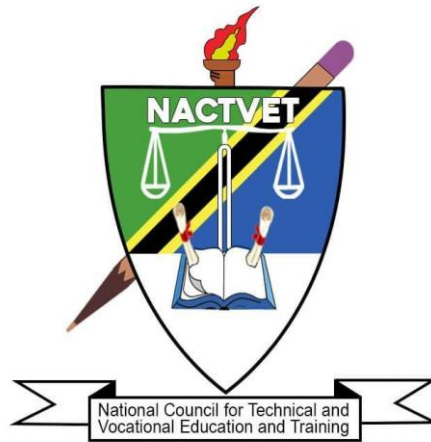


**THE NATIONAL COUNCIL FOR TECHNICAL AND VOCATIONAL EDUCATION
AND TRAINING**



OCCUPATIONAL STANDARDS

OCCUPATION: MARINE ELECTRICAL AND ELECTRONICS TECHNICIAN

LEVEL: NTA LEVEL 5

FEBRUARY 2024

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ABBREVIATIONS

BWM	International Convention for the Control and Management of Ships Ballast Water and Sediments
CBET	Competency Based Education and Training Model
ESB	Emergency Switchboard
GMDSS	Global Maritime Distress and Safety System
GPS	Global Positioning System
ISM	International Safety Management (i.e. International Management Code for the Safe Operation of Ships and for Pollution Prevention)
MARPOL	International Convention for the Prevention of Pollution from Ships
MOPP	Maintenance Operation Policies and Procedures
MSB	Main Switchboard
NACTVET	National Council for Technical and Vocational Education and Training
NOS	National Occupational Standards
OS	Occupational Standards
PLC	Programmable Logic Controller
PPE	Personal Protective Equipment
RPM	Revolutions Per Minute
SMS	Safety Management System
SOLAS	International Convention for Safety of Life at Sea
STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
TET	Technical Education and Training
TVET	Technical and Vocational Education and Training
UPS	Uninterruptible Power Supply

GLOSSARY OF TERMS

Circumstantial knowledge:	Detailed knowledge, which allows the decision-making in regard to different circumstances and cross cutting issues
Competence:	The ability to use knowledge, understanding, practical and thinking skills to perform effectively to the workplace standards required in employment.
Competency:	A description of the ability one possesses when able to perform a given occupational task effectively and efficiently.
Competency-based education:	An instructional programme that derives its content from validated tasks and bases assessment on the learner's performance
Curriculum:	A description or composite of statements about "what is to be learned" by the trainee/student in a particular instructional programme; a product that states the "intended learning outcomes".
Educational/training programme:	The complete curriculum and instruction (what and how) that is designed to prepare a person for employment in a job or other particular performance situation.
Occupation:	A specific position requiring the performance of specific tasks – essentially the same tasks are performed by all employees having the same title. (Example: baker)
Occupational analysis:	A process used to identify the tasks that are important to employees in any given occupation
Occupational area:	This is a broad grouping of related jobs. (Example: food service)
Occupational Standards:	Specific requirements of competences people are expected to demonstrate in a particular occupational area, including knowledge and relevant attitudes. They also act as performance tool of assessment of the pre – scribed outcomes.
Performance criteria:	indicate the expected end results or outcome in form of evaluative statements.
Skills:	The ability to perform occupational tasks with a high degree of proficiency within a given occupation. Skill is conceived of as a composite of three completely interdependent

components: cognitive, affective, and psychomotor.

Standards: It is a set of statement, which if proved true under working conditions, means that an individual is meeting an expected level and type of performance.

Task analysis: The process of analysing each task to determine the steps, related knowledge, attitudes, performance standards, tools and materials needed, and safety concerns required of employees performing it.

Task: A work activity that has a definite beginning and ending, is observable or measurable, consists of two or more definite steps, and leads to a product, service, or decision.

Underpinning Knowledge: This is crucial knowledge that an individual must acquire in order to demonstrate competences that are associated in performing a given task.

Verification process: The process of having experts review and conform the importance of the task (competency) statements identified through occupational analysis. Other questions, such as the degree of task learning difficulty are also frequently asked. This process is also sometimes referred to as validation.

Occupational Competence: The application of knowledge and skills to perform consistently to the standards required in the work context

1.0. INTRODUCTION

Technical Education and Training (TET) is one of the most important education sub-sectors in Tanzania, responsible for developing a skilled workforce to support the country's industrialization economic agenda. Tanzania's *Development Vision 2025* intends to raise the country's economy to a middle-income status, with a high level of human development. This requires a skilled workforce that is aligned with the needs of the public and private sectors of the economy. The National Council for Technical and Vocational Education and Training (NACTVET) has begun the job of drafting Occupational Standards (OS) that will eventually be adopted as National Occupational Standards (NOS) for use in the delivery of TET that meets the needs of the labour market and the country's economic agenda.

Occupational Standards (OS) are performance criteria that are matched with labour market demands. Each of them describes the functions, performance standards, and understanding or knowledge underpinning a given occupation. They combine skills, knowledge, and attitudes to describe best practice. They are useful tools for establishing job roles, personnel recruitment, supervision, and appraisal, as well as TET Standards. They are also helpful for benchmarking and harmonizing job qualifications on a national and international level. Standards, in general, provide a solid framework for high-quality TET that is labour market-relevant, current, and consistent in application across all public and private institutions.

However, it must be noted that Occupational Standards are different from Training /Education Standards. Occupational standards are defined in terms of activities performed by a person in a selected occupation (e.g., an electrical engineer designs electrical circuits, performs troubleshooting in electrical circuits, etc.), and are usually defined by Employers following procedures as agreed upon by all the stakeholders. On the other hand, Training and Education Standards are developed from the activities defined in the occupational standards, and they specify learning objectives to ensure that the necessary skills and knowledge are developed by a person to enable him/her to function at an agreed level in an occupation. Training and Education Standards are used to define curricula in training institutions. It is critical, however, to establish a direct link between the occupational standards and the

training standards for both of them to respond collaboratively to the demands of the labour market.

For the purpose of TET delivery, Tanzania has adopted the Competence Based Education and Training (CBET) approach. The CBET approach focuses on providing learners with the skills and knowledge required to meet the occupational standards. Occupational standards are thus the starting point for developing competency-based training (CBET) programmes. Therefore, it is quite pertinent for TET institutions to use the relevant occupational standards as a benchmark for formulating their curricula. Occupational Standards are developed based on a given occupation's current and future demands. As a result, they serve as a means of bridging the gap between the worlds of employment and technical education and training. The document explains how the occupational standards were developed, as well as the scope, the occupational profile in the form of DACUM charts, and the Occupational Standards.

2.0. OCCUPATIONAL STANDARD DEVELOPMENT PROCESS

The process of developing these Occupational Standards involved both local and international expertise. The process began with an examination of major documents that guide Tanzanian skills development including the *10-year National Skills Development Strategy (2016-2026)*. NACTVET labour market reports were also used in the literature review to determine the skills demand in the Tanzanian labour market as a whole.

After the literature review, a team of experts in consultation with practitioners developed draft occupational standards. The draft document was used to develop an occupational profile for each occupation (DACUM Chart), which is attached as an **Appendix** to every Occupational Standard. The draft occupational standards will be validated during stakeholders' forum. The information from stakeholders' forum will provide insight from the workplaces and professional bodies regarding trends and changes in the profession, including how well graduates are prepared for working in the occupation.

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FOR MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN

These standards cover a broad range of duties and tasks that can be performed by a Marine Electronic and Electrical Technician. However, the occupational standards are not meant to replace individual job descriptions, they are to be used for guidance in defining skill levels and knowledge for the technician in specific settings or positions. The Marine Electronic and Electrical Technician may perform tasks in a number of key areas of the occupational standards, but not necessarily in all areas. For example, in large operations other individuals may be employed or designated to perform specific tasks.

A Marine Electronic and Electrical Technician works under the supervision of the Marine Chief Engineer. They are responsible for inspecting, repairing, and maintaining the marine electrical, electronic, and automation equipment. On board, technicians are involved in tasks such as maintenance and repair of marine electrical and electronic equipment, as well as ship operations and personnel management. Typically, the Marine Electronic and Electrical Technicians perform the following responsibilities:

- a) Basic operation of ship power station;
- b) Operation of ship internal communication system;
- c) Cleaning the ship electronic and electrical equipment;
- d) Storage and use of electronic and electrical equipment;
- e) Application of relevant international conventions and regulations to prevent marine pollution;
- f) Operation of ship mechanical engineering systems;
- g) Operation and maintenance of ship steering and electrical control systems;
- h) Taking appropriate measures to prevent marine pollution and operating pollution prevention procedures and equipment;
- i) Onboard first aid measures;
- j) Operations related to ship repairs.

The occupational standards have been clustered into NTA qualification levels i.e. NTA level 4,

5 and 6.

4.0. VALIDITY PERIOD

The occupational standards will be valid for 3-5 years due to the fast-changing nature of technology. The review will proceed in the same manner as the previous one, with new occupational standards being developed based on current labour market Information.

