



Australian Government

MARA021 Manage advanced operations of a ship subject to IGF Code

Release: 1

MARAO21 Manage advanced operations of a ship subject to IGF Code

Modification History

Release 1. This is the first release of this unit of competency in the MAR Maritime Training Package.

Application

This unit involves the skills and knowledge required to manage operations onboard a ship that is subject to the International Code of Safety for Ships Using Gases or Other Low-Flashpoint Fuels (IGF Code).

This unit applies to people working in the maritime industry in the capacity of:

- Chief Mate
- Deck Officers
- Engineering Officers
- Engineers
- Masters
- Ratings

Licensing/Regulatory Information

This unit is equivalent to and delivers the objectives of the following STCW provisions:

- STCW Reg V/3 (7 and 8) and Code Section A-V/3 (2), Table A-V/3-2.

Legislative and regulatory requirements are applicable to this unit.

- This unit is one of the requirements to obtain Australian Maritime Safety Authority (AMSA) certification as Chief Mate, Deck Officers, Engineering Officers, Engineers, Masters or Ratings for advanced operations on ships subject to IGF Code and to meet regulatory requirements this unit must be delivered consistent with Marine Orders and with the relevant sections of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW).
- Those regulatory requirements include STCW International Maritime Organization (IMO) model course competencies and areas of knowledge, understanding and proficiency, together with the estimated total hours required for lectures and practical exercises. Teaching staff should note that timings are suggestions only and should be adapted to suit individual groups of trainees depending on their experience, ability, equipment and staff available for training.

Pre-requisite Unit

Not applicable.

Competency Field

A - Handling Cargo and Vessel Stability

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Perform work safely and monitor all cargo operations

2 Recognise physical and chemical properties of fuels

3 Operate fuel controls

PERFORMANCE CRITERIA

Performance criteria describe the performance needed to demonstrate achievement of the element.

- | | |
|------------|---|
| 1.1 | Communication with personnel is clear, concise and accurate and information is understood and acted upon |
| 1.2 | Cargo operations are planned, risk is managed and work carried out in accordance with accepted principles and procedures to ensure safety of operations and avoid pollution of the marine environment |
| 1.3 | Pumping operations are carried out in accordance with acceptable principles, procedures and type of fuel |
| 1.4 | Ship operations are carried out safely and take into consideration ship design, systems and equipment |
| 2.1 | Information resources are used effectively to identify properties and characteristics of oil cargo and their impact on safety and environmental protection |
| 2.2 | Information resources are used effectively to identify properties and characteristics of related gases and their impact on safety and vessel operation |
| 3.1 | Plant, auxiliary machinery and equipment are operated in accordance with technical specifications |
| 3.2 | Plant, auxiliary machinery and equipment are operated in accordance with technical specifications and within |

			safe operating limits at all time
4	Plan and monitor safe bunkering, stowage and securing of fuel	4.1	Fuel quality and quantity are determined and take into account the current conditions and necessary corrective safe measures
		4.2	Operations are planned and carried out in accordance with fuel transfer manuals and procedures to ensure safety of operations and avoid spill damages and pollution of the environment
		4.3	Personnel are allocated duties and informed of procedures and standards of work to be followed in a manner appropriate to the individuals concerned and in accordance with safe operational practices
5	Take precautions to prevent pollution of the environment	5.1	Procedures to safeguard the environment are observed at all time
		5.2	Procedures to safeguard personnel are observed at all times
6	Monitor and control compliance with legislative requirements	6.1	Fuel handling is conducted in compliance with relevant IMO instruments, established industrial standards and codes of safe working practices
		6.2	Operations are planned and performed in accordance with approved procedures and legislative requirements
7	Take precautions to prevent hazards	7.1	Cargo-related hazards to the vessel are identified, risk assessed, and control measures are implemented
		7.2	Cargo-related hazards to personnel are correctly identified and proper control measures are taken
		7.3	Flammable and toxic gas detection devices are used in accordance with manuals and workplace practices
8	Apply work health and safety (WHS)/occupational health and safety (OHS) precautions	8.1	Appropriate safety and protective equipment are used correctly by personnel
		8.2	Procedures designed to safeguard personnel and the ship are observed at all times
		8.3	Working practices are followed in accordance with legislative requirements, codes of practice, permits to

work and environmental concerns

- 8.4** Medical emergency procedures are identified and required actions taken conform to current recognised first aid practices and international guidelines

