



**Australian Government**

# **AURETH4010 Test high voltage batteries in hybrid electric vehicles**

**Release 2**

## AURETH4010 Test high voltage batteries in hybrid electric vehicles

### Modification History

Release	Comment
Release 2	Replaces AURETH4010 Test high voltage batteries in hybrid electric vehicles (Release 1)  Reference to OHS legislation replaced with new WHS legislation

### Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes required to test high voltage (HV) batteries in hybrid electric vehicles (HEVs). It includes identifying and confirming safety requirements, preparing for work, testing HV batteries, and completing work processes, including clean-up and documentation. Work requires individuals to demonstrate some judgement and problem-solving skills in managing own work activities.</p> <p>Importance is placed on the application of HV electrical safety procedures.</p> <p>Licensing, legislative, regulatory or certification requirements may apply to this unit in some jurisdictions. Users are advised to check with the relevant regulatory authority.</p>
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### Application of the Unit

Application of the unit	Work applies to testing HV batteries in HEVs, such as cars, trucks, motorcycles, marine applications and wheeled plant or equipment.
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## Licensing/Regulatory Information

Refer to Unit Descriptor.

## Pre-Requisites

<b>Prerequisite units</b>	AURETR3025 Test, charge and replace batteries
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## Employability Skills Information

<b>Employability skills</b>	This unit contains employability skills.
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## Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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## Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for work	<p>1.1. <b><i>Procedures and information</i></b> are sourced to determine job requirements, including testing method, and minimise task time</p> <p>1.2. <b><i>Workplace health and safety (WHS) requirements</i></b>, including personal safety needs, are identified and applied</p> <p>1.3. Tools and <b><i>testing equipment</i></b> are identified and checked for safe and effective operation</p>
2. Perform HV battery analysis	<p>2.1. Information for battery testing is accessed and correctly followed</p> <p>2.2. Battery tests are performed and results analysed according to product, manufacturer and component supplier specifications</p> <p>2.3. Battery testing procedures are carried out according to safe operating procedures and guidelines</p>
3. Complete service operations	<p>3.1. Work area is tidied, and tools and equipment are replaced according to <b><i>workplace requirements</i></b></p> <p>3.2. Job card or repair order is completed according to workplace requirements</p> <p>3.3. Report is prepared on the outcomes of the test of the HV battery system, according to workplace requirements</p>

## Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

### Required skills

- technical skills to:
  - use workplace technology relating to testing HV batteries in HEVs
  - complete tests and measurements to determine serviceability of batteries
  - use specialist tools
  - use computerised measuring and diagnostic equipment
  - report and record results
- literacy skills to collect, organise and understand information relating to work requirements, plans and safety procedures for HV battery testing
- communication skills to:
  - communicate ideas and information to enable confirmation of work requirements and specifications
  - interpret and apply common industry terminology
  - coordinate work with site supervisor, other workers and customers
  - report work outcomes and problems
- problem-solving skills to:
  - interpret technical information and specifications
  - interpret test results
  - identify repair options
- self-management skills to:
  - obtain information on HV battery testing procedures
  - manage risks and hazards associated with low voltage (LV) and HV HEV electrical systems and components
  - obtain equipment and material to avoid backtracking or workflow interruptions
  - use cooperative approaches to optimise workflow and productivity

### Required knowledge

- components of HV HEVs and their functions
- principles of electricity, including:
  - alternating current (AC)
  - direct current (DC)
- relevant WHS requirements relating to:
  - safe work practices
  - electrical safety
- applicable commonwealth, state or territory legislation, regulations, standards and codes of practice and environmental regulations relating to the testing of HEV HV batteries in the automotive workplace

- vehicle-specific electrical requirements
- workplace policies and procedures, including quality, recording and reporting procedures relating to the testing of HEV HV batteries in the automotive workplace