5.0 OCCUPATIONAL STANDARDS

5.1 OCCUPATIONAL STANDARDS FOR MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN LEVEL 5

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MONITOR THE OPERATION OF ELECTRICAL, ELECTRONIC, PROPULSION, AND AUXILIARY MACHINERY AUTOMATIC CONTROL SYSTEMS	DUTY NO.	501
TASK TITLE	OPERATE THE MARINE MECHANICAL ENGINEERING SYSTEMS	TASK NO	5011
PERFORMANCE CRITERIA	The person executing this task must be able to operate and run the marine mechanical engineering systems in accordance with technical requirements and manufacturer's manuals.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician or other senior crew members. The available tools and equipment include: 1. Main propulsion system and its auxiliary systems; 2. Auxiliary machinery in the engine room; 3. Steering system; 4. Loading and unloading systems; 5. Deck machinery; 6. Living systems; 7. Electrician’s complete tool kit 8. Personal protective equipment: earplugs, gloves, safety helmets, etc.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Operate the marine main		Detailed knowledge about: 1.0. Methods The person performing this task must be able to	

propulsion system; 2. Start the air compressor; 3. Start the service pumps for the main engine; 4. Start the steering gear equipment; 5. Operate the steering system; 6. Start the marine cargo handling equipment; 7. Start the marine anchor and winch machinery; 8. Switch the anchor winch; 9. Start the marine air conditioning equipment; 10. Check the operation conditions of the marine main propulsion system, auxiliary machinery of the engine room, steering system, cargo handling system, deck machinery, and life support equipment.	explain how to: 1.1. Refer to equipment operating manuals; 1.2. Operate the marine main propulsion system and engine room auxiliary machinery; 1.3. Operate the marine cargo handling system; 1.4. Operate the marine deck machinery; 1.5. Monitor the operation of the marine mechanical engineering system; 1.6. Record activities in the logbook. 2.0. Principle The person must be able to explain the principles of: 2.1. Operation of shipboard mechanical engineering systems; 2.2. Operation of the marine main propulsion system; 2.3. Operation of marine auxiliary machinery; 2.4. Operation regulations of shipboard mechanical engineering systems. 3.0. Theories The person must be able to explain: 3.1. Structure, system components, and operation methods of the main propulsion system; 3.2. Knowledge and operation methods of the steering system; 3.3. Composition and operation process of the cargo handling systems; 3.4. Functions and operation methods of the deck machinery; 3.5. Knowledge of life support equipment. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Safe and standardized operation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Operation of the marine mechanical engineering systems is conducted according to technical specifications and manufacturer manuals.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe operation of marine mechanical engineering systems; 2. Occupational Health & Safety; 3. Maintenance Operation Policies and Procedures (MOPP).

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MONITOR THE OPERATION OF ELECTRICAL, ELECTRONIC, PROPULSION, AND AUXILIARY MACHINERY AUTOMATIC CONTROL SYSTEMS	DUTY NO.	501
TASK TITLE	TEST AND INSTALL ELECTRONIC CIRCUITS	TASK NO	5012
PERFORMANCE CRITERIA	The person executing the task must be able to test and install electronic circuits in accordance with technical requirements.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician or other senior crew members. The available tools and equipment include: 1. Electronic components such as resistors, diodes, transistors, op-amps, etc.;; 2. Soldering tools such as soldering iron, solder, and flux; 3. Auxiliary tools such as needle-nose plier, diagonal cutter, tweezer and knife; 4. Electronic circuit wall chart; 5. Printed circuit boards; 6. Multimeter; 7. Oscilloscope; 8. Personal protective equipment. 9. Electrician’s complete tool kit		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Identify suitable electronic components; 2. Remove oxidation layer from component surfaces; 3. Handle component pins; 4. Prepare for soldering; 5. Solder and install circuit board; 6. Inspect and handle soldered joints; 7. Conduct electronic circuit testing; 8. Carry out seagoing services.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Keep a record in the logbook; 1.2. Identify electronic components; 1.3. Read electronic circuit diagrams; 1.4. Select soldering tools and solder electronic circuits; 1.5. Test electronic circuits. 2.0. Principle The person must be able to explain the principles of: 2.1. Installation and soldering standards for electronic components;	

	2.2. Electronic circuit diagrams. 3.0. Theories The person must be able to explain: 3.1. Knowledge of selecting electronic components; 3.2. Specifications and requirements for electronic soldering; 3.3. Testing electronic circuits. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills. 5.0. Mathematical skills 5.1. Basic arithmetic skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Testing and installation of electronic circuits is conducted as per approved standards and regulations.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe usage methods for electronic instruments; 2. Maintenance Operation Policies and Procedures; 3. Soldering waste disposal methods.

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MONITOR THE OPERATION OF ELECTRICAL, ELECTRONIC, PROPULSION, AND AUXILIARY MACHINERY AUTOMATIC CONTROL SYSTEMS	DUTY NO.	501
TASK TITLE	PREPARE AND MONITOR THE MARINE MAIN PROPULSION CONTROL SYSTEM	TASK NO	5013
PERFORMANCE CRITERIA	The person executing the task must be able to complete the preparation and effectively monitor the main propulsion control system according to the manufacturer's manual.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician or other senior crew members. The available tools and equipment include: 1. Main propulsion system and its control system; 2. Auxiliary systems of the main propulsion system; 3. Personal protective equipment. 4. Electrician’s complete tool kit		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Start the main air compressor; 2. Check the compressed air system of the main propulsion system; 3. Open the valves of the compressed air system; 4. Start the cooling water pump; 5. Check the cooling system of the main propulsion system; 6. Start the main lubricating oil pump; 7. Check the lubrication system of the main propulsion system; 8. Start the fuel pump; 9. Check the fuel system of the main propulsion system; 10. Check and operate the telegraph, inspect the main engine control system;		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Start and operate the auxiliary equipment of the main propulsion system; 1.2. Prepare and inspect the operation of the main propulsion system; 1.3. Prepare, check, and monitor the operation of the main engine control system; 1.4. Switch the main engine control stations; 1.5. Identify the sound signals related to ship operation and control; 1.6. Use monitoring instruments to assess the readiness status. 2.0. Principle The person must be able to explain the principles of: 2.1. Procedures for preparing the main propulsion system for operation;	

11. Check and switch the main engine control stations; 12. Check the cylinder oil electronic injection control system; 13. Carry out seagoing services.	2.2. Control for the main propulsion system. 3.0. Theories The person must be able to explain: 3.1. Composition and functions of the main propulsion system's fuel and lubrication systems; 3.2. Composition and functions of the main propulsion system's cooling system, air system, and control system; 3.3. Methods for preparing the main propulsion system for operation; 3.4. Methods for preparing the main engine control system for operation. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills. 5.0. Mathematical skills 5.1. Basic arithmetic skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Preparation and monitoring of the marine main propulsion control system is carried out as per technical specifications and manufacturer's manual.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Technical documentation such as equipment operation manuals; 2. Maintenance Operation Policies and Procedures (MOPP); 3. Occupational Health & Safety.

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MONITOR THE OPERATION OF ELECTRICAL, ELECTRONIC, PROPULSION, AND AUXILIARY MACHINERY AUTOMATIC CONTROL SYSTEMS	DUTY NO.	501
TASK TITLE	MONITOR THE OPERATION OF MARINE AUXILIARY MACHINERY AND CONTROL SYSTEMS	TASK NO	5014
PERFORMANCE CRITERIA	The person executing the task must be able to operate and monitor the marine auxiliary machinery and control systems in accordance with technical specifications and the manufacturer's manual.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician or other senior crew members. The available tools and equipment include: 1. Air compressor and its control system; 2. Auxiliary boiler and its control system; 3. Fuel system and temperature control and viscosity control system; 4. Oil separator and its control system; 5. Cooling water control system; 6. Lubricating oil automatic control device; 7. Food refrigeration, air conditioning system, and their control equipment; 8. Steering gear and control equipment; 9. Personal protective equipment. 10. Electrician’s complete tool kit		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Monitor the operation of the air compressor automatic control system. 2. Monitor the operation of the auxiliary boiler automatic control system. 3. Monitor the fuel system. 4. Monitor the operation of the fuel viscosity and temperature control		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Monitor the operation of the auxiliary machinery automatic control system, including: air compressor, auxiliary boiler, fuel viscosity control, oil separator, cooling water temperature, self-cleaning filter, galley refrigeration and air conditioning system, steering gear system; 1.2. Operate the auxiliary machinery automatic	

system. 5. Monitor the operation of the oil separator automatic control system. 6. Monitor the automatic control of the cooling system and lubricating oil system. 7. Monitor the automatic control of the food refrigeration and air conditioning system. 8. Monitor the automatic control operation of the steering gear; 9. Carry out seagoing services.	control system. 2.0. Principle The person must be able to explain the principles of: 2.1. Manufacturer's operation manual; 2.2. Operation of marine auxiliary machinery automatic control system. 3.0. Theories The person must be able to explain: 3.1. Automatic on-off and safety protection control system for air compressors; 3.2. Water level, combustion sequence, and steam pressure control system, as well as safety protection system for auxiliary boilers; 3.3. Composition and function of automatic control system for fuel temperature and viscosity; 3.4. Input and output signals of the oil separator control system, as well as composition and function of the oil separation timing control system; 3.5. Composition and function of automatic control system for cooling water temperature; 3.6. Composition of self-cleaning oil filter control system; 3.7. Composition of control system for food refrigeration and air conditioning equipment; 3.8. Composition and function of marine steering gear control system. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Information technology application skills. 5.0. Mathematical skills 5.1. Basic arithmetic skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Monitoring of the operation of marine auxiliary machinery and control systems is performed according to technical specifications and manufacturer's manuals.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Functions of auxiliary machinery control systems; 2. Safety operating procedures;

