

Onboard training for marine engineer officer cadets

Supervised onboard training

With respect to the paragraph 2.2 of Regulation III/1 of the STCW Convention, the supervised onboard training should at least cover the following elements:

1. Familiarization for all ships
 - 1.1 Emergency drills such as abandon ship and firefighting drill etc.
 - 1.2 Safe working practices such as entering enclosed space, hot work practice etc.
 - 1.3 Environmental pollution prevention practice such as garbage handling etc.
2. Marine engineering at the operational level
 - 2.1 Maintain a safe engineering watch
 - 2.1.1 Thorough knowledge of Principles to be observed in keeping an engineering watch, including:
 - .1 duties associated with taking over and accepting a watch
 - .2 routine duties undertaken during a watch
 - .3 maintenance of the machinery space logs and the significance of the readings taken
 - .4 duties associated with handing over a watch
 - 2.1.2 Safety and emergency procedures; change-over of remote/automatic to local control of all systems
 - 2.1.3 Safety precautions to be observed during a watch and immediate actions to be taken in the event of fire or accident, with particular reference to oil systems

Engine-room resource management

- 2.1.4 Knowledge of engine-room resource management principles, including:
 - .1 allocation, assignment, and prioritization of resources
 - .2 effective communication
 - .3 assertiveness and leadership

- .4 obtaining and maintaining situational awareness
- .5 Consideration of team experience
- 2.2 Use English in written and oral form
 - 2.2.1 Adequate knowledge of the English language to enable the officer to use engineering publications and to perform engineering duties
- 2.3 Use internal communication systems
 - 2.3.1 Operation of all internal communication systems on board
- 2.4 Operate main and auxiliary machinery and associated control systems
 - 2.4.1 Basic construction and operation principles of machinery systems, including (where applicable) :
 - .1 marine diesel engine
 - .2 marine steam turbine
 - .3 marine gas turbine
 - .4 marine boiler
 - .5 shafting installations, including propeller
 - .6 other auxiliaries, including various pumps, air compressor, purifier, fresh water generator, heat exchanger, refrigeration, airconditioning and ventilation systems
 - .7 steering gear
 - .8 automatic control systems
 - .9 fluid flow and characteristics of lubricating oil, fuel oil and cooling systems
 - .10 deck machinery
 - 2.4.2 Safety and emergency procedures for operation of propulsion plant machinery, including control systems
 - 2.4.3 Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems:
 - .1 main engine and associated auxiliaries
 - .2 steam boiler and associated auxiliaries and steam systems
 - .3 auxiliary prime movers and associated systems
 - .4 other auxiliaries, including refrigeration, air-conditioning and ventilation systems
- 2.5 Operate fuel, lubrication, ballast and other pumping systems and associated control systems
 - 2.5.1 Operational characteristics of pumps and piping systems, including control systems
 - 2.5.2 Operation of pumping systems:
 - .1 routine pumping operations
 - .2 operation of bilge, ballast and cargo pumping systems

2.5.3 Oily-water separators (or similar equipment) requirements and operation.

3. Electrical, electronic and control engineering at the operational level

3.1 Operate electrical, electronic and control systems

3.1.1 Basic configuration and operation principles of the following electrical, electronic and control equipment (where applicable) :

- .1 electrical equipment:
 - .a generator and distribution systems
 - .b preparing, starting, paralleling and changing over generators
 - .c electrical motors including starting methodologies
 - .d high-voltage installations
 - .e sequential control circuits and associated system devices
- .2 electronic equipment:
 - .a characteristics of basic electronic circuit elements
 - .b flowchart for automatic and control systems
 - .c functions, characteristics and features of control systems for machinery items, including main propulsion plant operation control and steam boiler automatic controls
- .3 control systems:
 - .a various automatic control methodologies and characteristics
 - .b Proportional–Integral–Derivative (PID) control characteristics and associated system devices for process control

3.2 Maintenance and repair of electrical and electronic equipment

- 3.2.1 Safety requirements for working on shipboard electrical systems, including the safe isolation of electrical equipment required before personnel are permitted to work on such equipment
- 3.2.2 Maintenance and repair of electrical system equipment, switchboards, electric motors, generator and DC electrical systems and equipment
- 3.2.3 Detection of electric malfunction, location of faults and measures to prevent damage
- 3.2.4 Construction and operation of electrical testing and measuring equipment
- 3.2.5 Function and performance tests of the following equipment and their configuration:
 - .1 monitoring systems
 - .2 automatic control devices
 - .3 protective devices

