



Australian Government

Department of Education, Employment and Workplace Relations

**TDMMR1407B MANAGE FUEL, BILGE
AND BALLAST OPERATIONS
PROCEDURES ON VESSELS OVER 750
KW PROPULSION POWER**

Release: 1

TDMMR1407B MANAGE FUEL, BILGE AND BALLAST OPERATIONS PROCEDURES ON VESSELS OVER 750KW PROPULSION POWER

Modification History

Not applicable.

Unit Descriptor

UNIT DESCRIPTOR:

This unit involves the skills and knowledge required to manage fuel, bilge and ballast operations within the limits of responsibility of a Marine Engineer Class 2 on a commercial vessel powered by main propulsion machinery of 750 kW propulsion power or above. This covers the knowledge and skills required to work as:

- **Chief Engineer on vessels between 750 kW and 3,000 kW propulsion power**
- **First Engineer (Second Engineer for STCW 95 Code) on vessels over 750 kW propulsion power.**

This includes the management and coordination of relevant preventative maintenance and fault-finding activities and the application of diagnostic and problem solving techniques to maintenance procedures.

Application of the Unit

Application of the unit	The unit has application in qualifications for Chief Engineer on a vessel between 750 kW and 3,000 kW propulsion power operating in international waters, i.e. the Advanced Diploma of Transport&Distribution(Marine Engineering Class 2).
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Licensing/Regulatory Information

Licensing/legislative requirements	The unit is consistent with the relevant sections of STCW 95 and Marine Orders under the Australian Navigation Act, describing requirements for a Chief Engineer on a ocean-going vessel between 750 kW and 3,000 kW propulsion power.
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Pre-Requisites

Not applicable.

Employability Skills Information

Not applicable.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
<p>1 Manage fuel and ballast operations</p>	<ul style="list-style-type: none"> a The organisation of fuel and ballast operations on a vessel between 750 kW and 3,000 kW propulsion power is carried out as per established procedures b Fuel and ballast operations are completed as per vessel's procedures and machinery and equipment manufacturer's instructions and specifications c The performance of machinery and equipment used in fuel and ballast operations is monitored in accordance with vessel's survey requirements and manufacturer's instructions and performance is compared with specifications and recommended limits of performance d Out of specification performance and faults are identified and appropriate action initiated to report or rectify the problem as per marine practice and procedures e Records of performance of equipment used in fuel and ballast operations are maintained on running sheets and operations logs as per procedures

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ELEMENT	PERFORMANCE CRITERIA
<p>2 Carry out preventative maintenance of machinery and equipment used in fuel and ballast operations</p>	<ul style="list-style-type: none"> a Preventative maintenance measures for machinery and equipment used in fuel and ballast operations are carried out in accordance with established procedures b Identified faults in machinery and equipment used in fuel and ballast operations are investigated using advanced diagnostic techniques in accordance with established procedures c Decisions are made to carry out temporary or permanent repairs depending on the vessel's position and circumstances d Appropriate consultation is taken with class society and marine administration concerning the nature of the repairs and any contingency or emergency action required e Management of the maintenance processes and the organisation and control of engine room personnel to facilitate repairs is in accordance with established procedures
<p>3 Carry out repairs on machinery and equipment used in fuel and ballast operations</p>	<ul style="list-style-type: none"> a Malfunctioning or faulty machinery or equipment used for fuel and ballast operations is correctly shut down, and disassembled, if necessary, as per manufacturer's instructions, company procedures and established practice b Damaged or faulty components are repaired or replaced in accordance with established procedures c Repaired machinery is reassembled in accordance with manufacturer's instructions, company procedures and established marine engineering practice d Repaired machinery is tested and adjusted as per vessel's procedures and manufacturer's instructions and in consultation with relevant personnel e Performance of repaired machinery and associated safety

ELEMENT	PERFORMANCE CRITERIA
	<p>devices, control systems and alarms is tested in accordance with manufacturer's instructions</p> <p>f Performance against recommended performance specifications is confirmed and the machinery is recommissioned in accordance with vessel's procedures</p>
<p>4 Complete operational and maintenance and repair documentation</p>	<p>a Correct records are kept relating to fuel and ballast operations and machinery failure incidents</p> <p>b All planned maintenance system and repair documentation is completed in accordance with survey and company requirements and regulations</p>

