NATIONAL COUNCIL FOR TECHNICAL EDUCATION

DECEMBER 2022

PROPOSED OCCUPATIONAL STANDARDS

FOR MARINE NAVIGATION TECHNICIAN

OCCUPATION: MARINE NAVIGATION

LEVEL: NTA 4

TABLE OF CONTENT

Contents

TABLE OF CONTENT ii

FOREWORD iii

ACKNOWLEDGEMENT v

ABBREVIATIONS vii

1.0. INTRODUCTION 1

2.0. OCCUPATIONAL STANDARD DEVELOPMENT PROCESS 2

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FOR MARINE NAVIGATION TECHNICIANS 3

4.0. VALIDITY PERIOD 5

5.0. OCCUPATIONAL STANDARDS 5

5.1. OCCUPATIONAL STANDARDS FOR MARINE NAVIGATION TECHNICIAN -NTA 4 5

TABLE 1: DACUM CHARTS FOR MARINE NAVIGATION TECHNICIANS LEVEL 4 26

FOREWORD

The National Council for Technical Education (NACTE) is a corporate body established by the National Council for Technical Education Act, Cap.129. The Act provides a legal framework for the Council to coordinate the provision of technical education and training in Tanzania. The mandate of NACTE is three-fold, namely; Regulatory, Quality Assurance and Policy Advisory.

In discharging its mandate, the Council has been charged with the responsibilities, among others, to:

(a) assist technical institutions in the transmission of knowledge, principles and training in the field of technical education and training for the benefit of the people of Tanzania;
(b) assist technical institutions in the overall development of the quality of education they provide and promote and maintain approved academic standards;
(c) establish and make awards in technical education which are consistent in standard and comparable to related awards in Tanzania and internationally; and
(d) ensure that the quality of education required for the awards is met and maintained throughout the duration of the delivery of the course.

In the course of execution of these responsibilities, the Council has been instituting various measures aiming at advancing the quality of training provided in technical institutions in respect of the changing demands of the labour market, both local and international.

To achieve the above obligation, NACTE, under the Ministry of Education, Science and Technology implemented the East Africa Skills for Transformation and Regional Integration Project (EASTRIP), a project aiming at promoting regional integration through supporting the regional corridors and sector markets, developing common standards and qualifications, and promoting mobility of students, faculty, and graduates. The project supports the Government of Tanzania to address shortage of skills in five sectors namely:

(a) Energy;
(b) Construction;
(c) Information and Communication Technology (ICT);
(d) Transportation; and
(e) Agribusiness.

To address the skills miss-match and shortage in the five (5) sectors in the country, the project specially funded, among others, a component of Development of Occupational Standards for Technical and Vocational Education and Training (TVET). In this regard, NACTE endeavoured to identify qualified and highly experienced experts in the five sectors from both the industry and training institutions to carry out the development of Occupational Standards. The exercise was carried out at Morogoro Teachers College – Morogoro from 16th July to 10th August, 2021. The output of the exercise is Occupational Standards for 12occupations. Occupational standards for Marine Navigation Technicians are among the occupational standards for 12 occupations which have been developed.

Since Occupational Standards are statements of work performance reflecting the ability to successfully complete the functions required in an occupation, as well as the application of knowledge, skills, attitudes and understanding in an occupation, it is the Council's expectations that the developed standards will form a robust base for decision making and provide explicit guidance to policy makers, curriculum developers, educators, employers and other stakeholders in matters related to manpower planning as well as execution of Technical and Vocational Education and Training undertakings.

Prof. J. W. Kondoro — Dar es Salaam

Chairman — **August 2022**

ACKNOWLEDGEMENT

The National Council for Technical Education (NACTE) is charged with the mandate to be the Quality Assurance organ of the Government in matters related to Technical and Vocational Education and Training (TVET) and production of qualified manpower for both local and international labour markets. In order to realize this obligation, NACTE endeavours to institute policies, guidelines and standards and to set the quality benchmarks for training institutions.

However, this is only possible if there is a strong base, linking the training institutions on one hand and the demands of the industry/labour market for relevant manpower on the other hand. Therefore, the Council undertook a step to develop Occupational Standards in sectors considered to be the engine to steer the country's desire to achieve an industrial economy. This exercise would not be a success without the input and support from our stakeholders. I am indebted to acknowledge some of them here.

I wish to acknowledge and appreciate the support from the Ministry of Education, Science and Technology through the East Africa Skills for Transformation and Regional Integration Project (EASTRIP)for the financial support which facilitated the preparation of this document. I also wish to appreciate Mrs Leah Lukindo and Eng. Dr. Simon Baregu for the tireless efforts and commitment in facilitating and guiding the standards development process, Ms. Eileen Tzamburakis and Ms. ChausikuYakweli Ibrahim for compiling and type setting the final document; and the NACTE Secretariat for coordinating the whole activity.

