AURETH018 Inspect and maintain hydrogen fuel cell system

Unit code	AURETH018
Unit title	Inspect and maintain hydrogen fuel cell system
Application	This unit describes the skills and knowledge required to inspect and maintain a hydrogen fuel cell system in hydrogen fuel cell electric vehicles (FCEVs). FCEVs may be vehicles or marine vessels. It involves preparing for the task, inspecting the hydrogen fuel cell system, maintaining the hydrogen fuel cell system and completing workplace processes and documentation. The level of maintenance will vary according to the work context. The unit applies to individuals working in the automotive service and repair industry. No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Pre-requisite unit	AURETH101 Depower and reinitialise battery electric vehicles AURETH017 Work safely with hydrogen in automotive workplaces
Unit sector	Electrical Technical – Hybrid Vehicle and Battery Vehicle
Elements	**Performance criteria**
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1. Prepare to inspect and maintain hydrogen fuel cell system	1.1 Identify job requirements from workplace instructions
	1.2 Access and interpret workplace procedures and manufacturer specifications
	1.3 Identify hazards associated with the work, assess potential risks and implement control measures in line with workplace policies and procedures
	1.4 Identify tools and equipment required for inspecting activity and establish maintenance requirements according to workplace procedures
2. Depower hydrogen FCEV	2.1 Use hydrogen gas detector according to manufacturer specifications to identify hydrogen FCEV hydrogen gas leaks
	2.2 Visually inspect hydrogen FCEV and make safe for inspection and maintenance

	2.3 Shut down and isolate high-voltage and hydrogen systems, and perform zero voltage test to confirm it is safely depowered, according to manufacturer specifications, workplace procedures and work health and safety requirements
3. Inspect hydrogen fuel cell system	3.1 Carry out inspection according to manufacturer specifications, workplace procedures, workplace health and safety and environmental requirements
	3.2 Use diagnostic tools and test equipment to assess performance and identify faults
	3.3 Compare inspection results with manufacturer specifications
	3.4 Report inspection findings and recommendations for necessary repairs according to workplace procedures
4. Maintain hydrogen fuel cell system	4.1 Carry out maintenance and adjustments according to manufacturer specifications, workplace procedures, workplace health and safety and environmental requirements
	4.2 Carry out removal and replacement of hydrogen fuel cell system components according to workplace procedures, workplace health and safety and environmental requirements
	4.3 Repower hydrogen FCEV according to manufacturer specifications
	4.4 Carry out post-maintenance testing according to workplace procedures
5. Complete work processes	5.1 Conduct final inspection according to workplace procedures
	5.2 Clear work area and dispose of or recycle materials according to workplace procedures
	5.3 Check tools and equipment are stored, and faulty equipment is identified, tagged and isolated according to workplace procedures
	5.4 Complete documentation according to workplace procedures
Foundation skills This section describes those language, literacy, numeracy and employment skills that are essential to performance	
Learning	▪ locate required sources of information ▪ take responsibility for maintaining knowledge of evolving hydrogen fuel cell technologies.

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Reading	▪ interpret text, symbols and diagrams in inspection and maintaining information from manufacturer specifications and workplace procedures ▪ interpret fuel quality reports.
Writing	▪ legibly and accurately fill out workplace documentation.
Oral communication	▪ listen to workplace instructions and ask questions to clarify job requirements ▪ participate in verbal discussions on workplace safety, report faults and make maintenance recommendations ▪ communicate with suppliers and manufacturers for replacement parts and advanced troubleshooting ▪ discuss features and maintenance needs of hydrogen FCEVs with customers, including: o refuelling procedures o performance expectations o regular maintenance to ensure safety and longevity.
Numeracy	▪ match hydrogen fuel cell system components and part identification numbers to workplace instructions, hydrogen FCEV and system component part lists, and manufacturer specifications ▪ take, interpret and record measurements on digital and analogue gauges, including: o conductivity o current o force o leak detection o pressure o resistance o temperature o torque o voltage ▪ interpret and analyse diagnostic data ▪ convert metric and imperial measurement units ▪ calculate capacity and state of change ▪ calculate deviations from manufacturer specifications.

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Planning and organising	▪ plan own work requirements ▪ prioritise actions to achieve required outcomes ▪ confirm tasks are completed within workplace timeframes.
Technology	▪ use specialised diagnostic tools and software ▪ use specialised testing equipment and software.
Unit mapping information	No equivalent unit.
Links	Link to Companion Volume Implementation Guide.