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ELEMENT	PERFORMANCE CRITERIA
<p>5 Follow safety and hazard control procedures</p>	<p>a Fuel and ballast operations are conducted in accordance with relevant safety regulations and company procedures</p> <p>b Operational hazards for fuel and ballast operations are identified and action is taken to minimise or eliminate risk to personnel, vessel and the environment</p> <p>c Safety, hazard minimisation and pollution control procedures and national and international regulations are followed at all times during fuel and ballast operations</p> <p>d Where relevant, procedures and precautions necessary for entry into a pump-room, fuel tanks or other confined spaces on a vessel are correctly followed</p> <p>e Action is taken, in the event of a machinery failure or emergency to secure the machinery and the vessel and maintain the safety of the vessel and persons involved, and shipboard emergency and contingency plans are followed</p>

ELEMENT	PERFORMANCE CRITERIA
	f Personnel are trained and organised to implement shipboard emergency and contingency plans in the event of a machinery failure or emergency

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Required Skills and Knowledge

REQUIRED KNOWLEDGE

This describes the knowledge required for this unit.

- 1 National and international regulations, IMO Conventions and Codes, including AMSA Marine Orders applicable to the management of fuel and ballast operations on vessels between 750 kW and 3,000 kW propulsion power
- 2 Relevant OH&S and anti-pollution legislation, policies and procedures
- 3 Established engineering practice for the management of fuel, bilge and ballast operations, including pollution control measures and the maintenance of related machinery, systems and equipment
- 4 Operational characteristics and performance specifications for the different types of machinery and equipment used in fuel, bilge and ballast operations
- 5 Procedures for carrying out shipboard machinery testing, troubleshooting and repair as part of routine maintenance procedures to ensure compliance with the company and survey requirements and established safety rules and regulations
- 6 Planned maintenance systems and procedures for the performance monitoring of machinery and equipment used in fuel, bilge and ballast operations, including responsibilities and requirements covered by various forms of vessel survey
- 7 The nature and causes of typical fuel, bilge and ballast operational problems and the available methods for their identification and rectification, including machinery malfunction fault-finding techniques
- 8 Fuel, bilge and ballast operational hazards and problems and appropriate preventative and remedial action and solutions
- 9 Procedures for the shipboard treatment of fuel and lubricating oils, including:
 - a bunkering procedures and fuel transfer arrangements
 - b the use and operation of centrifugal separators
 - c the function and operation of a shipboard fuel blender and alternative fuel treatments

REQUIRED KNOWLEDGE

- 10 Causes and effects of fuel and lubricating oil contamination and methods of controlling such contamination, including the sampling and testing of oil
- 11 Procedures for assessing the performance of different fuel and ballast pumping systems and their components
- 12 Operational problems that occur with pumps and pumping systems handling sea water and action that can be taken to minimise or rectify these problems
- 13 Influences on vessel stability and correct procedures relating to dry docking, free surface, cargo shift and other occurrences affecting stability
- 14 Procedures for the initiation and coordination of temporary and permanent repair and/or replacement procedures on board vessels at sea, alongside and in dry dock
- 15 Safety, environmental and hazard control precautions and procedures relevant to shipboard machinery inspection and maintenance operations
- 16 Maintenance and repair records that must be maintained on a vessel to meet the requirements of the company, survey requirements and regulatory authorities

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- 17 Maritime communication techniques needed during fuel and ballast operations
- 18 Procedures for the reading and interpretation of machinery performance readings and indications
- 19 Characteristics and features of fuel, bilge and ballast systems, machinery and equipment on vessels between 750 kW and 3,000 kW propulsion power
- 20 Awareness and understanding of fuel specifications
- 21 Principles and procedures of machinery lubrication, including:
 - a theory and types of lubrication
 - b relative characteristics, and applications of mineral and synthetic oils
 - c contaminants that may affect lubricants, their effect on machinery performance, and action that can be taken to avoid and remedy contamination of lubricants

- 17 Maritime communication techniques needed during fuel and ballast operations
- 22 Properties and characteristics of liquids, fuels and lubricants used on board vessel.

REQUIRED SKILLS

This describes the basic skills required for this unit.

- 1 Communicate effectively with other personnel when managing the operation of fuel, bilge and ballast systems on vessels between 750 kW and 3,000 kW propulsion power
- 2 Interpret and follow procedures for the operation of fuel, bilge and ballast systems on vessels between 750 kW and 3,000 kW propulsion power
- 3 Read and interpret equipment performance readings and instrumentation
- 4 Read and interpret material safety data sheets
- 5 Read and interpret vessel and machinery specifications, machinery design drawings, machine drawings, operational manuals, specifications and electrical and control circuit diagrams
- 6 Work collaboratively with other shipboard personnel when managing the operation of fuel, bilge and ballast systems on vessels between 750 kW and 3,000 kW propulsion power
- 7 Identify problems that can occur during the operation of fuel, bilge and ballast systems on vessels between 750 kW and 3,000 kW propulsion power
- 8 Carry out calculations required when operating fuel, bilge and ballast systems on vessels between 750 kW and 3,000 kW propulsion power
- 9 Adapt to differing types of fuel, bilge and ballast systems from one vessel to another and when equipment and systems are changed
- 10 Select and use tools and equipment required for the operation of fuel, bilge and ballast systems on vessels between 750 kW and 3,000 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.