In a very special way I wish further to extend my sincere gratitude to this team of wonderful experts who tirelessly dedicated their time and availed their invaluable intellect in the preparation of this document. I would like to recognise the colossal inputs of the following experts:

S/N	Name	Designation	Organization
1	Eng. Thomas J. Mayagilo	Lecturer	Dar-es-Salaam Maritime Institute (DMI)
2	Capt. Gilbert L. Mokiwa	Master	Dar-es-Salaam Maritime Institute (DMI)
3	Dr. Eliamin Kassembe	Rector	Dar-es-Salaam Maritime Institute (DMI)

S/N	Name	Designation	Organization
4	Eng. Mushumbusi Abdu Dauda	Lecturer	Dar-es-Salaam Maritime Institute (DMI)

In addition, the Council hopes to further enhance the internationalization of Occupational Standards and promote the modernization and internationalization of industries in Tanzania, so as to facilitate Tanzania's integration into the international market and tap its development potential. Therefore, the Council invited the China - Africa Vocational Education Alliance, China - Africa (Chongqing) Vocational Education Alliance, and Chinese vocational colleges to participate in the development, revision, and review of the Occupational Standard documents. It is firmly believed that they will provide strong support for the development of vocational education and related industries in Tanzania based on their rich experience in vocational education, relying on China's advanced and complete industrial chain as well as its status in the international market.

Therefore, I would like to express my heartfelt appreciation to this professional team composed of Chinese colleges, institutions and experts for their hard work and dedication. They've made great contributions to the compilation of this document. I would like to thank the following colleges and experts for their support.

No.	College	Name	Title/Area of Expertise
1	Jiangsu Maritime Institute	Zhang Haifeng	Associate Professor/Marine Technology
2		Wan Jianxia	Associate Professor/Marine Technology
1	Shandong Transport Vocational College	Ni Wenliang	Associate Professor/Ship Management
2		Qiu Liang	Lecturer/Marine Technology

Dr. A. B. Rutayuga — Dar es Salaam

Executive Secretary — **August 2022**

ABBREVIATIONS

CPP	Controllable Pitch Propeller
DMI	Dar -es-salaam Maritime Institute
GPS	Global Positioning System
ICT	Information Communication Technology
IMO	International Marine Organisation
ISPS	International Ship and Port Facility Security
MBS	Minimum Breaking Strength
MLC	Maritime Labour Convention
NACTE	National Council of Technical Education
NOS	National Occupational Standards
OOW	Officer on Watch
OS	Occupational Standards
SOLAS	Safety of Life At Sea
SWL	Safe Working Load
TET	Technical Education and Training
TVET	Technical and Vocational Education and Training
WLL	Working Load Limit
MARPOL	Marine Pollution
VHF	Very High Frequency

GLOSSARY OF TERMS

Circumstantial Knowledge:	Detailed knowledge for 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 system 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 to do) that is designed to prepare a person for employment in a job or other particular performance situation.
Occupation:	A specific position requires 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:	It indicates 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 analyzing each task to determine the steps, related knowledge, attitudes, performance standards, tools and materials needed, and safety concerns required of employees performing it.
Tasks:	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 confirm 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. 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 Education has begun the job of drafting Occupational Standards that will eventually be adopted as National Occupational Standards for TET in order to ensure that it meets the needs of the lab our market and the country's economic agenda.

National Occupational Standards (NOS) are PERFORMANCE CRITERIA that are matched with labour market demands. Each National Occupation Standard describes functions, performance standards, and knowledge/understanding for one important function or task. They combine skills, knowledge, and attitudes to describe best practice. They are useful tools for establishing job roles, personnel recruiting, supervision, and appraisal, as well as TET standards. They're also helpful for benchmarking and harmonizing 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 delivery across all public and private institutions.

However, it must be noted that, Occupational Standards and Training standards/qualifications standards are different. Occupational standards are defined in terms of activities performed by a person in a selected occupation (e.g., an electrical engineer designs electrical wiring circuits, performs trouble shooting in electrical wiring, etc.) and they are usually defined by employers following procedures agreed upon by all stakeholders. Education and training standards are developed from the activities defined in occupational standards, and they include learning objectives to ensure that the necessary skills and knowledge are developed by a person to enable him or her to function at an agreed level in an occupation. Education and Training standards are used to define curricula in training institutions. It is however critical that there must be a direct link between the occupational standards and the training standards to respond to demands of the lab our market.

In TET delivery, Tanzania adopted the Competency-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 Education and Training (CBET) programs. TET institutions will be required to benchmark their curricula with relevant occupational standards. 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 (TET).

The Marine Navigation Technician Occupation has its own set of occupational standards. 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 Occupational standards development process began with an examination of major documents that guide Tanzanian skill development. The 10-year National Skills Development Strategy (2016-2026) was one of the documents reviewed, and it outlined six (6) economic sectors that should be prioritized when developing skills development programmes. These sectors include: Transport and Logistics, Tourism and Hospitality, Agribusiness, Construction, Energy and ICT. NACTE 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 workshop comprised of expert workers and educators with substantial knowledge and experience in the occupation conducted an occupational analysis utilizing the DACUM approach to produce the occupational profile. The analysis resulted in DACUM Charts, which are attached as **Appendix 1** to this document.

