



Australian Government

Department of Education, Employment and Workplace Relations

TDMMF4107B CARRY OUT ENGINEERING CALCULATIONS RELATED TO MAINTENANCE AND OPERATIONS

Release: 1

TDMMF4107B CARRY OUT ENGINEERING CALCULATIONS RELATED TO MAINTENANCE AND OPERATIONS

Modification History

Not applicable.

Unit Descriptor

UNIT DESCRIPTOR:

This unit involves the skills and knowledge required to carry out engineering calculations and apply them to maintenance and operations decisions on a small vessel within the limits of responsibility of a Marine Engine Driver Grade 1.

Application of the Unit

Application of the unit	The unit has applications in the qualification for a Marine Engine Driver Grade 1 (MED 1) as per relevant sections of Part D of the National Standard for Commercial Vessels (NSCV), i.e. Certificate IV in Transport&Distribution (Marine Engine Driving - Grade 1).
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Licensing/Regulatory Information

Licensing/legislative requirements	The unit is consistent with the relevant sections of State and Territory maritime regulations and NSCV/USL Code for a MED 1.
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Pre-Requisites

Not applicable.

Employability Skills Information

Not applicable.

Elements and Performance Criteria Pre-Content

<i>Elements describe the essential outcomes of a unit of competency.</i>	<i>Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.</i>
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
. 1 Carry out engineering maintenance and operations calculations	. a Information required for engineering and operations calculations is obtained from readings on instrumentation and gauges or other relevant sources in accordance with established procedures b Calculations for small vessel operations and maintenance are carried out in accordance with established procedures c The results of operational and maintenance calculations are verified d The results of calculations are applied to operational or maintenance decisions in accordance with procedures e The results of operations and maintenance calculations are recorded in accordance with company requirements

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Required Skills and Knowledge

REQUIRED KNOWLEDGE

This describes the knowledge required for this unit.

- 1 Methods for working out operational and maintenance calculations required to be completed by a MED 1
- 2 Procedures and established marine practice concerning engineering calculations and their application to operations and maintenance decisions on a small vessel
- 3 Procedures for recording the results of engineering calculations on a small vessel and their application to operations and maintenance decisions using manual and computer-based recording systems
- 4 Issues related to the application of results of engineering calculations to typical operations and maintenance decisions on board a small commercial vessel
- 5 Communication techniques required in carrying out relevant calculations and applying them to operations and maintenance issues on board a small commercial vessel

REQUIRED SKILLS

This describes the basic skills required for this unit.

- 1 Read, interpret and apply simple instructions for measurements and related calculations within the limits of responsibility of a MED 1
- 2 Read and interpret machinery performance readings and indications
- 3 Carry out the engineering calculations related to maintenance and operations within the limits of responsibility of a MED 1
- 4 Complete any required records of calculations and results

REQUIRED KNOWLEDGE

- 5 Work collaboratively with others when taking measurements and carrying out related calculations within the limits of responsibility of a MED 1
- 6 Adapt to differences in vessels, equipment and operating and servicing procedures as they relate to required engineering calculations

Evidence Guide

Evidence Guide

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The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

1 Critical aspects of evidence required to demonstrate competency in this unit	Assessment must confirm appropriate knowledge and skills to: - a Carry out operational and routine maintenance calculations on a small vessel - b Apply results of calculations to engineering operations and maintenance decisions - c Communicate effectively with others concerning their application to operational and maintenance decisions on a small vessel
2 Evidence required for demonstration of consistent performance	- a Performance is demonstrated consistently over a period of time and in a suitable range of contexts - b Consistently applies underpinning knowledge and skills when: 1 carrying out calculations on a small vessel 2 verifying the results of the calculations 3 applying the results of the calculations to related operations and maintenance decisions

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

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| 4 | maintaining required records of calculations and their application to operations and maintenance decisions |
| c | Shows evidence of application of relevant workplace procedures, including: <ol style="list-style-type: none"> 1 relevant sections of State and Territory marine regulations, NSCV/ USL Code 2 procedures for working out the relevant calculations using established methods 3 job procedures and work instructions 4 record keeping procedures and reporting requirements on board a small vessel |
| d | Action is taken promptly to report any operational and maintenance problems identified through engineering calculations |
| e | Work is completed systematically with required attention to detail |
| f | Recognises and adapts appropriately to cultural differences in the workplace, including modes of behaviour and interactions among crew and others |

Evidence Guide (continued)