<p>1 Critical aspects of evidence required to demonstrate competency in this unit</p>	<p>Assessment must confirm appropriate knowledge and skills to:</p> <ul style="list-style-type: none"> a Organise and manage fuel, bilge and ballast operations as per established vessel procedures b Identify malfunctioning and faulty machinery and equipment used in fuel, bilge and ballast operations and components and initiate appropriate action for repair or replacement c Exercise all required safety, environmental and hazard control precautions and procedures when overseeing fuel, bilge and ballast operations and related maintenance d Identify typical operational problems and hazards when carrying out fuel, bilge and ballast operations and take appropriate action within limits of responsibility e Communicate effectively with others during fuel, bilge and ballast operations f Ensure adherence to national and international regulations, IMO Conventions and Codes
<p>2 Evidence required for demonstration of consistent performance</p>	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 1 managing fuel, bilge and ballast operations on a vessel between 750 kW and 3,000 kW propulsion power 2 identifying fuel, bilge and ballast machinery and equipment malfunctions on a vessel between 750 kW and 3,000 kW propulsion power 3 taking action to minimise any damage and pollution that could be caused by fuel, bilge and ballast machinery malfunctions 4 identifying and evaluating fuel, bilge and ballast

	operational problems and determining appropriate courses of action
	5 identifying and implementing improvements to fuel, bilge and ballast operational procedures
	6 applying safety precautions relevant to fuel, bilge and ballast operations
	7 completing operational and maintenance documentation and records
c	Shows evidence of application of relevant workplace procedures, including:
	1 relevant sections of maritime regulations
	2 OH&S regulations and hazard prevention policies and procedures

Evidence Guide (continued)

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2 Evidence required for demonstration of consistent performance (continued)	3 anti-pollution procedures and regulations, including the MARPOL Convention
	4 ISM Code safety management system procedures and work instructions fuel and ballast operations and related maintenance, including machinery specifications and directions on equipment capability and limitations
	5 machinery security procedures
	6 following on-board housekeeping processes
	7 waste, pollution and recycling management processes
	d Action is taken promptly to report and/or rectify machinery malfunctions, non-conformities, accidents, hazardous occurrences and safety incidents in accordance with regulations, company procedures and the ISM Code
	e Work is managed, controlled and completed systematically with required attention to detail
f Recognises and adapts appropriately to cultural differences	

	<p>in the workplace, including modes of behaviour and interactions among crew and others</p>
<p>3 Context of assessment</p>	<p>a Assessment of competency must comply with the assessment requirements of the relevant maritime regulations</p> <p>b Assessment of this unit must be undertaken within relevant marine authority approved and audited arrangements by a registered training organisation:</p> <ol style="list-style-type: none"> 1 As a minimum, assessment of knowledge must be conducted through appropriate written/oral examinations, and 2 Appropriate practical assessment must occur: <ol style="list-style-type: none"> i at the registered training organisation; and/or ii on an appropriate working or training vessel
<p>4 Specific resources required for assessment</p>	<p>Access is required to opportunities to:</p> <ol style="list-style-type: none"> a participate in a range of practical and theoretical assignments, exercises, case studies and other assessments that demonstrate the skills and knowledge to manage fuel, bilge and ballast operations on a vessel between 750 kW and 3,000 kW propulsion power, including the ability to identify an appropriate range of possible machinery malfunctions and take appropriate action; and/or b carry out fuel, bilge and ballast operations in a range of operational situations on a commercial or training vessel between 750 kW and 3,000 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 in compliance with mandatory rules and regulations and IMO Conventions and Codes, including the relevant sections of the AMSA Marine Orders and ensuring that applicable codes, guidelines and standards recommended by IMO, the classification societies and maritime industry organisations are taken into account
b. Work is performed:	1 relatively independently under broad operational requirements, with accountability for self and others in achieving the prescribed outcomes within the limits of responsibility
c. Work involves:	1 the application of marine engineering practice to the management of fuel and ballast operations on a vessel between 750 kW and 3,000 kW propulsion power across a wide and often unpredictable variety of contexts. Contribution to the development and implementation of a broad plan or strategy for the management of fuel and ballast operations is required and accountability and responsibility for self and others in achieving the outcomes is involved

