STANDARDS Australia

STANDARDS PLAYBOOK

Green Hydrogen Industry

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Introduction

While actual bilateral trade between India and Australia in hydrogen is still very limited[1], there is an expanding and strategically significant partnership in hydrogen, particularly green hydrogen, driven by shared ambitions for decarbonisation, energy security, and clean energy trade. Australia is well positioned to become a major exporter of renewable hydrogen and its derivatives, while India is emerging as one of the world's largest future producers and consumers under the National Green Hydrogen Mission. Both countries have identified hydrogen as a priority area of cooperation through the *Australia-India Comprehensive Strategic Partnership* and the *Australia–India Green Hydrogen Taskforce*, with collaboration spanning research, standards development, certification, supply chains, and investment.

To support the safe and efficient growth of this emerging industry, bilateral hydrogen trade depends on harmonised technical standards, certification frameworks, and testing methodologies. Standards harmonisation is the process of aligning technical requirements across jurisdictions to ensure compatibility and create a predictable regulatory environment that supports investment, innovation, and international trade. This can be achieved through the adoption of internationally recognised standards developed by organisations such as the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC), alongside the recognition of equivalent national standards where comparable outcomes are achieved.

In the hydrogen sector, harmonisation supports consistent approaches to hydrogen production, purity, storage, transport, refuelling infrastructure, safety management, guarantees of origin, and lifecycle greenhouse gas accounting. Alignment between India and Australia reduces technical barriers to trade, improves interoperability across hydrogen value chains, lowers certification and compliance costs, accelerates project deployment, and provides greater confidence for investors and exporters seeking to participate in global clean hydrogen markets.

This playbook provides organisations with:

- A stage-by-stage overview of the green hydrogen supply chain
- The role standards play at each stage
- Key national and international standards

1 World Integrated Trade Solution, “Hydrogen imports by country in 2024, https://wits.worldbank.org/trade/comtrade/en/country/ALL/year/2024/tradeflow/Imports/partner/WLD/product/280410.

Production

Green hydrogen is produced using renewable energy which includes, but is not limited to, production through electrolysis to split water into hydrogen and oxygen or production through conversion of biomass. Production facilities integrate electrical systems, water treatment, electrolysers, control systems, and safety infrastructure.[2]

Standards at the production stage:

- Define design, safety, and performance criteria for electrolysers
- Ensure electrical, water quality, and control system compatibility
- Promote confidence among investors and markets by establishing common definitions of green hydrogen

Without standards, projects face inconsistent performance claims, safety uncertainty, and difficulties accessing incentives or export markets.

Below are key international, Indian and Australian green hydrogen production standards.

Adopted standard | Indigenous standard

SDO	Designations	Title
ASTM	ASTM D7941/D7941M-23	Standard Test Method for Hydrogen Purity Analysis Using a Continuous Wave Cavity Ring-Down Spectroscopy Analyzer
ISO	ISO 22734-1:2025	Hydrogen generators using water electrolysis - Part 1: Safety
	ISO/WD TS 22734-2	Hydrogen generators using water electrolysis Part 2: Testing guidance for performing electricity grid service
BIS	IS 16509:2020	Hydrogen Generators Using Water Electrolysis - Industrial, Commercial and Residential Applications (First Revision)
	IS 1070:2023	Reagent grade water-specification
SA	AS 22734:2020	Hydrogen generators using water electrolysis - Industrial, commercial, and residential applications (ISO 22734:2019, MOD)
	SA TS 19883:2020	Safety of pressure swing adsorption systems for hydrogen separation and purification

2 Anand, C., et al., "Green hydrogen for a sustainable future: A review of production methods, innovations, and applications," 2025, https://www.sciencedirect.com/science/article/abs/pii/S0360319925008341.

Storage & Transport

Hydrogen storage solutions must manage high pressures or cryogenic temperatures safely.[3] Standards ensure reliability and material compatibility.