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| 3 Context of assessment | <table border="0"> <tr> <td style="vertical-align: top; padding-right: 10px;">a</td> <td>Assessment of competency must comply with the assessment requirements of the relevant maritime regulations</td> </tr> <tr> <td style="vertical-align: top; padding-right: 10px;">b</td> <td>Assessment of this unit must be undertaken within relevant marine authority approved and audited arrangements by a registered training organisation: <ol style="list-style-type: none"> 1 As a minimum, assessment of knowledge must be conducted through appropriate written/oral examinations </td> </tr> </table> | a | Assessment of competency must comply with the assessment requirements of the relevant maritime regulations | b | Assessment of this unit must be undertaken within relevant marine authority approved and audited arrangements by a registered training organisation: <ol style="list-style-type: none"> 1 As a minimum, assessment of knowledge must be conducted through appropriate written/oral examinations |
| a | Assessment of competency must comply with the assessment requirements of the relevant maritime regulations | | | | |
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3 Context of assessment	- a Assessment of competency must comply with the assessment requirements of the relevant maritime regulations 2 Appropriate practical assessment must occur: - i at the registered training organisation; and/or - ii on an appropriate working or training vessel
4 Specific resources required for assessment	Access is required to opportunities to: - a participate in a range of exercises and assessments that demonstrate the skills and knowledge to carry out the relevant calculations and apply them to operational and maintenance decisions on a small commercial vessel and to enter the outcomes of calculations into logs and record systems on a small vessel; and/or - b completion of engineering calculations and apply them to operational and maintenance decisions when carrying out marine engine driving functions on a small commercial or training vessel

Range Statement

Range Statement

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The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

VARIABLE

SCOPE

1. GENERAL CONTEXT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

a. Work must be carried out:	1 in compliance with the relevant sections of State and Territory marine regulations, NSCV and USL Code
b. Work is performed:	1 within broad operational requirements, with responsibility for own outputs in relation to specified quality standards and limited responsibility for others in achieving the specified quality and quantity of outcomes
c. Work involves:	1 the completion of routine calculations and their application to operations and routine maintenance on a small vessel

2. WORKSITE ENVIRONMENT

a Vessel may include:	1 any small commercial vessel of less than 1,500 kW propulsion power.
b Completion of calculations and the application of results to operational and maintenance decisions may be required:	1 by day or night in both normal and emergency situations 2 under any permissible conditions of weather 3 while underway 4 while anchored or moored 5 during maintenance operations 6 when vessel is slipped 7 when bunkering 8 during cargo operations
c Calculations may include:	1 fuel and lubricating oil consumption during a voyage 2 hourly fuel consumption 3 theoretical steaming times and distances covered

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| 4 | requirements for replenishing oil in oil tanks |
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Range Statement (continued)

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c Calculations may include: (continued)

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| 5 | area and circumference of a circle |
| 6 | volumes of regularly shaped tanks |
| 7 | tank capacities and pumping capacities for tank filling and emptying |
| 8 | calculations involving theoretical vessel speed, propeller pitch and RPM |
| 9 | calculations involving specific fuel consumption, power, speed and range |
| 10 | use of calibration tables to measure quantities in tanks |
| 11 | calculations involving stress, strain and safe working load |
| 12 | calculations involving mechanical advantage, load effort and moments |
| 13 | calculations involving units, specific gravity/relative density and levers |
| 14 | conversion of fractions to decimals |

d Calculations may be carried out:

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| 1 | manually |
| 2 | with the aid of tables and charts |
| 3 | with the aid of a calculator |
| 4 | with the aid of a computer |

c Calculations

5 area and circumference of a circle

e Documentation and records may include:

- 1 relevant sections of State and Territory marine regulations, NSCV/ USL Code
- 2 readings and data obtained from instrumentation, gauges, computers and other measuring devices
- 3 calibration charts and tables
- 4 running logs and databases
- 5 company reporting procedures
- 6 maintenance records
- 7 vessel and equipment manufacturer's instructions, specifications and recommended procedures

f Applicable legislation, regulations and codes may include:

- 1 State and Territory marine regulations related to the operation of small vessels
- 2 National Standard for Commercial Vessels and USL Code
- 3 relevant Commonwealth, State and Territory OH&S and pollution control legislation
- 4 relevant international and Australian standards

Unit Sector(s)

Not applicable.

Field

Field MF Operational Quality and Safety

Relationship to other units

Relationship to other units	The unit may be assessed in conjunction with other units that relate to the functions of the occupation(s) concerned.
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