

## **Onboard training for electro-technical officer cadets**

### **Supervised onboard training**

With respect to the paragraph 2.2 of Regulation III/6 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. Electrical, electronic and control engineering at the operational level
  - 2.1 Monitor the operation of electrical, electronic and control systems
    - 2.1.1 Basic understanding of the operation of mechanical engineering systems, including:
      - .1 prime movers, including main propulsion plant
      - .2 engine room auxiliary machinery
      - .3 steering systems
      - .4 cargo handling systems
      - .5 deck machinery
      - .6 hotel systems
    - 2.1.2 Basic knowledge of heat transmission, mechanics and hydromechanics
  
  - Knowledge of:*
    - 2.1.3 Electro-technology and electrical machines theory
    - 2.1.4 Fundamentals of electronics and power electronics
    - 2.1.5 Electrical power distribution boards and electrical equipment
    - 2.1.6 Fundamentals of automation, automatic control systems and technology
    - 2.1.7 Instrumentation, alarms and monitoring systems

- 2.1.8 Electrical drives
- 2.1.9 Technology of electrical materials
- 2.1.10 Electro-hydraulic and electrical pneumatic control systems
- 2.1.11 Appreciation of the hazards and precautions required for the operation of power systems above 1,000 volts
- 2.2 Monitor the operation of automatic control systems of propulsion and auxiliary machinery
  - 2.2.1 Preparation of control systems of propulsion and auxiliary machinery for operation
- 2.3 Operate generators and distribution systems
  - 2.3.1 Coupling, load sharing and changing over generators
  - 2.3.2 Coupling and breaking connection between switchboards and distribution panels
- 2.4 Operate and maintain power systems in excess of 1,000 volts

*Theoretical knowledge*

- 2.4.1 High-voltage technology
- 2.4.2 Safety precautions and procedures
- 2.4.3 Electrical propulsion of the ships, electric motors and control systems

*Practical knowledge*

- 2.4.4 Safe operation and maintenance of high-voltage systems, including knowledge of the special technical type of high-voltage systems and the danger resulting from operational voltage of more than 1,000 volts
- 2.5 Operate computers and computer networks on ships

*Understanding of:*

- .1 main features of data processing
- .2 construction and use of computer networks on ships
- .3 bridge-based engine-room-based and commercial computer use

- 2.6 Use English in written and oral form
  - 2.6.1 Adequate knowledge of the English language to enable the officer to use engineering publications and to perform officer's duties

2.7 Use internal communication systems

2.7.1 Operation of all internal communication systems on board

3. Maintenance and repair at the operational level

3.1 Maintenance and repair of electrical and electronic equipment

3.1.1 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

3.1.2 Maintenance and repair of electrical system equipment, switchboards, electric motors, generators and DC electrical systems and equipment

3.1.3 Detection of electric malfunction, location of faults and measures to prevent damage

3.1.4 Construction and operation of electrical testing and measuring equipment

3.1.5 Function and performance tests of the following equipment and their configuration:

- .1 monitoring systems
- .2 automatic control devices
- .3 protective devices

3.1.6 The interpretation of electrical and electronic diagrams

3.2 Maintenance and repair of automation and control systems of main propulsion and auxiliary machinery

3.2.1 Appropriate electrical and mechanical knowledge and skills

*Safety and emergency procedures*

3.2.2 Safe isolation of equipment and associated systems required before personnel are permitted to work in such plant or equipment

3.2.3 Practical knowledge for the testing, maintenance, fault finding and repair

3.2.4 Test, detect faults and maintain and restore electrical and electronic control equipment to operating condition

3.3 Maintenance and repair of bridge navigation equipment and ship communication systems

- 3.3.1 Knowledge of the principles and maintenance procedures of navigation equipment, internal and external communication systems

*Theoretical knowledge*

- 3.3.2 Electrical and electronic systems operating in flammable areas

*Practical knowledge*

- 3.3.3 Carrying out safe maintenance and repair procedures
- 3.3.4 Detection of machinery malfunction, location of faults and action to prevent damage

- 3.4 Maintenance and repair of electrical, electronic and control systems of deck machinery and cargo-handling equipment

- 3.4.1 Appropriate electrical and mechanical knowledge and skills

*Safety and emergency procedures*

- 3.4.2 Safe isolation of equipment and associated systems required before personnel are permitted to work on such plant or equipment
- 3.4.3 Practical knowledge for the testing, maintenance, fault finding and repair
- 3.4.4 Test, detect faults and maintain and restore electrical and electronic control equipment to operating condition

- 3.5 Maintenance and repair of control and safety systems of hotel equipment

*Theoretical knowledge*

- 3.5.1 Electrical and electronic systems operating in flammable areas

*Practical knowledge*

- 3.5.2 Carrying out safe maintenance and repair procedures
- 3.5.3 Detection of machinery malfunction, location of faults and action to prevent damage

- 4. Controlling the operation of the ship and care of person on board at the operational level

- 4.1 Ensure compliance with pollution-prevention requirements

*Prevention of pollution of the marine environment*

- 4.1.1 Knowledge of the precautions to be taken to prevent pollution of the marine environment
- 4.1.2 Anti-pollution procedures and all associated equipment
- 4.1.3 Importance of proactive measures to protect the marine environment

4.2 Prevent, control and fight fires on board

*Fire prevention and fire-fighting appliances*

- 4.2.1 Ability to organize fire drills
- 4.2.2 Knowledge of classes and chemistry of fire
- 4.2.3 Knowledge of fire-fighting systems
- 4.2.4 Action to be taken in the event of fire, including fires involving oil systems

4.3 Operate life-saving appliances

*Life-saving*

- 4.3.1 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

4.4 Apply medical first aid on board ship

*Medical aid*

- 4.4.1 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 illness that are likely to occur on board ship

4.5 Application of leadership and team working skills

- 4.5.1 Working knowledge of shipboard personnel management and training
- 4.5.2 Ability to apply task and workload management, including:
  - .1 planning and co-ordination
  - .2 personnel assignment

- .3 time and resource constraints
- .4 prioritization
- 4.5.3 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
- 4.5.4 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
- 4.6 Contribution to the safety of personnel and ship
  - 4.6.1 Knowledge of personnel survival techniques
  - 4.6.2 Knowledge of fire prevention and ability to fight and extinguish fire
  - 4.6.3 Knowledge of elementary first aid
  - 4.6.4 Knowledge of personal safety and social responsibilities

### **Training record book**

- 5. The training record of each task should include following items
  - 5.1 Name of the task
  - 5.2 Related equipment/tools/systems etc.
  - 5.3 Date of training
  - 5.4 Name of supervising marine engineer officer and his initials after task completion
  - 5.5 Task evaluation and areas for improvement
- 6. The training record book should also contain the following information:
  - 6.1 Personal information of the candidate for certification, such as name, date of birth, residential address, seaman discharge book no. etc.
  - 6.2 Company(ies) information which the candidate has been served such as company name, company address, service period for the particular training

programme etc.

- 6.3 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.