Standards at the storage phase:

- Establish design, construction and testing protocols for pressure and cryogenic vessels
- Address material embrittlement and component integrity under hydrogen service

Green hydrogen transport spans pipelines, tube trailers, liquid tankers, and overseas shipping logistics.[4] Standardisation is critical to ensure safe transport of hydrogen and to avoid fragmentation of transport infrastructure.

Green hydrogen transport standards:

- Define pressure limits, purity acceptance, and contamination risk mitigation
- Support safe pipeline design and operation as hydrogen networks expand
- Enable consistent engineering requirements for vehicles and handling equipment

Poorly harmonised transport standards raise safety concerns and deter private investment.

Adopted standard | Indigenous standard

SDO	Designations	Title
ISO	ISO 11515:2022	Gas cylinders - Refillable composite reinforced tubes of water capacity between 450 l and 3000 l - Design, construction and testing
	ISO 7866:2012	Gas cylinders - Refillable seamless aluminium alloy gas cylinders - Design, construction and testing
	ISO 9809-1:2019	Gas cylinders - Design, construction and testing of refillable seamless steel gas cylinders and tubes, Part 1: Quenched and tempered steel cylinders and tubes with tensile strength less than 1,100 Mpa
	ISO 9809-2:2019	Gas cylinders - Design, construction and testing of refillable seamless steel gas cylinders and tubes, Part 2: Quenched and tempered steel cylinders and tubes with tensile strength greater than or equal to 1,100 Mpa
	ISO 9809-3:2019	Gas cylinders - Design, construction and testing of refillable seamless steel gas cylinders and tubes, Part 3: Normalized steel cylinders and tubes
	ISO 9809-4:2021	Gas cylinders - Design, construction and testing of refillable seamless steel gas cylinders and tubes, Part 4: Stainless steel cylinders with an R m value of less than 1,100 Mpa
	ISO 16486-1:2023	Plastics piping systems for the supply of gaseous fuels Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing - Part 1: General
	ISO 16486-2:2024	Plastics piping systems for the supply of gaseous fuels Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing - Part 2: Pipes
	ISO 21036:2025	Plastics piping systems for industrial applications Unplasticized polyamide (PA-U) Metric series for specifications for components and system

3 mirthan, T., and Perera, M. S. A., "The role of storage systems in the hydrogen economy: A review," 2022, https://www.sciencedirect.com/science/article/abs/pii/S1875510022004292.

4 Hren, R., et al., "Hydrogen production, storage and transport for renewable energy and chemicals: An environmental footprint assessment," 2023, https://www.sciencedirect.com/science/article/pii/S1364032122009947.