The occupational standards were then developed. Experts in Occupational Analysis and the Development of Occupational Standards facilitated the workshop. Interviews, online surveys, and a stakeholder forum were used to validate the occupational standards. Engineers, supervisory technicians on the job, and experienced marine navigation technicians were key informants in the survey to discover occupational trends. This information was used to gain insight from the workplaces regarding trends and changes in the profession, including how well graduates are prepared for working in the occupation. A total of …….. online surveys were completed by experts from the labour market across the country. Apart from the survey

aiding in defining the scope for the occupational analysis, they served to engage a wide cross-section of experts in the occupation. The stakeholders' forum was attended by 100 participants from different parts of the country representing various companies.

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FOR MARINE NAVIGATION TECHNICIANS

These standards cover a broad range of duties and tasks that can be performed by a Marine Navigation 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 Navigation 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.

Marine Navigation Technicians work in the Marine Transport Sub sector. Marine transportation includes cargo-carrying commercial shipping (e.g. merchant marine) and non-cargo commercial shipping (e.g. ferries, cruise ships, etc.). Marine vessels move goods and people from one part of the world to the other, manned by a cadre of trained and qualified seafarers. There are many types of ships and of various sizes, trades, and different manning levels. The manning level of a ship is governed by the ship's trade type. Cruise vessels lead in the number of crew required to satisfy their Manning certificate level. A manning certificate is a document that contains information about the number of crew members required for a ship's safe operation and the qualifications of each member. A standard marine vessel has three main departments namely:

1. Navigation / Deck department
2. Engineering Department and
3. Catering Department.

The **Navigation** department is manned by the following crew members:

1. **The Captain** who is the Master and Commanding Officer of the ship.
2. **The Chief Officer** who is second in command and head of Deck Department.
3. **The Second Officer** who is "Officer of the Watch" and responsible for Navigation.
4. **The Third Officer** who is also "Officer of the Watch" and responsible for Life Saving Appliances.

5. **The Fourth Officer,** who is present in some ships, also keeps watch.
6. **The Bosun** is the Petty Officer –head of all deck ratings.
7. **The Ratings:** These could be of any number depending on the manning certificate level**,** size of ship and trade.

This **Occupation Standard** covers the **"Marine Navigation Technician",** who in this case will include the following: **Second Officer,** whom we referred to as Officer of the Watch (OOW) and on the NACTE awards system is at NTA 6. **Third Officer**, also an Officer of the Watch (OOW) is considered an NTA 5 (Operational Level). **Fourth Officer,** who also keeps watch, is considered an NTA 4 (basic technician)

The Marine Navigation Technician plays an important role in ensuring safe sailing, navigation and berthing of the marine vessel. The standard covers the main duties of the Marine Navigation Technician as follows:

1. Contributing to safe navigation
2. Handling cargo on board the vessel
3. Performing shipboard maintenance
4. Controlling the operation of on-board equipment
5. Performing watchkeeping during sailing
6. Performing watchkeeping when the ship is anchored or berthed
7. Performing chart reading
8. Maintaining safe navigation
9. Undertaking communication with different parties
10. Performing loading and unloading activities
11. Performing safe anchoring
12. Performing safe berthing.

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 NAVIGATION TECHNICIAN - NTA 4

OCCUPATION	MARINE NAVIGATION TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	CONTRIBUTE TO SAFE NAVIGATION WATCH	**DUTY NO.**	401
TASK TITLE	STEER VESSEL	**TASK NO.**	4011
PERFORMANCE CRITERIA	A person carrying out this task must be able to steer a marine vessel (control of the ship's direction) as per instructions from superiors in accordance with the current versions of regulations and standards governing the marine field.		
RANGE STATEMENT	The task will be performed aboard a marine vessel. For successful performance of the task, the following will be required: 1. SSB Radio; 2. Navigation charts; 3. Nautical publications; 4. Helm; 5. Compass; 6. Log book; 7. Radar; 8. GPS.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1 Receive orders from senior (bosun); 2 Steer the vessel; 3 Keep sea watch; 4 Keep port watch; 5 Respond to sound, light and flag signals.	**Detailed knowledge about:** **1.0. Methods:** This person performing this task must be able to explain how to: 1.1. Respond to sound, light and flag signals; 1.2. Identify landmarks; 1.3. Identify bearing, direction, distance and geographical coordinates; 1.4. Steer a vessel; 1.5. Maintain vessel cleanliness; 1.6. Maintain sea watches and port watches. **2.0. Principle** The person must be able to explain the principles of: 2.1. Observing good seamanship practice; 2.2. Communication; 2.3. Navigation. **3.0. Theories** 3.1. Rules of the road at sea; 3.2. Collision regulations; 3.3. Code of safe working practice; 3.4. Safe use of tools and equipment; 3.5. Company policy; 3.6. STCW 2010. **4.0. Essential Skills**

	4.1. Communication skills; 4.2. Maritime English; 4.3. Interpersonal skills; 4.4. Commitment; 4.5. Integrity; 4.6. Behavioural skills. **5.0. Math Skills** 5.1. Simple arithmetic.
DESCRIPTION OF END PRODUCTS/SERVICE	Steering of a marine vessel is performed as per approved rule and regulation.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Watchkeeping systems; 2. Physical geography; 3. House keeping; 4. Safe handling of communication equipment; 5. Health and safety legislations and regulations (OSHA); 6. Waste disposal methods.