	3. Maintenance Operation Policies and Procedures (MOPP); 4. Occupational Health & Safety.
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OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MONITOR THE OPERATION OF THE MARINE ELECTRICAL AND AUTOMATION CONTROL SYSTEMS	DUTY NO.	502
TASK TITLE	CONDUCT TESTING OF MARINE COMMONLY USED SENSORS	TASK NO	5021
PERFORMANCE CRITERIA	The person executing the task must be able to conduct testing and calibration of marine sensors in accordance with technical requirements and manufacturer's manuals.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician or other senior crew members. The available tools and equipment include: 1. Temperature sensor and its testing equipment; 2. Pressure sensor and its testing equipment; 3. Liquid level sensor; 4. Flow sensor; 5. Speed sensor; 6. Electrical meter; 7. Thermometer; 8. Pressure gauge; 9. Tachometer; 10.Wrench, screwdriver, and another tool; 11.Personal protective equipment. 12.Electrician’s complete tool kit		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Connect the sensor with the testing/calibration equipment; 2. Check and test the performance of the temperature sensor; 3. Check and test the performance of the pressure sensor; 4. Test and evaluate the liquid level sensor; 5. Test and evaluate the flow sensor; 6. Measure the speed sensor; 7. Carry out seagoing services.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Connect the sensor with the testing/calibration equipment; 1.2. Test the temperature sensor; 1.3. Test the pressure sensor; 1.4. Test and evaluate the liquid level and flow sensors; 1.5. Measure the speed sensor. 2.0. Principle The person must be able to explain the principles of:	

	2.1. Marine commonly used sensors operation. 3.0. Theories The person must be able to explain: 3.1. Types and detection methods of temperature sensors. 3.2. Types and detection methods of pressure sensors. 3.3. Types and detection methods of level sensors. 3.4. Types and detection methods of flow sensors. 3.5. Types and detection methods of speed sensors. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Report writing skills. 5.0. Mathematical skills 5.1. Basic arithmetic skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Testing of marine commonly used sensors is conducted as per approved standards and technical specifications.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe operation of work tools; 2. Safe operation of testing instruments and equipment; 3. Maintenance Operation Policies and Procedures (MOPP); 4. Occupational Health & Safety.

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MONITOR THE OPERATION OF THE MARINE ELECTRICAL AND AUTOMATION CONTROL SYSTEMS	DUTY NO.	502
TASK TITLE	OPERATE AND MAINTAIN MARINE MACHINERY MONITORING AND ALARM SYSTEM	TASK NO	5022
PERFORMANCE CRITERIA	The person executing the task must be able to complete parameter queries, alarm testing, and routine maintenance of the marine machinery monitoring and alarm system in accordance with technical requirements and manufacturer's manuals.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician or other senior crew members. The available tools and equipment include: 1. Marine machinery monitoring and alarm system or simulation device; 2. Operation manual for machinery monitoring and alarm system; 3. electrician’s complete tool kit; 4. Cleaning tools; 5. Variable resistors; 6. Personal protective equipment.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Select the required safety regulations for task execution; 2. Start the marine machinery monitoring and alarm system; 3. Reset and confirm alarms; 4. Query parameters of the machinery monitoring and alarm system; 5. Switch duty positions and extend alarm usage; 6. Print alarm parameters; 7. Test the functionality of alarm points; 8. Modify alarm parameters;		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Start the operation of the machinery monitoring and alarm system; 1.2. Reset and confirm alarms; 1.3. Switch duty positions; 1.4. Query parameters of the alarm system; 1.5. Trigger alarms and print parameters; 1.6. Test the functionality of alarm points; 1.7. Modify alarm parameters; 1.8. Maintain the units of the alarm system. 2.0. Principle The person must be able to explain the principles of:	

9. Maintain the units of alarm functions; 10. Carry out seagoing services.	2.1. Manufacturer's operation manual; 2.2. Operation of the machinery monitoring and alarm system. 3.0. Theories The person must be able to explain: 3.1. Types, components, and main functions of the machinery monitoring and alarm system; 3.2. Functions of modules in the machinery monitoring and alarm system; 3.3. Basic operational methods of the machinery monitoring and alarm system; 3.4. Maintenance methods of the machinery monitoring and alarm system. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Information technology application skills. 5.0. Mathematical skills 5.1. Basic arithmetic skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Operation and maintenance of marine machinery monitoring and alarm system is conducted according to technical specifications and manufacturer's manuals.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe operation of testing tools; 2. Maintenance Operation Policies and Procedures (MOPP); 3. Occupational Health & Safety.

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MONITOR THE OPERATION OF THE MARINE ELECTRICAL AND AUTOMATION CONTROL SYSTEMS	DUTY NO.	502
TASK TITLE	OPERATE AND PERFORM FUNCTIONAL TESTING OF SHIP FIRE ALARM SYSTEM	TASK NO	5023
PERFORMANCE CRITERIA	The person executing the task must be able to carry out the operation, alarm testing, and routine maintenance of the marine fire alarm system in accordance with technical requirements and manufacturer's manuals.		
RANGE STATEMENT	The task will be carried out on the ship or in approved laboratory facilities under the supervision and guidance of a marine electrical and electronic technician or other senior crew members. The available tools and equipment include: 1. Marine fire alarm system or simulation device; 2. Fire detector testing tool; 3. Fire detector encoder; 4. Electrician’s complete tool kit 5. Personal protective equipment.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Operate marine fire alarm system; 2. Retrieve alarm parameters; 3. Test marine fire alarm system and fire detectors; 4. Maintain marine fire alarm system 5. Carry out seagoing services.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Operate marine fire alarm system; 1.2. Test marine fire alarm system and fire detectors; 1.3. Maintain marine fire alarm system. 2.0. Principle The person must be able to explain the principles of: 2.1. Manufacturer's instructions and regulations; 2.2. Operation of marine fire alarm systems; 2.3. Operation of marine fire detectors. 3.0. Theories The person must be able to explain: 3.1. Structure, components, functions, and types of marine fire alarm systems;	

	3.2. Fire detection methods and types of fire detectors; 3.3. The use of appropriate tools and equipment. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Emergency response capability. 5.0. Mathematical skills 5.1. Basic arithmetic skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Operation and performing of functional testing of ship fire alarm system is carried out in accordance with technical specifications and manufacturer's manual.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe operation of work tools; 2. Maintenance Operation Policies and Procedures (MOPP); 3. Occupational Health & Safety.

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MONITOR THE OPERATION OF THE MARINE ELECTRICAL AND AUTOMATION CONTROL SYSTEMS	DUTY NO.	502
TASK TITLE	OPERATE AND MAINTAIN CRANKCASE OIL MIST CONCENTRATION MONITORING SYSTEM	TASK NO	5024
PERFORMANCE CRITERIA	The person executing the task must be able to operate, conduct alarm testing, and perform routine maintenance of the marine diesel engine crankcase oil mist concentration monitoring and alarm system according to technical requirements and the manufacturer's manual.		
RANGE STATEMENT	The task will be carried out on the ship or in approved laboratory facilities under the supervision and guidance of a marine electrical and electronic technician or other senior crew members. The available tools and equipment include: 1. Diesel engine crankcase oil mist monitoring and alarm device; 2. Smoke test and maintenance tools; 3. Complete set of general tools; 4. Personal protective equipment.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Operate marine crankcase oil mist concentration monitoring and alarm system; 2. Query alarm parameters; 3. Test diesel engine crankcase oil mist concentration monitoring and alarm system; 4. Maintain diesel engine crankcase oil mist concentration monitoring and alarm system; 5. Carry out seagoing services.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Operate marine crankcase oil mist concentration monitoring and alarm system; 1.2. Test diesel engine crankcase oil mist concentration monitoring and alarm system; 1.3. Maintain diesel engine crankcase oil mist concentration monitoring and alarm system. 2.0. Principle The person must be able to explain the principles of: 2.1. Manufacturer's instructions and regulations; 2.2. Operation of crankcase oil mist concentration monitoring and alarm system.	

	3.0. Theories The person must be able to explain: 3.1. Composition and functions of marine crankcase oil mist concentration alarm system; 3.2. Testing methods for crankcase oil mist concentration alarm system. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills. 5.0. Mathematical skills 5.1. Basic arithmetic skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Operation and maintenance of crankcase oil mist concentration monitoring system is performed according to technical specifications and manufacturer's manuals.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safety operation methods for testing tools; 2. Maintenance Operation Policies and Procedures (MOPP); 3. Occupational Health & Safety.

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	OPERATE AND MAINTAIN MARINE GENERATOR AND DISTRIBUTION SYSTEM	DUTY NO.	503
TASK TITLE	PERFORM GENERATOR PARALLELING, LOAD SHARING, AND SWITCHING	TASK NO	5031
PERFORMANCE CRITERIA	The person executing this task must be able to carry out the paralleling, load sharing, and switching operations of the marine generators in accordance with technical requirements and manufacturer's manuals.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician or other senior crew members. The available tools and equipment include: 1. Two or more generators; 2. Two or more prime movers and control equipment; 3. Main distribution panel with at least two or more generator control panels and synchronizing panels; 4. Load panels and electrical loads; 5. Electrician’s complete tool kit 6. Personal protective equipment.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Start and perform operational checks on prime movers; 2. Determine conditions for generator paralleling; 3. Perform generator paralleling operation; 4. Perform load distribution operation of generators; 5. Transfer and shed loads on generators; 6. Shutdown generators; 7. Carry out seagoing services.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Consult operation manuals for generators and distribution panels; 1.2. Assess conditions for generator paralleling; 1.3. Start and perform operational checks on prime movers; 1.4. Perform generator paralleling operation; 1.5. Conduct load distribution operation of generators; 1.6. Transfer and shed loads on generators; 1.7. Shutdown generators. 2.0. Principle The person must be able to explain the principles of: 2.1. Parallel running of generators.	

