



Australian Government

Department of Education, Employment and Workplace Relations

TDMMR1007B OPERATE PUMPING SYSTEMS AND ASSOCIATED CONTROL SYSTEMS

Revision Number: 1

TDMMR1007B OPERATE PUMPING SYSTEMS AND ASSOCIATED CONTROL SYSTEMS

Modification History

Not applicable.

Unit Descriptor

UNIT DESCRIPTOR:

This unit involves the skills and knowledge required to operate pumping systems and associated control systems on board a commercial vessel, including planning pumping systems operations, operating the systems, identifying malfunctions and taking appropriate action, exercising all required safety and pollution control measures, and keeping all required operational records.

Application of the Unit

Application of the unit	The unit has application in the qualifications for an Engineer Watchkeeper on a vessel greater than 750 kW, i.e. Diploma of Transport&Distribution(Marine Engineering - Engineer Watchkeeper).
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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 1912, describing the role and responsibilities of an engineer watchkeeper.
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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 pumping systems and associated control systems	- a Work plans for the operation of pumping systems and associated control systems are made in accordance with established watchkeeping procedures, operational instructions, vessel and company rules, and established marine engineering practice - b Pumping systems and associated control systems are operated within specified limits in accordance with established plans and procedures and manufacturer's instructions and specifications - c The performance of shipboard pumping systems and associated control systems 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 in consultation with a senior engineer and appropriate action initiated to report or rectify the problem in accordance with marine engineering practice and vessel's procedures - e Records of performance are maintained on running sheets and operations logs in accordance with vessel's procedures

ELEMENT	PERFORMANCE CRITERIA
2 Follow safety and hazard control procedures	- a All required watchkeeping procedures, safety precautions and regulations are followed when operating pumping systems and associated control systems - b Operational hazards are identified and action is taken to minimise or eliminate risk to personnel, vessel and the environment - c Safety, hazard minimisation and pollution control procedures and national and international regulations are followed at all times during the operation of pumping systems and associated control systems - d Where relevant, and in consultation with a senior engineer, procedures and precautions necessary for entry into confined spaces on a vessel are correctly followed - e Appropriate action is taken in the event of a failure or emergency associated with pumping systems and associated control systems to isolate and secure the plant and equipment and the vessel and maintain the safety of the vessel and persons involved - f Shipboard emergency and contingency plans are followed in the event of a failure or emergency associated with pumping systems and associated control systems

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 operation of pumping systems and associated control systems on vessels of unlimited propulsion power
- 2 Established engineering practice and procedures for the operation of shipboard pumping systems and associated control systems in warm through, manoeuvring, start up, normal running, emergency and shut down situations
- 3 Relevant safety, environmental and hazard control legislation, precautions and procedures relevant to the operation of pumping systems and associated control systems
- 4 Operational characteristics and performance specifications for the different types of marine pumping systems and associated control systems usually found on a vessel of unlimited propulsion power
- 5 Operating precautions for pumping systems and associated control systems to ensure operational performance is in compliance with the bridge orders, technical specifications, survey requirements and established safety and anti-pollution rules and regulations
- 6 The nature and causes of typical malfunctions and/or poor performance pumping systems and associated control systems and the available methods for their detection and rectification
- 7 Hazards and problems that can occur during the operation of pumping systems and associated control systems and appropriate preventative and remedial action and solutions
- 8 Principles and functions of marine pumping systems, including
 - a typical pumping arrangements on a vessel
 - b different types of marine pumps, filters, purifiers, clarifiers and heat exchangers and their applications
 - c different types and locations of valves and safety fittings
- 9 Elementary knowledge of marine control systems, including
 - a common sensors and their associated transmitters
 - b temperature and pressure control systems used on board vessel

REQUIRED KNOWLEDGE

- c typical level control systems used on board vessel
- 10 Operational and performance evaluation records that must be maintained on a vessel to meet the requirements of the company, survey requirements and regulatory authorities
- 11 Maritime communication techniques needed during the operation of pumping systems and associated control systems
- 12 Procedures for the reading and interpretation of readings and indications of the performance of pumping systems and associated control systems
- 13 Typical vessel and machinery specifications, machinery design drawings, operational manuals, specifications and electrical and control circuit diagrams
- 14 Purpose and content of material safety data sheets

REQUIRED SKILLS

This describes the basic skills required for this unit.

