



**Australian Government**

# **AURRTE3006 Diagnose and repair outboard engines and components**

**Release 1**

## AURRTE3006 Diagnose and repair outboard engines and components

### Modification History

Release	Comment
Release 1	Replaces AURR301102A Diagnose and repair outboard engines and components Unit code updated to meet policy requirements Reference to OHS legislation replaced with new WHS legislation

### Unit Descriptor

<b>Unit descriptor</b>	<p>This unit of competency describes the skills and knowledge required to diagnose and repair two and four cycle outboard marine engines and components.</p> <p>It requires the ability to interpret work requirements, diagnose and repair two and four cycle outboard engines and components and finalise work processes.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>
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### Application of the Unit

<b>Application of the unit</b>	This unit applies to individuals who undertake the repair of two and four cycle outboard engines and components in a marine environment.
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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 performance needed to demonstrate achievement of the element. 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 engine repair work	1.1. Confirm nature and scope of work to be carried out 1.2. Locate workplace health and safety (WHS) and workplace environmental and sustainable procedures and practices applicable to the work 1.3. Access and interpret repair method, workshop manuals and manufacturer information 1.4. Check and prepare tools, equipment and materials 1.5. Set up work area
2. Conduct engine system tests and analyse results	2.1. Develop a diagnosis strategy 2.2. Undertake engine system tests in accordance with workplace procedures and manufacturer and component supplier specifications 2.3. Start and run engine to operating temperature and check for leaks, abnormal noises and pressures 2.4. Compare test results with manufacturer and component supplier specifications to identify compliance or non-compliance 2.5. Document results, including evidence, relevant information and recommendations 2.6. Forward report to persons for action in accordance with workplace procedures 2.7. Finalise repair requirements
3. Dismantle engine and components	3.1. Dismantle engine and components in a logical sequence without causing damage 3.2. Clean engine and arrange components ready for inspection 3.3. Measure and compare components against supplier specifications and tolerances 3.4. Decide repair method in accordance with WHS, environmental and industry regulations, and guidelines and enterprise procedures 3.5. Source parts as required 3.6. Determine and arrange outsourcing of third-party repair
4. Repair and rebuild engine and engine components	4.1. Perform repair and rebuild operations in accordance with workplace procedures and manufacturer and component supplier specifications and tolerances 4.2. Re-assemble engine and components following manufacturer and component supplier procedures

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
	<p>4.3. Measure running clearances against component manufacturer and supplier specifications</p> <p>4.4. Conduct pre-start checks, make required adjustments and re-test</p> <p>4.5. Apply appropriate lubricants to engine</p> <p>4.6. Check that protective guards, cowlings and safety features are in place according to workplace expectations</p> <p>4.7. Perform hot run testing in test tank or at launching ramp</p> <p>4.8. Complete workplace documentation and deal with as relevant to repair outcomes</p>
<p>5. Prepare engine for delivery to customer or storage</p>	<p>5.1. Seal engine orifices against ingress of foreign matter</p> <p>5.2. Determine the need for water testing</p> <p>5.3. Make final inspection to ensure protective features are in place and according to workplace requirements</p> <p>5.4. Clean and store engine according to workplace requirements</p> <p>5.5. Finalise and process work completion documentation, update customer and warranty information and give to appropriate persons as required</p> <p>5.6. Clean work area, dispose of waste and store tools and equipment in accordance with workplace procedures</p>

## Required Skills and Knowledge

### REQUIRED SKILLS AND KNOWLEDGE

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

#### Required skills

Required skills include:

- technical skills to the level required to use workplace technology related to the testing, diagnosis and repair of marine engines and components, including use of specialist tooling, measuring equipment, use of communication devices and workplace technology to record results of repair work
- communication skills to the level required to confirm work requirements and specifications, to communicate effectively regarding work requirements with supervisor, other workers and customers, to relate to people from a range of social, cultural and ethnic backgrounds and of varying physical and mental abilities, and to report work outcomes and problems
- literacy skills to the level required to understand information related to work orders, including common industry terminology, plans and safety procedures, to interpret technical information and specifications, and to prepare reports
- numeracy skills to the level required to correctly calculate time, assess tolerances, apply accurate measurements, calculate material requirements and establish quality checks
- problem-solving skills to the level required to identify technical and procedural problems to avoid planning and scheduling problems, and time and material wastage
- team skills to the level required to work effectively and cooperatively with others to optimise workflow and productivity