OCCUPATION	MARINE NAVIGATION TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	CONTRIBUTE TO SAFE NAVIGATION WATCH	**DUTY NO.**	401
TASK TITLE	PARTICIPATE IN BERTHING, ANCHORING AND MOORING ACTIVITIES	**TASK NO.**	4012
PERFORMANCE CRITERIA	A person carrying out this task must be able to take part in berthing, anchoring and mooring of a marine vessel in accordance with the current versions of regulations and standards governing the marine navigation occupation.		
RANGE STATEMENT	The task will be performed aboard a marine vessel. For successful performance of the task, the following will be required: 1. Mooring equipment; 2. Anchor; 3. Charts; 4. Helm; 5. GPS.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able do the following: 1. Send berthing ropes to mooring gang; 2. Send tug lines to tug; 3. Let go of tug lines; 4. Let go the anchor; 5. Heave away the anchor; 6. Take mooring ropes to ship; 7. Throw heaving line (messenger line); 8. Stow mooring ropes.	**Detailed knowledge about:** **1.0. Methods** This person performing this task must be able to explain how to: 1.1. Fasten the ship alongside a quay; 1.2. Fasten the tug and let go the tug; 1.3. Secure anchor; 1.4. Conduct surveillance on deck; 1.5. Stow mooring ropes. **2.0. Principle** The person must be able to explain the principles of: 2.1. Navigation; 2.2. Communication; 2.3. Mooring operations; 2.4. Berthing/unberthing. **3.0. Theories** 3.1. Rules of the road at sea; 3.2. Code of good seamanship; 3.3. Code of safe working practice; 3.4. Guidelines and Notices to Mariners. **4.0. Essential Skills** 4.1. Communication skills; 4.2. Maritime English; 4.3. Interpersonal skills; 4.4. Commitment;

	4.5. Integrity; 4.6. Behavioural skills. 5.0. **Math Skills** 5.1. Coordinate geometry; 5.2. General arithmetic.
DESCRIPTION OF END PRODUCTS/SERVICE	The person participates in the berthing, anchoring and mooring of a marine vessel as per approved rule and regulation.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Sea and port watch systems; 2. Safe working practice; 3. Safe handling of navigation equipment; 4. Safe handling of communication equipment; **5.** Health and safety legislations and regulations (OSHA).

OCCUPATION	MARINE NAVIGATION TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	CONTRIBUTE TO SAFE NAVIGATION WATCH	**DUTY NO.**	401
TASK TITLE	MONITOR AND CONTROL SAFETY WATCH	**TASK NO.**	4013
PERFORMANCE CRITERIA	A person carrying out this task must be able to carry out safety watch and ensure the safety of the ship's navigation in accordance with the relevant requirements of the *International Regulations for Preventing Collisions at Sea*.		
RANGE STATEMENT	The task will be performed aboard a marine vessel. For successful performance of the task, the following will be required: 1. Communication equipment; 2. Signal flags, national flags; 3. Charts; 4. Radar; 5. Compass; 6. GPS.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Identify the type of vessel and the name of each part; 2. Use communication equipment and communicate quickly and effectively; 3. Use working language to communicate with the senior officer on duty on matters related to watch duties; 4. Maintain a regular lookout; 5. Identify and fly signal flags and national flags; 6. Shifting of duty.	**Detailed knowledge about:** **1.0. Methods:** This person performing this task must be able to explain how to: 1.1. Identify the type of vessel; 1.2. Communicate effectively; 1.3. Safeguard duty responsibilities; 1.4. Maintain a regular lookout; 1.5. Identify signal flags and national flags; 1.6. Shifting of duty. **2.0. Principle** The person must be able to explain the principles of: 2.1. Communication; 2.2. Shifting of duty; 2.3. Navigation. **3.0. Theories** 3.1. Code of good seamanship; 3.2. Rules of the road at sea; 3.3. Code of safe working practice; 3.4. Guidelines and Notices to Mariners. **4.0. Essential Skills** 4.1. Communication skills; 4.2. Maritime English; 4.3. Interpersonal skills; 4.4. Commitment; 4.5. Integrity;

	4.6. Behavioural skills. 5.0. **Math Skills** 5.1. Coordinate geometry; 5.2. General arithmetic.
Description of the end products/service	The person monitors and controls safety watch in accordance with approved rules and regulations.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Sea and port watch systems; 2. Safe working practice; 3. Safe handling of navigation equipment; 4. Safe handling of communication equipment; **5.** Health and safety legislations and regulations (OSHA).

