



**Australian Government**

# **AURRTD101 Diagnose and repair marine steering systems**

**Release: 1**

# AURRTD101 Diagnose and repair marine steering systems

## 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 steering systems. 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 - Steering and Suspension

## 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 steering system | 1.1 Identify job requirements from workplace instructions<br>1.2 Identify required information for diagnosis activity<br>1.3 Analyse diagnostic options and source testing strategy to identify cause of fault using workplace and manufacturer procedures<br>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<br>1.5 Identify tools and equipment required for testing strategy and establish serviceability according to workplace procedures |

| ELEMENTS                           | PERFORMANCE CRITERIA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2. Diagnose marine steering system | <ul style="list-style-type: none"><li>2.1 Implement diagnostic tests set out in testing strategy according to manufacturer and workplace procedures, and workplace health and safety requirements</li><li>2.2 Identify cause of fault through analysis of diagnostic test results</li><li>2.3 Confirm and report cause of fault according to workplace procedures</li><li>2.4 Develop and report recommendations for necessary repairs according to workplace procedures</li></ul>                                                                                      |
| 3. Repair marine steering system   | <ul style="list-style-type: none"><li>3.1 Identify required information for repair activity</li><li>3.2 Identify tools, equipment and materials required for repair activity and establish serviceability according to workplace procedures</li><li>3.3 Carry out repairs according to workplace and manufacturer procedures, manufacturer specifications, workplace health and safety and environmental requirements</li><li>3.4 Carry out post-repair testing according to workplace procedures, workplace health and safety and environmental requirements</li></ul> |
| 4. Complete work processes         | <ul style="list-style-type: none"><li>4.1 Conduct final inspection according to workplace procedures and confirm vehicle is ready for use</li><li>4.2 Clear work area and dispose of or recycle materials according to workplace procedures</li><li>4.3 Complete documentation according to workplace procedures</li></ul>                                                                                                                                                                                                                                              |

## 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           | <ul style="list-style-type: none"><li>• Locates required sources of information efficiently</li><li>• Develops a sequenced plan for a specific task.</li></ul>                       |
| Reading            | <ul style="list-style-type: none"><li>• Organises and interprets technical information from workplace procedures, manufacturer procedures and manufacturer specifications.</li></ul> |
| Oral communication | <ul style="list-style-type: none"><li>• Clarifies instructions</li><li>• Obtains information from customers and supervisors.</li></ul>                                               |

| SKILL                   | DESCRIPTION                                                                                                                                                                                                   |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Numeracy                | <ul style="list-style-type: none"><li>• Measures steering system components</li><li>• Uses mathematical operations</li><li>• Calculates deviations and tolerances from manufacturer specifications.</li></ul> |
| Planning and organising | <ul style="list-style-type: none"><li>• Plans own work requirements</li><li>• Prioritises actions to achieve required outcomes</li><li>• Ensures tasks are completed within workplace timeframes.</li></ul>   |
| Technology              | <ul style="list-style-type: none"><li>• Uses measuring equipment.</li></ul>                                                                                                                                   |

## Unit Mapping Information

Supersedes and is equivalent to AURRTD001 Diagnose and repair marine steering 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 AURRTD101 Diagnose and repair marine steering 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 at least two of the following marine steering systems:
  - mechanical cable
  - hydraulic steering
  - electrohydraulic steering.

## 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 steering systems including:
  - information provided by customers and supervisors
  - manufacturer specifications and procedures or equivalent documentation
- workplace procedures required to diagnose and repair marine steering 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 steering systems, including procedures for:
  - avoiding pinch points when operating steering systems

- working with high hydraulic oil pressures
- determining safe working loads of ropes, chains and cables
- environmental requirements relating to diagnosing and repairing marine steering systems
- operating principles of marine steering systems, including:
  - rudders and the principle of unequal water pressures
  - propwash
- purpose and operation of marine steering systems and components, including:
  - rope, cable and chain systems
  - inboard steering systems, including:
    - steering gear
    - balanced and unbalanced rudders
    - electrohydraulic steering
  - outboard engine steering, including:
    - mechanical cable
    - hydraulic steering
    - electrohydraulic steering
  - stern drive steering, including:
    - power steering
    - electrohydraulic steering
  - bow and stern thrusters, including:
    - electric systems
    - hydraulic systems
- diagnostic testing procedures for marine steering systems, including:
  - rudder wear down
  - mechanical cable testing, including:
    - helm evaluation, including backlash
    - draglink wear
  - hydraulic system testing, including:
    - pressure testing
    - testing system for air
    - draglink wear
  - electrohydraulic system testing, including:
    - pressure testing
    - component electrical testing
- repair procedures for marine steering systems, including procedures for:
  - selecting steering system appropriate to vessel
  - dismantling, repairing and lubricating steering system components
  - replacing components
  - replacing helm and ram seal
  - identifying and measuring cables

- post-repair testing procedures for marine steering systems, including procedures for testing for smooth operation and full range of movement.

## 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 steering 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 steering system specifications
- marine vessels with faults in the steering systems specified in the performance evidence
- diagnostic equipment for marine steering systems
- tools, equipment and materials appropriate for repairing and adjusting marine steering systems.

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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