Adopted standard | Indigenous standard

SDO	Designations	Title
	ISO 11114-4:2017	Transportable gas cylinders - Compatibility of cylinder and valve materials with gas contents, Part 4: Test methods for selecting steels resistant to hydrogen embrittlement
	ISO 16111:2018	Transportable gas storage devices — Hydrogen absorbed in reversible metal hydride
	ISO 5168:2005	Measurement of fluid flow — Procedures for the evaluation of uncertainties
	ISO 16964:2019	Gas cylinders — Flexible hoses assemblies — Specification and testing
BIS	IS 1090:2002	Compressed Hydrogen - Specification
	IS 8198:2004	Steel cylinders for compressed gases (Atmospheric gases, hydrogen, high pressure liquefiable gases and dissolved acetylene gases) - Code of practice
	IS/ISO 11114-4:2017	Transportable Gas Cylinders — Compatibility of Cylinder and Valve Materials with Gas Contents Part 4 Test Methods for Selecting Steels Resistant to Hydrogen Embrittlement (First Revision)
	IS 19037:2023	Transportable Gas Storage Devices - Hydrogen Absorbed in Reversible Metal Hydride
	IS/ISO 11515:2022	Gas cylinders - Refillable composite reinforced tubes of water capacity between 450 l and 3000 l - Design, construction and testing
	IS/ISO 9809-2:2019	Gas cylinders - Design, construction and testing of refillable seamless steel gas cylinders and tubes, Part 2: Quenched and tempered steel cylinders and tubes with tensile strength greater than or equal to 1,100 Mpa
	IS 17288: 2021	Measurement of fluid flow – Procedures for the evaluation of uncertainties
	IS 17613:2021	Gas Cylinders refillable welded aluminium alloy cylinders — design and construction & testing
	IS 16507:2017	Transportable Gas Cylinder Cascades
	IS 12620:1989	Seamless Steel tubes for Manufacturing high pressure gas cylinders
	IS 14885:2022	Polyethylene Pipes for the Supply of Gaseous Fuels — Specification
	IS 3224:2021	Valve fittings for compressed gas cylinders excluding LPG cylinders
	IS 15660:2017	Gas cylinders — Refillable transportable seamless aluminium alloy gas cylinders – Specification (First Revision)
	IS 7285 Part 1:2018	Refillable Seamless Steel Gas Cylinders — Specification Part 1 Normalized Steel Cylinders (Fourth Revision)
	IS 19035:2023	Gas cylinders — Flexible hoses assemblies — Specification and testing
	IS 7285 Part 2:2017	Quenched and Tempered Steel Cylinders With Tensile Strength Less Than 1100 MPa
	IS 5903:2025	Types of Safety Device for Gas Cylinders and Gas Cylinder Valves
	IS 16017:2013	Transportable gas cylinders — Periodic inspection and testing of seamless aluminium alloy gas cylinders
National Transport Commission	ADG Code Edition 7.8	Australian Code for the Transport of Dangerous Goods by Road & Rail

Adopted standard | Indigenous standard

SDO	Designations	Title
SA	AS/NZS ISO 11515:2025	Gas cylinders - Refillable composite reinforced tubes of water capacity between 450 l and 3 000 l - Design, construction and testing
	AS 1210:2010	Pressure vessels
	AS 2030.1:2009	Gas cylinders, Part 1: General requirements
	AS 2030.5:2009	Gas cylinders, Part 5: Filling, inspection and testing of refillable cylinders
	AS 2337.1:2004	Gas cylinder test stations, Part 1: General requirements, inspection and tests - Gas Cylinders
	AS 2337.3:2020	Gas cylinder test stations, Part 3: Transportable gas cylinders - Periodic inspection and testing of composite cylinders (ISO 11623:2015, MOD)
	AS 4332:2004	The storage and handling of gases in cylinders
	AS ISO 16111:2020	Transportable gas storage devices - Hydrogen absorbed in reversible metal hydride
	SA TS 5359:2022	The storage and handling of hydrogen
	AS/NZS ISO 11114.4:2025	Transportable gas cylinders - Compatibility of cylinder and valve materials with gas contents, Part 4: Test methods for selecting steels resistant to hydrogen embrittlement
	AS 2885.0:2018	Pipelines - Gas and liquid petroleum - General requirements
	AS 2885.3:2022	Pipelines - Gas and liquid petroleum - Operation and maintenance
	AS 2885.4:2024	Pipelines - Gas and liquid petroleum, Part 4: Submarine pipeline systems
	AS 2885.5:2020	Pipelines - Gas and liquid petroleum - Field pressure testing
	AS/NZS 2885.1:2018	Pipelines - Gas and liquid petroleum - Design and construction
	AS/NZS 2885.2:2020	Pipelines - Gas and liquid petroleum - Welding
	AS/NZS 2885.6:2018	Pipelines - Gas and liquid petroleum - Pipeline safety management
	SA HB 225:2023	Guideline for blending hydrogen into pipelines and gas distribution networks
	AS 4564:2020	General-purpose natural gas
	AS/NZS 5263.0:2023	Gas appliances, Part 0: General requirements
	AS/NZS 5601.1:2022	Gas installations, Part 1: General installations
	SA TS 19883:2020	Safety of pressure swing adsorption systems for hydrogen separation and purification
	AS/NZS ISO 9809.1:2025	Gas cylinders - Design, construction and testing of refillable seamless steel gas cylinders and tubes, Part 1: Quenched and tempered steel cylinders and tubes with tensile strength less than 1,100 Mpa
	AS/NZS ISO 9809.2:2025	Gas cylinders - Design, construction and testing of refillable seamless steel gas cylinders and tubes, Part 2: Quenched and tempered steel cylinders and tubes with tensile strength greater than or equal to 1,100 Mpa
	AS/NZS ISO 9809.3:2025	Gas cylinders - Design, construction and testing of refillable seamless steel gas cylinders and tubes, Part 3: Normalized steel cylinders and tubes