OCCUPATION	MARINE NAVIGATION TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	CONTRIBUTE TO SAFE NAVIGATION WATCH	**DUTY NO.**	401
TASK TITLE	OPERATE EMERGENCY EQUIPMENT AND RESPOND TO EMERGENCY PROCEDURES	**TASK NO.**	4014
PERFORMANCE CRITERIA	A person carrying out this task must be able to operate emergency equipment and respond to emergency procedures as required by the relevant rules.		
RANGE STATEMENT	The task will be performed aboard a marine vessel. For successful performance of the task, the following will be required: 1. Communication equipment; 2. Alarm equipment; 3. Visual distress equipment; 4. Radio distress equipment; 5. Muster list; 6. Leak stopper; 7. GPS.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Conduct initial actions for emergency or unusual situations; 2. Use alarm equipment; 3. Use visual distress equipment; 4. Use emergency position-indicating radio beacons and search and rescue radar transponders; 5. Avoid false alarms and false alarm cancellations.	**Detailed knowledge about:** **1.0. Methods** This person performing this task must be able to explain how to handle: 1.1. Emergency duties; 1.2. Alarm signals; 1.3. Methods of leak stoppage; 1.4. The use of pyrotechnical distress signal; 1.5. The use of emergency position-indicating radio beacon; 1.6. The use of search and rescue radar transponders. **2.0. Principle** The person must be able to explain the principles of: 2.1. Emergency response; 2.2. Survival; 2.3. Alarm. **3.0. Theories** 3.1. Code of good seamanship; 3.2. Ship emergency procedures; 3.3. Code of safe working practice; 3.4. Survival at sea. **4.0. Essential Skills** 4.1. Communication skills; 4.2. Maritime English;

	4.3. Interpersonal skills; 4.4. Commitment; 4.5. Integrity; 4.6. Behavioural skills. **5.0 Math Skills** 5.1 General arithmetic.
DESCRIPTION OF END PRODUCTS/SERVICE	The person responds quickly to emergency procedures in accordance with approved rules and regulations.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Sea and port watch systems; 2. Safe working practice; 3. Safe handling of alarm equipment; 4. Safe handling of communication equipment; **5.** Health and safety legislations and regulations (OSHA).

OCCUPATION	MARINE NAVIGATION TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	HANDLE CARGO	**DUTY NO.**	402
TASK TITLE	PERFORM STOWING AND SECURING OF CARGO	**TASK NO.**	4021
PERFORMANCE CRITERIA	A person carrying out this task must be able to stow and secure cargo in a marine vessel in accordance with safe working practices.		
RANGE STATEMENTs	The task will be performed aboard a marine vessel. For successful performance of the task, the following will be required: 1. Cargo holds; 2. Forklift; 3. Cranes; 4. Chain block; 5. Wires and ropes; 6. Pipes; 7. Spike; 8. Crow bar; 9. Cleaning materials.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Open hatches; 2. Block and lash cargoes; 3. Rig guard lines or rails; 4. Stow and secure vehicles and trailers; 5. Secure containers; 6. Operate cranes/hoists; 7. Secure deck cargoes; 8. Check scuppers and sounding pipes; 9. Segregate different cargoes; 10. Check for damage and defects of cargoes due to loading and unloading operations; 11. Stow stores/spares safely; 12. Lash stores/spares safely; 13. Secure stores/spares safely.	**Detailed knowledge about:** 1.0. **Methods** This person performing this task must be able to explain how to: 1.0. Handle different cargoes; 1.1. Handle different stores; 1.2. Operate cargo piping system; 1.3. Inspect status of gears/tools; 1.4. Operate cranes/hoists. 2.0. **Principle** The person must be able to explain the principles of: 2.1. Safe handling of cargoes and stores; 2.2. Safe handling of cargo gears; 2.3. Safe lifting; 2.4. Safe working loads. 3.0. **Theories** The person must be able to explain 3.1. Code of lifting appliances in the marine environment; 3.2. Code of safe working practice on board ship; 3.3. IMO guidelines on handling of cargoes and stores; 3.4. Company policy. 4.0. **Essential Skills** 4.1. Communication skills;

	4.2. Maritime English; 4.3. Interpersonal skills; 4.4. Integrity; 4.5. Vigilance; 5.0. **Math Skills** 5.1. General arithmetic.
DESCRIPTION OF END PRODUCTS/SERVICE	Handling of cargo and stores is properly done as per safe working practice and company policy。
CIRCUMSTANTIAL KNOWLEDGE:	**Detailed knowledge about:** 1. Safe working practice; 2. Cargo handling equipment; 3. House keeping; 4. OSHA and NEMC regulations; 5. Waste disposal methods.

OCCUPATION	MARINE NAVIGATION TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	HANDLE CARGO	**DUTY NO.**	402
TASK TITLE	HANDLE SPECIAL CARGOES AND DANGEROUS GOODS	**TASK NO.**	4022
PERFORMANCE CRITERIA	A person carrying out this task must be able to handle special cargoes and dangerous goods in a marine vessel in accordance with safe working practices.		
RANGE STATEMENTs	The task will be performed aboard a sailing marine vessel. For successful performance of the task, the following will be required: 1. Cargo holds; 2. Forklift; 3. Cranes; 4. Chain block; 5. Wires and ropes; 6. Pipes; 7. Pumps; 8. Cleaning materials; 9. Labels; 10. Placards.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
1. Label different cargoes; 2. Segregate dangerous according to IMDG Code; 3. Load heavy cargo on deck; 4. Secure cargo on/below deck; 5. Block and chock the cargo; 6. Rig guard lines or rails.	**Detailed knowledge about:** **1.0. Methods** This person performing this task must be able to explain how to: 1.1. Recognise special cargoes and dangerous goods; 1.2. Use the IMDG segregation table; 1.3. Mark and placard special cargoes and dangerous goods; 1.4. Deal with emergency involving dangerous goods; **2.0. Principles** The person must be able to explain the principles of: 2.1. Segregation of dangerous goods; 2.2. Stowage of special cargoes and dangerous goods; 2.3. Cargo handling of special cargoes and dangerous goods; 2.4. Cargo securing procedures; 2.5. House keeping. **3.0. Theories** The person must be able to explain; 3.1. IMDG Code related documents; 3.2. SOLAS Convention; 3.3. MARPOL Convention; 3.4. Code of safe working practice; 3.5. Collision Regulations.

