Australian Government

AURETH4012 Service and maintain electrical components in hybrid electric vehicles

Release 2

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

AURETH4012 Service and maintain electrical components in hybrid electric vehicles

Modification History

Release	Comment
Release 2	Replaces AURETH4012 Service and maintain electrical components in hybrid electric vehicles (Release 1) Reference to OHS legislation replaced with new WHS legislation

Unit Descriptor

Unit descriptor	This unit describes the performance outcomes required to service and maintain electrical components of hybrid electric vehicles (HEVs). It involves working with automotive electrical components and electrical systems that support the control and operation of the HEV. Importance is placed on the application of high voltage (HV) and low voltage (LV) electrical safety procedures. Licensing, legislative, regulatory or certification requirements may apply to this unit in some jurisdictions. Users are advised to check with the relevant regulatory authority.

Application of the Unit

Application of the unit	Work applies to the inspection, service and maintenance of HEVs in the automotive industry.

Licensing/Regulatory Information

Refer to Unit Descriptor.

Pre-Requisites

Prerequisite units	AURETH4011 Deactivate and reinitialise power supply in hybrid electric vehicles

Employability Skills Information

Employability skills	This unit contains employability skills.

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.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for service operations	1.1. ***Information and documents*** are sourced 1.2. ***Workplace health and safety (WHS) requirements*** and other ***appropriate precautions*** are identified and taken 1.3. Service method appropriate for the specific circumstances is selected and prepared for 1.4. Tools and ***testing equipment*** necessary to conduct the work are assembled 1.5. Technical and/or calibration requirements for inspection and service of HEV electrical components are established
2. Check associated electrical components	2.1. Information relevant to the inspection and service of HEV components and systems is followed 2.2. Checks are conducted on the condition and operation of associated ***electrical components*** 2.3. Problems with the performance of electrical components are identified, and corrective action is taken 2.4. Faults and corrective action are recorded
3. Complete service operations	3.1. Work area is tidied, and tools and equipment are replaced according to ***workplace requirements*** 3.2. Job card or repair order is completed according to workplace requirements 3.3. Report is prepared on the outcomes of the service and maintenance according to workplace requirements

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 the service and maintenance of HEVs
  - use specialist tools and equipment
  - report and record actions
- communication skills to:
  - confirm work requirements and specifications
  - communicate effectively regarding work requirements with supervisor, other workers and customers
  - report work outcomes and problems
- literacy skills to interpret technical information and specifications
- numeracy skills to complete tests and measurements to determine correct operation
- problem-solving skills to:
  - interpret test results
  - identify repair options
- self-management skills to:
  - manage risks and hazards associated with HV HEV electrical systems and components
  - optimise workflow and productivity

Required knowledge

- electrical/electronic components of HEVs and their functions
- HEV-specific electrical requirements
- WHS requirements relating to:
  - safe work practices
  - electrical safety
- principles of electricity, including:
  - alternating current (AC)
  - direct current (DC)
- applicable commonwealth, state or territory legislation, regulations, standards, codes of practice and environmental regulations relating to the service and maintenance of HEVs in an automotive workplace
- workplace policies and procedures, including quality, ecording and reporting procedures relating to the service and maintenance of HEVs in an automotive workplace

Evidence Guide

Evidence Guide	
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.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	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. A person who demonstrates competency in this unit must be able to: • comply with WHS requirements and safe work practices • ensure electrical and mechanical integrity of any component and system is maintained when performing tests • check associated electrical components and systems of HV HEVs according to manufacturer's specifications • complete relevant documentation for the service and maintenance of the HEV.
Context of, and specific resources for assessment	Competency is to be assessed in the workplace or a simulated workplace environment that accurately reflects performance in a real workplace setting. Assessment is to occur: • using standard workplace practices and procedures • following safety requirements • applying environmental constraints Assessment is to comply with relevant: • regulatory requirements • Australian standards • industry codes of practice 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. The following resources must be made available for the assessment of this unit:

Evidence Guide	
	• appropriate PPE • an operational HEV • manufacturer specifications for the HEV • testing equipment • full range of essential tools and equipment • workplace documentation.
Method of assessment	Assessment must satisfy the endorsed Assessment Guidelines of this Training Package. 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. Assessment methods must be by direct observation of tasks and include questioning on required skills and knowledge to ensure correct interpretation and application. Competence in this unit may be assessed in conjunction with other units which together form part of a holistic work role. Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate the needs of diverse clients. 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.

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.	
Information and documents may include:	• Australian standards • diagrams and sketches • engineer and manufacturer 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 • workshop manuals and specifications.
WHS requirements may include:	• eliminating hazardous materials and substances • first aid equipment • following emergency procedures • hazard and risk control • material safety data sheets (MSDS) • personal protective equipment (PPE) and clothing • safety equipment • techniques for manual handling, including shifting, lifting and carrying.

Appropriate precautions may include:	• analysing task to define risk
	• applying electrical safety precautions, such as:
	  • "one hand rule"
	  • live system warning tags or signs
	• depowering the vehicle
	• isolating the HV battery supply
	• using PPE, such as:
	  • electrical safety gloves 1000V
	  • HV insulating mats (Australian standards rated).

Range Statement	
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 thermometer.
Electrical components may include:	• air conditioning control system • anti-lock braking system (ABS) and traction control system (TCS) • automatic power windows • auxiliary cooling system for the internal combustion engine (ICE) and HV system • driver information warning display • electric power steering • electronic brake control system • electronic stability control • electronically controlled automatic transmission • headlight aiming control system • ICE control management system • multi-function display units, including sat-nav system • tyre pressure warning system (TPWS).
Workplace requirements may include:	• industry codes of practice • manufacturer specifications • quality policies and procedures • safe work procedures • sustainability, environment, equal opportunity and anti-discrimination policies and procedures • workplace recording and reporting procedures.

Unit Sector(s)

Competency field	Electrical
Sector	Technical – Hybrid and Battery Electric Vehicle

Custom Content Section

Not applicable.