



Australian Government

MARL001 Carry out engineering calculations

Release: 1

MARL001 Carry out engineering calculations

Modification History

Release 1. New unit of competency.

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.

This unit applies to engine workers in the maritime industry working as a Marine Engine Driver Grade 1 Near Coastal on vessels up to 1500 kW.

This unit has links to legislative and certification requirements.

Pre-requisite Unit

Not applicable.

Competency Field

L - Marine Engineering

Unit Sector

Not applicable.

Elements and Performance Criteria

Elements describe the essential outcomes.

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

1 Calculate fuel consumption and storage	1.1	Information required for calculations related to fuel consumption and storage is obtained from relevant sources
	1.2	Calculations are completed to accepted working tolerances
	1.3	Results of calculations are verified
	1.4	Results of calculations are applied to managing fuel as required
2 Complete calculations related to engine	2.1	Information required for calculations related to engine performance is obtained from relevant sources
	2.2	Calculations are completed to accepted working tolerances

performance

- 2.3 Results of calculations are verified
- 2.4 Results of calculations are applied to managing engine performance as required

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

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

Range of Conditions

Specifies different 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.

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

Calculations related to fuel consumption and storage must include:

- calculations involving:
 - specific fuel consumption
 - volume and capacity of regular shaped tanks
 - pumping capacities for tank filling and emptying
 - consumption of fuel and lubricating oil
 - hourly fuel consumption
- requirements for replenishing lubricating oil in oil tank
- using calibration tables to measure quantities in tanks
- using relative density/specific gravity to convert quantity in litres and volume to mass

Calculations related to engine performance must include:

- calculations involving:
 - theoretical steaming times
 - distances covered
 - specific power, speed and range
 - theoretical steaming times

- mechanical advantage, load, effort moments
- stress, strain and safe working load
- remaining steaming times

Unit Mapping Information

This is a new unit. This unit is equivalent to MARL4001A 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 MARL001 Carry out engineering calculations

Modification History

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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
 - hourly fuel consumption
 - mechanical advantage, load, effort moments
 - pumping capacities for tank filling and emptying
 - remaining steaming times
 - requirements for replenishing lubricating oil in oil tank
 - specific fuel consumption, power, speed and range
 - stress, strain and safe working load
 - tank capacities and pumping capacities for tank filling and emptying
 - theoretical steaming times
 - velocity ratio and efficiency of simple machines
 - volume and capacity of regular shaped tanks
- converting:
 - fractions to decimals
 - units to multiples of base units
- performing accurate and reliable calculations
- using calibration tables to measure quantities in tanks
- using relative density/specific gravity to convert quantity in litres and volume.

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 SI units such as kilogram, tonne, Newton, Newton metre, Pascal, joule, watt and metre
- relationship between theoretical vessel speed, propeller pitch and revolutions per minute (RPM)
- terminology of:
 - simple levers
 - material technology
- volumes of regular shaped tanks
- work health and safety (WHS)/occupational health and safety (OHS) requirements and work practices.

Assessment Conditions

Assessors must satisfy National Vocational Education and Training Regulator (NVR)/Australian Quality Training Framework (AQTF) assessor requirements.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that reflect workplace conditions.

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.

Resources for assessment must include access to:

- tools, equipment, machinery, materials and personal protective equipment currently used in industry
- applicable documentation such as legislation, regulations, codes of practice, workplace procedures and operational manuals
- range of relevant exercises, case studies and/or simulations.

Links

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