COMPETENCY STANDARDS

UNDERWATER HULL CLEANING LEVEL II

MARITIME SECTOR

TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY East Service Road, South Luzon Expressway (SLEX), Taguig City, Metro Manila

TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY TESDA
Complex East Service Road, South Luzon Expressway (SLEX), Fort Bonifacio,
Taguig City

Technical Education and Skills Development Act of 1994 (Republic Act No. 7796)

Section 22, "Establishment and Administration of the National Trade Skills Standards" of the RA 7796 known as the TESDA Act mandates TESDA to establish national occupational skill standards. The Authority shall develop and implement a certification and accreditation program in which private industry group and trade associations are accredited to conduct approved trade tests, and the local government units to promote such trade testing activities in their respective areas in accordance with the guidelines to be set by the Authority.

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UNDERWATER HULL CLEANING LEVEL II

COMPETENCY STANDARDS FOR
UNDERWATER HULL CLEANING LEVEL II

SECTION 1 UNDERWATER HULL CLEANING LEVEL II QUALIFICATION

The **UNDERWATER HULL CLEANING LEVEL II** Qualification consists of competencies that a person must achieve to perform maintenance procedures to remove biofouling, such as algae, barnacles, and other marine growth, from the submerged portion of a vessel's hull. This process is essential for maintaining the vessel's performance, fuel efficiency, and structural integrity without the need for dry-docking.

This Qualification is packaged from the competency map of the Maritime Sector as shown in Annex A.

The units of competency comprising this qualification include the following:

CODE NO.	**BASIC COMPETENCIES**
400311210	Participate in workplace communication
400311211	Work in team environment
400311212	Solve/address general workplace problems
400311213	Develop career and life decisions
400311214	Contribute to workplace innovation
400311215	Present relevant information
400311216	Practice occupational safety and health policies and procedures
400311217	Exercise efficient and effective sustainable practices in the workplace
400311218	Practice entrepreneurial skills in the workplace
CODE NO.	**COMMON COMPETENCIES**
MEE722201	Apply Safe Practices
	Interpret Ship Design
	Perform Calculation for Underwater activities
MEE721204	Contribute to Quality System
MEE721206	Use Hand tools
MTM834211	Take immediate action upon encountering an accident or other medical emergency
MTM834213	Take precautions to prevent pollution of the marine environment
CODE NO.	**CORE COMPETENCIES**
AB-MTM03710700835301	Perform Underwater Hull Cleaning
AB-MTM03710700835302	Cary out Underwater Minor Hull Repair

A person who has achieved this Qualification is competent to be:

- Commercial Diver - Hull Cleaning

SECTION 2 COMPETENCY STANDARDS

These guidelines are set to provide the Technical Vocational Education and Training (TVET) providers with information and other important requirements to consider when designing training programs for **UNDERWATER HULL CLEANING LEVEL II**.

BASIC COMPETENCIES

UNIT OF COMPETENCY: **PARTICIPATE IN WORKPLACE COMMUNICATION**

UNIT CODE: **400311210**

UNIT DESCRIPTOR: This unit covers the knowledge, skills and attitudes required to gather, interpret and convey information in response to workplace requirements.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms are* elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Obtain and convey workplace information	1.1 Specific and relevant information is accessed from ***appropriate sources*** 1.2 Effective questioning, active listening and speaking skills are used to gather and convey information. 1.3 An appropriate ***medium*** is used to transfer information and ideas 1.4 Appropriate non-verbal communication is used 1.5 Appropriate lines of communication with supervisors and colleagues are identified and followed 1.6 Define workplace procedures for the location and ***storage*** of information are used	1.1 Effective verbal and non-verbal communication 1.2 Different modes of communication 1.3 Medium of communication in the workplace 1.4 Organizational policies 1.5 Communication procedures and systems 1.6 Lines of communication 1.7 Technology relevant to the enterprise and the individual's work responsibilities 1.8 work etiquette	1.1 following simple spoken language 1.2 Performing Routine workplace duties following simple written notices 1.3 Participating in Workplace meetings and discussions 1.4 Preparing work related documents 1.5 Estimating, calculating and recording routine workplace measures 1.6 Relating/ Interacting with people of