9 Prevent and control fire

- 9.1** Type and impact of the emergency is identified promptly, and response actions confirmed with emergency procedures

- 9.2** Evacuation, emergency shutdown (ESD) and isolation procedures are appropriate to the fuels addressed by the IGF Code

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Unit Mapping Information

This is a new unit. No equivalent unit.

Links

Companion Volume implementation guide can be found in VetNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=772efb7b-4cce-47fe-9bbd-ee3b1d1eb4c2>

Assessment Requirements for MARAO21 Manage advanced operations of a ship subject to IGF Code

Modification History

Release 1. This is the first release of this unit of competency in the MAR Maritime Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- applying relevant international regulations, codes, industry guidelines, industry standards, and port regulations
- applying safe work practices and risk assessments for personal and shipboard safety
- calibrating and using monitoring and fuel detection systems, instruments and equipment
- communicating effectively with personnel and authorities
- conducting cargo operations with acceptable safety limits, including stress limits, at all times
- conducting risk assessments during cargo operations
- developing safety plans and safety instructions to manage risk
- evaluating ship design, arrangement and characteristics and cargo to inform decision making during cargo and fuel operations
- managing and supervising personnel with cargo-related responsibilities
- monitoring control measures to manage flammability, explosion, toxicity, reactivity, corrosivity, health hazards, inert gas composition, electrostatic hazards, pressurised gases and low temperatures
- operating controls of fuel related to propulsion plant, engineering systems, services and safety devices
- performing fuel system measurements and calculations
- using available data to ensure safe bunkering, storage and securing of fuels using operational plans, procedures and checklists to maintain safe operating limits
- using available data to ensure safe bunkering, storage and securing of fuels
- using fuel system theory and characteristics to inform decision making
- using fundamental chemistry, physics and correct and relevant definitions to ensure the safe bunkering and use of fuels onboard ships subject to International Code of Safety for Ships Using Gases or Other Low-Flashpoint Fuels (IGF Code)
- using personal protective equipment (PPE) and devices
- using risk assessment method analysis to conduct risk assessments
- using safety data sheets (SDS)/material safety data sheets (MSDS) during IGF operations and first aid.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- checklists and safe procedures for taking fuel tanks in and out of service, including:
 - cooling down
 - emptying systems
 - heating of fuel
 - inerting
 - initial loading
 - pressure control
 - ship to shore
- calibration use and monitoring of fuel detection systems, instruments and equipment
- consequences, including dangers, of non-compliance with relevant legislation and regulations
- data relating to bunkering, storage and securing of fuels available onboard ship
- effects of pollution on personnel, the public and environment
- fuel system theory and characteristics and types of fuel system pumps and their safe operation, including:
 - heaters
 - high pressure
 - low pressure
 - pressure build-up units
 - vaporisers
- fuel system measurements and calculations, including:
 - fuel consumption calculations
 - maximum fill quantity
 - minimum remain on board (ROB)
 - on board quantity (OBQ)
- fundamental chemistry, physics and definitions relating to safe bunkering and use of fuels onboard ships subject to IGF Code, including:
 - chemical structure of different fuels used onboard ships subject to IGF Code
 - effect of low temperature, including brittle fracture for liquid cryogenic fuels
 - fundamental chemical structure, properties and characteristics of fuels subject to IGF Code, including:
 - boil-off and weathering of cryogenic fuels
 - combustion properties and heating values
 - compression and gas expansion
 - critical pressure and temperature of gases
 - dewpoint and bubble point
 - flashpoint, upper and lower flammable limits and auto-ignition temperature

