



Australian Government

Department of Education, Employment and Workplace Relations

TDMMR2507B OPERATE AND MAINTAIN AUXILIARY MACHINERY SYSTEMS, INCLUDING STEERING GEAR AND REFRIGERATION SYSTEMS

Release: 1



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Modification History

Not applicable.

Unit Descriptor

UNIT DESCRIPTOR:

This unit involves the skills and knowledge required to operate and carry out basic routine maintenance on auxiliary systems on a small commercial vessel within the limits of responsibility of a Marine Engine Driver Grade 1, including pumping systems, hydraulic systems, steering gear and refrigeration systems on a small vessel of up to 1,500 kW propulsion power.

Note: Relevant State/Territory training and qualification requirements need to be fulfilled by any persons carrying out installation, maintenance and/or repair of refrigeration equipment especially with regard to preventing the escape of refrigerants into the atmosphere and to electrical work. Work on refrigeration systems only includes allowable basic operator servicing as per manufacturer's manual. Maintenance and repair of refrigeration systems on a vessel should only be performed by persons qualified under the relevant regulations.

Application of the Unit

Application of the unit	The unit has application in the qualification for a Marine Engine Driver Grade 1 as per relevant sections of Part D of the 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 Operate auxiliary systems	. a Auxiliary systems are prepared, started, and shut down as per instructions b Auxiliary systems are operated as per procedures and instructions c Records of performance of auxiliary systems are maintained on running sheets and operations logs/databases in accordance with vessel's procedures
2 Carry out basic, routine checking and maintenance procedures on auxiliary systems	a The performance of auxiliary systems is monitored as per instructions b Routine service checks and procedures are carried out to maintain the serviceability of auxiliary systems as per instructions and vessel's procedures c Preventative and remedial maintenance programs are carried out in accordance with manufacturer's instructions d Poor performance and faulty operation are identified and investigated and appropriate action initiated to report or rectify

ELEMENT	PERFORMANCE CRITERIA
	the problem

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ELEMENT	PERFORMANCE CRITERIA
2 Carry out basic, routine checking and maintenance procedures on auxiliary systems (continued)	e Basic repairs are carried out on auxiliary systems and equipment as required within the limits of responsibility of a Marine Engine Driver Grade 1 f Assistance is provided to contractors engaged for repairs on auxiliary systems g Maintenance and service records are completed in accordance with manufacturer's instructions and vessel's procedures
3 Follow safety and hazard control procedures	a Safety, hazard minimisation and pollution control procedures and regulations are followed at all times when operating systems and carrying out basic maintenance b Operational and maintenance hazards are identified and action is taken to minimise or eliminate risk to personnel, vessel and the environment c Where relevant, procedures and precautions necessary for entry into confined spaces on a vessel are correctly followed d Action is taken in the event of failure or emergency to isolate and secure the auxiliary systems and maintain the safety of the vessel and persons involved e Vessel's emergency and contingency plans are followed in the event of a failure or emergency involving an auxiliary system

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Required Skills and Knowledge

REQUIRED KNOWLEDGE

This describes the knowledge required for this unit.

- 1 Relevant OH&S and pollution control legislation and codes of practice
- 2 Typical procedures for the operation and routine maintenance of auxiliary systems on a small vessel to ensure compliance with the company requirements and established safety and pollution control rules and regulations
- 3 Safety, environmental and hazard control precautions and procedures relevant to inspection and maintenance operations the operation and routine maintenance of auxiliary systems
- 4 Principal features and operating characteristics of marine hydraulic systems used on small vessels, including:
 - a electro-hydraulic steering gears
 - b emergency operation in the event of electrical or hydraulic failure
 - c simple hydraulic circuits
 - d preventative and remedial maintenance requirements of hydraulic systems
- 5 Principal features and operating characteristics of typical steering systems and steering system components used on small vessels, including:
 - a rudder types rudder construction features
 - b rudder and stock support bearings
 - c glands, packing and seals
 - d tiller arm attachment
 - e steering operation using hydraulic, cable, and rod and gear
 - f requirements for the maintenance and testing of steering and related

REQUIRED KNOWLEDGE

hydraulic systems

- 6 Principal features and operating characteristics of typical pumping systems and pumping system components used on small vessels, including:
 - a fire, bilge, and tank circulating systems
 - b basic fault identification and maintenance procedures
 - c basic procedures for the prevention of corrosion in pumping systems
 - d valve types, including their construction and maintenance
 - e back flooding prevention procedures
 - f strainers, mudboxes and footvalves
 - g use of flexible materials, hoses, etc.
 - h drive systems, belts, clutches, motors, etc.
- 7 Principal features and operating characteristics of typical refrigeration systems used on small vessels, including:

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- a basic principles of operation of refrigeration systems, including the refrigeration cycle
- b types of refrigerant
- c hazards of refrigerant gases
- d components of typical refrigeration systems
- e environmental issues and responsibilities concerning refrigeration systems

- a basic principles of operation of refrigeration systems, including the refrigeration cycle
- 8 Maritime communication techniques needed during the operation and basic maintenance of auxiliary systems on small vessels
- 9 Problems related to the during the operation and basic maintenance of auxiliary systems on small vessels and appropriate action and solutions
- 10 Types of maintenance records that must be maintained on a vessel to meet the requirements of the company and regulatory authorities

REQUIRED SKILLS

This describes the basic skills required for this unit.