#### Required knowledge

Required knowledge includes:

- operating principles and construction of two and four cycle outboard engines and components
- repair and rebuild procedures and methodologies for different engines types
- testing and adjustment procedures for different engine types
- service and repair manuals (hard copy and electronic)
- manufacturer and component supplier specifications, including workshop manuals and repair guides
- applicable commonwealth, state or territory legislation, regulations, standards and codes of practice, including WHS, personal safety and environment, relevant to testing, diagnosing and repairing two and four cycle outboard engines and components
- organisational policies and procedures, including quality requirements, reporting and recording procedures, WHS regulations and requirements, equipment, material

<b>REQUIRED SKILLS AND KNOWLEDGE</b>
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and personal safety requirements related to testing, diagnosing and repairing two and four cycle outboard engines and components
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## 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, 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>Assessors must be satisfied that the candidate can competently and consistently:</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 repair methods and techniques appropriate to the circumstances</li> <li>• complete preparatory activity in a systematic manner</li> <li>• repair and rebuild a range of two and four cycle outboard engines from single cylinder to current multi-cylinder engines and their components to manufacturer and component specifications</li> <li>• complete the repair of two and four cycle outboard engine and components within workplace timeframes</li> <li>• complete workplace records.</li> </ul>
<b>Context of, and specific resources for assessment</b>	<ul style="list-style-type: none"> <li>• The application of competency is to be assessed in the workplace or a simulated environment that reflects as far as possible the actual working environment.</li> <li>• Assessment is to occur using standard and authorised work practices, safety requirements and environmental constraints.</li> <li>• Assessment is to comply with relevant regulatory requirements, including specified Australian standards.</li> <li>• Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.</li> <li>• The following resources should be made available: <ul style="list-style-type: none"> <li>• appropriate worksite</li> <li>• range of two and four cycle marine engines and components</li> <li>• specifications and work instructions</li> <li>• equipment, hand and power tooling appropriate to repairing marine engines</li> <li>• relevant information, including manufacturer</li> </ul> </li> </ul>



<b>EVIDENCE GUIDE</b>	
	specifications.
<b>Method of assessment</b>	<ul style="list-style-type: none"> <li>• Assessment must satisfy the endorsed Assessment Guidelines of this Training Package.</li> <li>• Assessment methods must confirm consistency and accuracy of performance (over time and in a range of workplace relevant contexts) together with application of Required Skills and Knowledge.</li> <li>• Assessment methods must be by direct observation of tasks and include questioning on Required Skills and Knowledge to ensure its correct interpretation and application.</li> <li>• Assessment may be applied under project-related conditions (real or simulated) and require evidence of process.</li> <li>• Assessment must confirm a reasonable inference that competency is able not only to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.</li> <li>• Competence in this unit may be assessed in conjunction with other functional units which together form part of the holistic work role.</li> </ul>
<b>Guidance information for assessment</b>	Assessment processes and techniques must be culturally sensitive and appropriate to the language and literacy capacity of the candidate and the work being performed.

## Range Statement

<b>RANGE STATEMENT</b>	
<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. 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>	
<b>Marine engines</b>	<p>Marine engines may include:</p> <ul style="list-style-type: none"> <li>• 2-stroke petrol</li> <li>• 4-stroke diesel and petrol</li> </ul>
<b>Repair and rebuild</b>	<p>Repair and rebuild may include:</p>

<b>RANGE STATEMENT</b>	
	<ul style="list-style-type: none"> <li>• on- and off-site repairs</li> <li>• dismantling and reassembly</li> <li>• repair and replacement of components</li> <li>• testing and adjustments</li> </ul>
<b>Pre-start checking procedures</b>	<p>Pre-start checking procedures may include:</p> <ul style="list-style-type: none"> <li>• running to operating temperature</li> <li>• priming oil</li> <li>• checking engine fluid levels, including lubrication and coolant</li> <li>• checking fuel system for leaks</li> <li>• checking for abnormal noises</li> <li>• checking for pressures</li> <li>• checking gauges and warning devices for operation</li> </ul>
<b>Tooling and equipment</b>	<p>Tooling and equipment may include:</p> <ul style="list-style-type: none"> <li>• specific service and general workshop equipment and tooling</li> <li>• measuring equipment</li> <li>• lubricating equipment</li> </ul>
<b>Materials</b>	<p>Materials may include:</p> <ul style="list-style-type: none"> <li>• spare parts</li> <li>• lubricants</li> <li>• fluids</li> <li>• cleaning materials</li> </ul>
<b>Environmental work practices</b>	<p>Environmental work practices may include:</p> <ul style="list-style-type: none"> <li>• use of renewable, recyclable, reusable and recoverable resources</li> <li>• minimisation and appropriate disposal of waste and packaging</li> <li>• prevention of contaminants and wastewater entering stormwater drains, waterways or marine environments</li> <li>• minimisation and containment of hazards to air quality</li> <li>• minimisation of noise generating activities</li> <li>• safe storage of parts and components containing environmentally hazardous material</li> <li>• provision of appropriate storage or recycling</li> </ul>

