



Australian Government

AURRTE106 Diagnose and repair marine outboard engines

Release: 1

AURRTE106 Diagnose and repair marine outboard engines

Modification History

Release	Comments
Release 1	This version first released with AUR Automotive Retail, Service and Repair Training Package Version 6.0

Application

This unit describes the skills and knowledge required to diagnose and repair marine outboard engines. The unit involves preparing for the task, sourcing a diagnostic testing strategy, diagnosing the cause of the fault, carrying out the repair, performing post-repair testing, and completing workplace processes and documentation.

The unit 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.

Unit Sector

Marine Technical - Engines

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Prepare to diagnose and repair marine outboard engine	1.1 Identify job requirements from workplace instructions 1.2 Identify required information for diagnosis activity 1.3 Analyse diagnostic options and source testing strategy to identify cause of fault using workplace and manufacturer procedures 1.4 Identify hazards and environmental issues associated with diagnose and repair activity, assess potential risks and implement control measures in line with workplace policies and procedures 1.5 Identify tools and equipment required for testing strategy and establish serviceability according to workplace procedures

ELEMENTS	PERFORMANCE CRITERIA
2. Diagnose marine outboard engine	2.1 Implement diagnostic tests set out in testing strategy according to manufacturer and workplace procedures, and workplace health and safety requirements 2.2 Identify cause of fault through analysis of diagnostic test results 2.3 Confirm and report cause of fault according to workplace procedures 2.4 Develop and report recommendations for necessary repairs according to workplace procedures
3. Dismantle marine outboard engine	3.1 Identify tools and equipment required to dismantle engine and establish serviceability according to workplace procedures 3.2 Dismantle engine, clean and inspect components according to workplace procedures, workplace health and safety and environmental requirements 3.3 Measure and compare components against manufacturer specifications 3.4 Confirm recommendations for necessary repairs according to workplace procedures
4. Repair and re-assemble marine outboard engine	4.1 Identify required information for repair activity 4.2 Identify tools, equipment and materials required for repair activity and establish serviceability according to workplace procedures 4.3 Carry out repairs according to workplace and manufacturer procedures, manufacturer specifications, workplace health and safety and environmental requirements 4.4 Re-assemble engine according to workplace and manufacturer procedures, manufacturer specifications, workplace health and safety and environmental requirements 4.5 Carry out post-repair testing according to workplace procedures, workplace health and safety and environmental requirements
5. Complete work processes	5.1 Conduct final inspection according to workplace procedures and confirm vehicle is ready for use 5.2 Clear work area and dispose of or recycle materials according to workplace procedures 5.3 Complete documentation according to workplace procedures

Foundation Skills

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

SKILL	DESCRIPTION
Learning	• Locates required sources of information efficiently • Develops a sequenced plan for a specific task.
Reading	• Organises and interprets technical information from workplace procedures, manufacturer procedures and manufacturer specifications.
Oral communication	• Clarifies instructions • Obtains information from customers and supervisors.
Numeracy	• Measures outboard engine components • Uses mathematical operations • Calculates deviations and tolerances from manufacturer specifications.
Planning and organising	• Plans own work requirements • Prioritises actions to achieve required outcomes • Ensures tasks are completed within workplace timeframes.
Technology	• Uses precision measuring equipment.

Unit Mapping Information

Supersedes and is equivalent to AURRTE006 Diagnose and repair marine outboard engines.

Links

Companion Volume Implementation Guide is found on VETNet -

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

Assessment Requirements for AURRTE106 Diagnose and repair marine outboard engines

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Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- 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

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- methods to locate and interpret information required to diagnose and repair marine outboard engines including:
 - information provided by customers and supervisors
 - manufacturer specifications and procedures or equivalent documentation
- workplace procedures required to diagnose and repair marine outboard engines including:
 - establishing serviceability of tools and equipment
 - documentation procedures
 - housekeeping procedures including:
 - examination of tools and equipment
 - storage of equipment
 - identification, tagging and isolation of faulty equipment
 - disposal of excess materials
 - recycling procedures
- workplace health and safety (WHS) requirements relating to diagnosing and repairing marine outboard engines, including procedures for lifting and supporting outboard engines
- environmental requirements relating to diagnosing and repairing marine outboard engines, including procedures for trapping, storing and disposing of fluids released from engines

- operating principles of marine outboard engines, 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
- 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 marine 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 marine 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 marine outboard engines, including:
 - load testing engines
 - tank testing engines
 - water testing engines.

Assessment Conditions

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.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

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