- hydrate formation
- liquid and vapour densities
- methane number/knocking
- pollutant characteristics of fuels addressed in IGF Code
- saturated vapour pressure/reference temperature
- simple physical laws
- states of matter
- nature and properties of solutions
- properties of materials
- properties of single liquids and materials
- thermodynamic laws and diagrams
- thermodynamic units
- hazards and control measures, including:
 - corrosivity
 - electrostatic hazards
 - explosion
 - flammability
 - health hazards
 - inert gas composition
 - low temperature
 - pressurised gases
 - reactivity
 - toxicity
- hot work, enclosed spaces and tank entry including permitting procedures
- information contained in SDS/MSDS relevant to fuels subject to IGF Code
- international regulations, codes, industry guidelines, industry standards and port regulations, including:
 - codes of safe working practice
 - environmental procedures
 - IGF Code
 - International Convention for the Prevention of Pollution from Ships (MARPOL)
 - International Convention for the Safety of Life at Sea (SOLAS)
 - International Medical Guide for Ships
 - SDS/MSDS
 - Medical First Aid Guide (MFAG)
 - medical first aid procedures
 - permits to work
 - workplace procedures
- measures to be taken in event of:
 - leakage

- spillage
- venting
- operating controls of fuel related to propulsion plant, engineering systems, services and safety devices, including:
 - marine engineering terms
 - operating principles of marine power plants
 - ships auxiliary machinery
- operating bunkering systems, including:
 - bunkering procedures
 - emergency procedures
 - prevention of rollover
 - ship to shore/ship to ship interface
- PPE and devices, including:
 - breathing apparatus
 - evacuating equipment
 - rescue and escape equipment
 - resuscitators
- prevention control and firefighting and extinguishing systems
- rationale, practical application and implications of ship design, systems and equipment, including:
 - impact on decision making in typical and emergency situations
 - location, positioning and segregation
 - operational advantages, disadvantages and limitations
- risk assessments
- risk assessment methodology and risk analysis for ships subject to IGF Code
- risks of non-compliance with relevant regulations and legislation
- safe operation of pumps
- safety and emergency procedures for operating machinery, fuel and control systems
- safe management of bunkering and other IGF-related operations concurrent with other onboard operations both in port and at sea
- safe working practices, procedures and precautions, including:
 - electrical safety
 - entering enclosed spaces, including correct use of different types of breathing apparatus
 - maintenance work before, during and after repairs
 - ship to shore safety checklists
- ship design, systems and equipment, including:
 - cryogenic fuel tanks temperature and pressure maintenance
 - fuel emergency shutdown (ESD) system
 - fuel handling equipment and instrumentation, including:

- expansion devices
- flame screens
- fuel pipelines
- fuel pumps and pumping arrangements
- fuel systems for different propulsion engines
- general arrangement and construction
- systems, including:
 - fuel tank level gauging systems
 - fuel storage systems, including materials of construction and insulation
 - fuel system atmosphere control systems (inert gas, nitrogen), including:
 - distribution
 - generation
 - storage
 - tank pressure monitoring and control systems
 - temperature monitoring systems
 - toxic and flammable gas-detecting systems
- SDS/MSDS for IGF operations and first aid
- selection and correct use of PPE, including personal monitors
- work health and safety (WHS)/occupational health and safety (OHS) legislation and policies.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Practical assessment must occur in a workplace or realistic simulated workplace, under the normal range of workplace conditions.

Simulations and scenarios may be used where situations cannot be provided in the workplace or may occur only rarely, in particular for situations relating to emergency procedures and adverse weather conditions where assessment would be unsafe, impractical or may lead to environmental damage.

Resources for assessment must include access to:

- applicable documentation, such as legislation, regulations, codes of practice, workplace procedures and operational manuals
- tools, equipment, machinery, materials and relevant personal protective equipment (PPE) currently used in industry.

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