

**INFORMATION  
SHEET**

# Hydrogen Refuelling Stations

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## **ABOUT STANDARDS AUSTRALIA**

Standards Australia is an independent, non-government, not for profit organisation. We are the nation's peak non-government standards development organisation.

The work of Standards Australia and our staff, stakeholders, members and contributors enhances the nation's economic efficiency, international competitiveness and contributes to a safe and sustainable environment for all Australians.

Standards Australia's vision is to be a global leader in trusted solutions that improve life – today and tomorrow.



# Hydrogen Refuelling Stations

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The transport sector has been identified as one of the early off-takers of hydrogen, and refuelling infrastructure is key to unlocking this opportunity.

In Australia, there are a small number of operational hydrogen refuelling stations. These operating facilities have all been built to a variety of Australian and international standards and codes.

This information sheet has been prepared to provide guidance on Australian and international codes and standards suitable for gaseous and liquid hydrogen refuelling stations. This information sheet includes:

1. Identification of the typical activities and equipment used,
2. Relevant Australian and international standards and codes,
3. A list of key safety regulators that may regulate activities, and
4. Future adoptions and developments for Australia.

The information sheet is intended to summarise the *current* Australian industry knowledge for the application of standards and codes for hydrogen refuelling stations.

There are limitations to this document:

- This list of standards and codes is not exhaustive.
- Standards shall be reviewed in a legislative context to ensure they meet the obligations of all Australian law.
- The information sheet is developed for information only and should not be used as a substitute for appropriate consultation with the relevant engineering firms and authorities.

# Typical station activities and equipment

All stations have similar equipment, but employ different designs depending on how the hydrogen is produced, delivered, stored and dispensed.

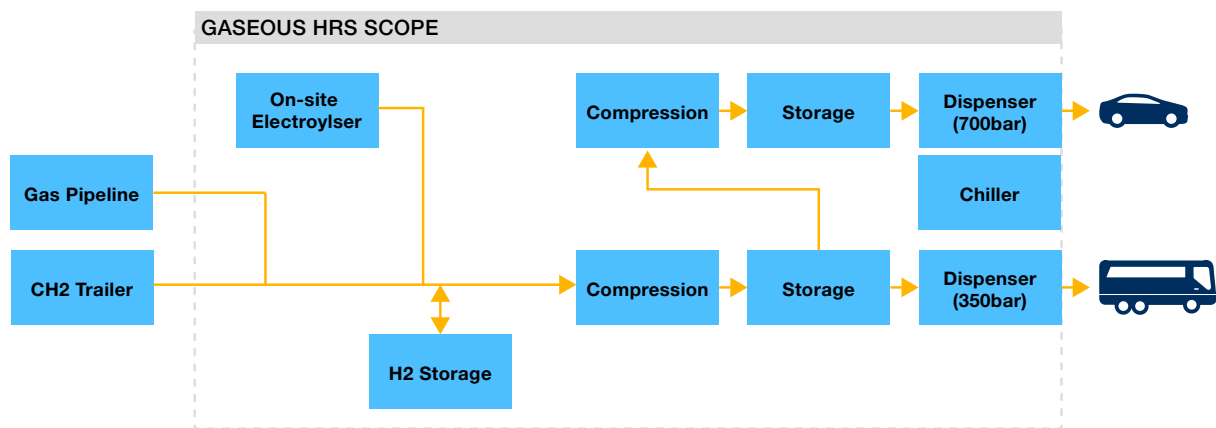
A summary for gaseous and liquid hydrogen refuelling stations are provided below.

## Gaseous hydrogen refuelling station

Stations are in operation and under construction for light-duty vehicles (passenger vehicles), heavy-duty vehicles (trucks and buses), and material handling equipment. Stations dispense hydrogen as a compressed gas at pressures of 70MPa for light-duty vehicles and 35MPa for other vehicles.