Refuelling

Refuelling and end-user interface infrastructure (for vehicles, vessels, industry feedstock) must operate reliably under defined conditions and match user expectations for safety and performance.

Green hydrogen refuelling standards:

- Create uniform fuelling station requirements around components such as valves, dispenser systems, and hoses, and around fuel quality.
- Ensure refuelling safety protocols (pressure, temperature, controlled flow)
- Enable cross-region interoperability for vehicles and vessels

Uniform refuelling standards are critical to scaling green hydrogen infrastructure across borders.

Adopted standard | Indigenous standard

SDO	Designations	Title
ASTM International	ASTM D7606-24a	Standard Practice for Sampling of High Pressure Hydrogen and Related Fuel Cell Feed Gases
	ASTM D7653-24	Standard Test Method for Determination of Trace Gaseous Contaminants in Hydrogen Fuel by Fourier Transform Infrared (FTIR) Spectroscopy
	ASTM D7676-23	Standard Practice for Screening Organic Halides Contained in Hydrogen or Other Gaseous Fuels
	ASTM D7675-22	Standard Test Method for Determination of Total Hydrocarbons in Hydrogen by FID-Based Total Hydrocarbon (THC) Analyzer
	ASTM D7634-24	Standard Practice for Visualizing Particulate Sizes and Morphology of Particles Contained in Hydrogen Fuel by Microscopy
	ASTM D7651-24e1	Standard Test Method for Gravimetric Measurement of Particulate Concentration of Hydrogen Fuel
	ASTM D7892-25	Standard Test Method for Determination of Total Organic Halides, Total Non-Methane Hydrocarbons, and Formaldehyde in Hydrogen Fuel by Gas Chromatography/Mass Spectrometry
ISO	ISO 19880-9:2024	Gaseous hydrogen - Fuelling stations - Part 9: Sampling for fuel quality analysis
	ISO 19880-8:2024	Gaseous hydrogen Fuelling stations - Part 8: Fuel quality control
	ISO 14687:2025	Hydrogen fuel quality Product specification
	ISO 19880-2:2025	Gaseous hydrogen Fuelling stations - Part 2: Dispensers and dispensing systems
	ISO 19880-1:2020	Gaseous hydrogen - Fuelling stations, Part 1: General requirements
	ISO 19880-5:2025	Gaseous hydrogen - Fuelling stations, Part 5: Dispenser hoses and hose assemblies
	ISO 19880-3:2018	Gaseous hydrogen - Fuelling stations, Part 3: Valves
SAE	SAE J2719-1: 2022	Application Guideline for Use of Hydrogen Quality Specification
BIS	IS 18538 (Part 1):2023	Gaseous Hydrogen - fuelling stations Part 1 General requirements
	IS 18538 (Part 3):2023	Gaseous Hydrogen - fuelling stations Part 3 Valves
	IS 18538 (Part 5):2023	Gaseous Hydrogen - fuelling stations Part 8 Fuel quality control
	IS 18538 (Part 8):2023	Gaseous Hydrogen - fuelling stations Part 5 Dispenser hoses and hose assemblies
	IS 16061:2021	Hydrogen quality product specification
SA	AS ISO 14687:2020	Hydrogen fuel quality - Product specification
	AS 19880.3:2020	Gaseous hydrogen - Fuelling stations, Part 3: Valves (ISO 19880-3:2018, MOD)
	AS 19880-1:2023	Gaseous hydrogen - Fuelling stations, Part 1: General requirements (ISO 19880-1:2020, MOD)
	AS ISO 19880.5:2021	Gaseous hydrogen - Fuelling stations, Part 5: Dispenser hoses and hose assemblies
	AS ISO 19880.8:2021	Gaseous hydrogen - Fuelling stations, Part 8: Fuel quality control