			various levels in the workplace. 1.7 Gathering and providing basic information in response to workplace requirements 1.8 Basic business writing skills 1.9 Interpersonal skills in the workplace 1.10 Active listening skills
2. Perform duties following Workplace instructions	2.1 Written notices and instructions are read and interpreted in accordance with organizational guidelines. 2.2 Routine written instruction are followed based on established procedures. 2.3 Feedback is given to workplace supervisor based instructions/information received 2.4 ***Workplace interactions*** are conducted in a courteous manner. 2.5 Where necessary, clarifications about routine workplace procedures and matters concerning conditions of employment are sought and asked from ***appropriate sources***.	2.1 Effective verbal and non-verbal communication 2.2 Different modes of communication 2.3 Medium of communication in the workplace 2.4 Organizational/ Workplace policies 2.5 Communication procedures and systems 2.6 Lines of communication 2.7 Technology relevant to the enterprise and the individual's work responsibilities 2.8 Effective questioning techniques (clarifying and probing) 2.9 Workplace etiquette	2.1 Following simple spoken instructions 2.2 Performing routine workplace duties following simple written notices 2.3 Participating in workplace meetings and discussions 2.4 Completing work- related documents 2.5 Estimating, calculating and recording routine workplace measures 2.6 Relating/ Responding to people of various levels in the workplace 2.7 Gathering and providing information in response to

	2.6 Meetings outcomes are interpreted and implemented.		workplace requirements 2.8 Basic questioning/ querying 2.9 Skills in reading for information 2.10 Skills in locating
3. Complete relevant work-related documents	3.1 Range of ***forms*** relating to conditions of employment are completed accurately and legibly. 3.2 Workplace data is recorded on standard workplace forms and documents. 3.3 Errors in recording information on forms/ documents are identified and acted upon. 4. Reporting requirements to supervisor are completed according to organizational guidelines.	3.1 Effective verbal and non-verbal communication 3.2 Different modes of communication 3.3 Workplace forms and documents 3.4 Organizational/ Workplace policies 3.5 Communication procedures and systems 3.6 Technology relevant to the 3.7 enterprise and the individual's work responsibilities	3.1 Completing work-related document 3.2 Applying operations of addition, subtraction, 3.3 division and multiplication 3.4 Gathering an providing information in response to workplace requirements 3.5 Effective record keeping skills

RANGE OF VARIABLES

1. Appropriate sources	May include: 1.1 Team members 1.2 Supervisor/Department Head 1.3 Suppliers 1.4 Trade personnel 1.5 Local government 1.6 Industry bodies
2. Medium	May include: 2.1 Memorandum 2.2 Circular 2.3 Notice 2.4 Information dissemination 2.5 Follow-up or verbal instructions 2.6 Face-to-face communication 2.7 Electronic media (disk files, cyberspace)
3. Storage	May include: 3.1 Manual filing system 3.2 Computer-based filing system
4. Workplace interactions	May include: 4.1 Face-to-face 4.2 Telephone 4.3 Electronic and two-way radio 4.4 Written including electronic means, memos, instruction and forms 4.5 Non-verbal including gestures, signals, signs and diagrams
5. Forms	May include: 5.1 HR/Personnel forms, telephone message forms, safety reports

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Prepared written communication following standard format of the organization 1.2 Accessed information using workplace communication equipment/systems 1.3 Made use of relevant terms as an aid to transfer information effectively 1.4 Conveyed information effectively adopting formal or informal communication
2. Resource Implications	**The following resources should be provided:** 2.1 Fax machine 2.2 Telephone 2.3 Notebook 2.4 Writing materials 2.5 Computer with Internet connection
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Demonstration with oral questioning 3.2 Interview 3.3 Written test **3.4** Third-party report
4. Context for Assessment	4.1 Competency may be assessed individually in the actual workplace or through an accredited institution

