the safety and control circuits
- Compliance documentation for hazardous area assessments
- Compliance documentation for individual components within the Fuel Cell Gas System
- Compliance documentation for any Programmable Electrical Systems (PES) or Programmable Logic Controls (PLC)
- Cabinetry and enclosure ventilation requirements and methods of provision
- Discharge vent line design and location requirements

Appendix 1 provides a list of standards to be considered in the design, construction, assessment, and approval of a Fuel Cell Gas System.

Appendix 2 can also be used as a self-check tool for persons preparing a technical submission or as a method providing feedback where a submission does not demonstrate compliance, and further evidence is required for particular item(s).

When preparing the technical submission content, the following should be noted:

- methodology and calculations must be included to support outcomes
- email trails and letters from component and equipment manufacturers are not considered evidence of compliance
- schematic drawings must be accurate, legible and relevant

A risk assessment is required for the design and installation of the device in its installed location.

## Format

The information should be provided in a logical format that is easily followed and interpreted by the Gas Device Approval Authority. Where supporting evidence is of significant size, complexity or is under commercial in confidence arrangements, it should be provided as a referenced attachment.

Dependent on the nature and complexity of the device the submission may be presented in a report style format, or for more complex designs, or summary document that references the particular attachments for methodology and calculations.

When considering the format of the technical submission, the following should be noted:

- Gas Device Approval Authorities are being encouraged to reject technical submissions that are not presented in an acceptable format
- Gas Device Approval Authorities are being encouraged not to provide advice or guidance in relation to submission content – advice and guidance may breach the conditions of their authority and be considered a design service
- technical submissions that have to be submitted multiple times will increase the cost of final approval
- at the conclusion of the approval and installation process, the installer is to provide the technical submission (with sensitive or commercial in confidence material removed) to the gas device owner, operator, or proposed operator as part of the commissioning process.

# Appendix 1. Safety requirements and standards

## Safety requirements:

- AS/NZS 5601.1 Gas installations, Part 1: General installations
- AS/NZS 60079.0 Part 0 'Equipment—general requirements'
- AS/NZS 60079.10.1 'Explosive atmospheres', Part 10.1 'Classification of areas—explosive gas atmospheres'
- AS 61508 'Functional safety of electrical/Electronic/programmable electronic safety-related systems' Parts 0 to 7.
- AS/IEC 61511 'Functional safety—safety instrumented systems for the process industry sector', Parts 1, 2 and 3.

## Reference standards - stationary fuel cell gas systems:

- AS 62282.3.11:2021 Fuel cell technologies, Part 3.100: Stationary fuel cell power systems – Safety (IEC 62282-3-100:2019 (ED 2.0), MOD)
- AS 62282.3.300:2021 Fuel cell technologies, Part 3.300: Stationary fuel cell power systems – Installation (IEC 62282-3-300:2012 (ED.1.0),MOD)
- AS 22734 Hydrogen generators using water electrolysis – Industrial, commercial, and residential applications
- AS 16110 series Hydrogen generators using fuel processing technologies Part 1 – Safety
- AS 16110.2 Hydrogen generators using fuel processing technologies Part 2: Test methods for performance
- 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
- AS 16110 series Hydrogen generators using fuel processing technologies
- AS 4041-2006 Pressure piping

## Reference standards - mobile fuel cell gas systems:

- UN Regulation No. 134 - Hydrogen fuel cell vehicle safety (UNR134)
- AS ISO 19881 Gaseous hydrogen – Land vehicle fuel containers

## Guidance standards - stationary fuel cell gas systems:

- SA TS 19883 Safety of pressure swing adsorption systems for hydrogen separation and purification
- NFPA 2 - Hydrogen Technologies Code (stationary)
- EIGA Doc 6/02 - Safety in storage, handling, and distribution of liquid hydrogen (stationary)
- EIGA Doc 211/17 - hydrogen vent systems for customer applications (stationary)
- ASME B31.12 - Hydrogen Piping and Pipelines. (stationary)

