



**Australian Government**

# **AURETR2010 Fabricate, test and repair wiring harnesses and looms**

**Release 1**

## AURETR2010 Fabricate, test and repair wiring harnesses and looms

### Modification History

Release	Comment
Release 1	Replaces AURE220140A Manufacture and repair wiring harness/looms Performance Criteria and Range Statement updated to reflect technologies

### Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes required to fabricate wiring harnesses and looms, check their continuity to specification or drawing, test for functionality, and decide preferred repair action. It also includes the removal, replacement and labelling of wiring harness and loom assemblies that are an integral part of a vehicle's electrical system.</p> <p>The unit also involves identifying and confirming work requirements, preparing for work, 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

Application of the unit	<p>Work applies to wiring harnesses and looms fitted in light and heavy vehicle, mining, construction, agricultural, motorcycle, outdoor power equipment and marine environments.</p> <p>Work requires individuals to demonstrate some 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

<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 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.
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## Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for work	1.1. <i>Workplace instructions</i> are used to determine <i>job requirements</i> 1.2. <i>Workplace health and safety (WHS) requirements</i> are observed throughout the work 1.3. <i>Procedures and information</i> are sourced and interpreted 1.4. <i>Tools and equipment</i> are identified for effective fabrication, testing and repair methods
2. Check and test wiring harness and loom assembly	2.1. <i>Wiring harness and looms</i> are visually checked to establish the extent of damage 2.2. <i>Options for diagnosing faults</i> are used, using appropriate tools and diagnostic techniques 2.3. Components or systems are checked without causing damage to components or systems as a result of <i>inappropriate testing procedures</i> 2.4. <i>Faults</i> are identified and preferred repair action is determined
3. Remove, replace and label wiring harness and loom	3.1. Correct information is accessed and interpreted from manufacturer and component supplier specifications 3.2. Wiring harness and loom are labelled and removed using tools and techniques 3.3. Associated components are labelled, removed and tagged for storage 3.4. Repaired and fabricated harness and loom are correctly refitted to vehicle and reconnected according to manufacturer and component supplier specifications 3.5. Removal, replacement and labelling are completed according to industry regulations and guidelines, and WHS and workplace policies and procedures, and without causing damage to components or systems
4. Repair wiring harness and loom	4.1. Correct information is accessed and interpreted from manufacturer and component supplier specifications 4.2. <i>Repair options</i> are carried out using tools, diagnostic techniques and materials 4.3. Repairs are carried out according to industry regulations and guidelines, and WHS and workplace policies and procedures
5. Fabricate wiring harness and loom	5.1. Electrical circuit wiring diagrams are accessed and interpreted from manufacturer and component supplier specifications 5.2. Harness and loom are fabricated to approved specifications using tools and contemporary fabrication techniques and

	<p>materials</p> <p>5.3. <b><i>Post-repair testing</i></b> of the harness and loom is conducted and results are documented according to workplace policies and procedures</p>
<p>6. Clean up work area and maintain equipment</p>	<p>6.1. Workplace documents are completed according to site requirements</p> <p>6.2. Material that can be reused is collected and stored</p> <p>6.3. Waste and scrap are removed following workplace procedures</p> <p>6.4. Tools, equipment and work area are cleaned, inspected for serviceable condition, and maintained according to workplace procedures</p> <p>6.5. Faulty equipment is identified, tagged and isolated according to workplace procedures</p> <p>6.6. Operator maintenance is completed according to manufacturer and component supplier specifications and site procedures</p>

## 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
- learning skills to identify sources of information, assistance and expert knowledge to expand skills, knowledge and understanding
- literacy skills to:
  - read and follow information in written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents
  - document required repairs and parts
- numeracy skills to:
  - test, measure and analyse test equipment results compared to desired system performance
  - assess tolerances and apply accurate measurements and adjustments
- 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 repairing vehicle wiring systems, 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 SKILLS AND KNOWLEDGE****Required 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 harness 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
  - databus networks
- techniques for reading and interpreting technical information, wiring diagrams and graphic symbols
- diagnostic and testing procedures, including:
  - testing procedures for wiring harnesses and looms, including resistance and voltage drop and circuit performance checks
  - 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

