



Australian Government

AURRTC001 Diagnose and repair marine exhaust and cooling systems

Release: 1

AURRTC001 Diagnose and repair marine exhaust and cooling systems

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 exhaust and cooling systems 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 – Cooling Systems

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 exhaust and cooling system	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

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.
	managed 1.5 Diagnostic tools and equipment are selected and checked for serviceability
2. Diagnose exhaust and cooling system	2.1 Diagnostic tests are performed 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 exhaust and cooling system	3.1 Tools, equipment and materials are selected and checked 3.2 Exhaust and cooling system is dismantled as required according to workplace procedures, and safety and environmental requirements 3.3 Exhaust and cooling system is cleaned and its components are arranged for inspection according to workplace procedures, and safety and environmental requirements 3.4 Exhaust and cooling system components are inspected, measured and compared with manufacturer specifications 3.5 Final repair recommendations are made and reported according to workplace procedures
4. Repair and reassemble exhaust and cooling system	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 Exhaust and cooling system 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 vessel is presented ready for use or stored according to workplace procedures

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	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 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 marine cooling system 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 exhaust and cooling system 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 infra-red thermometers.

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 exhaust and cooling system components • working with hot exhaust and cooling system components.
<i>Environmental requirements</i> must include:	• procedures for trapping, storing and disposing of materials released from exhaust systems.

Unit Mapping Information

No equivalent unit.

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 AURRTC001 Diagnose and repair marine exhaust and cooling systems

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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 the fresh water 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

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 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, including procedures for trapping, storing and disposing of materials released from exhaust systems
- application, purpose and operation of marine exhaust and cooling systems and components, including:
 - fresh water cooling 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 exhaust and cooling systems, including:
 - manometer measurement
 - turbocharger boost measurement
 - raw water system pressure and flow measurement
 - fresh water cooling system pressure testing
 - infra-red temperature measurement
- dismantling and repair procedures for exhaust and cooling systems, including procedures for 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 exhaust and cooling systems, including water testing procedures while under load.

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 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 fresh water 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.

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