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

- d. Work requires:**
- 1 significant judgement in planning, engineering and leadership functions related to fuel and ballast operations within the limits of responsibility. This includes management, training and control of personnel, analysis of the situation and decision making

2. WORKSITE ENVIRONMENT

a Fuel and ballast operations may be managed on:	<ol style="list-style-type: none"> 1 an Australian or international commercial vessel between 750 kW and 3,000 kW propulsion power
b Fuel and ballast operations may be carried out:	<ol style="list-style-type: none"> 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

Range Statement (continued)

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VARIABLE	SCOPE
b Fuel and ballast operations may be carried out:	<ol style="list-style-type: none"> 5 when bunkering 6 during cargo operations
c Types of machinery may include:	<ol style="list-style-type: none"> 1 pumps and pumping systems 2 auxiliary systems and controls, including

VARIABLE	SCOPE
	<ul style="list-style-type: none"> i fuel, oil, gas, coal ii bilge and ballast system, oily water separator iii waste management and pollution control systems iv cargo pumps, tank washing machines and associated systems
<p>d Testing and repair equipment may include:</p>	<ul style="list-style-type: none"> 1 meters and gauges, oxygen meter and gas detectors 2 computer displays of performance parameters 3 hand tools, such as spanners, wrenches, screwdrivers, hacksaws, etc. 4 greasing and lubrication tools 5 electric power tools, such as grinders, lathes, drills, etc. 6 pneumatic power tools, such as grinders, sanders, drills, etc. 7 welding equipment 8 block and tackle and portable and manual lifting equipment, cranes and hydraulic jacks 9 material safety data sheets 10 protective clothing and equipment such as: <ul style="list-style-type: none"> i eye and ear protection ii safety boots and helmet iii dust and fume masks iv boilersuit/overalls
<p>e Maintenance and repair hazards may include:</p>	<ul style="list-style-type: none"> 1 moving heavy loads in an unsafe work environment 2 unsecured machinery, components or repair equipment 3 slippery deck

VARIABLE	SCOPE
	4 welding equipment

Range Statement (continued)

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VARIABLE	SCOPE	
<p>e Maintenance and repair hazards may include: (continued)</p>	5 sharp tools and implements, including power tools	
	6 moving and rotating machinery	
	7 flammable liquids, vapours and fuel	
	8 faulty machinery equipment handling equipment and lifting gear	
	9 using equipment beyond safe working limits	
	10 poor housekeeping procedures	
	11 non-compliance with safe working procedures	
	12 hot pipes and valves (steam, fuel oil, lubricating oil)	
	13 cold pipes and valves (refrigeration and liquefied	
	<p>f Emergencies may include:</p>	1 flooding of engine room
		2 fire or explosion in engine room
		3 fuel oil, lubrication oil, steam and gas leaks
		4 overheating and overspeed of machinery, governors, emergency trips
5 dangerous atmosphere		
6 fuel spills and overfilling of tanks		

VARIABLE	SCOPE
g Documentation and records may include:	<ol style="list-style-type: none"> 1 ISM Code safety management system plans, procedures, checklists and instructions 2 vessel and company's planned maintenance system, repair procedures and instructions 3 machinery and vessel manufacturer's specifications, instructions and recommended procedures 4 maintenance log, running sheets and records, including computer database of running information and maintenance records where relevant 5 vessel's survey procedures and instructions as they relate to shipboard machinery used in fuel, bilge and ballast operations 6 relevant sections of national and international regulations, IMO Conventions and Codes, including AMSA Marine Orders and class society rules dealing with shipboard machinery operation, maintenance and repair 7 instructions of relevant maritime authorities and class societies concerning shipboard machinery operation, maintenance and repair

Range Statement (continued)

<p>TDMMR1407B MANAGE FUEL, BILGE AND BALLAST OPERATIONS PROCEDURES ON VESSELS OVER 750 KW PROPULSION POWER</p>

VARIABLE	SCOPE
h Applicable legislation, regulations and codes may include:	<ol style="list-style-type: none"> 1 sections of national and international regulations, IMO Conventions and Codes, including AMSA Marine Orders and class society rules related to shipboard machinery operation, maintenance and repair on vessels between 750 kW and 3,000 kW propulsion power 2 relevant international, Commonwealth, State and Territory OH&S legislation 3 relevant international, Commonwealth, State and Territory engineering practice 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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