UNIT OF COMPETENCY: **WORK IN TEAM ENVIRONMENT**

UNIT CODE: **400311211**

UNIT DESCRIPTOR: This unit covers the knowledge, skills and attitudes to identify one's role and responsibilities as a member of a team.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms are* elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Describe team role and scope	1.1 The ***role and objective of the team*** is identified from available ***sources of information***. 1.2 Team parameters, Reporting relationships and responsibilities are identified from team discussions and appropriate external sources.	1.1 Group structure 1.2 Group Development 1.3 Sources of information	1.1 Communicating with others, appropriately consistent with the culture of the workplace 1.2 Developing ways in improving work structure and performing respective roles in the group or organization
2. Identify one's role and responsibility within a team	2.1 Individual roles and responsibilities within the team environment are identified. 2.2 Roles and objectives of the team is identified from available ***sources of information***. 2.3 Team parameters, reporting relationships and responsibilities are identified based on team discussions and appropriate external sources.	2.1 Team roles and objectives 2.2 Team structure and parameters 2.3 Team development 2.4 Sources of information	2.1 Communicating with others, appropriately consistent with the culture of the workplace 2.2 Developing ways in improving work structure and performing respective roles in the group or organization

3. Work as a team member	3.1 Effective and appropriate forms of communications are used and interactions undertaken with team members 3.2 Effective and appropriate contributions made to complement team activities and objectives, based on ***workplace context***. 3.3 Protocols in reporting are observed based on standard company practices. 3.4 Contribute to the development of team work plans based on an understanding of team's role and objectives.	3.1 Communication Process 3.2 Workplace communication protocol 3.3 Team planning and decision making 3.4 Team thinking 3.5 Team roles 3.6 Process of team development 3.7 Workplace context	3.1 Communicating appropriately, consistent with the culture of the workplace 3.2 Interacting effectively with others 3.3 Deciding as an individual and as a group using group think strategies and Techniques 3.4 Contributing to Resolution of issues and concern s

RANGE OF VARIABLES

1. Role and objective of team	May include: 1.1 Work activities in a team environment with enterprise or specific sector 1.2 Limited discretion, initiative and judgement maybe demonstrated on the job, either individually or in a team environment
2. Sources of information	May include: 2.1 Standard operating and/or other workplace procedures 2.2 Job procedures 2.3 Machine/equipment manufacturer's specifications and instructions 2.4 Organizational or external personnel 2.5 Client/supplier instruction 2.6 Quality standards 2.7 OHS and environmental standards
3. Workplace context	May include: 3.1 Work procedures and practices 3.2 Conditions of work environments 3.3 Legislation and industrial agreements 3.4 Standard work practice including the storage, safe handling and disposal of chemicals 3.5 Safety, environmental, housekeeping and quality guidelines

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Worked in a team to complete workplace activity 1.2 Worked effectively with others 1.3 Conveyed information in written or oral form 1.4 Selected and used appropriate workplace language 1.5 Followed designated work plan for the job
2. Resource Implications	**The following resources should be provided:** 2.1 Access to relevant workplace or appropriately simulated environment where assessment can take place 2.2 Materials relevant to the proposed activity or tasks
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Role play involving the participation of individual member to the attainment of organizational goal\ 3.2 Case studies and scenarios as a basis for discussion of issues and strategies in teamwork 3.3 Socio-drama and socio-metric methods 3.4 Sensitivity techniques 3.5 Written Test
4. Context for Assessment	4.1 Competency may be assessed in workplace or in a simulated workplace setting 4.2 Assessment shall be observed while task are being undertaken whether individually or in group

