



Australian Government

Department of Education, Employment and Workplace Relations

AURETH3002 Service and maintain battery electric vehicles

Release: 1

AURETH3002 Service and maintain battery electric vehicles

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes required to service and maintain battery electric vehicles (BEVs). It involves working with automotive electrical components, maintaining batteries, and basic testing of electric motors.</p> <p>Importance is placed on the application of high voltage (HV) and low voltage (LV) 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 the service and maintenance of BEVs in the automotive industry.
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Licensing/Regulatory Information

Refer to Unit Descriptor.

Pre-Requisites

Prerequisite units	AURETH3001 Depower electric vehicles
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Employability Skills Information

Employability skills	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 service operations	1.1. Information and documents are sourced 1.2. Occupational health and safety (OHS) requirements and other appropriate precautions are identified and followed 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 servicing the BEV are established
2. Test the battery systems	2.1. Tests and checks for electrical efficiency are carried out on battery system using manufacturer specifications and test procedures 2.2. Battery fixture and connections are checked to ensure they are secure 2.3. Faults with the battery systems are identified and appropriate corrective action is taken 2.4. Faults and corrective action are recorded
3. Check the electrical motor	3.1. Electrical motor checks are carried out to confirm condition and efficiency 3.2. Problems associated with the performance of the electrical motor are identified 3.3. Corrective action required to achieve an optimum motor performance is implemented 3.4. Faults and corrective action are recorded
4. Check associated electrical components	4.1. Checks are conducted on the condition and operation of associated electrical components 4.2. Problems with the performance of electrical components are identified and corrective action is taken 4.3. Faults with associated electrical components are identified and appropriate corrective action is taken 4.4. Faults and corrective action are recorded
5. Complete service operations	5.1. Work area is tidied, and tools and equipment are replaced according to workplace requirements 5.2. Job card or repair order is completed according to workplace requirements

ELEMENT	PERFORMANCE CRITERIA
	5.3. Client report on the outcomes of the service and repair is prepared according to workplace requirements 5.4. Vehicle is prepared for return to the client

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 BEVs
 - use specialist tools and equipment
- 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 BEV electrical systems and components
 - optimise workflow and productivity

Required knowledge

- battery theory, including:
 - battery internal resistance
 - battery types
 - terminal corrosion
 - terminal resistance
- battery pack theory, including:
 - cell failure theory
 - charging characteristics
 - open circuit cells
 - reverse polarisation
 - series cell configuration
 - strapping and layout
- battery charger characteristics and operation
- battery management system (BMS) theory
- components of BEVs and their functions
- OHS requirements relating to:
 - electrical safety

- safe work practices
- power distribution unit (PDU) operation
- 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 BEVs
- vehicle-specific electrical requirements
- workplace policies and procedures, including quality, recording and reporting procedures relating to the service and maintenance of BEVs

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	<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"> • comply with OHS requirements and safe work practices • ensure electrical and mechanical integrity of components and system is maintained when performing tests • test battery performance and correct deficiencies • check electric motor performance and correct deficiencies • check associated electrical components and correct deficiencies • complete relevant documentation for the service of the BEV.
Context of, and specific resources for assessment	<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"> • using standard workplace practices and procedures • following safety requirements • applying environmental constraints. <p>Assessment is to comply with relevant:</p> <ul style="list-style-type: none"> • regulatory requirements • Australian standards • industry codes of practice. <p>Competency is to be assessed using a BEV that uses HV and LV AC/DC electrical systems. Where simulation is used, an operational BEV must be included in the simulation.</p>

Evidence Guide	
	<p>The following resources must be made available for the assessment of this unit:</p> <ul style="list-style-type: none"> • appropriate PPE • a BEV • manufacturer specifications for the BEV • testing equipment • full range of essential tools and equipment • workplace documentation.
Method of assessment	<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	
<p>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.</p>	
<p>Information and documents may include:</p>	<ul style="list-style-type: none"> • Australian standards • diagrams and sketches • engineer and manufacturer design specifications and instructions • industry codes of practice • parts catalogues • verbal, written and graphical instructions issued by authorised internal and external persons • workplace specifications and requirements • workshop manuals.
<p>OHS requirements may include:</p>	<ul style="list-style-type: none"> • elimination of 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.
<p>Appropriate precautions may include:</p>	<ul style="list-style-type: none"> • analysing tasks to define risk • applying electrical safety precautions, such as: <ul style="list-style-type: none"> • “one hand rule” • live system warning tags or signs • depowering the vehicle • isolating the HV battery supply • using PPE, such as: <ul style="list-style-type: none"> • electrical safety gloves 1000V • HV insulating mats (Australian standards rated).
<p>Tests and checks may include:</p>	<ul style="list-style-type: none"> • battery charging interlock • battery cooling system • BMS • inertia safety cut-out switch

Range Statement	
	<ul style="list-style-type: none"> • isolation/cut-off emergency device • leakage of electrolyte • mounting of batteries • on-board battery charging system • PDU.
Corrective action may include:	<ul style="list-style-type: none"> • tightening connections • balancing state of charge • replacing cable connections • removing and replacing components.
Electrical motor checks may include:	<ul style="list-style-type: none"> • connecting scanner or computer interface to check motor operation • integrity of mountings.
Workplace requirements may include:	<ul style="list-style-type: none"> • 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.