Fire and Safety

Green hydrogen's flammability and diffusivity demand rigorous safety management frameworks.[5] Standardisation ensures consistency between design, operation, and emergency procedures.

Green hydrogen fire and safety standards:

- Define risk assessment and hazard controls to prevent incidents
- Establish ventilation, detection, and response protocols for production facilities
- Provide common hazard terminology for responders

5 Delargy, A., "Green hydrogen safety: Risk mitigation strategies," 2025, libertyspecialtymarkets.com/article/green-hydrogen-safety-risk-mitigation-strategies

Adopted standard | Indigenous standard

SDO	Designations	Title
ASTM International	ASTM F326-23	Standard Test Method for Electronic Measurement for Hydrogen Embrittlement From Cadmium-Electroplating Processes
	ASTM F519-23	Standard Test Method for Mechanical Hydrogen Embrittlement Evaluation of Plating/Coating Processes and Service Environments
	ASTM F1459-06(2024)	Standard Test Method for Determination of the Susceptibility of Metallic Materials to Hydrogen Gas Embrittlement (HGE)
	ASTM F1624-12(2024)	Standard Test Method for Measurement of Hydrogen Embrittlement Threshold in Steel by the Incremental Step Loading Technique
	ASTM F2078-22	Standard Terminology Relating to Hydrogen Embrittlement Testing
ISO	ISO 7039:2024	Metallic materials - Tensile testing - Method for evaluating the susceptibility of materials to the effects of high-pressure gas within hollow test pieces
	ISO/TR 20491:2019	Fasteners - Fundamentals of hydrogen embrittlement in steel fasteners
	ISO 22734-1:2025	Hydrogen generators using water electrolysis - Part 1: Safety
	ISO/TR 15916:2015	Basic considerations for the safety of hydrogen systems
	ISO 26142:2010	Hydrogen detection apparatus — Stationary applications
National Fire Protection Association	NFPA 2: 2023	Hydrogen Technologies Code
	NFPA 55: 2023	Compressed Gases and Cryogenic Fluids Code
SAE	USCAR5-5: 2019	Avoidance of Hydrogen Embrittlement of Steel Fasteners and Other Hardened or Spring Steel Parts from Surface Coating Processes
	USCAR7-2: 2020	Deembrittlement Verification Test
BIS	IS 15201:2022	Hydrogen - Code of Safety (First Revision)
	IS 16749:2018	Basic Considerations for the Safety of Hydrogen Systems
	IS 16253:2016	Hydrogen detection apparatus — Stationary applications
	IS 5572:2009	Classification of hazardous areas (other than mines) having flammable gases and vapours for electrical installation
	IS 16724:2018	Explosive atmospheres — Electrical installations design, selection and erection
	IS 1642:2013	Code of practice for fire safety of buildings
	IEC/IS 60079:2015 series	Series Explosive Atmosphere Standards
	IS 16017:2013	Transportable gas cylinders — Periodic inspection and testing of seamless aluminium alloy gas cylinders

Adopted standard | Indigenous standard

SDO	Designations	Title
SA	AS 26142:2020	Hydrogen detection apparatus - Stationary applications (ISO 26142:2010 (ED 1.0) MOD)
	AS 4343:2014	Pressure equipment - Hazard levels
	AS 61508.0-2006 REC:2015	Functional safety of electrical/electronic/programmable electronic safety-related systems, Part 0: Functional safety and AS 61508
	AS 61508.1-2011 REC:2023	Functional safety of electrical/electronic/programmable electronic safety-related systems, Part 1: General requirements

