



Australian Government

Department of Education, Employment and Workplace Relations

TDMMA407B MANAGE PROCEDURES FOR THE HANDLING, LOADING AND DISCHARGING OF LIQUEFIED GAS CARGOES

Release: 1

TDMMA407B MANAGE PROCEDURES FOR THE HANDLING, LOADING AND DISCHARGING OF LIQUEFIED GAS CARGOES

Modification History

Not applicable.

Unit Descriptor

UNIT DESCRIPTOR:

This unit involves the skills and knowledge required to safely manage procedures for the handling, loading and discharging of liquefied gas cargoes on liquefied gas tankers, including use of checklists, cargo condition maintenance both on passage and in harbour, segregation of cargoes, transfer of liquefied gas cargoes, cleaning of tanks, changing of cargoes, sampling of liquefied gas cargoes, ballasting and deballasting, and following warming up and gas freeing procedures, as well as the cooling down of a gas-free system from ambient temperature.

Application of the Unit

Application of the unit	The unit has application within a supplementary Statement of Attainment for competencies required by a Master or Chief Mate on a liquefied gas tanker.
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Licensing/Regulatory Information

Licensing/legislative requirements	The unit is consistent with the relevant sections of STCW 95, the International Ship and Port Facility Security (ISPS) Code and Marine Orders under the Australian Navigation Act 1912.
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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
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1 Plan the loading, discharge and condition maintenance of liquefied gas cargo	- a Plans for the loading, discharge and condition maintenance of liquefied gas cargoes are obtained or prepared in accordance with company procedures, tanker's ISM Code safety management system, regulatory requirements and established maritime practice - b Checklists for use in the loading, discharge and condition maintenance of liquefied gas cargoes are obtained or developed - c Operational plans and procedures for the loading, discharge and condition maintenance of liquefied gas cargoes are documented and made available to relevant staff in accordance with tanker procedures and regulatory requirements

ELEMENT	PERFORMANCE CRITERIA
2 Manage the loading, discharge and condition maintenance of liquefied gas cargo	a Operational plans and procedures for the loading, discharge and condition maintenance of liquefied gas cargoes are implemented in accordance with operational and regulatory requirements

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ELEMENT	PERFORMANCE CRITERIA
2 Manage the loading, discharge and condition maintenance of liquefied gas cargo (continued)	b Personnel involved in liquefied gas operations are correctly supervised in accordance with company and regulatory requirements c Cargo segregation and cargo transfer procedures are correctly carried out in accordance with operational and regulatory requirements d Checklists are correctly used in accordance with tanker procedures e The condition of liquefied gas cargo is correctly maintained in accordance with established procedures and liquefied gas tanker practice f Liquefied gas cargo sampling and testing is carried out in accordance with established tanker procedures and regulatory requirements g Established procedures and precautions are applied during tank cleaning operations h The cool down of a gas-free system from ambient temperature is closely followed in accordance with established operational procedures and safety precautions i Warm up and gas freeing procedures are implemented in accordance with established liquefied tanker practice and regulatory requirements

ELEMENT	PERFORMANCE CRITERIA
	j Ballasting and deballasting procedures for a liquefied gas tanker are followed in accordance with operational requirements and regulatory requirements k Required communication with relevant personnel is correctly and constantly maintained throughout loading, discharging, handling and condition maintenance operations involving liquefied gas cargo
3 Ensure the implementation of safety and hazard control procedures	a Appropriate personal protection clothing and equipment is correctly used throughout loading, discharge, handling and condition maintenance operations involving liquefied gas cargo b Hazard minimisation and safety precautions for the loading, discharging and handling of liquefied gas products are carried out in accordance with regulatory requirements and established liquefied gas tanker practice c Appropriate monitoring equipment is correctly used throughout loading, discharge, handling and condition maintenance operations d Emergency situations during loading or discharging of cargo or cargo condition monitoring and maintenance are identified and acted upon in accordance with established tanker emergency procedures and regulatory requirements

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ELEMENT	PERFORMANCE CRITERIA
4 Implement pollution prevention measures	a Air and water pollution prevention procedures are implemented in accordance with established tanker practice and regulatory requirements b Required action is taken in the event of a spillage, vapour release or the jettisoning of cryogenic liquids in accordance with regulatory requirements and established liquefied gas tanker procedures