UNIT OF COMPETENCY: **SOLVE / ADDRESS GENERAL WORKPLACE PROBLEMS**

UNIT CODE: **400311212**

UNIT DESCRIPTOR: This unit covers the knowledge, skills and attitudes required to apply problem-solving techniques to determine the origin of problems and plan for their resolution. It also includes addressing procedural problems through documentation, and referral.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms are* elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify routine problems	1.1. Routine ***problems or procedural*** **problem** areas are identified. 1.2. Problems to be investigated are defined and determined. 1.3. Current conditions of the problem are identified and documented.	1.1 Current industry hardware and software products and services 1.2 Industry maintenance, service and helpdesk practices, processes and procedures 1.3 Industry standard diagnostic tools 1.4 Malfunctions and Resolutions	1.1 Identifying current industry hardware and software products and services 1.2 Identifying current industry maintenance, services and helpdesk practices, process and procedures. 1.3 Identifying current industry standards 1.4 Describing common malfunctions and resolutions 1.5 Determining the root cause
2. Look for solutions to routine problems	2.1 Potential solutions to the problem are identified. 2.2 Recommendations about possible solutions are developed, documented, ranked and presented to the appropriate person for decision	2.1 Current industry hardware and software product and services 2.2 Industry service and helpdesk practices, process and procedures	2.1 Identifying current industry hardware and software products and services 2.2 Identifying services and helpdesk practices, process and procedures

		2.3 Operating Systems 2.4 Industry standard diagnostic tools 2.5 Malfunctions and resolutions 2.6 Root cause analysis	2.3 Identifying operating system 2.4 Identifying current industry standard diagnostic tools 2.5 Describing common malfunctions and resolutions. 2.6 Determining the root cause of a routine malfunction
3. Recommend solutions to problems	3.1 Implementation of solutions are **planned.** 3.2 Evaluation of implemented solutions are planned 3.3 Recommended solutions are documented and submitted to the appropriate person for coordination	3.1 Standard procedures 3.2 Documentation produce	3.1 Producing documentation that recommends solutions to problems 3.2 Following established procedures

RANGE OF VARIABLES

1. Problems/Procedural Problem	May include: 1.1 Routine/non – routine processes and quality problems 1.2 Equipment selection, availability and failure 1.3 Teamwork and work allocation problem 1.4 Safety and emergency situations and incidents 1.5 Work-related problems outside of own work area
2. Appropriate person	May include 2.1 Supervisor or manager 2.2 Peers/work colleagues 2.3 Other members of the organization
3. Document	May include: 3.1 Electronic mail 3.2 Briefing notes 3.3 Written report 3.4 Evaluation report
4. Plan	May include: 4.1 Priority requirements 4.2 Co-ordination and feedback requirements 4.3 Safety requirements 4.4 Risk assessment 4.5 Environmental requirements

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Determined the root cause of a routine problem 1.2 Identified solutions to procedural problems. 1.3 Produced documentation that recommends solutions to problems. 1.4 Followed established procedures. 1.5 Referred unresolved problems to support persons
2. Resource Implications	2.1 Assessment will require access to a workplace over an extended period, or a suitable method of gathering evidence of operating ability over a range of situations.
3 Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Case Formulation 3.2 Life Narrative Inquiry 3.3 Standardized test The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components.
4 Context for Assessment	4.3 Competency may be assessed individually in the actual workplace or simulated environment in TESDA accredited institution

UNIT OF COMPETENCY: **DEVELOP CAREER AND LIFE DECISIONS**

UNIT CODE: **400311213**

UNIT DESCRIPTOR: This unit covers the knowledge, skills, and attitudes in managing one's emotions, developing reflective practice, and boosting self-confidence developing self-regulation.