Figure 1 shows a typical gaseous hydrogen refuelling station and key hydrogen systems.

**Figure 1. Typical gaseous station**

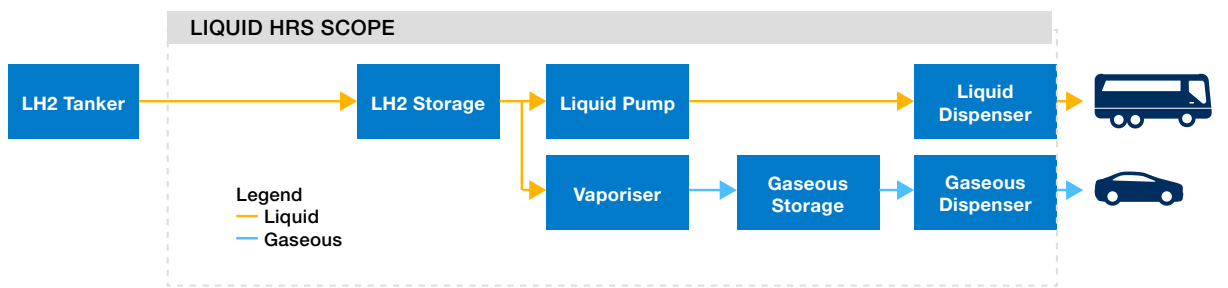


## Liquid hydrogen refuelling station

At stations with liquid storage, a tanker truck pumps hydrogen into an above-ground tank where it's held at a cryogenic temperature. Liquid hydrogen is vaporized, compressed, and stored in above-ground cylinders for dispensing. As customers fuel their vehicles, the gaseous hydrogen cylinders are refilled. Liquid storage generally requires more space than gaseous storage.

Figure 2 shows a typical liquid hydrogen refuelling station and key hydrogen systems.

**Figure 2. Typical liquid station**



# Relevant standards and codes

The following section summarises Australian and international standards applicable to hydrogen refuelling stations.

## Australian Standards

These are developed either by a national standards body (like Standards Australia) or another accredited body. Any standards developed under the Australian Standard® name have been created in Australia or are adoptions of international or other standards.

To date, Standards Australia's ME-093 Hydrogen Technologies Committee has successfully overseen the adoption of several ISO (International Organization for Standardization) standards to assist Australia's energy transition and ensure Australia's position as a global force in the emerging hydrogen economy as shown in Table 1.

<b>Table 1 – Adopted Australian Standards relevant for hydrogen</b>	
<b>Designation</b>	<b>Title</b>
<a href="#">AS 22734</a>	Hydrogen generators using water electrolysis – Industrial, commercial, and residential applications
<a href="#">AS 16110.1</a>	Hydrogen generators using fuel processing technologies
<a href="#">AS ISO 16110.2</a>	Hydrogen generators using fuel processing technologies
<a href="#">SA TS 19883</a>	Safety of pressure swing adsorption systems for hydrogen separation and purification
<a href="#">AS ISO 16111</a>	Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride
<a href="#">AS ISO 19881</a>	Gaseous hydrogen – Land vehicle fuel containers
<a href="#">AS 19880.3</a>	Gaseous hydrogen – Fuelling stations
<a href="#">AS 26142</a>	Hydrogen detection apparatus – stationary applications
<a href="#">AS ISO 14687</a>	Hydrogen fuel quality – Product specification
<a href="#">AS ISO / TR 15916</a>	Basic considerations for the safety of hydrogen systems

A list of key standards, codes and documents identified as relevant to hydrogen refuelling stations is provided [here](#).

## International Standards and Codes

These are developed by [International Organization for Standardization](#) (ISO), [International Electrotechnical Commission](#) (IEC), and [International Telecommunications Union](#) (ITU) for countries to adopt for national use. Standards Australia embraces and supports the development and adoption of international standards.