ELEMENT	PERFORMANCE CRITERIA
	- c All relevant information is immediately reported to appropriate officials when a spill, vapour release, or the jettisoning of cryogenic liquids is detected or when a malfunction has occurred which may pose a risk of a spill or release - d Shore-based personnel are immediately notified of a spill, vapour release, or the jettisoning of cryogenic liquids - e Shipboard spill and vapour containment and emergency procedures are initiated in accordance with established tanker practice and regulatory requirements
5 Complete cargo handling documentation	- a Correct reports are completed relating to liquefied gas cargo handling operations and incidents in accordance with established procedures and regulatory requirements - b All cargo handling documentation is completed in accordance with requirements and regulations

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Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

REQUIRED KNOWLEDGE

This describes the knowledge required for this unit.

- 1 Relevant sections of IMO STCW 95 Code and AMSA Marine Orders applicable to liquefied gas tankers
- 2 Relevant OH&S and pollution control legislation, codes of practice, policies and procedures
- 3 The basic principles and trends in liquefied gas tanker design and cargo containment and handling systems:
 - a types and design of liquefied gas tankers and their equipment

REQUIRED SKILLS AND KNOWLEDGE

- b cargo containment systems with special reference to rules, surveys, tank construction, materials, coatings, insulation and compatibility
 - c cargo handling equipment, including pumps and pumping arrangements, vapour-return systems, piping systems and valves
 - d cargo conditioning systems, including warm up and cool down procedures
 - e tank atmosphere control systems, including the use of inert gas and nitrogen
 - f instrumentation of cargo containment and handling systems, including that of gauging, sampling and temperature control and pressure monitoring systems
- 4 Procedures and regulatory requirements for loading, discharge, handling and condition monitoring of liquefied gas cargo, including:
- a cargo loading and discharging preparations and procedures
 - b Checklists
 - c cargo condition maintenance on passage and in harbour
 - d segregation of cargoes
 - e procedures for cargo transfer and changing cargoes
 - f tank cleaning procedures
 - g cargo sampling
 - h ballasting and deballasting
 - i warm up and gas freeing procedures
 - j cooling down of a gas-free system from ambient temperature and the safety precautions involved
 - k emergency procedures, i.e. pre-planned action in the event of leaks, fire, collision, stranding, emergency cargo discharge and personnel casualty
- 5 Cargo tank vent systems and procedures:
- a types of filters, strainers, expansion devices and flame screens used
 - b the storage, generation and distribution systems for the most commonly used inert gas systems

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- c liquid recirculation and reliquefaction systems
 - d cargo boil-off systems and auxiliary systems
 - e the function and use of gas detection and monitoring systems and CO₂ monitoring systems
 - f the firefighting, safety and rescue systems appropriate for liquefied gas tankers
- 6 Liquefied gas cargo handling systems and equipment and the procedures for their use
- 7 Principles of liquefied gas cargo containment, including:
- a containment systems
 - b rules
 - c surveys
 - d tank construction
 - e materials
 - f coatings
 - g insulation
 - h compatibility
- 8 The properties and characteristics of liquefied gases and their vapours, including:
- a the definition of gas
 - b simple gas laws
 - c the gas equation
 - d density of gases
 - e diffusion and mixing of gases

- c liquid recirculation and reliquefaction systems
- f compression of gases
- g liquefaction of gases
- h refrigeration of gases
- i critical temperature
- j the practical significance of flashpoint
- k upper and lower explosive limits
- l auto-ignition temperature
- m compatibility of gases
- n reactivity
- o polymerisation

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- p inhibitors
- 9 The properties of single liquids, including:
- a densities of liquids and vapours
 - b variation with temperature
 - c vapour pressure and temperature
 - d enthalpy, vaporisation and boiling liquids
- 10 The nature and properties of solutions, including:
- a the solubility of gases in liquids
 - b miscibility between liquids
 - c effects of temperature change
 - d densities of solutions and dependence on temperature and concentration

- p inhibitors
 - e effects of dissolved substances on melting and boiling points
 - f hydrates, their formation and dispersion
 - g hygroscopicity
 - h drying of air and other gases
 - i dewpoint and low-temperature effects
- 11 Principles of toxicity of liquefied gas, including:
- a the modes by which liquefied gases and their vapours may be toxic
 - b the toxic properties of inhibitors and of products of combustion of both materials of construction and of liquefied gases carried
 - c acute and chronic effects of toxicity
 - d systemic poisons and irritants
 - e the threshold limit value (TLV)
 - f hazards of skin contact, inhalation and ingestion
 - g medical first aid and administering of antidotes

p inhibitors

- 12 Maritime communication techniques as they are applied in the loading, discharge, handling and condition monitoring of liquefied gas cargo

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REQUIRED SKILLS

This describes the basic skills required for this unit.