ELEMENT	PERFORMANCE CRITERIA Italicized terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Manage one's emotion	1.1 ***Self-management strategies*** are identified. 1.2 Skills to work independently and to show initiative, to be conscientious, and persevering in the face of setbacks and frustrations are developed. 1.3 Techniques for effectively handling negative emotions and ***unpleasant situation*** in the workplace are examined.	1.1 Self-management strategies that assist in regulating behavior and achieving personal and learning goals (e.g. Nine self - management strategies according to Robert Kelley) 1.2 Enablers and barriers in achieving personal and career goals 1.3 Techniques in handling negative emotions and unpleasant situation in the workplace such as frustration, anger, worry, anxiety, etc.	1.1 Managing properly one's emotions and recognizing situations that cannot be changed and accept them and remain professional. 1.2 Developing self-discipline, working independently, and showing initiative to achieve personal and career goals 1.3 Showing confidence, and resilience in the face of setbacks and frustrations and other Negative emotions and unpleasant situations in the workplace

2 Develop reflective practice	2.1 Personal strengths and achievements, based on self-assessment strategies and teacher feedback are contemplated. 2.2 Progress when seeking and responding to feedback from teachers to assist them in consolidating strengths, addressing weaknesses and fulfilling their potential are monitored 2.3 Outcomes of personal and academic challenges by reflecting on previous problem solving and decision making strategies and feedback from peers and teachers are predicted.	2.1 Basic SWOT analysis 2.2 Strategies to improve one's attitude in the workplace 2.3 Gibbs' Reflective Cycle/Model (Description, Feelings, Evaluation, Analysis, Conclusion, and Action plan)	2.1 Using the basic SWOT analysis as self-assessment strategy 2.2 Developing reflective practice through realization of limitations, likes/ dislikes; through showing of self- confidence 2.3 Demonstrating self-acceptance and being able to accept challenges
3 Boost self-confidence and develop self-regulation	3.1 Efforts for continuous self-improvement are demonstrated. 3.2 Counter-productive tendencies at work are eliminated. 3.3 Positive outlook in life are maintained.	3.1 Four components of self-regulation based on Self - Regulation Theory (SRT) 3.2 Personality development concept 3.3 Self-help concepts (e. g., 7 Habits by Stephen Covey, transactional analysis, psycho spiritual concepts)	3.1 Performing effective communication skills – reading, writing, conversing skills 3.2 Showing affective skills – flexibility, adaptability, etc. 3.3 Self-assessment for determining one's strengths and weaknesses

RANGE OF VARIABLES

VARIABLE	RANGE
1. Self-management strategies	May include: 1.1 Seeking assistance in the form of job coaching or mentoring 1.2 Continuing dialogue to tackle workplace grievances 1.3 Collective negotiation/bargaining for better working conditions 1.4 Share your goals to improve with a trusted co-worker or supervisor 1.5 Make a negativity log of every instance when you catch yourself complaining to others 1.6 Make lists and schedules for necessary activities
2. Unpleasant situation	May include: 2.1 Job burn-out 2.2 Drug dependence 2.3 Sulking

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Express emotions appropriately 1.2 Work independently and show initiative 1.3 Consistently demonstrate self-confidence and self-discipline
2. Resource Implications	**The following resources should be provided:** 2.1 Access to workplace and resources 2.2 Case studies
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Demonstration or simulation with oral questioning 3.2 Case problems involving work improvement and sustainability issues 3.3 Third-party report
4. Context for Assessment	4.1 Competency assessment may occur in workplace or any appropriately simulated environment

UNIT OF COMPETENCY: **CONTRIBUTE TO WORKPLACE INNOVATION**

UNIT CODE: **400311214**

UNIT DESCRIPTOR: This unit covers the knowledge, skills, and attitudes required to make a pro-active and positive contribution to workplace innovation