A number of international standards exist for hydrogen refuelling stations. Not all of these standards have not been adopted in Australia and care should be taken if applying them to ensure that they meet the desired safety outcomes.

Table 2 has examples of other key international standards applicable to hydrogen refuelling stations.

<b>Document / Series</b>	<b>Description</b>
ISO 19880 series	International Standards Organisation (ISO) Technical Committee (TC) 197, has been tasked with the development of the ISO 19880 series which aims to define the minimum requirements applicable for the safety and performance of gaseous hydrogen stations.
SAE J2601 series	SAE J2601 (along with J2799) provides guidance on the fuelling hydrogen storage systems to a high state of charge (SOC) without violating the operating limits of the internal tank temperature or pressure.
SAE J2799 series	The intent of SAEJ2799 is to enable the harmonised development and implementation of hydrogen fuelling interfaces for Fuel Cell Electric Vehicles (FCEVs)
NFPA 2	NFPA 2 provides fundamental safeguards for the generation, installation, storage, piping, use, and handling of hydrogen in compressed gas (GH <sub>2</sub> ) form or cryogenic liquid (LH <sub>2</sub> ) form.

## Safety Regulators

Table 3 provides a list of key state safety regulators that may have an interest in a station. This list is not exhaustive.

<b>Jurisdiction</b>	<b>Regulatory Body</b>
Australian Capital Territory	<a href="#">WorkSafe ACT</a> <a href="#">Australian Capital Territory Planning and Land Authority</a>
New South Wales	<a href="#">SafeWork NSW</a> <a href="#">NSW Fair trading</a>
Northern Territory	<a href="#">NT WorkSafe</a>
Queensland	<a href="#">Workplace Health and Safety Queensland</a> <a href="#">Resource, Safety and Health Queensland</a> <a href="#">Electrical Safety Office</a>
South Australia	<a href="#">SafeWork SA</a> <a href="#">Office of the Technical Regulator</a> <a href="#">Office of Consumer and Business Services</a>
Tasmania	<a href="#">WorkSafe Tasmania</a> <a href="#">Office of the Tasmanian Economic Regulator</a>
Victoria	<a href="#">WorkSafe Victoria</a> <a href="#">Energy Safe Victoria</a>
Western Australia	<a href="#">EnergySafety</a> <a href="#">Department of Mines, Industry Regulation and Safety</a>

Other regulatory bodies may have an interest outside those listed above. Examples include environmental and land planning bodies, network market regulators, Australian Energy Market Operator and Australian Energy Regulator.

## Future adoptions and development

Standards Australia committee ME-093 is coordinating the efforts of industry to develop robust standards that ensure the safe use of hydrogen for transportation and stationary applications.

ME-093 Mobility Applications Working Group scope includes:

- Hydrogen fuel specification including sampling and testing protocols
- Hydrogen fuelling stations and associated infrastructure
- Refuelling protocols for light vehicles, heavy vehicles and marine applications
- Hydrogen safety systems and devices

Table 4 summarise the planned activities including adoptions for the Mobility Applications Working Group.

<b>Table 4. Future activities planned for the mobility applications working group</b>
<b>Activities</b>
Review and adopt ISO 19880, Gaseous hydrogen – Fuelling Stations Series.
Participate in ISO/TC 197 active projects relating to mobility applications in the areas of: <ul style="list-style-type: none"> <li>– refuelling protocols, specifically new protocols for fast refuelling of buses and trucks.</li> <li>– refuelling station equipment design performance criteria.</li> </ul>
Monitor and assess the need for Australia to establish National Mirror Committees to ISO/TC 22, Road Vehicles and ISO/TC 110, Industrial Trucks and/or relevant sub-committees to facilitate hydrogen use in these sectors. Develop a proposal for membership in conjunction with the Fuel Cell Applications Working Group if appropriate.
Review published international standards related to hydrogen refuelling facilities - both gaseous and liquid, including the impact of hazardous areas for potential use in Australia.