<b>EVIDENCE GUIDE</b>	
<p>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.</p>	
<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>• select methods and techniques appropriate to the circumstances</li> <li>• complete preparatory activity in a systematic manner</li> <li>• select and use appropriate materials for fabricating, testing and repairing wiring harnesses and looms</li> <li>• test wiring of harnesses and looms and locate potential faults</li> <li>• remove and replace wiring harnesses and looms</li> <li>• test and repair wiring harnesses and looms to manufacturer specification</li> <li>• perform electrical connections, including crimping and soldering to manufacturer specification</li> <li>• perform a terminal retention check following replacement of terminals in a wiring connector</li> <li>• fabricate wiring harnesses.</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>The following resources must be made available for the assessment</p>



<b>EVIDENCE GUIDE</b>	
	<p>of this unit:</p> <ul style="list-style-type: none"> <li>• workplace location or simulated workplace</li> <li>• material relevant to the fabrication and repair of wiring harnesses and looms</li> <li>• equipment, and hand and power tools appropriate to fabricating, testing and repairing wiring harnesses and looms</li> <li>• specifications and work instructions.</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.

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

<b>RANGE STATEMENT</b>	
	<ul style="list-style-type: none"> <li>• heat-gun or blower</li> <li>• wire and cabling of various colours and sizes</li> <li>• heat shrink sleeving and flexible conduit</li> <li>• terminals and connectors</li> <li>• electrical tape.</li> </ul>
<b><i>Wiring harness and looms</i></b> may include:	<ul style="list-style-type: none"> <li>• basic single wiring, for example:               <ul style="list-style-type: none"> <li>• tailer harness</li> <li>• driving lights harness</li> </ul> </li> <li>• complex multi-wiring with varying wire gauges</li> <li>• CAN-bus network wiring, including:               <ul style="list-style-type: none"> <li>• twisted pair</li> <li>• shielded wiring.</li> </ul> </li> </ul>
<b><i>Options for diagnosing faults</i></b> may include:	<ul style="list-style-type: none"> <li>• continuity testing</li> <li>• insulation testing</li> <li>• isolation of faults</li> <li>• visual inspection and evaluation of components.</li> </ul>
<b><i>Inappropriate testing procedures</i></b> may include:	<ul style="list-style-type: none"> <li>• 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"> <li>• back probing terminals and connectors and fuse holders with inappropriate test probes</li> <li>• probing terminal and connectors with inappropriate test probes</li> <li>• pushing sharp probes and objects into wiring insulation.</li> </ul> </li> </ul>
<b><i>Faults</i></b> may include:	<ul style="list-style-type: none"> <li>• open circuits</li> <li>• short circuits</li> <li>• damaged insulation</li> <li>• frayed wires</li> <li>• burnt wiring</li> <li>• water and moisture ingress</li> <li>• connector damage</li> <li>• terminal damage</li> <li>• diagnosis trouble codes (DTC) being set.</li> </ul>
<b><i>Repair options</i></b> may include:	<ul style="list-style-type: none"> <li>• pre- and post-repair testing</li> <li>• identifying and testing components</li> <li>• diagnosing and determining faults</li> <li>• component repair procedures, including:               <ul style="list-style-type: none"> <li>• removal, replacement and adjustment procedures</li> <li>• dismantle, repair, reassembly and adjustment procedures</li> </ul> </li> <li>• electrical measurements</li> </ul>

<b>RANGE STATEMENT</b>	
	<ul style="list-style-type: none"> <li>• peak voltage testing</li> <li>• visual and functional assessments, including for damage and wear.</li> </ul>
<i>Post-repair testing</i> may include:	<ul style="list-style-type: none"> <li>• validating effectiveness of the repair action</li> <li>• confirming that reported fault has been rectified</li> <li>• confirming that no other faults are present as a result of the repair action.</li> </ul>

### **Unit Sector(s)**

<b>Competency field</b>	Electrical
<b>Unit sector</b>	Technical – Electrical and Electronic

### **Custom Content Section**

Not applicable.