ELEMENT	PERFORMANCE CRITERIA Italicized terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify opportunities to do things better	1.1 ***Opportunities for improvement*** are identified proactively in own area of work. 1.2 ***Information*** are gathered and reviewed which may be relevant to ideas and which might assist in gaining support for idea.	1.1 Roles of individuals in suggesting and making improvements. 1.2 Positive impacts and challenges in innovation. 1.3 Types of changes and responsibility. 1.4 Seven habits of highly effective people.	1.1 Identifying opportunities to improve and to do things better. Involvement 1.2 Identifying the positive impacts and the challenges of change and innovation 1.3 Identifying examples of the types of changes that are within and outside own scope of responsibility
2. Discuss and develop ideas with others	2.1 ***People who could provide input*** to ideas for improvements are identified. 2.2 Ways of approaching people to begin sharing ideas are selected 2.3 Meeting is set with relevant people. 2.4 Ideas for follow up are review and	2.1 Roles of individuals in suggesting an making improvements 2.2 Positive impacts and challenges in innovation 2.3 Types of changes and responsibility. 2.4 Seven habits of highly effective people	2.1 Identifying opportunities to improve and to do things better. Involvement 2.2 Identifying the positive impacts and the challenges of change and innovation 2.3 Providing examples of the types of changes that are within and outside own scope of responsibility 2.4 Communicating ideas for change

	selected based on feedback 2.5 ***Critical inquiry method*** is used to discuss and develop ideas with others.		through small group discussions and meetings
3. Integrate ideas for change in the workplace	3.1 Critical inquiry method is used to integrate different ideas for change of key people 3.2 Summarizing, analyzing and generalizing skills are used to extract salient points in the pool of ideas. 3.3 ***Reporting skills*** are likewise used to communicate results. 3.4 ***Current Issues and concerns*** on the systems, processes an procedures, as well as the need for simple innovative practices are identified.	3.1 Roles of individuals in suggesting and making improvements 3.2 Positive impacts and challenges in innovation 3.3 Types of changes and responsibility 3.4 Seven habits of highly effective people 3.5 Basic research skills	3.1 Identifying opportunities to improve and to do things better. Involvement 3.2 Identifying the positive impacts and the challenges of change and innovation 3.3 Providing examples of the types of changes that are within and outside own scope of responsibility 3.4 Communicating ideas for change through small group discussions and meetings 3.5 Demonstrating skills in analysis and interpretation of data

RANGE OF VARIABLES

VARIABLE	RANGE
1. Opportunities for improvement	May include: 1.1 Systems 1.2 Processes 1.3 Procedures 1.4 Protocols 1.5 Codes 1.6 Practices
2. Information	May include: 2.1 Workplace communication problems 2.2 Performance evaluation results 2.3 Team dynamics issues and concerns 2.4 Challenges on return of investment 2.5 New tools, processes and procedures 2.6 New people in the organization
3. People who could provide input	May include: 3.1 Leaders 3.2 Managers 3.3 Specialists 3.4 Associates 3.5 Researchers 3.6 Supervisors 3.7 Staff 3.8 Consultants (external) 3.9 People outside the organization in the same field or similar expertise/industry 3.10 Clients
4. Critical inquiry method	May include: 4.1 Preparation 4.2 Discussion 4.3 Clarification of goals 4.4 Negotiate towards a Win-Win outcome 4.5 Agreement 4.6 Implementation of a course of action 4.7 Effective verbal communication. See our pages: Verbal Communication and Effective Speaking 4.8 Listening 4.9 Reducing misunderstandings is a key part of effective negotiation 4.10 Rapport Building 4.11 Problem Solving 4.12 Decision Making 4.13 Assertiveness 4.14 Dealing with Difficult Situations

5. Reporting skills	May include: 5.1 Data management 5.2 Coding 5.3 Data analysis and interpretation 5.4 Coherent writing 5.5 Speaking

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Identified opportunities to do things better. 1.2 Discussed and developed ideas with others on how to contribute to workplace innovation. 1.3 Integrated ideas for change in the workplace. 1.4 Analyzed and reported rooms for innovation and learning in the workplace.
2. Resource Implications	**The following resources should be provided:** 2.1 Pens, papers and writing implements 2.2 Cartolina 2.3 Manila papers
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Psychological and behavioral Interviews 3.2 Performance Evaluation 3.3 Life Narrative Inquiry 3.4 Review of portfolios of evidence and third-party workplace reports of on-the-job performance 3.5 Sensitivity analysis 3.6 Organizational analysis 3.7 Standardized assessment of character strengths and virtues applied
4. Context for Assessment	4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions.

