



Australian Government

AURETR2009 Install, test and repair vehicle lighting and wiring systems

Release 1

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Modification History

Release	Comment
Release 1	Replaces AURE219331A Install, test and repair low voltage wiring/lighting systems Performance Criteria and Range Statement updated to reflect technologies

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes required to carry out installation, testing and repair processes to low voltage (LV) vehicle lighting and wiring systems and components.</p> <p>The unit involves identifying and confirming work requirements; preparing for work; installing, testing and repairing LV lighting systems and components; and completing work finalisation processes, including clean-up and documentation.</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

<p>Application of the unit</p>	<p>Work applies to the installation of LV lighting and wiring systems that are fitted in light and heavy vehicle, mining, construction, agricultural, motorcycle, outdoor power equipment and marine environments.</p> <p>This work applies to the installation of a light or heavy vehicle rear lighting wiring harness that would typically be required for a vehicle towing a trailer, caravan or boat or a heavy vehicle trailer. It also includes both normal filament lamps and LED lamps that may be fitted to either the vehicle or the trailer.</p> <p>Work requires individuals to demonstrate discretion, judgement and problem-solving skills in managing own work activities and contributing to a productive team environment.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

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

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

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for work	1.1. Workplace instructions are used to determine job requirements 1.2. Workplace health and safety (WHS) requirements are observed throughout the work 1.3. Procedures and information are sourced and interpreted 1.4. Installation options are analysed and those most appropriate to the circumstances are selected and prepared 1.5. Tools and equipment are identified for effective installation and testing procedures
2. Install and test lighting and wiring systems	2.1. Low voltage lighting and wiring systems are installed according to manufacturer and component supplier specifications without causing damage to components or systems as a result of inappropriate testing procedures 2.2. Tests are carried out to determine faults using tools and diagnostic techniques 2.3. Preferred repair options are determined and carried out 2.4. Post-repair testing is carried out according to workplace procedures
3. Prepare vehicle and equipment for delivery to customer after repair is completed	3.1. Final inspection is made to ensure work is to workplace expectations 3.2. Vehicle is cleaned to workplace expectations and presented ready for use 3.3. Workplace documentation is processed according to workplace procedures
4. Clean up work area and maintain equipment	4.1. Material that can be reused is collected and stored 4.2. Waste and scrap are removed following workplace procedures 4.3. Equipment and work area are cleaned and inspected for serviceable condition according to workplace procedures 4.4. Faulty equipment is identified, tagged and isolated according to workplace procedures 4.5. Operator maintenance is completed according to manufacturer and component supplier specifications and site procedures 4.6. Tools and equipment are maintained according to workplace procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

- communication skills to:
 - follow verbal and written instructions
 - clarify workplace instructions and determine job requirements
 - gain information from appropriate persons and assistance as required
- literacy skills to:
 - read and follow information in written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents
 - obtain and record measurements
 - document required repairs and parts
- numeracy skills to:
 - test, measure and analyse test equipment results compared to desired system performance
- planning and organising skills to:
 - plan own work requirements and prioritise actions to achieve required outcomes and ensure tasks are completed on time
 - identify risk factors and take action to minimise them
- problem-solving skills to:
 - recognise a workplace problem or potential problem and take action
 - refer problems outside area of responsibility to appropriate person and suggest possible causes
 - seek information and assistance as required to solve problems
- self-management skills to:
 - select and use appropriate equipment, materials, processes and procedures
 - recognise limitations and seek timely advice
 - follow workplace documentation, such as codes of practice and operating procedures
- teamwork skills to apply knowledge of own role to complete activities efficiently to support team activities and tasks
- technical skills to use workplace technology and tools relating to installing and testing vehicle LV lighting and wiring systems and components, including:
 - specialist tools and equipment
 - electrical measuring equipment
- technology skills to:
 - operate a range of electrical diagnostic test equipment
 - use technology to collect, analyse and provide information

Required knowledge

REQUIRED SKILLS AND KNOWLEDGE

- WHS regulations, requirements, equipment, material and personal safety requirements, including:
 - codes of practice
 - personal protection needs
- wiring harness and loom fabrication techniques
- procedures for removing and replacing wiring harnesses and looms
- soldering procedures and techniques
- cable types and sizes and current carrying capacity
- various types of wiring systems found in vehicles, including:
 - basic wiring
 - twisted pair
 - shielded wiring
 - computer area network databus (CAN-bus) networks
- techniques for reading and interpreting technical information, wiring diagrams and graphic symbols
- diagnostic and testing procedures, including:
 - testing procedures for LV lighting and wiring installations, including:
 - following manufacturer and component suppliers' test procedures
 - following original equipment manufacturer (OEM) service information
 - analysis of system operation using basic electrical test equipment and other industry-relevant test equipment
 - visual, aural and functional assessments, including:
 - component damage and wear
 - component corrosion
 - water and moisture ingress
- repair procedures, including:
 - component removal and replacement procedures
 - component and associated system adjustment procedures

