



**Australian Government**

# **MARL046 Carry out engineering calculations**

**Release: 2**

# MARL046 Carry out engineering calculations

## Modification History

**Release 2.** This is the second release of this unit of competency in the MAR Maritime Training Package.

- Minor statement changes in unit Application
- Minor re-ordering changes in Performance Evidence
- Minor statement changes in Knowledge Evidence
- Minor statement changes in Assessment Conditions.

**Release 1.** This is the first release of this unit of competency in the MAR Maritime Training Package.

## Application

This unit involves the skills and knowledge required to carry out calculations related to fuel consumption, fuel storage and engine performance that conform to accepted engineering tolerances.

It includes calculating fuel consumption and storage and completing calculations related to engine performance.

This unit applies to people working in the maritime industry in the capacity of Marine Engine Driver Grade 1 Near Coastal.

## Licensing/Regulatory Information

Legislative and regulatory requirements are applicable to this unit.

This unit is one of the requirements to obtain Australian Maritime Safety Authority (AMSA) certification as a Marine Engine Driver Grade 1 Near Coastal, as specified in Marine Order 505.

Seafarers seeking certification should check with AMSA.

## Pre-requisite Unit

Not applicable.

## Competency Field

L - Marine Engineering

## Unit Sector

Not applicable.

## Elements and Performance Criteria

### ELEMENTS

Elements describe the essential outcomes.

#### **1 Calculate fuel consumption and storage**

#### **2 Complete calculations related to engine performance**

### PERFORMANCE CRITERIA

Performance criteria describe the performance needed to demonstrate achievement of the element.

- |            |                                                                                                                 |
|------------|-----------------------------------------------------------------------------------------------------------------|
| <b>1.1</b> | Information required for calculations related to fuel consumption and storage is obtained from relevant sources |
| <b>1.2</b> | Calculations are completed to accepted working tolerances                                                       |
| <b>1.3</b> | Results of calculations are verified                                                                            |
| <b>1.4</b> | Results of calculations are applied to managing fuel, as required                                               |
| <b>2.1</b> | Information required for calculations related to engine performance is obtained from relevant sources           |
| <b>2.2</b> | Calculations are completed to accepted working tolerances                                                       |
| <b>2.3</b> | Results of calculations are verified                                                                            |
| <b>2.4</b> | Results of calculations are applied to managing engine performance, as required                                 |

## Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

## Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

## Unit Mapping Information

This unit replaces and is equivalent to MARL001 Carry out engineering calculations.

## Links

Companion Volume Implementation Guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=772efb7b-4cce-47fe-9bbd-ee3b1d1eb4c2>

# Assessment Requirements for MARL046 Carry out engineering calculations

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## Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- calculating:
  - area and circumference of a circle
  - consumption of fuel and lubricating oil for a particular voyage, using quantity in litres and mass in tonnes and specified regular shaped tanks
  - distances covered
  - fuel consumption and storage calculations:
    - using calibration tables to measure quantities in tanks
    - using relative density/specific gravity to convert quantity in litres and volume to mass
  - hourly fuel and lubricating oil consumption
  - mechanical advantage, load, force and moments
  - remaining steaming times and engine performance
  - specific fuel consumption, power, speed and range
  - stress, strain and safe working load (SWL)
  - tank capacities and pumping capacities for tank filling and emptying
  - velocity ratio and efficiency of simple machines
  - volume and capacity of regular shaped tanks
- converting:
  - fractions to decimals
  - units to multiples of base units.

## Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- area and circumference of a circle
- calibration tables
- common International System of Units (SI), such as kilogram, tonne, Newton, Newton metre, Pascal, joule, watt and metre
- relationship between theoretical vessel speed, propeller pitch and revolutions per minute (r.p.m.)
- terminology of:
  - material technology
  - simple levers
- volumes of regular shaped tanks.

## Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Practical assessment must occur in a workplace, or realistic simulated workplace, under the normal range of workplace conditions.

Simulations and scenarios may be used where situations cannot be provided in the workplace or may occur only rarely, in particular for situations relating to emergency procedures and adverse weather conditions where assessment would be unsafe, impractical or may lead to environmental damage.

Resources for assessment must include access to:

- applicable documentation, such as legislation, regulations, codes of practice, workplace procedures and operational manuals
- tools, equipment, machinery, materials and personal protective equipment (PPE) currently used in industry.

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