UNIT OF COMPETENCY : **PRESENT RELEVANT INFORMATION**

UNIT CODE : **400311215**

UNIT DESCRIPTOR : This unit covers the knowledge, skills, and attitudes required to present data/information appropriately.

ELEMENT	PERFORMANCE CRITERIA Italicized terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Gather data/ information	1.1 Evidence, facts and information are collected. 1.2 Evaluation, terms of reference and conditions are reviewed to determine whether data/information falls within project scope.	1.1. Organisational protocols 1.2. Confidentiality 1.3. Accuracy 1.4. Business mathematics and statistics 1.5. Data analysis techniques/ procedures 1.6. Reporting requirements to a range of audiences 1.7. Legislation, policy and procedures relating to the conduct of evaluation 1.8. Organisational values, ethics and codes of conduct	1.1. Describing organizational protocols relating to client liaison 1.2. Protecting confidentiality 1.3. Describin accuracy 1.4. Computing business mathematics and statistics 1.5. Describing data Analysis techniques/ Procedures 1.6. Reporting requirements to a range of audiences 1.7. Stating legislation, policy and procedures relating to the conduct of evaluation 1.8. Stating organizational values, ethics and codes of conduct

2. Assess gathered data/ information	2.1 Validity of data/ information is assessed. 2.2 Analysis techniques are applied to assess data information. 2.3 Trends and anomalies are identified. 2.4 ***Data analysis techniques*** and procedures are documented. 2.5 Recommendations are made on areas of possible improvement.	2.1 Business mathematics and statistic 2.2 Data analysis techniques/ procedure 2.3 Reporting requirements to a range of audiences 2.4 Legislation, policy and procedures relating to the conduct of evaluation 2.5 Organisational values, ethics and codes of conduct	2.1 Computing business mathematics and statistic 2.2 Describing data analysis techniques/ procedures 2.3 Reporting requirements to a range of audiences 2.4 Stating legislation, policy and procedures relating to the conduct of evaluations 2.5 Stating organizational values, ethics and codes of conduct
3. Record and present informati on	3.1 Studied data/ information are recorded. 3.2 Recommendations are analysed for action to ensure they are compatible with the project's scope and terms of reference. 3.3 Interim and final reports are analysed and outcomes are compared to the criteria established at the outset. 3.4 Findings are presented to stakeholders.	3.1 Data analysis techniques/ procedures 3.2 Reportin requirements to a range of audience 3.3 Legislation, polic and procedures relating to the conduct of evaluations 3.4 Organisational values, ethics and codes of conduct	3.1 Describing data analysis techniques/ procedures 3.2 Reporting requirements to a range of audiences 3.3 Stating legislation, policy and procedure relating to the conduct of evaluation 3.4 Statin organisationa values, ethic and codes of conduc practices

RANGE OF VARIABLES

VARIABLE	RANGE
1. Data analysis techniques	May include: 1.1Domain analysis 1.2Content analysis 1.3Comparison technique

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Determine data / information 1.2 Studied and applied gathered data/information 1.3 Recorded and studied data/information These aspects may be best assessed using a range of scenarios what ifs as a stimulus with a walk through forming part of the response. These assessment activities should include a range of problems, including new, unusual and improbable situations that may have happened.
2. Resource Implications	**Specific resources for assessment** 2.1 Evidence of competent performance should be obtained by observing an individual in an information management role within the workplace or operational or simulated environment.
3.Methods of Assessment	**Competency in this unit may be assessed through:** 3.1Written Test 3.2 Interview 3.3 Portfolio The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components.
4.Context for Assessment	4.1 In all workplace, it may be appropriate to assess this unit concurrently with relevant teamwork or operation units.