	3.0. Theories The person must be able to explain: 3.1. Composition and instruments of the main distribution panel; 3.2. Judgment methods for generator synchronization; 3.3. Methods for parallel operation, load transfer, and load shedding. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Information technology application skills. 5.0. Mathematical skills 5.1. Basic arithmetic skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Generator paralleling, load sharing, and switching are performed according to technical specifications and manufacturer's manuals.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safety operating procedures for distribution panel; 2. Maintenance Operation Policies and Procedures (MOPP); 3. Occupational Health & Safety.

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	OPERATE AND MAINTAIN MARINE GENERATOR AND DISTRIBUTION SYSTEM	DUTY NO.	503
TASK TITLE	PERFORM CONNECTION AND DISCONNECTION BETWEEN DISTRIBUTION BOARD AND DISTRIBUTION PANEL	TASK NO	5032
PERFORMANCE CRITERIA	The person executing the task must be able to carry out the connection and disconnection between the distribution board and distribution panel according to technical requirements and manufacturer's manual.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician or other senior crew members responsible for training. The available tools and equipment include: 1. Marine generator; 2. Main distribution board; 3. Emergency distribution board; 4. Shore power cabinet and instruments; 5. Electrical tools; 6. Personal protective equipment.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Operate the busbar coupling switch; 2. Switch between the main power grid and the emergency power grid; 3. Manually start the emergency generator; 4. Perform a closing test on the emergency distribution board; 5. Automatically start the emergency generator and perform a closing test; 6. Connect the ship to shore power; 7. Disconnect shore power and switch to marine power;		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Operate the busbar coupling switch; 1.2. Supply power from the main distribution board to the emergency distribution board; 1.3. Perform testing on the emergency generator and emergency distribution board; 1.4. Switch between marine power and shore power. 2.0. Principle The person must be able to explain the principles of: 2.1. Uninterrupted power supply on ships; 2.2. Switching between the main power grid and the emergency power grid; 2.3. Basic ship-to-shore power conversion.	

8. Carry out seagoing services.	3.0. Theories The person must be able to explain: 3.1. Composition of the main distribution board and emergency distribution board; 3.2. Connection and necessary safety precautions between the main distribution board and emergency distribution board; 3.3. Operation safety manual; 3.4. Safety precautions for ship-to-shore power connection; 3.5. Manufacturer's instructions and regulations. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Emergency response capability. 5.0. Mathematical skills 5.1. Basic arithmetic skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Connection and disconnection between distribution board and distribution panel is performed according to technical specifications and manufacturer's manual.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. High voltage shore power connection; 2. Maintenance Operation Policies and Procedures (MOPP); 3. Occupational Health & Safety.

OCCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	OPERATE AND MAINTAIN MARINE GENERATOR AND DISTRIBUTION SYSTEM	DUTY NO.	503
TASK TITLE	CONDUCT MAINTENANCE AND UPKEEP OF GENERATORS AND DISTRIBUTION EQUIPMENT, AND FUNCTIONAL TESTING OF PROTECTIVE DEVICES	TASK NO	5033
PERFORMANCE CRITERIA	The person executing the task must be able to carry out the maintenance and upkeep of generators and distribution equipment, as well as conduct functional testing of protective devices, in accordance with technical requirements and manufacturer's manuals.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician or other senior crew members. The available tools and equipment include: 1. Marine generator; 2. Electrical tools; 3. Cleaning and dust removal tools; 4. Air filters; 5. Bearing lubricants; 6. Personal protective equipment; 7. Distribution equipment; 8. Power system protection units for overload, short circuit, under voltage, reverse power, etc.; 9. Prime mover protection units for overspeed, oil pressure, cooling water temperature, etc.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Inspect the condition of the generator windings; 2. Check the generator bearings 3. Clean the air filter; 4. Inspect the automatic voltage regulator and excitation system; 5. Check the main busbar; 6. Inspect the cooling system; 7. Check the internal wiring and		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Refer to the operation manuals for the generator and distribution board; 1.2. Operate and maintain the generator; 1.3. Operate and maintain the distribution board; 1.4. Test the protective functions of the power system and generator prime mover.	

components of the generator; 8. Inspect and maintain low-voltage electrical equipment such as circuit breakers, disconnectors and contactors, busbars, terminal blocks, measuring instruments, and mutual inductors in the distribution board; 9. Test the protective functions of the power system and generator prime mover; 10. Carry out seagoing services.	2.0. Principles The person must be able to explain the principles of: 2.1. Maintaining the generator; 2.2. Maintaining the main distribution board, emergency distribution board, and distribution panel equipment; 2.3. Marine electrical system protection 3.0. Theories The person must be able to explain: 3.1. Safety work code; 3.2. Manufacturer's instructions and regulations; 3.3. Structure and principles of generators; 3.4. Composition of distribution panels; 3.5. Power system protection equipment and prime mover protection equipment. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Report writing skills. 5.0. Mathematical skills 5.1. Basic arithmetic skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Maintenance and upkeep of generators and distribution equipment, and functional testing of protective devices is conducted according to technical specifications and manufacturer's manuals.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe operation methods of work tools; 2. Safe operation methods of testing equipment; 3. Maintenance Operation Policies and Procedures (MOPP); 4. Occupational Health & Safety.

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	OPERATE AND MAINTAIN MARINE ELECTRICAL AUTOMATION SYSTEM	DUTY NO.	504
TASK TITLE	OPERATE AND MAINTAIN MAIN PROPULSION AUTOMATIC CONTROL SYSTEM	TASK NO	5041
PERFORMANCE CRITERIA	The person executing the task must be able to operate and maintain the main propulsion automatic control system in accordance with technical requirements and manufacturer's manuals.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician or other senior crew members. The available tools and equipment include: 1. Main engine remote control system; 2. Main engine safety protection system; 3. Electrical tools; 4. Personal protective equipment; 5. Cleaning and dust removal equipment.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Review the technical manuals for the main propulsion system and its control system. 2. Inspect and maintain the power supply, cables, and shielding wires of the electrical and automation equipment for the main propulsion system. 3. Inspect and maintain the wiring terminals, connectors, and circuit boards of the electrical and automation equipment for the main propulsion system. 4. Inspect and maintain the solenoid valves in the pneumatic control system of the main engine. 5. Inspect and maintain the various functional modules of the remote-control system for the		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Review maintenance manual for main propulsion system and its control system; 1.2. Maintain electrical, mechanical, hydraulic, and pneumatic components of the main propulsion system; 1.3. Maintain solenoid valves of the main propulsion control system; 1.4. Maintain various functional modules of the main engine remote control system. 2.0. Principle The person must be able to explain the principles of: 2.1. Main propulsion system control; 2.2. Maintenance for main propulsion control system. 3.0. Theories The person must be able to explain:	

main engine. 6. Inspect and maintain the clock unit and printing unit of the control system for the main propulsion system. 7. Inspect and maintain the speed control execution unit and speed measuring device for the main engine. 8. Inspect and maintain the safety protection unit for the main engine; 9. Carry out seagoing services.	3.1. Safety work code; 3.2. Composition, types, and functions of various parts of marine main engine remote control system; 3.3. Functions of the speed control unit in marine main engine remote control system; 3.4. Functions of the safety unit in marine main engine remote control system. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Information technology application skills. 5.0. Mathematical skills 5.1. Calculus Fundamentals.
DESCRIPTION OF THE END PRODUCT / SERVICE	Operation and maintenance of main propulsion automatic control system is performed in accordance with technical specifications and manufacturer's manuals.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe operation methods of work tools; 2. Maintenance Operation Policies and Procedures (MOPP); 3. Occupational Health & Safety.

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	OPERATE AND MAINTAIN MARINE ELECTRICAL AUTOMATION SYSTEM	DUTY NO.	504
TASK TITLE	OPERATE AND MAINTAIN THE AUTOMATIC CONTROL SYSTEM FOR THE ENGINE ROOM AUXILIARY MACHINERY	TASK NO	5042
PERFORMANCE CRITERIA	The person executing the task must be able to operate and maintain the automatic control system of engine room auxiliary machinery according to technical requirements and manufacturer's manuals.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician or other senior crew members responsible for training. The available tools and equipment include: 1. Fuel viscosity and temperature control system; 2. Air compressor and its control device; 3. Automatic control system for lubrication, fuel, and cooling; 4. Auxiliary boiler and its control device; 5. Marine refrigeration system and its control system for food cold storage refrigeration, cargo refrigeration, and air conditioning; 6. Oil separator and its control system; 7. Steering gear and its automatic control device; 8. Personal protective equipment; 9. Electrical tools; 10. Cleaning and dust removal tools.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Maintain the control mode adjustment and parameter setting of the fuel viscosity and temperature control system; 2. Maintain the air compressor and its control device; 3. Maintain the automatic control system for lubrication, fuel, and cooling; 4. Maintain the auxiliary boiler and its control device;		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Review the maintenance manual for auxiliary machinery equipment and its control system; 1.2. Maintain the fuel viscosity and temperature control system; 1.3. Maintain the air compressor and its control device; 1.4. Maintain the automatic control system for lubrication, fuel, and cooling; 1.5. Maintain the auxiliary boiler and its control	