	4.0. Essential Skills 4.1. Communication skills; 4.2. Team work; 4.3. Interpersonal skills; 4.4. Maritime English. **5.0. Math Skills** 5.1. General arithmetic.
DESCRIPTION OF END PRODUCTS/SERVICE	Special cargoes and dangerous goods are handled as per IMDG Code.
UNDERPINNING KNOWLEDGE	**Detailed knowledge about:** **1.0. Methods** This person performing this task must be able to explain how to: 1.1. Recognise special cargoes and dangerous goods; 1.2. Use the IMDG segregation table; 1.3. Mark and placard special cargoes and dangerous goods; 1.4. Deal with emergency involving dangerous goods. **2.0. Principles** The person must be able to explain the principles of: 2.1. Segregation of dangerous goods; 2.2. Stowage of special cargoes and dangerous goods; 2.3. Cargo handling of special cargoes and dangerous goods; 2.4. Cargo securing procedures; 2.5 House keeping. **3.0. Theories** The person must be able to explain 3.1. IMDG Code related documents; 3.2. SOLAS Convention; 3.3. MARPOL Convention; 3.4. Code of safe working practice; 3.5. Collision Regulations. **4.0. Essential Skills** 4.1. Communication skills; 4.2. Team work; 4.3. Interpersonal skills; 4.4. Maritime English. **5.0. Math Skills** 5.1. General arithmetic.
CIRCUMSTANTIAL KNOWLEDGE:	**Detailed knowledge about:** 1. Handling of special cargoes and dangerous goods; 2. OSHA and NEMC regulations; 3. Waste disposal methods.

OCCUPATION	MARINE NAVIGATION TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	HANDLE CARGO	**DUTY NO.**	402
TASK TITLE	OPERATE DECK EQUIPMENT AND MACHINERY	**TASK NO.**	4023
PERFORMANCE CRITERIA	A person carrying out this task must be able to operate deck equipment and machinery of a sailing marine vessel in accordance with the code of safe working practice.		
RANGE STATEMENTs	The task will be performed aboard a marine vessel. For successful performance of the task, the following will be required: 1. Valves and pumps; 2. Hoists, cranes and booms ; 3. Windlasses and capstans; 4. Hatches, watertight doors and ports; 5. Fibre and wire ropes; 6. Cables and chains; 7. Marlin spike; 8. Bosun's chair; 9. Ladders.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able do the following: 1. Rig bosun's chair; 2. Rig pilot ladder, hoists, rat-guards and gangways; 3. Open hatches, watertight doors and ports; 4. Close hatches, watertight doors and ports; 5. Splice wires and ropes.	**Detailed knowledge about:** **1.0. Methods** This person performing this task must be able to explain how to: 1.1. Rig bosun's chair, pilot ladder, rat guards and gangway; 1.2. Maintain deck equipment and machinery; 1.3. Dip and hoist flags. **2.0. Principles** The person must be able to explain the principles of: 2.1. Equipment and machinery maintenance; 2.2. Equipment and machinery operation; 2.3. Safe use of tools; 2.4. Safe working load (SWL) or working load limit (WWL). **3.0. Theories** The person must be able to explain 3.1. Code of safe working practice; 3.2. ISM code; 3.3. Rigging techniques; 3.4. Code of Hand Signals. **4.0. Essential Skills** 4.1. Communication skills; 4.2. Interpersonal skills; 4.3. Team work;

	4.4. Integrity; 4.5. Maritime English; 4.6. Punctuality. **5.0. Math Skills** 5.1. General arithmetic.
DESCRIPTION OF END PRODUCTS/SERVICE	Operation of deck equipment and machinery is performed as per code of safe working practice
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Rope work; 2. Main single flag signals; 3. Rigging techniques; 4. Safe operation of deck machinery.

