



Australian Government

Department of Education, Employment and Workplace Relations

**TDMMR2707B OPERATE AND
MAINTAIN MARINE INTERNAL
COMBUSTION ENGINES WITHIN THE
LIMITS OF RESPONSIBILITY OF A
MARINE ENGINE DRIVER GRADE 2**

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 routine servicing within the limits of responsibility and skill of a Marine Engine Driver Grade 2 on marine internal combustion engines on small commercial vessels up to 750 kW propulsion power. This includes operating the engines within technical specifications, monitoring the performance of engines and propulsion machinery, recognising faults and poor performance, and reporting and rectifying faults in accordance with manufacturer's specifications and established servicing procedures.

Application of the Unit

Application of the unit	The unit has applications in the qualification for a Marine Engine Driver Grade 2 (MED 2) as per relevant sections of Part D of the National Standard for Commercial Vessels (NSCV), i.e. Certificate III in Transport&Distribution (Marine Engine Driving - Grade 2).
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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 2.
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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 engines and propulsion systems	. a Propulsion system is prepared, started, and shut down in accordance with manufacturer's instructions b Propulsion system is operated in accordance with established procedures and manufacturer's instructions and specifications c Records of performance of propulsion system are maintained on running sheets and operations logs/computer databases as per vessel's procedures
2 Carry out routine checking and servicing of propulsion systems	a The performance of propulsion system is monitored in accordance with manufacturer's instructions b Preventative and remedial service checks and procedures are conducted in accordance with procedures and manufacturer's instructions c Poor performance and faults are identified and appropriate action initiated to report or rectify the problem as per procedures and manufacturer's instructions d Routine service checks are carried out to maintain the serviceability of the main propulsion systems as per manufacturer's instructions and vessel's procedures

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ELEMENT	PERFORMANCE CRITERIA
2 Carry out routine checking and servicing of propulsion systems (continued)	e Service records are completed in accordance with manufacturer's instructions and 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 servicing - 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 engine and propulsion 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 sections of State and Territory maritime regulations, NSCV and USL Code dealing with the operation of small vessels
- 2 Relevant OH&S and pollution control legislation and policies
- 3 Servicing procedures for marine internal combustion engines, propulsion plant
- 4 Operational characteristics and performance specifications for the different types of marine internal combustion engines and propulsion machinery usually found on vessels of up to 750 kW propulsion power
- 5 The nature and causes of typical malfunctions and/or poor performance of engines and propulsion machinery and the appropriate action that should be taken
- 6 Hazards and problems that can occur during the operation and servicing of marine engines and propulsion machinery and appropriate preventative and remedial action and solutions
- 7 Safety, environmental and hazard control precautions, and procedures relevant to the operation and servicing of engines and propulsion machinery
- 8 Service records that must be maintained on a vessel
- 9 Maritime communication techniques needed during the operation and performance evaluation of engines and propulsion machinery
- 10 Basic principles and operational characteristics of internal combustion engines, including:
 - a two stroke and four stroke cycles
 - b turbo charging arrangements in engines
 - c diesel engine scavenging systems both in normal and emergency operation

REQUIRED KNOWLEDGE

- d atmospheric pollution caused by diesel engine combustion and ways in which it can be minimised
- e irregularities in the performance of engines and plant

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REQUIRED SKILLS

This describes the basic skills required for this unit.

- 1 Use basic verbal communication skills required when operating and servicing propulsion equipment
- 2 Read, interpret and apply operating and service manuals and instructions for propulsion equipment, 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 servicing records
- 6 Work safely and collaboratively with others when operating and servicing propulsion equipment
- 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 servicing propulsion equipment and take appropriate action
- 10 Adapt to differences in vessels, propulsion equipment and operating and servicing procedures
- 11 Operate marine propulsion systems on vessels of less than 750 kW propulsion power

Evidence Guide

Evidence Guide

TDMMR2707B OPERATE AND MAINTAIN MARINE INTERNAL COMBUSTION ENGINES WITHIN THE LIMITS OF RESPONSIBILITY OF A MARINE ENGINE DRIVER GRADE 2