5. Maintain the food cold storage refrigeration, cargo refrigeration, and air conditioning and their control systems; 6. Maintain the oil separator and its control system; 7. Maintain the steering gear and its automatic control device; 8. Carry out seagoing services.	device; 1.6. Maintain the marine refrigeration system and its control system; 1.7. Maintain the oil separator and its control system; 1.8. Maintain the steering gear and its automatic control device. 2.0. Principle The person must be able to explain the principles of: 2.1. Manufacturer's equipment maintenance operating procedures; 2.2. Operation of fuel viscosity and temperature control system; 2.3. Air compressor control circuit; 2.4. Automatic control of lubrication, fuel, and cooling; 2.5. Operation of auxiliary boiler control system; 2.6. Operation of marine refrigeration system and its control system. 2.7. Operation of oil separator and timing control. 2.8. Operation of steering gear and its automatic control device. 3.0. Theories The person must be able to explain: 3.1. Composition and functions of fuel viscosity and temperature control system units. 3.2. Automatic on-off control and protection of air compressor. 3.3. Composition of automatic control system for lubrication, fuel, and cooling. 3.4. Water level, steam pressure, combustion timing control, and safety protection devices of auxiliary boiler. 3.5. Composition, functions, and control methods of marine refrigeration system. 3.6. Working process of oil separator and its control system. 3.7. Composition and functions of steering gear system. 3.8. Reading circuit diagrams of marine engine room auxiliary machinery control system. 4.0. Essential skills
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	4.1. Communication skills; 4.2. Teamwork skills; 4.3. Information technology application skills. 5.0. Mathematical skills 5.1. Calculus Fundamentals.
DESCRIPTION OF THE END PRODUCT / SERVICE	Operation and maintenance of the automatic control system for the engine room auxiliary machinery is performed in accordance with technical specifications and manufacturer's operation manuals.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe operation procedures for work tools; 2. Maintenance Operation Policies and Procedures (MOPP); 3. Occupational Health & Safety.

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	OPERATE AND MAINTAIN MARINE ELECTRICAL AUTOMATION SYSTEM	DUTY NO.	504
TASK TITLE	OPERATE AND MAINTAIN THE ELECTRICAL, ELECTRONIC, AND CONTROL SYSTEMS OF DECK MACHINERY AND CARGO HANDLING EQUIPMENT	TASK NO	5043
PERFORMANCE CRITERIA	The person executing the task must be able to operate and maintain the electrical, electronic, and control systems of deck machinery and cargo handling equipment in accordance with technical requirements and manufacturer's manuals.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician. The available tools and equipment include: 1. Anchor winch and windlass equipment; 2. Boat winch equipment; 3. Switch equipment; 4. Gangway deployment and retrieval equipment; 5. Cargo lifting equipment; 6. Multimeter; 7. Megohmmeter; 8. Electrician's toolbox; 9. Personal protective equipment, such as electrical insulated shoes, safety goggles, gloves, etc.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Adhere to safety operating procedures and safety precautions while performing tasks; 2. Select appropriate tools and equipment for the task; 3. Operate and maintain the power-driven control system of anchor and mooring winches; 4. Operate and maintain the power-driven control system of		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Operate and maintain the power-driven control system of anchor and mooring winches; 1.2. Operate and maintain the power-driven control system of boat winch equipment; 1.3. Operate and maintain the power-driven control system of switch equipment; 1.4. Operate and maintain the power-driven control system of gangway deployment and retrieval equipment;	

boat winch equipment; 5. Operate and maintain the power-driven control system of switch equipment; 6. Operate and maintain the power-driven control system of gangway deployment and retrieval equipment; 7. Operate and maintain the power-driven control system of cargo handling equipment; 8. Clean tools, equipment, and work areas; 9. Safely store tools and equipment 10. Carry out seagoing services.	1.5. Operate and maintain the power-driven control system of cargo handling equipment; 1.6. Review the marine maintenance and upkeep system. 2.0. Principle The person must be able to explain the principles of: 2.1. Operation of deck machinery; 2.2. Operation of cargo handling equipment. 3.0. Theories The person must be able to explain: 3.1. Structure, components, and functions of deck machinery and cargo handling equipment. 3.2. Analysis of control circuits for deck machinery and cargo handling equipment. 3.3. Operation of deck machinery and cargo handling equipment. 3.4. Maintenance and troubleshooting of control circuits for deck machinery and cargo handling equipment. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Problem solving skills; 4.4. Maintenance report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Operation and maintenance of the electrical, electronic, and control systems of deck machinery and cargo handling equipment is handled according to technical specifications and manufacturer's manuals.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe operation of electrical instruments; 2. Safe operation of working equipment; 3. Maintenance Operation Policies and Procedures (MOPP); 4. Occupational Health & Safety.

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	OPERATE AND MAINTAIN MARINE ELECTRICAL AUTOMATION SYSTEM	DUTY NO.	504
TASK TITLE	OPERATE AND MAINTAIN THE MARINE STEERING GEAR ELECTRICAL CONTROL SYSTEM	TASK NO	5044
PERFORMANCE CRITERIA	The person executing the task must be able to operate and maintain the marine steering gear electrical control system in accordance with technical requirements and manufacturer's manuals.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician. The available tools and equipment include: 1. Marine steering equipment; 2. Steering gear control console; 3. Marine steering gear control system; 4. Multimeter; 5. Megohmmeter; 6. A set of electrical tools; 7. Personal protective equipment, such as electrical insulated shoes, goggles, gloves, etc.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Follow safety operating procedures and precautions while performing tasks; 2. Select appropriate tools and equipment for the task; 3. Manual steering; 4. Follow-up steering; 5. Automatic steering; 6. Maintain the steering gear electrical control system; 7. Clean tools, equipment, and training area; 8. Safely store tools and equipment; 9. Carry out seagoing services.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Manual steering; 1.2. Follow-up steering; 1.3. Automatic steering; 1.4. Maintain the steering gear electrical control system. 2.0. Principle The person must be able to explain the principles of: 2.1. Marine steering gear electrical control system; 2.2. Maintenance of marine steering gear electrical control system. 3.0. Theories The person must be able to explain:	

	3.1. Basic components and operating principles of marine steering gear system; 3.2. Methods and principles of operating marine steering gear; 3.3. Marine steering gear control circuit; 3.4. Maintenance and troubleshooting of marine steering gear control circuit. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Problem solving skills; 4.4. Maintenance report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Operation and maintenance of the marine steering gear electrical control system is performed according to technical specifications and manufacturer's manuals.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe operation methods of work tools; 2. Safe operation methods of measuring instruments; 3. Maintenance Operation Policies and Procedures (MOPP); 4. Occupational Health & Safety; 5. Waste disposal methods.

OCCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	REPAIR SIMPLE FAULTS IN MARINE ELECTRICAL AND ELECTRONIC EQUIPMENT	DUTY NO.	505
TASK TITLE	ISOLATE ELECTRICAL EQUIPMENT	TASK NO	5051
PERFORMANCE CRITERIA	The person executing the task must be able to safely isolate electrical equipment in accordance with the marine electricity safety regulations.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician. The available tools and equipment include: 1. Marine engine room electrical system; 2. Marine electrical equipment control box; 3. Multimeter; 4. Megohmmeter; 5. A set of electrical tools; 6. Protective safety equipment, such as electrical insulated shoes, goggles, gloves, etc.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Follow safety operating procedures and precautions; 2. Select appropriate tools and equipment for the task; 3. Locate the position of power supply; 4. Cut off the power supply; 5. Hang warning signs; 6. Clean tools, equipment, and training areas; 7. Safely store tools and equipment; 8. Carry out seagoing services.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Locate the position of the power supply; 1.2. Minimize the power outage area while ensuring safety; 1.3. Hang warning signs; 1.4. Review the marine electricity safety regulations. 2.0. Principle The person must be able to explain the principles of: 2.1. Safely isolating electrical equipment. 3.0. Theories The person must be able to explain: 3.1. Principles of electrical equipment safety isolation; 3.2. Procedures for electrical equipment safety isolation;	

	3.3. Knowledge of the marine electricity safety. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Problem solving skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Isolation of electrical equipment is carried out in line with the electricity safety regulations.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Electricity safety regulations; 2. Safe operation of electrical instruments; 3. Safe operation of operating equipment; 4. Maintenance Operation Policies and Procedures (MOPP); 5. Occupational Health & Safety.

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	REPAIR SIMPLE FAULTS IN MARINE ELECTRICAL AND ELECTRONIC EQUIPMENT	DUTY NO.	505
TASK TITLE	INTERPRET ELECTRONIC AND ELECTRICAL DRAWINGS	TASK NO	5052
PERFORMANCE CRITERIA	The person executing the task must be able to read electronic and electrical drawings based on technical requirements and circuit diagram drawing rules.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician. The available tools and equipment include: 1. Marine electrical equipment circuit schematic diagram; 2. Marine electrical equipment layout diagram; 3. Marine electrical equipment external wiring diagram; 4. Electrician's toolbox; 5. Protective safety equipment, such as marine electrician's insulated shoes, safety goggles, gloves, etc.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Follow safety operating procedures and precautions; 2. Select appropriate tools and equipment for the task; 3. Interpret the electrical equipment circuit schematic diagram; 4. Interpret the electrical equipment layout diagrams; 5. Interpret the electrical equipment external wiring diagrams; 6. Clean tools, equipment, and workspaces; 7. Safely store tools and equipment; 8. Carry out seagoing services.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Read the electrical graphic symbols and textual symbols; 1.2. Read the circuit schematic diagram; 1.3. Read the electrical equipment layout diagrams; 1.4. Read the external wiring diagrams of electrical equipment; 1.5. Refer to national standards for electrical diagram drawings. 2.0. Principle The person must be able to explain the principles of: 2.1. Reading electronic and electrical drawings. 3.0. Theories The person must be able to explain: 3.1. Purpose and drawing rules of electrical schematic diagrams;	

	3.2. Purpose and drawing rules of electrical layout diagrams; 3.3. Purpose and drawing rules of electrical equipment external wiring diagrams; 3.4. Basic methods for reading electrical drawings. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Problem solving skills; 4.4. Electrical drawing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Interpretation of electronic and electrical drawings is done according to national standards for circuit diagram drawings.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Electrical drawing standards; 2. Occupational Health & Safety.

OCCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	REPAIR SIMPLE FAULTS IN MARINE ELECTRICAL AND ELECTRONIC EQUIPMENT	DUTY NO.	505
TASK TITLE	TROUBLESHOOT SIMPLE FAULTS IN MARINE ELECTRICAL EQUIPMENT AND SYSTEMS, DISTRIBUTION PANELS, MOTORS, GENERATORS, AND ELECTROMAGNETIC STARTER CONTROL BOXES	TASK NO	5053
PERFORMANCE CRITERIA	The person executing the task must be able to carry out basic troubleshooting of faults in marine electrical equipment and systems, distribution panels, motors, generators, and electromagnetic starter control boxes according to technical requirements and manufacturer specifications.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician. The available tools and equipment include: 1. Marine electrical equipment and electrical control boxes; 2. Distribution panels; 3. Three-phase asynchronous motors; 4. Marine synchronous generators; 5. Electromagnetic starter control boxes; 6. Multimeters; 7. Megohmmeters; 8. Electrician's toolbox; 9. Protective safety equipment, such as electrician's insulated shoes, safety goggles, gloves, etc.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Follow safety operating procedures and precautions; 2. Select appropriate tools and equipment for the task; 3. Troubleshoot faults in distribution panels; 4. Troubleshoot faults in electromagnetic starter control		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Troubleshoot faults in distribution panels; 1.2. Troubleshoot faults in electromagnetic starter control boxes; 1.3. Troubleshoot faults in marine synchronous generators; 1.4. Troubleshoot faults in basic control circuits of	

boxes; 5. Troubleshoot faults in marine synchronous generators; 6. Troubleshoot faults in basic control circuits of three-phase asynchronous motors; 7. Clean tools, equipment, and training areas; 8. Safely store tools and equipment; 9. Carry out seagoing services.	three-phase asynchronous motors; 1.5. Conduct general troubleshooting methods; 1.6. Refer to equipment manuals. 2.0. Principle The person must be able to explain the principles of: 2.1. Troubleshooting marine electrical power systems; 2.2. Troubleshooting marine electrical equipment. 3.0. Theories The person must be able to explain: 3.1. Principles of excitation and voltage buildup in marine generators, common faults, and troubleshooting methods; 3.2. Common faults and troubleshooting methods for three-phase asynchronous motors; 3.3. Common faults and troubleshooting methods for electromagnetic starter boxes; 3.4. Faults in marine distribution panels and its troubleshooting methods. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Problem solving skills; 4.4. Maintenance report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Troubleshooting simple faults in marine electrical equipment and systems, distribution panels, motors, generators, and electromagnetic starter control boxes is done according to technical specifications and manufacturer manuals.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe operation of electrical instruments; 2. Safe operation of operating equipment; 3. Maintenance Operation Policies and Procedures (MOPP); 4. Occupational Health & Safety.

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	REPAIR SIMPLE FAULTS IN MARINE ELECTRICAL AND ELECTRONIC EQUIPMENT	DUTY NO.	505
TASK TITLE	OPERATE ELECTRICAL TEST AND MEASUREMENT EQUIPMENT	TASK NO	5054
PERFORMANCE CRITERIA	The person executing the task must be able to operate electrical test instruments and measurement equipment in accordance with technical requirements and electrical instrument usage specifications.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician. The available tools and equipment include: 1. Distribution panel; 2. Multimeter; 3. Megohmmeter; 4. Clamp meter; 5. Resistor, capacitor, diode, transistor, rectifier bridge; 6. Electrician's toolbox; 7. Protective safety equipment, such as electrician's insulated shoes, safety goggles, gloves, etc.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Follow safety operating procedures and precautions; 2. Select appropriate tools and equipment for the task; 3. Properly use a multimeter; 4. Properly use a megohmmeter; 5. Properly use a clamp meter; 6. Use a multimeter to test diodes, transistors, rectifier bridges, capacitors, etc.; 7. Properly use electrical instruments on distribution panels; 8. Clean tools, equipment, and training areas;		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Properly use a multimeter; 1.2. Properly use a megohmmeter; 1.3. Properly use a clamp meter; 1.4. Use a multimeter to test diodes, transistors, rectifier bridges, capacitors, etc.; 1.5. Properly use electrical instruments on distribution panels; 1.6. Refer to the electrical instrument usage specifications. 2.0. Principle The person must be able to explain the principles of: 2.1. Marine electrical instrument usage specifications;	

9. Safely store tools and equipment; 10. Carry out seagoing services.	2.2. Using electrical test instruments to test the electrical equipment. 3.0. Theories The person must be able to explain: 3.1. Common electrical instruments and their classifications; 3.2. Operation principles of magnetic, electromagnetic, electric, and induction type instruments; 3.3. Usage specifications for multimeters, megohmmeters, and clamp meters; 3.4. Functions and proper reading of instruments on distribution panels; 3.5. Measurement of electrical equipment parameters such as voltage, current, insulation value, etc. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Operation of electrical test and measurement equipment is conducted according to technical requirements and electrical instrument usage specifications.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Maintenance Operation Policies and Procedures (MOPP); 2. Occupational Health & Safety.

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	REPAIR SIMPLE FAULTS IN MARINE ELECTRICAL AND ELECTRONIC EQUIPMENT	DUTY NO.	505
TASK TITLE	REPAIR THE MARINE LIGHTING SYSTEM	TASK NO	5055
PERFORMANCE CRITERIA	The person executing the task must be able to repair the marine lighting system according to technical requirements and electricity safety regulations.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician. The available tools and equipment include: 1. Main lighting system; 2. Emergency lighting system; 3. Temporary emergency lighting system; 4. Navigation lights and signal light system; 5. Multimeter; 6. Megohmmeter; 7. Electrician's toolbox; 8. Protective safety equipment, such as electrician's insulated shoes, safety goggles, gloves, etc.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Follow safety operating procedures and precautions; 2. Select appropriate tools and equipment for the task; 3. Repair the main lighting system; 4. Repair the emergency lighting system; 5. Repair the temporary emergency lighting system; 6. Repair the navigation lights and signal light system; 7. Identify various types of luminaires of lighting system; 8. Clean tools, equipment, and workspaces; 9. Safely store tools and equipment;		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Repair the main lighting system; 1.2. Repair the emergency lighting system; 1.3. Repair the temporary emergency lighting system; 1.4. Repair the navigation lights and signal light system; 1.5. Identify various types of luminaires of lighting system; 1.6. Refer to the construction regulations for marine lighting systems. 2.0. Principle The person must be able to explain the principles of: 2.1. Power supply specifications for marine lighting systems;	

10. Carry out seagoing services.	2.2. Operation of marine lighting systems. 3.0. Theories The person must be able to explain: 3.1. Classification and characteristics of marine lighting systems; 3.2. Common marine lamps and light sources; 3.3. Control circuits of marine lighting systems; 3.4. Maintenance, upkeep, and troubleshooting of marine lighting systems. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Problem solving skills; 4.4. Maintenance report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Marine lighting system is repaired according to technical requirements and electricity safety regulations.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Electricity safety regulations; 2. Safe operation of electrical instruments; 3. Maintenance Operation Policies and Procedures (MOPP); 4. Occupational Health & Safety.

OCCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	REPAIR SIMPLE FAULTS IN MARINE ELECTRICAL AND ELECTRONIC EQUIPMENT	DUTY NO.	505
TASK TITLE	CARRY OUT FUNCTIONAL TEST OF MONITORING SYSTEMS, AUTOMATIC CONTROL EQUIPMENT, PROTECTION DEVICES, AND ELECTRICAL EMERGENCY EQUIPMENT	TASK NO	5056
PERFORMANCE CRITERIA	The person executing the task must be able to conduct functional test of monitoring systems, automatic control equipment, protection devices, and electrical emergency equipment in accordance with technical requirements and manufacturer manuals.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician. The available tools and equipment include: 1. Marine monitoring systems; 2. Marine automatic control equipment; 3. Marine protection devices; 4. Electrical emergency equipment; 5. Personal protective equipment.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Use personal protective equipment; 2. Perform functional test of marine monitoring systems; 3. Perform functional test of marine automatic control equipment; 4. Perform functional test of marine protection devices; 5. Perform functional test of electrical emergency equipment; 6. Carry out seagoing services.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Read and understand equipment technical documentation and operation manuals; 1.2. Perform functional test of marine monitoring systems; 1.3. Perform functional test of marine automatic control equipment; 1.4. Perform functional test of marine protection devices; 1.5. Perform functional test of electrical emergency equipment. 2.0. Principles The person must be able to explain the principles of:	

	2.1. Operating marine monitoring systems; 2.2. Operating marine protection devices; 2.3. Operating marine emergency equipment. 3.0. Theories The person must be able to explain: 3.1. Methods for functional test of monitoring systems, automatic control equipment, and protection devices; 3.2. Pressure calibrator and its usage methods; 3.3. 4-20mA calibrator and its usage methods; 3.4. Methods for functional test of electrical emergency equipment. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Emergency response capability. 5.0. Mathematical skills 5.1. Basic arithmetic skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Functional test of monitoring systems, automatic control equipment, protection devices, and electrical emergency equipment are performed according to technical specifications and manufacturer manuals.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe operation precautions for test tools; 2. Maintenance Operation Policies and Procedures (MOPP); 3. Occupational Health & Safety; 4. Waste disposal methods.