## Guidance standards - mobile fuel cell gas systems:

- AS ISO 16111 Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride
- AS 26142 Hydrogen detection apparatus
- IEC 62282-4-101: Fuel cell technologies – Part 4-101: Fuel cell power systems for propulsion other than road vehicles and auxiliary power units (APU) – Fuel cell power systems for electrically powered industrial trucks – Safety
- IEC 62282-4-102: Fuel cell technologies - Part 4-102: Fuel cell power systems for propulsion other than road vehicles and auxiliary power units (APU)
- 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 Fuelling Connection Devices (mobile)
- SAE J2601 Fuelling Protocols for Light Duty Gaseous Hydrogen Surface Vehicles (mobile)

## Appendix 2. Technical information checklist

Item	Information / details required	Safety requirement/ Reference standard/ Guidance standard	Information submitted	Compliance demonstrated	Comment
<b>Device details</b>					
	Manufacturer				
	Model				
	Serial number				
<b>Device designer – Mechanical</b>					
	Name				
	Address				
	Qualifications/Engineering registration				
	Contact phone number				
	Contact email				
<b>Device designer – Electrical</b>					
	Name				
	Address				
	Qualifications/Engineering registration				
	Contact phone number				
	Contact email				
<b>Device designer – Process/Chemical</b>					
	Name				
	Address				
	Qualifications/Engineering registration				
	Contact phone number				
	Contact email				
<b>Owner, operator, or proposed operator</b>					
	Name				

	Address				
	Location of device installation if different				
	Contact phone number				
	Contact email				
<b>Installer/commissioning person</b>					
	Installer – GWA number				
	Phone				
	Email				
	Commissioning person – GWA				
	Phone				
	Email				
<b>Address and location of device</b>					
	Unit/Number of Street				
	Suburb				
	Site location (i.e., plant room 1)				
<b>Mobile Fuel Cell Gas Systems – not applicable to stationary FCGS</b>					
	Vehicle make				
	Vehicle model				
	VIN:				
	Registration No#				
<b>Risk Assessment</b>					
	Author name				
	Company/organisation				
	Qualifications				
	Phone				
	Email				
<b>Hazardous area assessment</b>					
	Author name				
	Qualifications				
	Phone				
	Email				
	Compliance with AS/NZS67009.10.1				



Hazardous area assessment					
	Auditors name				
	Auditors number				
	Phone				
	Email				
	Compliance with AS/NZS67009.14				
Programmable Electrical Systems (PES) or Programmable Logic Controls (PLC) for safety instrumented systems					
	Manufacturer				
	Model				
	Serial number				
	Design standard				
	Approval/certification number				
	Approval body/organisation				
Instructions - <i>Installation instructions should contain all information required for the purpose of installation in particular</i>					
	Installation				
	Operation				
	Maintenance				
Markings - <i>Each gas device shall include a data plate that is legibly, clearly and permanently marked and warning markings shall be provided where required</i>					
Device operation and process					
	Description of device operation and process				
	Process and instrumentation diagrams				
Hydrogen production unit					
	Manufacturer				
	Model				
	Serial number				
	Production type				
	Feedstock				
	Date of manufacturer				
	Output pressure				
	Design standard				

	Approval/certification number				
	Approval body/organisation				
<b>Hydrogen storage</b>					
	Type				
	Serial number				
	Storage type				
	Storage pressure				
	Design standard				
	Approval/certification number				
	Approval body/organisation				
	Description and drawings provided				
<b>Fuel Cell</b>					
	Type (stationary/mobile)				
	Manufacturer				
	Model				
	Serial number				
	Output capacity				
	Type of Gas				
	Date of manufacturer				
	Design standard				
	Approval/certification number				
	Approval body/organisation				
	Description and drawings provided				
<b>Leak detection provisions</b>					
	Manufacturer				
	Model				
	Serial number				
	Date of manufacturer				
	Leak sensor type (leak/pressure/other)				
	Design standard				
	Approval/certification number				
	Approval body/organisation				
	Description and drawings provided				

Pressure relief provisions					
	Type				
	Location				
	Set point				
	Cross-sectional area				
Schematic drawing and diagrams					
	Schematic drawing of the system and fuel valve train specifying all components				
	Schematic electrical wiring diagram showing the safety and control circuits				
Other technical information					
	Nominal gas consumption				
	Purge flow rate during purge periods				
Device location specific information					
	Ventilation requirements				
	Natural / Mechanical				
	Ventilation flow rate (m <sup>3</sup> /hr)				
	Vent pipes requirements and location				
Additional information					