3.2.6 The interpretation of electrical and simple electronic diagrams

4. Maintenance and repair at the operational level

4.1 Appropriate use of hand tools, machine tools and measuring instruments for fabrication and repair on board

4.1.1 Characteristics and limitations of materials used in construction and repair of ships and equipment

4.1.2 Characteristics and limitations of processes used for fabrication and repair

4.1.3 Properties and parameters considered in the fabrication and repair of systems and components

4.1.4 Methods for carrying out safe emergency/temporary repairs

4.1.5 Safety measures to be taken to ensure a safe working environment and for using hand tools, machine tools and measuring instruments

4.1.6 Use of hand tools, machine tools and measuring instruments

4.1.7 Use of various types of sealants and packings

4.2 Maintenance and repair of shipboard machinery and equipment

4.2.1 Safety measures to be taken for repair and maintenance, including the safe isolation of shipboard machinery and equipment required before personnel are permitted to work on such machinery or equipment

4.2.2 Appropriate basic mechanical knowledge and skills

4.2.3 Maintenance and repair, such as dismantling, adjustment and reassembling of machinery and equipment

4.2.4 The use of appropriate specialized tools and measuring instruments

4.2.5 Design characteristics and selection of materials in construction of equipment

4.2.6 Interpretation of machinery drawings and handbooks

4.2.7 The interpretation of piping, hydraulic and pneumatic diagrams

5. Controlling the operation of the ship and care for persons on board at the operational level

5.1 Ensure compliance with pollution prevention requirements

Prevention of pollution of the marine environment

5.1.1 Knowledge of the precautions to be taken to prevent pollution of the marine environment

5.1.2 Anti-pollution procedures and all associated equipment

5.1.3 Importance of proactive measures to protect the marine environment

5.2 Maintain seaworthiness of the ship

Ship stability

5.2.1 Working knowledge and application of stability, trim and stress tables, diagrams and stress-calculating equipment

5.2.2 Understanding of the fundamentals of watertight integrity

5.2.3 Understanding of fundamental actions to be taken in the event of partial loss of intact buoyancy

Ship construction

5.2.4 General knowledge of the principal structural members of a ship and the proper names for the various parts

5.3 Prevent, control and fight fires on board

Fire prevention and fire-fighting appliances

5.3.1 Ability to organize fire drills

5.3.2 Knowledge of classes and chemistry of fire

5.3.3 Knowledge of fire-fighting systems

5.3.4 Action to be taken in the event of fire, including fires involving oil systems

5.4 Operate life-saving appliances

Life-saving

5.4.1 Ability to organize abandon ship drills and knowledge of the operation of survival craft and rescue boats, their launching appliances and arrangements, and their equipment, including radio life-saving appliances, satellite EPIRBs, SARTs, immersion suits and thermal protective aids

5.5 Apply medical first aid on board ship

Medical Aid

- 5.5.1 Practical application of medical guides and advice by radio, including the ability to take effective action based on such knowledge in the case of accidents or illnesses that are likely to occur on board ship

5.6 Monitor compliance with legislative requirements

- 5.6.1 Basic working knowledge of the relevant IMO conventions concerning safety of life at sea and protection of the marine environment

5.7 Application of leadership and team working skills

- 5.7.1 Working knowledge of shipboard personnel management and training

- 5.7.2 A knowledge of related international maritime conventions and recommendations, and national legislation

- 5.7.3 Ability to apply task and workload management, including:

- .1 planning and co-ordination
- .2 personnel assignment
- .3 time and resource constraints
- .4 prioritization

- 5.7.4 Knowledge and ability to apply effective resource management:

- .1 allocation, assignment, and prioritization of resources
- .2 effective communication on board and ashore
- .3 decisions reflect consideration of team experiences
- .4 assertiveness and leadership, including motivation
- .5 obtaining and maintaining situational awareness

- 5.7.5 Knowledge and ability to apply decision-making techniques:

- .1 Situation and risk assessment
- .2 Identify and consider generated options
- .3 Selecting course of action
- .4 Evaluation of outcome effectiveness

5.8 Contribute to the safety of personnel and ship

- 5.8.1 Knowledge of personal survival techniques

- 5.8.2 Knowledge of fire prevention and ability to fight and extinguish fires

- 5.8.3 Knowledge of elementary first aid

5.8.4 Knowledge of personal safety and social responsibilities

Training record book

6. The training record of each task should include following items
 - 6.1 Name of the task
 - 6.2 Related equipment/tools/systems etc.
 - 6.3 Date of training
 - 6.4 Name of supervising marine engineer officer and his initials after task completion
 - 6.5 Task evaluation and areas for improvement
7. The training record book should also contain the following information:
 - 7.1 Personal information of the candidate for certification, such as name, date of birth, residential address, seaman discharge book no. etc.
 - 7.2 Company(ies) information which the candidate has been served such as company name, company address, service period for the particular training programme etc.
 - 7.3 Ship(s) information which the candidate has been served such as ship's name, ship's major particulars, engine particulars, lifesaving and firefighting equipment, cargo gears, navigational equipment and GMDSS equipment etc.