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	CONTROL AND MANAGE SHIP OPERATION	DUTY NO.	506
TASK TITLE	TAKE APPROPRIATE MEASURES TO PREVENT MARINE POLLUTION	TASK NO	5061
PERFORMANCE CRITERIA	The person executing the task must be able to apply convention regulations to govern the professional behavior of crew members, mitigating or eliminating intentional discharge of oil and other harmful substances that pollute the marine environment.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician. The available tools and equipment include: 1. Rules for preventing oil pollution; 2. Rules for controlling pollution from bulk hazardous liquid substances; 3. Rules for preventing pollution from packaged hazardous substances in maritime transport; 4. Rules for preventing pollution from ship's sewage; 5. Rules for preventing pollution from ship's garbage; 6. Rules for preventing atmospheric pollution caused by ships; 7. Pollution abatement equipment and apparatus.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Identify the way in which the ship causes pollution to the waters; 2. Institute measures to prevent water pollution in ship ballast; 3. Institute measures to prevent pollution from ship oil operations; 4. Verify the measures taken to prevent pollution while the ship is in port; 5. Sort and dispose of garbage; 6. Utilize various pollution abatement apparatus; 7. Carry out seagoing services.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain: 1.1. Definitions of various specialized terms mentioned in international and domestic conventions related to the prevention of environment pollution from ships; 1.2. Emission requirements for various types of marine pollutants; 1.3. Operational requirements for port state supervision; 1.4. Scope and waste disposal regulations for special areas. 2.0. Principles The person must be able to explain the principles of:	

	2.1. Regulations for the marine environment prevention of pollution from ships; 2.2. International Convention for the Prevention of Pollution from Ships (MARPOL). 3.0. Theories The person must be able to explain: 3.1. The six annexes of the MARPOL; 3.2. The implementation of the MARPOL. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Ship contingency drill skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Appropriate measures to prevent marine pollution are taken according to the regulations of pollution prevention conventions
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. International and domestic pollution prevention conventions and regulations; 2. Regulations for waste disposal in special areas; 3. Ship oil contamination emergency drills; 4. Waste disposal methods.

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	CONTROL AND MANAGE SHIP OPERATION	DUTY NO.	506
TASK TITLE	ENGAGE AND OPERATE POLLUTION PREVENTION PROCEDURES AND EQUIPMENT	TASK NO	5062
PERFORMANCE CRITERIA	The person executing the task must be familiar with the environment pollution from ships, the technical measures for pollution prevention and control, and the ship's pollution prevention procedures, and be able to correctly use and operate ship pollution prevention equipment.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician. The available tools and equipment include: 1. Marine oil-water separator; 2. Marine sewage treatment plant; 3. Marine incinerator; 4. Marine oil separator; 5. Ballast water treatment system.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Utilize and maintain the oil-water separator; 2. Handle ship garbage; 3. Operate and maintain the marine incinerator; 4. Operate and maintain the marine sewage treatment plant; 5. Operate and maintain the marine oil separator; 6. Operate and maintain the marine ballast water treatment system; 7. Carry out seagoing services.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Inspect the marine oil-water separator; 1.2. Manage the marine waste disposal; 1.3. Properly operate and maintain the marine incinerator; 1.4. Properly operate the marine sewage treatment plant; 1.5. Properly operate and maintain the marine oil separator. 2.0. Principle The person must be able to explain the principles of: 2.1. Operating the ship pollution prevention procedures and various pollution prevention equipment. 3.0. Theories	

	The person must be able to explain: 3.1. Separation methods and typical structures of marine oil-water separators; 3.2. Classification and treatment methods of ship waste; 3.3. Structure and functionality of marine incinerator devices; 3.4. Structure of marine sewage treatment plant; 3.5. Composition and structure of marine oil separators. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Troubleshooting skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Pollution prevention procedures and equipment are engaged to abate marine pollution.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Maintenance Operation Policies and Procedures (MOPP); 2. Occupational Health & Safety; 3. Waste disposal methods.

OCCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	CONTROL AND MANAGE SHIP OPERATION	DUTY NO.	506
TASK TITLE	CARRY OUT FIRE PREVENTION, FIRE CONTROL, AND FIRE EXTINGUISHING ON THE SHIP	TASK NO	5063
PERFORMANCE CRITERIA	The person executing this task must have knowledge of basic ship firefighting theory, be able to use and operate ship firefighting equipment, and be skilled in the use of ship firefighting gear.		
RANGE STATEMENT	The task will be carried out on the ship or in approved laboratory facilities under the supervision and guidance of a marine electrical and electronic technician or other senior crew members responsible for training. The available tools and equipment include: 1. Foam fire extinguisher; 2. Water fire extinguisher; 3. Dry powder fire extinguisher; 4. Carbon dioxide fire extinguisher; 5. Trolley fire extinguisher; 6. Ship firefighter gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Operate portable ship fire extinguisher; 2. Operate trolley fire extinguisher; 3. Operate large-scale fixed fire suppression system; 4. Wear firefighter gear; 5. Organize and participate in ship fire drills; 6. Carry out seagoing services.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Control ship fires; 1.2. Extinguish ship fires; 1.3. Use ship firefighter gear; 1.4. Utilize large-scale fixed fire suppression systems; 1.5. Organize ship fire drills. 2.0. Principle The person must be able to explain the principles of: 2.1. Fire extinguishing; 2.2. Fire control. 3.0. Theories The person must be able to explain: 3.1. Mechanism of fire combustion, types of combustion, and combustion products; 3.2. Spread, classification, and characteristics of fires;	

	3.3. Common extinguishing agents and firefighting methods; 3.4. Ship fire prevention and firefighting. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Emergency response capability.
DESCRIPTION OF THE END PRODUCT / SERVICE	Fire prevention, fire control, and fire extinguishing on the ship is performed in accordance with approved standards, rules and regulations.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. The use of fire alarm devices; 2. Maintenance Operation Policies and Procedures (MOPP); 3. Occupational Health & Safety; 4. Waste disposal methods.

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	CONTROL AND MANAGE SHIP OPERATION	DUTY NO.	506
TASK TITLE	OPERATE LIFE-SAVING EQUIPMENT	TASK NO	5064
PERFORMANCE CRITERIA	The person executing the task must be familiar with the life-saving equipment required by Chapter III of the International Convention for the Safety of Life at Sea (SOLAS) 1974, and be able to operate lifesaving equipment as per standard operating procedures.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician or other senior crew members. The available tools and equipment include: 1. Personal life-saving equipment; 2. Visual signals; 3. Lifeboats and life rafts; 4. Rescue boats; 5. Descent and embarkation equipment; 6. Other life-saving equipment.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Use personal life-saving equipment; 2. Identify and use various visual distress signals; 3. Release and operate lifeboats and life rafts; 4. Use equipment associated with lifeboats and life rafts; 5. Release and operate rescue boats; 6. Operate and use descent and embarkation equipment; 7. Operate and use other life-saving equipment; 8. Carry out seagoing services.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain: 1.1. Various life-saving equipment and their associated equipment. 1.2. Operation and use of various life-saving equipment. 2.0. Principle The person must be able to explain the principles of: 2.1. International Convention for the Safety of Life at Sea (SOLAS) 1974. 3.0. Theories The person must be able to explain: 3.1. Technical requirements for personal life-saving equipment; 3.2. Technical requirements for visual distress signals; 3.3. Technical requirements and equipment list for lifeboats and life rafts;	

	3.4. Technical requirements and equipment list for rescue boats; 3.5. Technical requirements for descent and embarkation equipment; 3.6. Technical requirements for other life-saving equipment. 4.0. Essential skills 4.1. Identification skills; 4.2. Operation skills; 4.3. Life-saving skills; 4.4. Fearlessness in the face of danger.
DESCRIPTION OF THE END PRODUCT / SERVICE	OPERATION OF LIFE-SAVING EQUIPMENT is performed as per manufacturer's instructions and approved SOPs.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe operation of life-saving equipment; 2. Maintenance Operation Policies and Procedures (MOPP); 3. Occupational Health & Safety; 4. Waste disposal methods; 5. Shipboard life-saving contingency drills.

OCCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	CONTROL AND MANAGE SHIP OPERATION	DUTY NO.	506
TASK TITLE	IMPLEMENT FIRST AID USING ONBOARD MEDICAL FACILITIES	TASK NO	5065
PERFORMANCE CRITERIA	The person executing the task must be knowledgeable about the purpose and principles of maritime first aid, pre-aid assessment, be able to carry out first aid operation and request external assistance through various communication methods.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician or other senior crew members. The following equipment is required to support this task: 1. Stethoscope; 2. Thermometer; 3. Sphygmomanometer; 4. Tourniquet; 5. Medical pads; 6. First aid kit; 7. Stretcher; 8. Common emergency medications.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Measure blood pressure; 2. Assess the condition of the injured person; 3. Administer common emergency medications; 4. Perform cardiopulmonary resuscitation (CPR); 5. Apply triangular bandage for wound dressing; 6. Apply splinting for fracture fixation; 7. Attend a victim of electric shock 8. Carry out seagoing services.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Common emergency medical techniques on board; 1.2. Emergency operation procedures and implementation steps; 1.3. Common emergencies on board and emergency response methods. 2.0. Principle The person must be able to explain the principles of: 2.1. Maritime first aid. 3.0. Theories The person must be able to explain: 3.1. Human body structure and function;	

	3.2. Basic condition and vital signs of injured or ill individuals; 3.3. Methods for assessing the severity of a condition; 3.4. Utilization of first aid kits and common emergency medications; 3.5. Channels for requesting external assistance. 4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. Emergency handling skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	First aid is provided to victims using onboard medical facilities according to approved operating procedures.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe use of first aid equipment and medications; 2. First aid techniques commonly used on ships; 3. Occupational Health & Safety; 4. Waste disposal methods.