<b>RANGE STATEMENT</b>	
	<ul style="list-style-type: none"> <li>containers for solid and liquid waste</li> <li>• use of impervious paved area for surface cleaning, engine degreasing and preparation</li> <li>• use of an approved parts washer</li> <li>• use of drip trays under vehicles</li> <li>• cleaning hands over drains connected to an oil/water separator or liquid waste collection drums</li> <li>• minimisation of vehicle exhausts and emissions and provision of ventilated work areas</li> <li>• use of a ventilated, enclosed booth or chamber for spray painting and abrasive sanding</li> <li>• recovering CFCs, HCFCs and blends from air conditioning systems for recycling or approved disposal</li> <li>• prevention of tributyltin, arsenic, mercury and DDT entering the marine environment</li> </ul>
<b>Information/documents</b>	<p>Information/documents may include:</p> <ul style="list-style-type: none"> <li>• verbal, written and graphical instructions issued by authorised internal and external persons</li> <li>• parts listing prices and catalogues</li> <li>• inventory systems</li> <li>• material safety data sheets (MSDS)</li> <li>• diagrams or sketches</li> <li>• engineer's design specifications and instructions</li> <li>• manufacturer specifications</li> <li>• industry standards (e.g. American Boat and Yacht Council, National Marine, Manufacturer's Association and US Coast Guard)</li> <li>• Australian standards</li> <li>• workplace specifications and requirements</li> <li>• current boating licence</li> </ul>
<b>Legislative requirements</b>	<p>Legislative requirements are to be in accordance with applicable commonwealth, state or territory legislation, regulations, certification requirements and codes of practice, and may include:</p>

<b>RANGE STATEMENT</b>	
	<ul style="list-style-type: none"> <li>• award and enterprise agreements</li> <li>• industrial relations</li> <li>• Australian standards</li> <li>• Australian Design Rules</li> <li>• confidentiality and privacy</li> <li>• WHS</li> <li>• the environment</li> <li>• equal opportunity</li> <li>• anti-discrimination</li> <li>• duty of care</li> </ul>
<b>WHS requirements</b>	<p>WHS requirements are to be in accordance with applicable commonwealth, state or territory legislation and regulations, and organisational safety policies and procedures, and may include:</p> <ul style="list-style-type: none"> <li>• personal protective equipment and clothing</li> <li>• safety equipment</li> <li>• first aid equipment</li> <li>• hazard and risk control</li> <li>• elimination of hazardous materials and substances</li> <li>• manual handling, including shifting, lifting and carrying</li> <li>• emergency procedures</li> <li>• road rules</li> <li>• safe driving policy</li> </ul>
<b>Environmental requirements</b>	<p>Environmental requirements may include:</p> <ul style="list-style-type: none"> <li>• waste management</li> <li>• noise</li> <li>• dust</li> <li>• clean-up management</li> </ul>
<b>Organisational policies and procedures</b>	<p>Organisational policies and procedures may include:</p> <ul style="list-style-type: none"> <li>• quality policies and procedures, including Australian standards</li> <li>• WHS, sustainability, environment, equal opportunity and anti-discrimination</li> <li>• manufacturer specifications and industry codes of practice</li> <li>• safe work procedures</li> </ul>

**RANGE STATEMENT**

	<ul style="list-style-type: none"><li>• reporting and recording procedures</li></ul>
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**Unit Sector(s)**

<b>Unit sector</b>	Marine
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**Co-requisite units**

Not applicable.

**Competency field**

<b>Competency field</b>	Technical - Engines
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