



Australian Government

AURRTC101 Diagnose and repair marine exhaust and cooling systems

Release: 1

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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 faults in the exhaust and cooling systems of marine vessels. 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 – Cooling Systems

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 exhaust and cooling system	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

ELEMENTS	PERFORMANCE CRITERIA
	and establish serviceability according to workplace procedures
2. Diagnose marine exhaust and cooling system	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 exhaust and cooling system	3.1 Identify tools and equipment required to dismantle engine and establish serviceability according to workplace procedures 3.2 Dismantle exhaust and cooling system, 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 exhaust and cooling system	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 exhaust and cooling system 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 marine exhaust and cooling system components • Uses mathematical operations • Calculates distances, areas, volumes and tolerances • Calculates deviations 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 including infra-red thermometers.

Unit Mapping Information

Supersedes and is equivalent to AURRTC001 Diagnose and repair marine exhaust and cooling systems.

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 AURRTC101 Diagnose and repair marine exhaust and cooling systems

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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 the freshwater cooling exhaust and cooling systems of two different vessels
- diagnose and repair a fault in the raw water exhaust and cooling systems of two different vessels.

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 exhaust and cooling systems including:
 - information provided by customers and supervisors
 - manufacturer specifications and procedures or equivalent documentation
- workplace procedures required to diagnose and repair marine exhaust and cooling systems 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 exhaust and cooling systems, including procedures for:
 - lifting and supporting exhaust and cooling system components

- working with hot exhaust and cooling system components
- environmental requirements relating to diagnosing and repairing marine exhaust and cooling systems, including procedures for trapping, storing and disposing of materials released from exhaust systems
- purpose and operation of marine exhaust and cooling systems and components, including:
 - fresh watercooling systems, including:
 - circulation pumps
 - thermostats
 - heat exchangers
 - exhaust manifolds
 - turbochargers
 - dry exhausts
 - raw water-cooling systems, including:
 - pumps, including camshaft, belt, shaft and gear driven
 - relief valves
 - engine oil coolers
 - transmission oil coolers
 - sacrificial anodes
 - intercoolers
 - seawater strainers
 - exhaust manifolds
 - exhaust elbows and risers
 - exhaust tubes and hoses
 - wet exhausts
 - mufflers and waterlocks
 - siphon breaks
 - exhaust outlet flappers
- diagnostic testing procedures for marine exhaust and cooling systems, including:
 - manometer measurement
 - turbocharger boost measurement
 - raw water system pressure and flow measurement
 - freshwater cooling system pressure testing
 - infra-red temperature measurement
- dismantling and repair procedures for marine exhaust and cooling systems, including procedures inspecting and evaluating the following components:
 - circulation pumps
 - thermostats
 - heat exchangers
 - turbochargers and intercoolers
 - raw water pumps, including camshaft, belt, shaft and gear driven

- relief valves
- sacrificial anodes
- seawater strainers
- exhaust manifolds
- exhaust elbows and risers
- exhaust tubes and hoses
- mufflers and waterlocks
- siphon breaks
- exhaust outlet flappers
- post-repair testing procedures for marine exhaust and cooling systems, including water testing procedures while under load.

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 exhaust and cooling systems 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 exhaust and cooling system specifications
- two different marine vessels with faults in their freshwater cooling exhaust and cooling systems
- two different marine vessels with faults in their raw water exhaust and cooling systems
- diagnostic equipment for marine exhaust and cooling systems
- tools, equipment and materials appropriate for dismantling, testing, repairing and reassembling marine exhaust and cooling systems.

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

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