OCCUPATION	MARINE NAVIGATION TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	PERFORM SHIPBOARD MAINTENANCE AND REPAIR	**DUTY NO.**	403
TASK TITLE	MAINTAIN HEALTH, SAFETY, AND SECURITY OF STAFF, EQUIPMENT AND ENVIRONMENT	**TASK NO.**	4031
PERFORMANCE CRITERIA	A person carrying out this task must be able to maintain health, safety, and security of staff, equipment and environment in a sailing marine vessel in accordance with the Code of safe working practice and security code.		
RANGE STATEMENT	The task will be performed aboard a marine vessel. For successful performance of the task, the following will be required: 1. PPE; 2. Flashlight; 3. Whistle; 4. Medication; 5. Suppliers' safety data sheet; 6. Deck scuppers; 7. Garbage compactor; 8. Anti-pollution equipment.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able do the following: 1. Keep deck safety and security watch; 2. Wear appropriate safety gear; 3. Clean spilled fluids, paints, toxic materials in a safe manner; 4. Collect and segregate waste and garbage; 5. Collect and dispose cargo sweepings; 6. Observe Safety Information Symbols, Signs and Alarm Signals; 7. Operate garbage compactor.	**Detailed knowledge about:** **1.0. Methods** This person performing this task must be able to explain how to: 1.1. Keep anchor and port watch; 1.2. Take bunkers; 1.3. Clean up oil spills; 1.4. Segregate waste and hand ashore for disposal; 1.5. Operate garbage compactor. **2.0. Principles** The person must be able to explain the principles of: 2.1. Company policy on safety and security; 2.2. Medical aid; 2.3. Waste and garbage collection; 2.4. Bunkering; 2.5. Handling hazardous substances; 2.6. Good housekeeping practices. **3.0. Theories** The person must be able to explain; 3.1. Medical aid training; 3.2. Code of Safe Working Practice; 3.3. ISPS Code;

	3.4. Entry in enclosed spaces; 3.5. MARPOL 73/78; 3.6. International Labour Standards on occupational; 3.7. Safety and Health ILO; 3.8. Safety and Health in ports; 3.9. ISM Code. **4.0. Essential Skills** 4.1. Communication skills; 4.2. Interpersonal skills; 4.3. Team work; 4.4. Integrity; 4.5. Maritime English; 4.6. Punctuality. **5.0. Math Skills** 5.1. Simple arithmetic.
DESCRIPTION OF END PRODUCTS/SERVICE	Health, safety, and security of staff, equipment and environment are maintained as per safe working practice and security code.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Permit to work; 2. M.S.C. Circular 1084 Annex list of principles for hot works; 3. Safety guidelines onboard; 4. Health and safety legislations and regulations (OSHA); 5. Waste disposal method; 6. MARPOL 73/78; 7. Company's policy on garbage management; 8. Ballast Water Management Convention.

OCCUPATION	MARINE NAVIGATION TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	PERFORM SHIPBOARD MAINTENANCE AND REPAIR	**DUTY NO.**	403
TASK TITLE	PERFORM DECK MAINTENANCE	**TASK NO.**	4032
PERFORMANCE CRITERIA	A person carrying out this task must be able to carry out deck maintenance in accordance with safe working practice code.		
RANGE STATEMENT	The task will be performed aboard a marine vessel. For successful performance of the task, the following will be required: 1. PPE; 2. Manual chipping hammers; 3. Power scaling equipment; 4. Painting brushes and rollers; 5. Lubricant and grease; 6. Cleaning materials.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able do the following: 1. Observe safety precautions; 2. Clean deck space for chipping; 3. Chip area to bare metal; 4. Clean the area; 5. Paint the area; 6. Store tools and equipment.	**Detailed knowledge about:** **1.0. Methods** This person performing this task must be able to explain how to: 1.1. Remove rust; 1.2. Paint sequentially; 1.3. Stow working tools and equipment. **2.0. Principles** The person must be able to explain the principles of: 2.1. Surface preparation; 2.2. Paint application; 2.3. Housekeeping. **3.0. Theories** The person must be able to explain 3.1. Code of safe working practice; 3.2. Safety and Health in Port (ILO); 3.3. ISM Code; 3.4. Safe use tools and equipment. **4.0. Essential Skills** 4.1. Communication skills; 4.2. Interpersonal skills; 4.3. Maritime English; 4.4. Multi-lingual skills; 4.5. Team work; 4.6. Commitment; 4.7. Integrity. **5.0. Math Skills**

	5.1. Simple arithmetic.
DESCRIPTION OF END PRODUCTS/SERVICE	The task of deck maintenance is properly done as per safe working practice standards.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Waste disposal methods; 2. OSHA; 3. Company policy on deck maintenance; 4. Permit to work.

OCCUPATION	MARINE NAVIGATION TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	PERFORM SHIPBOARD MAINTENANCE AND REPAIR	**DUTY NO.**	403
TASK TITLE	PERFORM SERVICE OF DECK MACHINERY AND EQUIPMENT	**TASK NO.**	4033
PERFORMANCE CRITERIA	A person carrying out this task must be able to service deck machinery and equipment in accordance with safe working practice code.		
RANGE STATEMENT	The task will be performed aboard a marine vessel. For successful performance of the task, the following will be required: 1. PPE; 2. Hand and power tools; 3. Valves and pumps; 4. Hoists, cranes and booms; 5. Windlasses and capstans; 6. Hatches and watertight doors; 7. Painting brushes and rollers; 8. Lubricant and grease; 9. Cleaning materials.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able do the following: 1. Observe safety precautions; 2. Identify the machinery/equipment; 3. Dismantle machinery/equipment; 4. Inspect machinery/equipment; 5. Service machinery/equipment; 6. Assemble machinery/equipment; 7. Clean up the area; 8. Stow tools and equipment.	**Detailed knowledge about:** **1.0. Methods** This person performing this task must be able to explain how to: 1.1. Identify machinery parts and equipment; 1.2. Recognize defective parts; 1.3. Service different deck machinery and equipment; 1.4. Use service manuals. **2.0. Principles** The person must be able to explain the principles of: 2.1. Maintenance; 2.2. Paint application; 2.3. Shipboard housekeeping. **3.0. Theories** The person must be able to explain 3.1. Code of safe working practice; 3.2. ISM Code; 3.3. Service manuals; 3.4. Safe use tools and equipment; 3.5. Manufacturer's safety guidelines and shipboard instructions. **4.0. Essential Skills**