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 and service marine internal combustion engines, propulsion plant and machinery against technical specifications on a vessel of up to 750 kW propulsion power - b Identify malfunctioning and faulty marine internal combustion engines, propulsion plant and machinery, and initiate appropriate action for repair or replacement - c Exercise all required safety, environmental and hazard control precautions and procedures when carrying out routine servicing of marine internal combustion engines, propulsion plant machinery - d Identify typical operational and performance evaluation problems and hazards and take appropriate action - e Communicate effectively with others during the operation and servicing of marine internal combustion engines, propulsion plant and machinery
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 marine internal combustion engines and propulsion machinery on a small vessel up to 750 kW propulsion power 2 carrying out servicing of marine internal combustion engines and propulsion machinery on a small vessel 3 applying safety and pollution control precautions when operating and servicing marine internal combustion engines and propulsion machinery on a small vessel - c Shows evidence of application of relevant workplace procedures, including:

- 1 relevant sections of State and Territory marine regulations, NSCV and USL Code
- 2 OH&S regulations and hazard prevention policies and procedures
- 3 job procedures and work instructions
- 4 relevant vessel manufacturer's guidelines relating to operating and maintaining marine internal combustion engines and propulsion machinery on a small vessel
- 5 environmental protection procedures when carrying out servicing operations

Evidence Guide (continued)

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2 Evidence required for demonstration of consistent performance (continued)	- d Action is taken promptly to report and/or rectify issues and problems identified with operating and servicing marine internal combustion engines and propulsion machinery - 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
3 Context of assessment	- 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: 1 As a minimum, assessment of knowledge must be conducted through appropriate written/oral examinations, and 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, case studies and other simulated practical and knowledge assessments that demonstrate the skills and knowledge to operate and service marine internal combustion engines and propulsion machinery on small vessels up to 750 kW propulsion power; and/or - b operate and service marine internal combustion engines and propulsion machinery on a small commercial or training vessel up to 750 kW propulsion power

Range Statement

Range Statement

TDMMR2707B OPERATE AND MAINTAIN MARINE INTERNAL COMBUSTION ENGINES WITHIN THE LIMITS OF RESPONSIBILITY OF A MARINE ENGINE DRIVER GRADE 2

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 in compliance with the relevant sections of State and Territory maritime regulations, NSCV and USL Code
b. Work is performed:	1 within 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 operation and routine servicing of the engines and propulsion system on a small vessel and the application of solutions to a defined range of servicing problems

2. WORKSITE ENVIRONMENT

a Vessel may include:	1 any small commercial vessel up to 750 kW propulsion power
b Operation and servicing of engines and propulsion machinery 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
c Propulsion plant configurations may include:	1 petrol and LPG outboard motors 2 medium and high speed diesel propulsion equipment 3 reduction gears, gearboxes, V-drive boxes, drive legs, etc. 4 thrust blocks and shaft bearings

Range Statement (continued)

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VARIABLE	SCOPE
c Propulsion plant configurations may include: (continued)	5 starting and reversing arrangements
d Auxiliary systems may include:	1 hydraulic systems, including electro-hydraulic steering gears 2 pumping systems, including: - i lubricating oil - ii fuel oil - iii fresh water - iv sea water
e Servicing may include:	1 preventative and remedial checks and basic repairs of main propulsion systems and related equipment and components 2 lubrication of equipment in main propulsion systems 3 routine servicing in accordance with established procedures 4 routine visual and performance checks main propulsion systems 5 identification of faulty equipment or fittings and arranging for repair or replacement 6 carrying out basic repairs in accordance with established procedures

VARIABLE	SCOPE
f Servicing tools and equipment may include:	1 hand tools, including screwdrivers, spanners, wrenches 2 greasing and lubrication tools 3 lifting gear and equipment 4 protective clothing and equipment such as: - i eye and ear protection - ii safety boots and helmet - iii dust and fume masks
g Servicing and repair hazards may include:	1 moving heavy loads in an unsafe work environment 2 unsecured machinery, components or repair equipment 3 slippery deck 4 welding equipment 5 sharp tools and implements 6 power tools

Range Statement (continued)

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VARIABLE	SCOPE
g Servicing and repair hazards may include: (continued)	7 moving and rotating machinery 8 flammable liquids, vapours and fuel 9 faulty machinery equipment handling equipment and lifting gear

VARIABLE	SCOPE
	10 using equipment beyond safe working limits 11 poor housekeeping procedures 12 non-compliance with safe working procedures 13 hot and cold pipes and valves (steam, fuel oil, lubricating oil, refrigeration)
h Documentation and records may include:	1 relevant sections of State and Territory marine regulations, NSCV/USL Code 2 OH&S and pollution control regulations and procedures 3 company and vessel operational and maintenance procedures 4 servicing schedules and records 5 vessel and propulsion equipment manufacturer's instructions, specifications and recommended procedures
i 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 Australian 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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