OCCUPATION	MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	CONTROL AND MANAGE SHIP OPERATION	DUTY NO.	506
TASK TITLE	IMPLEMENT THE COMPANY'S SAFETY MANAGEMENT SYSTEM REGULATIONS	TASK NO	5066
PERFORMANCE CRITERIA	The person executing the task must be familiar with international and domestic regulations related to ship safety operations and pollution prevention management, and be able to maintain and document electrical equipment according to the requirements of the company's safety management system.		
RANGE STATEMENT	The task will be carried out on the ship under the supervision and guidance of a marine electrical and electronic technician or other senior crew members. The available tools and equipment include: 1. International Safety Management (ISM) Code publications for the safe operation of ships and for pollution prevention; 2. National Safety Management (NSM) Code publications for the safe operation of ships and for pollution prevention; 3. Company's safety management system documents.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Fulfill duty responsibilities; 2. Record electrical work logs; 3. Maintain electrical equipment insulation records; 4. Generate various reports required for system operation; 5. Conduct regular inspections to identify and rectify any non-conformities; 6. Carry out seagoing services.		Detailed knowledge about: 1.0. Methods The person performing this task must be able to explain how to: 1.1. Outline of SMS system documents; 1.2. Occupational responsibilities required by SMS documents. 2.0. Principle The person must be able to explain the principles of: 2.1. ISM and NSM regulations; 2.2. Company’s Safety Management System (SMS). 3.0. Theories The person must be able to explain: 3.1. Structure of the ship safety management system; 3.2. Establishment and implementation steps of the ship safety management system; 3.3. Methods for assessing the effectiveness of the safety management system operation.	

	4.0. Essential skills 4.1. Communication skills; 4.2. Teamwork skills; 4.3. System performance skills; 4.4. Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The company's safety management system regulations are implemented according to approved standards and regulations.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safety Management System (SMS); 2. System operation records; 3. Occupational Health & Safety.

APPENDIX: DACUM CHARTS FOR MARINE ELECTRONIC AND ELECTRICAL TECHNICIAN NTA 5

DUTIES	TASKS	ENABLERS
1. Monitor the operation of electrical, electronic, propulsion, and auxiliary machinery automatic control systems	1.1 Operate the marine mechanical engineering systems. 1.2 Test and install electronic circuits. 1.3 Prepare and monitor the marine main propulsion control system. 1.4 Monitor the operation of marine auxiliary machinery and control systems.	Generic skills and knowledge - Utilizing communication skills to collaborate with others and report to superiors - Using manufacturer's manuals - Basic knowledge of marine main propulsion systems - Knowledge and skills related to auxiliary machinery, steering systems, cargo handling systems, deck machinery, and living systems in the engine room - Basic knowledge of heat transfer, mechanics, and fluid mechanics - Knowledge of electronics and power electronics - Knowledge of automation, automatic control systems, and related technologies - Composition and functions of main propulsion control systems - Knowledge and skills of marine auxiliary machinery control systems - Interpretation of technical drawings and documents Tools and Equipment - Personal protective equipment such as safety shoes, gloves, safety helmets, ear protection devices, etc. - Electronic soldering tools - Electrical measuring instruments: multimeters, clamp meters, megohmmeters, etc. Worker behaviors - Team work - Honesty - Obedience to superiors - Integrity

DUTIES	TASKS	ENABLERS
2. Monitor the operation of the marine electrical and automation control systems	2.1 Conduct testing of marine commonly used sensors. 2.2 Operate and maintain marine machinery monitoring and alarm system. 2.3 Operate and perform functional testing of ship fire alarm system. 2.4 Operate and maintain crankcase oil mist concentration monitoring system.	Generic skills and knowledge - Utilizing communication skills to collaborate with others and report to superiors - Using manufacturer's manuals - Common sensor types and operating principles - Knowledge and skills in marine machinery monitoring and alarm systems - Knowledge and skills in ship fire monitoring and alarm systems - Knowledge and skills in ship's diesel engine crankcase oil mist concentration monitoring systems - Interpretation of technical drawings and documentation Tools and Equipment - Personal protective equipment such as safety shoes, gloves, safety helmets, ear protection devices, etc. - Sensor testing tools - Electrical measurement instruments - Electrical tools Worker behaviors - Team work - Honesty - Obedience to superiors - Integrity
3. Operate and maintain marine generator and distribution system	3.1 Perform generator paralleling, load sharing, and switching. 3.2 Perform connection and disconnection between distribution board and distribution panel. 3.3 Conduct maintenance and upkeep of generators and distribution equipment, and perform functional testing of protective	Generic skills and knowledge - Utilizing communication skills to collaborate with others and report to superiors - Using manufacturer's manuals - Skills and knowledge related to ship's electrical power system including generators, distribution panels, and distribution equipment - Knowledge and skills in generators paralleling, load sharing, and switching

DUTIES	TASKS	ENABLERS
	devices.	- Knowledge and skills in connecting and disconnecting between distribution boards and distribution panels - Knowledge and skills in protection systems of ship's electrical power system - Interpretation of technical drawings and documents Tools and Equipment - Personal protective equipment such as safety shoes, gloves, safety helmets, ear protection devices, etc. - Electrical tools - Electrical instruments and testing tools - Cleaning and dust removal tools Worker behaviors - Team work - Honesty - Obedience to superiors - Integrity
4. Operate and maintain marine electrical automation system	4.1 Operate and maintain main propulsion automatic control system. 4.2 Operate and maintain the automatic control system for the engine room auxiliary machinery. 4.3 Operate and maintain the electrical, electronic, and control systems of deck machinery and cargo handling equipment. 4.4 Operate and maintain the marine steering gear electrical control system.	Generic skills and knowledge - Utilizing communication skills to collaborate with others and report to superiors - Using manufacturer's manuals - Skills and knowledge related to electrical, mechanical, hydraulic, pneumatic components, and automation equipment in the main propulsion control system and main engine remote control system - Skills and knowledge related to auxiliary machinery control systems such as ship air compressors, boiler control systems, steering gear, fuel systems, cooling systems, lubrication systems, fuel viscosity control, oil separators, food ice machine control systems, cargo refrigeration control systems, and air conditioning control systems - Skills and knowledge related to electrical,

DUTIES	TASKS	ENABLERS
		electronic, and control systems of equipment or systems such as anchor winches, mooring winches, gangway ladders, lifeboat winches, and hatch cover winches - Skills and knowledge related to electrical, electronic, and control systems of cargo handling equipment - Interpretation of technical drawings and documentation Tools and Equipment - Personal protective equipment such as safety shoes, gloves, safety helmets, ear protection devices, etc. - Electrical tools - Electrical instruments and testing tools - Cleaning and dust removal tools Worker behaviors - Team work - Honesty - Obedience to superiors - Integrity
5. Repair simple faults in marine electrical and electronic equipment	5.1 Isolate electrical equipment. 5.2 Interpret electronic and electrical drawings. 5.3 Troubleshoot simple faults in marine electrical equipment and systems, distribution panels, motors, generators, and electromagnetic starter control boxes. 5.4 Operate electrical test and measurement equipment. 5.5 Repair the marine lighting system. 5.6 Carry out functional	Generic skills and knowledge - Utilizing communication skills to collaborate with others and report to superiors - Using manufacturer's manuals - Skills and knowledge related to ship electrical equipment and systems, distribution panels, motors, generators, and electromagnetic starter control boxes - Skills in using testing and measuring equipment - Skills and knowledge related to ship lighting - Skills and knowledge related to monitoring systems, automatic control equipment, protection devices, and electrical emergency equipment - Interpretation of technical drawings and

DUTIES	TASKS	ENABLERS
	test of monitoring systems, automatic control equipment, protection devices, and electrical emergency equipment.	documentation Tools and Equipment - Personal protective equipment such as safety shoes, gloves, safety helmets, ear protection devices, etc. - Electrical tools - Electrical instruments and testing tools - Cleaning and dust removal tools Worker behaviors - Team work - Honesty - Obedience to superiors - Integrity
6. Control and manage ship operations	6.1 Prevent marine pollution 6.2 Engage and operate pollution prevention procedures and equipment 6.3 Carry out fire prevention, fire control, and fire extinguishing on the ship 6.4 Operate life-saving equipment 6.5 Implement first aid using onboard medical facilities 6.6 Implement company's safety management system regulations	Generic skills and knowledge - Pollution prevention operating skills - Teamwork skills - The SOLAS Convention - The MARPOL Convention - The ISM Code Tools and Equipment - Marine oil-water separator - Marine sewage treatment plant - Portable fire extinguisher - Trolley fire extinguisher - Large-scale fixed fire suppression system (simulated/video) - Firefighter equipment - Personal life-saving equipment - Visual signals - Life raft - Lifeboat - Rescue boat - Descent and embarkation equipment - Stethoscope - Thermometer - Sphygmomanometer Materials - Tourniquet - Medical pads

DUTIES	TASKS	ENABLERS
		- First aid kit - Stretcher - Common emergency medications Worker behaviors - Team work - Risk awareness - Obedience to superiors - Integrity - Environmental awareness