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, the 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:

- observe safety procedures and requirements
- select methods and techniques appropriate to the circumstances
- complete preparatory activity in a systematic manner
- read and interpret low voltage lighting wiring diagrams
- install low voltage lighting and wiring systems to specification
- retrofit LED lamps where filament lamps were originally installed
- repair low voltage lighting and wiring to specification
- test low voltage lighting and wiring to determine short circuits, open circuits, and earthing and ground faults
- test lighting wiring harness and looms and locate faults
- perform electrical connections, including crimping and soldering
- remove and replace lighting wiring harness and looms
- conduct installation according to workplace, manufacturer and component supplier requirements
- accurately interpret test results
- present vehicle and equipment in a condition that complies with workplace requirements.

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:

EVIDENCE GUIDE	
	<ul style="list-style-type: none"> • regulatory requirements • Australian standards • industry codes of practice. <p>The following resources must be made available for the assessment of this unit:</p> <ul style="list-style-type: none"> • workplace location or simulated workplace • material relevant to the installation of low voltage lighting and wiring systems and components • equipment, and hand and power tools appropriate to: <ul style="list-style-type: none"> • installing low voltage lighting and wiring components • retrofitting LED low voltage lighting and wiring components where filament lamps were originally fitted • specifications and work instructions.
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

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.

<i>Workplace instructions</i> may include:	<ul style="list-style-type: none"> • electronic or hard copy instructions • verbal instructions • written instructions.
<i>Job requirements</i> may include:	<ul style="list-style-type: none"> • diagnosis and repair methods, processes and equipment.
<i>Workplace health and safety requirements</i> may include:	<ul style="list-style-type: none"> • personal protective clothing and equipment • hazards associated with high voltage ignition systems • safe use of tools and equipment • safe handling of material • use of fire-fighting equipment • workplace safety policies and procedures • workplace first aid • hazard control, including control of hazardous materials and toxic substances.
<i>Procedures and information</i> may include:	<ul style="list-style-type: none"> • verbal, written and graphical instructions • signage • work schedules, plans and specifications • work bulletins and memos • material safety data sheets • diagrams and sketches • regulatory and legislative requirements relating to automotive industry • Australian Design Rules • engineer's design specifications and instructions • workplace work specifications and requirements • instructions issued by authorised workplace or external persons • Australian standards • vehicle service requirements and repair manuals.
<i>Tools and equipment</i> may include:	<ul style="list-style-type: none"> • hand tools • testing equipment, including multimeters and ohmmeters • insulation testers • crimping tools • soldering iron

RANGE STATEMENT	
	<ul style="list-style-type: none"> • heat-gun or blower • wire and cabling of various colours and sizes • heat shrink sleeving and flexible conduit • terminals and connectors • electrical tape.
<i>Low voltage lighting and wiring systems</i> may include:	<ul style="list-style-type: none"> • basic single wiring: <ul style="list-style-type: none"> • tailer wiring harness • driving lights wiring harness • side clearance lamps • high-mount rear brake lamps • ascent strip LED lamps • filament lamp to LED lamp replacement.
<i>Inappropriate testing procedures</i> may include:	<ul style="list-style-type: none"> • intrusive testing (which must not be performed as it is not a recommended test and repair method), which includes: <ul style="list-style-type: none"> • back probing terminals and connectors and fuse holders with inappropriate test probes • probing terminal and connectors with inappropriate test probes • pushing sharp probes and objects into wiring insulation.
<i>Faults</i> may include:	<ul style="list-style-type: none"> • open circuits • high resistance circuits • short circuits • damaged insulation • frayed wires • burnt wiring • water and moisture ingress • connector damage • terminal damage • diagnosis trouble codes (DTC) being set as a result of LED lamp resistance being lower than original resistive filament lamp load.
<i>Repair options</i> may include:	<ul style="list-style-type: none"> • pre- and post-repair testing • identifying and testing components • diagnosing and determining faults • component repair procedures, including: <ul style="list-style-type: none"> • removal, replacement and adjustment procedures • dismantle, repair, reassembly and adjustment procedures • electrical measurements • visual and functional assessments, including for damage and wear.

RANGE STATEMENT

Post-repair testing may include:

- validating effectiveness of the repair action
- confirming that reported fault has been rectified
- confirming that no other faults are present as a result of the repair action.

Unit Sector(s)

Competency field	Electrical
Unit sector	Technical – Electrical and Electronic

Custom Content Section

Not applicable.