Adopted standard | Indigenous standard

SDO	Designations	Title
SA	AS 61508.2-2011 REC:2023	Functional safety of electrical/electronic/programmable electronic safety-related systems, Part 2: Requirements for electrical/electronic/ programmable electronic safety-related systems
	AS 61508.3-2011 REC:2023	Functional safety of electrical/electronic/programmable electronic safety-related systems, Part 3: Software requirements
	AS 61508.4-2011 REC:2023	Functional safety of electrical/electronic/programmable electronic safety-related systems, Part 4: Definitions and abbreviations
	AS 61508.5-2011 REC:2023	Functional safety of electrical/electronic/programmable electronic safety-related systems, Part 5: Examples of methods for the determination of safety integrity levels
	AS 61508.6-2011 REC:2023	Functional safety of electrical/electronic/programmable electronic safety-related systems, Part 6: Guidelines on the application of IEC 61508-2 and IEC 61508-3
	AS 61508.7-2011 REC:2023	Functional safety of electrical/electronic/programmable electronic safety-related systems, Part 7: Overview of techniques and measures
	AS IEC 61511.1:2018	Functional safety - Safety instrumented systems for the process industry sector, Part 1: Framework, definitions, system, hardware and application programming requirements
	AS IEC 61511.2:2018	Functional safety - Safety instrumented systems for the process industry, Part 2: Guidelines for the application of AS IEC 61511.1
	AS IEC 61511.3:2018	Functional Safety - Safety instrumented systems for the process industry sector, Part 3: Guidance for the determination of the required safety integrity levels
	AS/NZS 60079.14:2022	Explosive atmospheres, Part 14: Design selection, erection and initial inspection
	AS/NZS 60079.29.1:2017	Explosive atmospheres, Part 29.1: Gas detectors- Performance requirements of detectors for flammable gases
	AS/NZS 60079.29.2:2016	Explosive atmospheres, Part 29.2: Gas detectors- Selection, installation, use and maintenance of detectors for flammable gases and oxygen
	AS/NZS IEC 60079.10.1:2022	Explosive atmospheres, Part 10.1: Classification of areas - Explosive gas atmospheres
	SA TR 15916:2021	Basic considerations for the safety of hydrogen systems

Emissions

Green hydrogen's value proposition depends on its credible lifecycle emissions profile. Standards are foundational to emissions accounting and certification.

Emissions standards:

- Provide methodologies for lifecycle greenhouse gas (GHG) accounting
- Enable consistent sustainability claims for production, use and trade
- Support certification schemes and international trade instruments

Without a common emissions and sustainability framework, market credibility diminishes and policy incentives lose impact.

Adopted standard | Indigenous standard

SDO	Designations	Title
Green Hydrogen Organisation	GHS 2.0	Green Hydrogen Standard
ISO	ISO/TS 19870:2023	Hydrogen technologies — Methodology for determining the greenhouse gas emissions associated with the production, conditioning and transport of hydrogen to consumption gate
	ISO/CD 19870-2	Hydrogen technologies — Methodology for determining the greenhouse gas emissions associated with the hydrogen supply chain — Part 2: Emissions associated with the conditioning and transport of gaseous and liquid hydrogen up to consumption gate
	ISO/CD 19870-3	Hydrogen Technologies — Methodology for determining the greenhouse gas emissions — Part 3: Emissions associated with the production, storage and transport of ammonia up to delivery gate and the conversion of ammonia into hydrogen
	ISO/CD 19870-4	Hydrogen technologies — Methodology for determining the greenhouse gas emissions associated with the hydrogen supply chain — Part 4: Emissions associated with the storage and transport of hydrogen via LOHC

Standards Mapping Portal

Visit the standards mapping portal to explore international, Indian, and Australian standards applicable to the hydrogen sector. The portal also highlights standards relevant to other important sectors to Australia and India's bilateral relationship including Food and Beverages, Pet Food, and Data Centres.

standards.org.au