



Australian Government

AURRTE006 Diagnose and repair marine outboard engines

Release: 1

AURRTE006 Diagnose and repair marine outboard engines

Modification History

Release	Comment
Release 1	New unit of competency.

Application

This unit describes the performance outcomes required to diagnose and repair faults in the two and four-stroke cycle outboard engines of marine vessels. It involves preparing for the task, selecting the correct diagnostic procedure, carrying out the diagnosis and the repair, performing post-repair testing, and completing workplace processes and documentation.

It applies to those working in the marine service and repair industry.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Competency Field

Marine

Unit Sector

Technical - Engines

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold and italicised text is used, further information is detailed in the range of conditions section.
1. Prepare to diagnose and repair marine outboard engine	1.1 Job requirements are determined from workplace instructions 1.2 Diagnostic information is sourced and interpreted 1.3 Diagnostic options are analysed and those most appropriate to the circumstances are selected 1.4 Hazards associated with the work are identified and risks are managed

Elements Elements describe the essential outcomes.	Performance Criteria Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold and italicised text is used, further information is detailed in the range of conditions section.
	1.5 Diagnostic tools and equipment are selected and checked for serviceability
2. Diagnose engine	2.1 Diagnostic tests are carried out according to workplace procedures and safety requirements 2.2 Faults are identified from diagnostic test results and causes of faults are determined 2.3 Diagnosis findings, including recommendations for necessary repairs or adjustments, are reported according to workplace procedures
3. Dismantle engine	3.1 Tools, equipment and materials are selected and checked 3.2 Engine is dismantled as required according to workplace procedures, and safety and environmental requirements 3.3 Engine is cleaned and components arranged for inspection according to workplace procedures, and safety and environmental requirements 3.4 Engine components are measured and compared with manufacturer specifications 3.5 Final repair recommendations are made and reported according to workplace procedures
4. Repair and reassemble engine	4.1 Repair information is sourced and interpreted 4.2 Repair options are analysed and those most appropriate to the circumstances are selected 4.3 Repairs and component replacements and adjustments are carried out according to manufacturer specifications, workplace procedures, and safety and environmental requirements, and without causing damage to components or systems 4.4 Engine is reassembled according to manufacturer specifications, workplace procedures and safety requirements 4.5 Post-repair testing is carried out according to workplace procedures to confirm fault rectification, and any further problems detected as having been introduced during the repair process are rectified
5. Complete work processes	5.1 Final inspection is made to ensure work is to workplace expectations and engine is presented ready for use or stored according to workplace procedures 5.2 Work area is cleaned, waste and non-recyclable materials are disposed of, and recyclable material is collected 5.3 Tools and equipment are checked and stored according to

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	workplace procedures 5.4 Workplace documentation is processed according to workplace procedures

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance and are not explicit in the performance criteria.

Skills	Description
Learning skills to:	locate appropriate sources of information efficiently.
Reading skills to:	interpret information from manufacturer and workshop literature when seeking engine specifications and procedures.
Writing skills to:	legibly and accurately fill out workplace documentation when reporting diagnostic findings, making repair recommendations, and recording parts and material used.
Oral communication skills to:	- clarify instructions - report diagnostic findings and make repair recommendations.
Numeracy skills to:	measure engine components and use basic mathematical operations, including addition, subtraction, multiplication and division, to calculate distances, areas, volumes, tolerances and deviations from manufacturer specifications.
Planning and organising skills to:	plan own work requirements and prioritise actions to achieve required outcomes and ensure tasks are completed within workplace timeframes.
Technology skills to:	use precision measuring equipment, such as micrometers and dial bore gauges.

Range of Conditions

This section specifies work environments and conditions that may affect performance.

Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included. Bold italicised wording, if used in the performance criteria, is detailed below.

<i>Safety requirements</i> must include:	• work health and safety (WHS) and occupational health and safety (OHS) requirements, including procedures for lifting and supporting outboard engines.
<i>Environmental requirements</i> must include:	• procedures for trapping, storing and disposing of fluids released from engines.

Unit Mapping Information

Equivalent to AURRTE3006 Diagnose and repair outboard engines and components

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b4278d82-d487-4070-a8c4-78045ec695b1>

Assessment Requirements for AURRTE006 Diagnose and repair marine outboard engines

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Performance Evidence

Before competency can be determined, individuals must demonstrate they can perform the following according to the standards defined in this unit's elements, performance criteria, range of conditions and foundation skills:

- diagnose and repair a fault in two different marine two-stroke powerheads, in which the work must involve dismantling and reassembling the powerhead
- diagnose and repair a fault in two different marine four-stroke powerheads, in which the work must involve dismantling and reassembling the powerhead.

Knowledge Evidence

Individuals must be able to demonstrate knowledge of:

- work health and safety (WHS) and occupational health and safety (OHS) requirements relating to diagnosing and repairing outboard engines, including procedures for lifting and supporting outboard engines
- environmental requirements, including procedures for trapping, storing and disposing of fluids released from engines
- operating principles of outboard engines and associated components, including:
 - combustion, including:
 - air-fuel ratios and combustion cycles
 - direct injection
 - detonation
 - engine measurement and performance, including:
 - swept volume and engine volume
 - compression ratio
 - engine efficiency, including volumetric efficiency, thermal efficiency and mechanical efficiency
 - torque and horsepower, including brake horsepower

- application, purpose and operation of outboard engines and components, including:
 - lubrication systems, cylinder blocks, cylinders, pistons, cylinder heads, combustion chambers, inlet manifolds, poppet and reed valves, connecting rods, crankshafts, piston rings, piston pins, camshafts, timing gears, vibration dampers and flywheels
- diagnostic testing procedures for outboard engines, including:
 - wet and dry compression tests
 - cylinder leakage tests
 - oil pressure tests
 - sources of fluid leaks
 - exhaust smoke diagnosis
 - checking abnormal engine noises
- dismantling procedures for outboard engines, including procedures for:
 - measuring clearances and tolerances
 - inspecting components
- repair procedures for outboard engines, including procedures for repairing cylinder blocks and cylinder heads
- assembly procedures for outboard engines, including procedures for fitting components and obtaining clearances and tolerances
- post-repair testing procedures for outboard engines, including:
 - load testing engines
 - tank testing engines
 - water testing engines.

Assessment Conditions

Assessors must satisfy NVR/AQTF assessor requirements.

Competency is to be assessed in the workplace or a simulated environment that accurately reflects performance in a real workplace setting.

Assessment must include direct observation of tasks.

Where assessment of competency includes third-party evidence, individuals must provide evidence that links them to the marine engines that they have worked on, e.g. repair orders.

Assessors must verify performance evidence through questioning on skills and knowledge to ensure correct interpretation and application.

The following resources must be made available:

- marine repair workplace or simulated workplace
- workplace instructions
- manufacturer outboard engine specifications
- two different marine two-stroke powerheads with system faults
- two different marine four-stroke powerheads with system faults
- diagnostic equipment for outboard engines and components

- tools, equipment and materials appropriate for dismantling, repairing, reassembling and adjusting outboard engines and components.

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