- 1 Read and interpret instructions, regulations, procedures and information relevant to the management of the handling, loading and discharging of liquefied gas cargoes
- 2 Communicate effectively with others during the handling, loading and discharging of liquefied gas cargoes
- 3 Provide leadership to others during the handling, loading and discharging of liquefied gas cargoes
- 4 Take appropriate initiatives related to the handling, loading and discharging of liquefied gas cargoes
- 5 Interpret and apply security and safety practices and regulations when managing the handling, loading and discharging of liquefied gas cargoes
- 6 Modify activities dependent on differing workplace contingencies, risk situations and environments
- 7 Identify and solve problems associated with the handling, loading and discharging of liquefied gas cargoes and take appropriate action based on available information
- 8 Monitor and anticipate problems and risks related to the handling, loading and discharging of liquefied gas cargoes, and take appropriate action
- 9 Adapt to differing types of vessels, port facilities, cargoes and equipment
- 10 Monitor the use of equipment related to the handling, loading and discharging of liquefied gas cargoes

Evidence Guide

Evidence Guide

TDMMA407B MANAGE PROCEDURES FOR THE HANDLING, LOADING AND DISCHARGING OF LIQUEFIED GAS CARGOES

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 Manage the safe loading, discharge, handling and condition maintenance of cargo on a liquefied gas tanker - b Ensure all required safety and hazard control procedures are implemented during loading, discharge, handling and condition maintenance operations - c Identify typical problems that may occur during liquefied gas cargo loading, discharge, handling and condition maintenance operations and take appropriate action - d Identify emergency situations that may arise during liquefied gas operations and take appropriate action - e Apply relevant international conventions, IMO and national codes, tanker safety guides and port regulations related to liquefied gas tanker cargo operations - f Communicate effectively with others during liquefied gas cargo handling and maintenance operations
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 managing the safe loading, discharge, handling and condition maintenance of cargo on a liquefied gas tanker 2 identifying and evaluating liquefied gas cargo handling problems and determining appropriate courses of action

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| | <ul style="list-style-type: none"> 3 identifying and implementing improvements to liquefied gas cargo handling procedures 4 applying safety and hazard control precautions relevant to liquefied gas cargo handling operations |
| c | Shows evidence of application of relevant workplace procedures, including: <ul style="list-style-type: none"> 1 relevant sections of IMO STCW 95 Code and AMSA Marine Orders 2 OH&S regulations and hazard prevention policies and procedures 3 ISM Code safety management system procedures and work instructions on the conduct of maintenance on liquefied gas tankers |

Evidence Guide (continued)

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2 Evidence required for demonstration of consistent performance (continued)

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| | <ul style="list-style-type: none"> 4 relevant manufacturer's guidelines relating to the use of liquefied gas cargo handling plant and equipment, including instructions on equipment capability and limitations 5 following on-board housekeeping processes 6 pollution management processes |
| d | Action is taken promptly to report and rectify operational accidents and incidents in accordance with 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 |

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 practical exercises, case studies and/or other exercises that demonstrate the skills and knowledge to manage the safe loading, discharge, handling and condition maintenance of cargo on a liquefied gas tanker; and/or - b manage the safe loading, discharge, handling and condition maintenance of cargo on board an operational liquefied gas tanker

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
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1. GENERAL CONTEXT

a. Work must be carried out:	1 in compliance with the relevant sections of the AMSA Marine Orders and IMO STCW 95 Convention and Code, ISM Code and tanker safety guides and port regulations related to liquefied gas cargo operations
b. Work is performed:	1 relatively independently under broad operational requirements with accountability and responsibility for self and others in achieving the prescribed outcomes
c. Work involves:	1 the application of a significant range of operational and supervisory principles and procedures, safety precautions and hazard minimisation strategies to the management of the loading, discharge, handling and condition maintenance of cargo on a liquefied gas tanker. Contribution to the development of a broad plan for liquefied gas cargo handling and maintenance operations is required