- 1 Communicate effectively with other personnel when operating pumping systems and associated control systems
- 2 Communicate with multilingual crew where applicable using established techniques
- 3 Interpret and follow procedures for the operation of pumping systems and associated control systems
- 4 Read and interpret equipment performance readings and instrumentation
- 5 Interpret and follow all safety management procedures and precautions when operating pumping systems and associated control systems
- 6 Read and interpret material safety data sheets
- 7 Read and interpret vessel and machinery specifications, machinery design drawings, machine drawings, operational manuals, specifications and electrical and control circuit diagrams
- 8 Work collaboratively with other shipboard personnel when operating pumping systems and associated control systems
- 9 Identify problems that can occur during the operation of pumping systems and

REQUIRED SKILLS

- associated control systems
- 10 Carry out calculations required when operating pumping systems and associated control systems
 - 11 Adapt to differing types of pumping systems and associated control systems from one vessel to another and when equipment and systems are changed
 - 12 Take appropriate precautions to prevent pollution of the marine environment
 - 13 Select and use tools and equipment required for the operation of pumping systems and associated control systems

Evidence Guide

Evidence Guide

TDMMR1007B OPERATE PUMPING SYSTEMS AND ASSOCIATED CONTROL SYSTEMS

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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| 1 Critical aspects of evidence required to demonstrate competency in this unit | <p>Assessment must confirm appropriate knowledge and skills to:</p> <ol style="list-style-type: none">a Ensure a safe engineering watch during the operation of pumping systems and associated control systemsb Operate shipboard pumping systems and associated control systems within specificationsc Identify malfunctioning pumping systems and associated control systems and, in consultation with a senior engineer, initiate appropriate action for repair or replacementd Exercise all required safety, environmental and hazard control precautions and procedures when overseeing the operation of pumping systems and associated control systemse Identify typical operational problems and hazards when |
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Evidence Guide

TDMMR1007B OPERATE PUMPING SYSTEMS AND ASSOCIATED CONTROL SYSTEMS

	operating pumping systems and associated control systems and take appropriate action
	f Communicate effectively with others during operation of pumping systems and associated control systems
	g Ensure adherence to applicable maritime regulations
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 maintaining a safe engineering watch involving the operation of pumping systems and associated control systems 2 assessing operational performance of pumping systems and associated control systems 3 assisting in the identification of operational problems with pumping systems and associated control systems and associated system and taking remedial action 4 taking action, in consultation with a senior engineer, to minimise any damage and safety risk that could be caused by malfunctions in pumping systems and associated control systems 5 identifying and implementing improvements to procedures for the operation of pumping systems and associated control systems 6 applying safety precautions relevant to the operation of pumping systems and associated control systems

Evidence Guide (continued)

TDMMR1007B OPERATE PUMPING SYSTEMS AND ASSOCIATED CONTROL SYSTEMS

2 Evidence required for demonstration of consistent performance (continued)

- 7 completing operations documentation and records
- c Shows evidence of application of relevant workplace procedures, including:
 - 1 relevant sections of applicable maritime regulations
 - 2 OH&S regulations and hazard prevention policies and procedures
 - 3 ISM Code safety management system procedures, quality procedures and work instructions on the operation of pumping systems and associated control systems
 - 4 following on-board housekeeping processes
- d Action is taken promptly to report and assist in the rectification of malfunctions in pumping systems and associated control systems, non-conformities, accidents, hazardous occurrences and safety incidents in accordance with statutory requirements, 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 in the workplace, including modes of behaviour and interactions between 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

Evidence Guide (continued)

TDMMR1007B OPERATE PUMPING SYSTEMS AND ASSOCIATED CONTROL SYSTEMS

	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 practical and theoretical assignments, exercises, case studies and other assessments that demonstrate the skills and knowledge to operate pumping systems and associated control systems typically found on a vessel of unlimited propulsion power; and/or - b operate the pumping systems and associated control systems in a range of operational situations while keeping a safe engineering watch on a commercial or training vessel of unlimited propulsion power