Title	Assessment Requirements for *AURETH018 Inspect and maintain hydrogen fuel cell system*
Performance evidence	The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to: ▪ inspect and maintain the hydrogen fuel cell system of at least two different hydrogen FCEVs.
Knowledge evidence	The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of: ▪ methods to locate and interpret information required to inspect and maintain hydrogen fuel cell system, including information from: o customers and supervisors o manufacturer specifications and procedures ▪ workplace procedures required to inspect and maintain hydrogen fuel cell system, including: o documentation procedures o housekeeping procedures, including those for: ▪ examining and storing tools and equipment ▪ identifying, tagging and isolating faulty hydrogen FCEVs and equipment ▪ disposing and recycling of excess materials ▪ workplace health and safety (WHS) requirements relating to inspecting and maintaining hydrogen fuel cell system, including procedures for:

	○ identifying hazards and controlling risks associated with: ▪ working with high voltages ▪ working with hydrogen gas ▪ working with high hydrogen gas pressures ▪ wearing jewellery while working around high electrical currents ▪ working with damaged hydrogen fuel cell system components ○ minimising risk associated with hazards, including applying safety precautions when: ▪ identifying hydrogen gas leaks ▪ purging gas lines ▪ using personal protective equipment (PPE), including electrical safety gloves with class 0 1000 volt rating and Australian standards rated high voltage insulating mat ▪ identifying and using firefighting equipment ▪ using the one hand rule ▪ following live system warning tags and signs ▪ depowering hydrogen FCEV ▪ isolating electrical supply ▪ isolating hydrogen fuel sources ▪ stabilising hydrogen FCEV electrical system ▪ environmental requirements relating to inspecting and maintaining hydrogen fuel cell system, including trapping, storing and disposing of waste produced during activity ▪ safe operating procedures for tools and equipment, including: ○ ventilation systems ○ high pressure cylinders and tanks ○ testing equipment ▪ characteristics of hydrogen FCEV, including: ○ types of hydrogen FCEVs ○ types of hydrogen

	○ fundamental operating principles ○ fuel cell design ○ hydrogen FCEV efficiency and range ○ fuel storage capacity and level ○ battery management ○ electric and thermal management ○ communication protocols, including CAN bus ○ environmental benefits and challenges ▪ identification, function and basic operation of hydrogen fuel cell system and components in manufactured and retrofitted hydrogen FCEV, including: ○ hydrogen storage system ○ high-pressure hydrogen circuit ○ hydrogen refuelling interface ○ fuel cell stack and associated systems ○ hydrogen fuel quality monitoring ○ hydrogen system safety equipment ▪ inspection procedures for hydrogen fuel cell system, including: ○ handheld and fluid leak detection ○ analysing thermal and electrical performance ○ differentiating between hydrogen and electric power system faults ○ analysing system component operation ○ using diagnostic tools and software ○ using testing equipment and software ○ predictive maintenance tools ○ identifying faults ▪ maintenance procedures for hydrogen fuel cell system, including: ○ when and how to purge hydrogen ○ identifying hydrogen-related faults, including software faults

	○ removal, replacement and adjustment of hydrogen fuel cell system components that require periodic replacement as part of the maintenance schedule ○ post-maintenance testing procedures for hydrogen fuel cell system components ▪ how to access and interpret fuel quality reports ▪ terminology relevant to inspecting and maintaining hydrogen fuel cell system.
Assessment conditions	Competency is to be assessed in the workplace or a simulated environment that accurately reflects performance in a real workplace setting. Assessment must occur in a safe environment where the workplace or simulated workplace complies with: ▪ Commonwealth, state or territory work health and safety/ occupational health and safety legislation and regulations ▪ state or territory dangerous goods and hazardous chemicals legislation and regulations related to storage and handling. Assessment must include direct observation of tasks. Where assessment of competency includes third-party evidence, individuals must provide evidence that links them to hydrogen FCEV that they have worked on, e.g. repair orders. Assessors must verify performance evidence through questioning on skills and knowledge to ensure correct interpretation and application. The following resources must be made available: ▪ automotive repair workplace or simulated workplace suitable for hydrogen FCEVs ▪ PPE and safety equipment, including electrical safety gloves with 1000 volt rating and HV insulating mat with Australian standards rating ▪ manufacturer specifications for hydrogen fuel cell system components ▪ two different hydrogen FCEVs for inspection and maintenance activities ▪ handheld hydrogen gas detector ▪ fuel cell diagnostic tools and software

	▪ pressure testing equipment, including gas detectors, flow meters and pressure gauges ▪ tools, equipment and materials appropriate for inspecting and maintaining hydrogen fuel cell system. Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.
Links	Link to Companion Volume Implementation Guide.