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

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| d. Work requires: | 1 significant judgement in planning, technical and leadership functions related to the handling and condition maintenance of cargo on a liquefied gas tanker |
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2. WORKSITE ENVIRONMENT

a Vessel may include:	1 any Australian or international liquefied gas tanker
b Liquefied gas cargo handling operations may be carried out:	1 by day or night in both normal and emergency situations 2 under any possible operational conditions 3 during loading and discharging of cargo 4 during ballasting and deballasting 5 during warm up and cool down procedures 6 during tank cleaning 7 during liquefied gas cargo condition maintenance

Range Statement (continued)

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VARIABLE	SCOPE
b Liquefied gas cargo handling operations may be carried out: (continued)	8 during liquefied gas cargo sampling

VARIABLE	SCOPE
c Operational cargo handling cycle of a liquefied gas tanker may include:	1 cool down of a gas-free system from ambient temperature 2 liquefied gas loading preparation and operations 3 maintenance operations during a loaded voyage 4 liquefied gas discharging preparation and operations 5 warm up and gas freeing operations 6 tank stripping and cleaning operations 7 ballasting and deballasting operations a 8 maintenance operations during a ballast voyage
d Liquefied gas cargo handling systems and equipment may include:	1 pumps and pumping arrangements, vapour-return systems, piping systems and valves 2 filters and strainers 3 expansion devices 4 flame screens 5 commonly used inert gases 6 storage, generation and distribution systems 7 temperature and pressure monitoring systems 8 cargo vent systems 9 liquid recirculation and reliquefaction systems 10 cargo gauging, instrumentation systems and alarms 11 CO₂ and gas detection and monitoring systems 12 cargo boil-off systems and auxiliary systems
e Personal protection clothing and	1 masks, goggles and breathing apparatus 2 resuscitation equipment

VARIABLE	SCOPE
include:	3 protective clothing, including headgear, gloves and footwear 4 escape and rescue equipment

Range Statement (continued)

TDMMA407B MANAGE PROCEDURES FOR THE HANDLING, LOADING AND DISCHARGING OF LIQUEFIED GAS CARGOES

VARIABLE	SCOPE
f Hazards associated with liquefied gas cargoes may include:	1 sources of ignition leading to explosion and fire 2 electrostatic generation leading to discharge 3 environmental hazards to air and water 4 reactivity hazards, including effects of self-reaction, temperature and effects of air, water, impurities and other chemicals and reagents 5 release of toxic fluids, vapours and gases involving skin contact, ingestion or inhalation 6 corrosion hazards to personnel, vessel structures and equipment 7 working in confined spaces
g Documentation and records may include:	1 ISM Code safety management system plans, procedures, checklists and instructions 2 operational orders 3 established tanker and company liquefied gas cargo operations procedures 4 sections of the AMSA Marine Orders and the IMO STCW Convention and Code related to liquefied gas tankers 5 Liquefied Gas Handling Principles on Ships and in Terminals, SIGTTO

VARIABLE	SCOPE
	6 Tanker Safety Guide (Liquefied Gas), ICS 7 Ship to Ship Transfer Guide (Liquefied Gases), ICS/OCIMF 8 tanker manufacturer's instructions and recommended procedures 9 OH&S and pollution prevention procedures relevant to the handling of liquefied gas cargoes 10 instructions of relevant maritime authorities concerning liquefied gas cargo operations 11 relevant Australian and international standards
h Applicable legislation, regulations and codes may include:	1 sections of the IMO STCW 95 Convention and Code related to liquefied gas tankers, including the International Ship and Port Facility Security (ISPS) Code 2 relevant sections of AMSA Marine Orders

Range Statement (continued)

TDMMA407B MANAGE PROCEDURES FOR THE HANDLING, LOADING AND DISCHARGING OF LIQUEFIED GAS CARGOES

VARIABLE	SCOPE
h Applicable legislation, regulations and codes may include: (continued)	3 instructions of relevant maritime authorities concerning liquefied gas cargo operations 4 relevant international, Commonwealth, State and Territory OH&S and pollution control legislation

Unit Sector(s)

Not applicable.

Field

Field MA Handling Cargo and Vessel Stability

Relationship to other units

Relationship to other units	The unit may be assessed in conjunction with the unit <i>TDMMF1401A Plan and implement special safety, maintenance and emergency procedures for liquefied gas tankers.</i>
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