Range Statement

Range Statement

TDMMR1007B OPERATE PUMPING SYSTEMS AND ASSOCIATED CONTROL SYSTEMS

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

Range Statement

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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 in consultation with a senior engineer, within broad operational requirements, with limited accountability and responsibility for self and others in achieving the prescribed outcomes
c. Work involves:	1 the application of marine engineering practice to the operation of pumping systems and associated control systems across a wide and often unpredictable variety of operational contexts. Monitoring and supervising the implementation of a broad plan or strategy for the operation of pumping systems and associated control systems is required. Defined accountability and responsibility for self and others in achieving the outcomes is involved
d. Work requires:	1 some responsibility for overseeing the operation of operation of shipboard pumping systems and associated control systems. This includes supervision and control of personnel, hazard minimisation, analysis of performance and operational situations and related decision making

2. WORKSITE ENVIRONMENT

Range Statement

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| a The operation of shipboard pumping systems and associated control systems may be undertaken: | 1 on an Australian or international commercial vessel of unlimited propulsion power |
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Range Statement (continued)

TDMMR1007B OPERATE PUMPING SYSTEMS AND ASSOCIATED CONTROL SYSTEMS

VARIABLE	SCOPE
b Safe watchkeeping procedures and the operation of shipboard pumping systems and associated control systems may be carried out:	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 while in dry dock
	7 when bunkering
	8 during cargo operations
c Pumps and pumping systems may include:	1 bilge pumping systems
	2 ballast pumping systems
	3 cargo pumping systems

Range Statement (continued)

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	4	fuel and lubrication oil systems
	5	sea water and fresh water systems
d Potential hazards during operation of pumping systems and associated control systems may include:	1	operating equipment beyond safe working limits
	2	moving and rotating machinery
	3	working in confined spaces
	4	faulty machinery equipment handling equipment and lifting gear
	5	non-compliance with safe working procedures
	6	hot pipes and valves (steam, fuel oil, lubricating oil)
	7	cold pipes and valves (refrigeration and liquefied gas cargoes)
	8	flammable liquids, vapours and fuel
	9	working at heights
	10	moving heavy loads in an unsafe work environment
	11	unsecured machinery, components or equipment
	12	slippery deck
	13	poor housekeeping procedures
	14	sharp tools and implements
	15	power tools
	16	dangerous atmosphere

Range Statement (continued)

TDMMR1007B OPERATE PUMPING SYSTEMS AND ASSOCIATED CONTROL SYSTEMS

VARIABLE	SCOPE
d Potential hazards during operation of pumping systems and associated control systems may include: (continued)	17 overspeed of electrical machinery, emergency trips 18 noxious and dangerous cargoes 19 machinery overload
e Emergencies may include:	1 loss of electrical power 2 pump failure 3 flooding of engine room 4 fire or explosion in engine room 5 fuel oil, lubrication oil, water, steam and gas leaks 6 overheating and overspeed of machinery, governors, emergency trips 7 electric shock
f Documentation and records may include:	1 ISM Code safety management system plans, procedures, checklists and instructions 2 vessel and company's planned pumping systems, operational procedures and instructions 3 pumping equipment and vessel manufacturer's specifications, instructions and recommended procedures 4 pumping systems running sheets, operations logs and other

Range Statement (continued)

TDMMR1007B OPERATE PUMPING SYSTEMS AND ASSOCIATED CONTROL SYSTEMS

	operational records, including computer database of running information, where relevant
5	vessel's survey procedures as they relate to shipboard pumping systems and associated control systems
6	relevant sections of national and international maritime regulations,
7	instructions of relevant maritime authorities and class societies concerning shipboard pumping systems and associated control systems operation
g Applicable legislation, regulations and codes may include:	1 sections of national and international regulations, IMO Conventions and Codes, including AMSA Marine Orders and class society rules related to the operation of pumping systems and associated control systems on vessels of unlimited 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 Communications

Relationship to other units

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