	4.1. Communication skills; 4.2. Interpersonal skills; 4.3. Maritime English; 4.4. Team work; 4.5. Commitment; 4.6. Integrity; 4.7. Resilience. **5.0. Math Skills** **5.1.** Simple arithmetic.
DESCRIPTION OF END PRODUCTS/SERVICE	The task of servicing deck machinery and equipment is properly done as per safe working practice standards.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Waste disposal methods; 2. OSHA; 3. Company policy on performing service; 4. Permit to work; 5. M.S.C. Circular 108 Annex List of principles for hot works.

TABLE 1: DACUM CHARTS FOR MARINE NAVIGATION TECHNICIANS LEVEL 4

DUTIES	TASKS	ENABLERS
1.0. Contribute to Safe Navigation Watch	1.1. Steer vessel. 1.2. Participate in Berthing, anchoring and mooring activities. 1.3. Monitor and control safety watch. 1.4. Operate emergency equipment and respond to emergency procedures.	**Generic Knowledge and Skills** • Knowledge in radio operations; • Knowledge of radio frequencies; • Skills in the use of radio transmission; • Knowledge of the importance of radio signals; • Knowledge of action to be taken depending on the radio signal received; • Knowledge of types of navigational chart and their application; • Knowledge and skills in chartwork; • Proficiency in chartwork; • Proficiency in marine navigation; • Proficiency in voyage execution; • General knowledge in engine operation and performance; • Adequate knowledge of ISM code and company policy; • Proficiency in ship's safety procedures; • Knowledge of rules of the road at sea and collision regulations; • Proficiency in radio operation (radio, alarm systems, etc.); • Proficiency in the use of navigational lights and shapes; • Knowledge and proficiency in the use of rules of the road; • Knowledge and Proficiency in the use of collision regulations (COLREGS); • Proficiency in communication using

DUTIES	TASKS	ENABLERS
		different communication modes; • Proficiency in operating emergency equipment; • Respond to emergency procedures. **Tools and equipment** • Chartwork tools (parallel rules) • Electronic charts • Echo sounder • Compass • GPS • Alarm equipment • Visual distress equipment • Communication equipment • Equipment (radio, morse) • Lights and shapes • Communication flags **Workers behavior** • Teamwork spirit • Honesty • Obediency to seniors

DUTIES	TASKS	ENABLERS
2.0. Handle cargo	2.1. Perform stowing and securing of cargo. 2.2. Handle special cargoes and dangerous goods. 2.3. Operate deck equipment and machinery.	**Generic Knowledge and skills** • Knowledge of cargo holds; • Knowledge of cargo holds capacity; • Knowledge of stevedoring operations; • Knowledge of type of cargo e.g. dry bulk, liquid bulk, general cargo, LPG/LNG, Gas carrier, fruit concentrate etc.); • Knowledge of cargo stowage; • Knowledge of ship stability; • Knowledge of the load line types; • Knowledge of the cargo characteristics; • Number of deck crew needed; • Crew competency; • Knowledge of cargo gear required; • Availability of cargo gears; • Performance of cargo piping system; • Knowledge of piping system; • Knowledge of cargo pumps; • Competency in the operation of cargo pumps and piping system; • Knowledge/Competency in the safety process of the operation; • Knowledge of of relevant codes(e.g. IMDG Code, ISM Code and Code of safe working practice.); • Competency in the compliance with safety requirement; • Knowledge of cargo supplier safety manual; • Knowledge of ship stability; • Knowlwdge of ballast tanks; • Competence in loading and unloading; • Competence in cargo stowage. **Tools and equipment** • Cargo handling equipment.

DUTIES	TASKS	ENABLERS
3.0. Perform Shipboard maintenance and repair	3.1. Maintain health, safety, and security of staff, equipment and environment. 3.2. Perform deck maintenance. 3.3. Perform service of deck machinery and equipment.	**Generic knowledge and Skills** • Competence in ballasting avoid free surface effect; • Knowledge of tides behavior; • Competence in maintaining vessel contact to the quay; • Knowledge of the International Ship and Port Facility Security (ISPS) Code; • Knowledge of Company Policy on ship's safety and Security; • Knowledge of the International Maritime Organisation (IMO) on ships' safety and security; • Knowledge of Master's standing orders; • Knowledge of gangway rigging; • Knowlwdge of gangway safety; • Identification of tresspassers; • Competence in handling emergences; • Proficiency in safety issues. **Tools and equipment** • Cargo handling equipment (shore cranes, davits, onboard cargo handling gear etc.); • Hand and power tools. **Workers behaviour** • Teamwork spirit; • Honesty; • Obediency to seniors; • Integrity.