## Evidence Guide

<b>Evidence Guide</b>	
The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
<b>Overview of assessment</b>	
<b>Critical aspects for assessment and evidence required to demonstrate competency in this unit</b>	<p>The evidence required to demonstrate competency in this unit must be relevant to workplace operations and satisfy all of the requirements of the performance criteria and required skills and knowledge.</p> <p>A person who demonstrates competency in this unit must be able to:</p> <ul style="list-style-type: none"> <li>• observe safety procedures and requirements</li> <li>• communicate effectively with others involved in or affected by the work</li> <li>• select methods and techniques appropriate to the circumstances</li> <li>• complete preparatory activity in a systematic manner</li> <li>• test HV batteries in HEVs according to requirements</li> <li>• complete relevant documentation for recording HEV battery test results.</li> </ul>
<b>Context of, and specific resources for assessment</b>	<p>Competency is to be assessed in the workplace or a simulated workplace environment that accurately reflects performance in a real workplace setting.</p> <p>Assessment is to occur:</p> <ul style="list-style-type: none"> <li>• using standard workplace practices and procedures</li> <li>• following safety requirements</li> <li>• applying environmental constraints.</li> </ul> <p>Assessment is to comply with relevant:</p> <ul style="list-style-type: none"> <li>• regulatory requirements</li> <li>• Australian standards</li> <li>• industry codes of practice.</li> </ul> <p>Competency is to be assessed using an HEV that uses HV and LV AC/DC electrical systems. Where simulation is used, an operational HEV must be included in the simulation.</p> <p>The following resources must be made available for the assessment of this unit:</p>

<b>Evidence Guide</b>	
	<ul style="list-style-type: none"><li>• appropriate PPE</li><li>• an HEV</li><li>• manufacturer specifications for the HEV</li><li>• testing equipment</li><li>• full range of essential tools and equipment</li><li>• workplace documentation.</li></ul>
<b>Method of assessment</b>	<p>Assessment must satisfy the endorsed Assessment Guidelines of this Training Package.</p> <p>Assessment methods must confirm consistency and accuracy of performance (over time and in a range of workplace relevant contexts) together with the application of required skills and knowledge.</p> <p>Assessment methods must be by direct observation of tasks and include questioning on required skills and knowledge to ensure correct interpretation and application.</p> <p>Competence in this unit may be assessed in conjunction with other units which together form part of a holistic work role.</p> <p>Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate the needs of diverse clients.</p> <p>Assessment processes and techniques must be culturally sensitive and appropriate to the language, literacy and numeracy capacity of the candidate and the work being performed.</p>



## Range Statement

### Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

***Procedures and information*** may include:

- Australian standards
- diagrams and sketches
- engineer design specifications and instructions
- industry codes of practice
- original equipment manufacturer (OEM) specifications
- verbal, written and graphical instructions issued by authorised internal and external persons
- workplace specifications and requirements.

***WHS requirements*** may include:

- applying electrical safety precautions, such as:
  - “one hand rule”
  - live system warning tags or signs
- electrical protective equipment, such as:
  - electrical safety gloves 1000V
  - HV insulating mats (Australian standards rated)
- eliminating hazards and hazardous materials and substances
- following emergency procedures, such as:
  - emergency shutdown and stopping of equipment
  - extinguishing fires
  - workplace first aid requirements
  - site evacuation
- personal protective equipment (PPE) and clothing
- workplace environment and safety equipment.

***Testing equipment*** may include:

- AC/DC current clamp
- battery management system (BMS) diagnostic equipment
- diagnostic scanner or computer interface device
- insulated hand tools
- multimeter CAT 3 1000V
- oscilloscope
- thermal imaging equipment or non-contact

Range Statement	
	thermometer.
<b>Workplace requirements</b> may include:	<ul style="list-style-type: none"><li>• industry codes of practice</li><li>• manufacturer specifications</li><li>• quality policies and procedures</li><li>• safe work procedures</li><li>• sustainability, environment, equal opportunity and anti-discrimination policies and procedures</li><li>• workplace recording and reporting procedures.</li></ul>

## Unit Sector(s)

<b>Competency field</b>	Electrical
<b>Sector</b>	Technical – Hybrid and Battery Electric Vehicle

## Custom Content Section

Not applicable.