- 1 Use basic verbal communication skills required when operating and maintaining auxiliary machinery and systems
- 2 Read, interpret and apply operating and service manuals and instructions for auxiliary machinery and systems, including all required OH&S procedures and precautions
- 3 Read and interpret material safety data sheets
- 4 Read and interpret machinery performance readings and indications
- 5 Complete any required operational and maintenance records
- 6 Work safely and collaboratively with others when operating and maintaining auxiliary machinery and systems
- 7 Select and use relevant tools and equipment as per instructions
- 8 Recognise faulty equipment and take appropriate action as per operating instructions
- 9 Recognise routine problems when operating and maintaining auxiliary machinery and systems and take appropriate action
- 10 Adapt to differences in vessels, auxiliary systems and operating and servicing procedures
- 11 Operate auxiliary systems on vessels of less than 1,500 kW propulsion power

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 Operate auxiliary systems on a small vessel - b Carry out preventative servicing and remedial maintenance on auxiliary systems on a small vessel - c Identify typical problems related to the operation and maintenance of auxiliary systems on a small vessel and take appropriate action in conjunction with crew - d Exercise all required safety, environmental and hazard control precautions and procedures during operation and routine maintenance of systems - e Communicate effectively with others when operating and carrying out maintenance on auxiliary systems 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 operating auxiliary systems on a small vessel up to 1,500 kW propulsion power 2 carrying out preventative servicing and remedial maintenance on auxiliary systems on a small vessel 3 identifying and evaluating typical operational and maintenance problems and determining appropriate courses of action

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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| | <ul style="list-style-type: none"> 4 applying safety and pollution control precautions when operating auxiliary systems on a small vessel 5 identifying and implementing improvements to operational and routine maintenance procedures |
| d | Action is taken promptly to report and/or rectify issues and problems identified with operating and maintaining auxiliary systems in accordance with manufacturer's instructions, statutory requirements and company procedures |
| 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

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| 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: <ul style="list-style-type: none"> 1 As a minimum, assessment of knowledge must be conducted through appropriate written/oral examinations 2 Appropriate practical assessment must occur: <ul style="list-style-type: none"> i at the registered training organisation; and/or ii on an appropriate working or training vessel |

3 Context of assessment

- a Assessment of competency must comply with the assessment requirements of the relevant maritime regulations

4 Specific resources required for assessment

Access is required to opportunities to:

- a participate in a range of exercises, case studies and other simulated practical and knowledge assessments that demonstrate the skills and knowledge to operate and maintain auxiliary systems on small vessels up to 1,500 kW propulsion power and/or
- b operate and maintain auxiliary systems on an operational small commercial or training vessel up to 1,500 kW propulsion power

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

a. Work must be carried out:	1 relevant sections of State and Territory marine regulations, NSCV/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

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

c. Work involves:	1 the organisation of maintenance operations on a vessel and the application of solutions to a defined range of maintenance problems
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2. WORKSITE ENVIRONMENT

a Vessel may include:	1 any small commercial vessel up to 1,500 kW propulsion power
b Operation and maintenance of auxiliary systems may be conducted:	1 by day or night in both normal and emergency situations 2 under any permissible conditions of weather 3 while underway 4 during berthing and unberthing operations 5 while anchored or moored 6 in dry dock 7 when bunkering 8 during cargo operations

Range Statement (continued)

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VARIABLE	SCOPE
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2. WORKSITE ENVIRONMENT

VARIABLE	SCOPE
c Auxiliary systems may include:	1 hydraulic systems, including electro-hydraulic steering gears 2 pumping systems, including: - i bilge - ii fuel oil - iii fresh water - iv sea water 3 refrigeration systems 4 ballast systems 5 compressed air systems 6 control systems
d Maintenance may include:	1 preventative and remedial maintenance and basic repairs of auxiliary systems and related equipment and components 2 lubrication of equipment in auxiliary systems 3 routine servicing in accordance with established procedures 4 routine visual and performance checks 5 identification of poor performance or faults in the operation of auxiliary systems 6 identification of faulty equipment or fittings and arranging for repair or replacement 7 assisting contractors in repair operations
e Maintenance tools and equipment may include:	1 hand tools, including screwdrivers, spanners, wrenches - greasing and lubrication tools - lifting gear and equipment - protective clothing and equipment such as:

VARIABLE**SCOPE**

- i eye and ear protection
- ii safety boots and helmet
- iii dust and fume masks

Range Statement (continued)
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VARIABLE**SCOPE****f Documentation and records may include:**

- 1 relevant sections of State and Territory marine regulations, NSCV/USL Code
- 2 company and vessel operational and maintenance procedures
- 3 preventative and remedial maintenance schedules and records
- 4 equipment manufacturer's instructions, specifications and recommended procedures
- 5 instructions of relevant maritime authorities related to the maintenance of small vessels
- 6 relevant Australian standards

g Applicable legislation, regulations and codes may include:

- 1 relevant sections of State and Territory marine regulations, NSCV/USL Code
- 2 relevant Commonwealth, State and Territory OH&S and pollution control legislation
- 3 relevant international and Australian engineering standards

Unit Sector(s)

Not applicable.

Field

Field R Carry Out Operations on Equipment and Systems

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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