UNIT OF COMPETENCY	**:**	**PRACTICE OCCUPATIONAL SAFETY AND HEALTH POLICIES AND PROCEDURES**
UNIT CODE	**:**	**400311216**
UNIT DESCRIPTOR	**:**	This unit covers the knowledge, skills and attitudes required to identify OSH compliance requirements, prepare OSH requirements for compliance, perform tasks in accordance with relevant OSH policies and procedures.

ELEMENT	PERFORMANCE CRITERIA Italicized terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify OSH compliance requirements	1.1 Relevant ***OSH requirements, regulations, policies and procedures*** are identified in accordance with workplace policies and procedures. 1.2 OSH activity non conformities are conveyed to ***appropriate personnel*** 1.3 ***OSH preventive and control requirements*** are identified in accordance with OSH work policies and procedures.	1.1 OSH preventive and control requirements 1.2 Hierarchy of Controls 1.3 Hazard 1.4 Prevention and Control 1.5 General OSH principles1Work standards and procedures 1.6 Safe handling procedures of tools, equipment and materials 1.7 Standard emergency plan and procedures in the workplace	1.1. Communication skills 1.2. Interpersonal skills 1.3. Critical thinking\skills 1.4. Observation skills

2. Prepare OSH requirements for compliance	2.1 OSH work activity material, tools and equipment requirements are identified in accordance with workplace policies and procedures. 2.2 Required OSH materials, tools and equipment are acquired in accordance with workplace policies and procedures. 2.3 Required OSH materials, tools and equipment are arranged/ placed in accordance with OSH work standards.	2.1 Resources necessary to execute hierarchy of controls 2.2 General OSH Principles 2.3 Work standards and procedures 2.4 Safe handling procedures of tools, equipment and materials 2.5 Different OSH control measures	2.1 Communication skills 2.2 Estimation skills 2.3 Interpersonal Skills 2.4 Critical thinking Skills 2.5 Observation skills 2.6 Material, tool and equipment identification skills
3. Perform tasks in accordance with relevant OSH policies and procedures	3.1 Relevant OSH work procedures are identified in accordance with workplace policies and procedures. 3.2 Work Activities are executed in accordance with OSH work standards. 3.3 ***Non-compliance work activities*** are reported to *appropriate personnel*.	3.1 OSH work standards 3.2 Industry related work activities 3.3 General OSH principles 3.4 OSH Violations 3.5 Non - compliance work activities	3.1 Communication skills 3.2 Interpersonal skills 3.3 Troubleshooting skills 3.4 Critical thinking skills 3.5 Observation skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. OSH Requirements, Regulations, Policies and Procedures	May include: 1.1 Clean Air Act 1.2 Building code 1.3 National Electrical and Fire Safety Codes 1.4 Waste management statutes and rules 1.5 Permit to Operate 1.6 Philippine Occupational Safety and Health Standards 1.7 Department Order No. 13 (Construction Safety and Health) 1.8 ECC regulations
2. Appropriate Personnel	May include: 2.1 Manager 2.2 Safety Officer 2.3 EHS Offices 2.4 Supervisors 2.5 Team Leaders 2.6 Administrators 2.7 Stakeholders 2.8 Government Official 2.9 Key Personnel 2.10 Specialists 2.11 Himself
3. OSH Preventive and Control Requirements	May include: 3.1 Resources needed for removing hazard effectively 3.2 Resources needed for substitution or replacement 3.3 Resources needed to establishing engineering controls 3.4 Resources needed for enforcing administrative controls 3.5 Personal Protective equipment
4. Non OSH-Compliance Work Activities	May include non-compliance or observance of the following safety measures: 4.1 Violations that may lead to serious physical harm or death 4.2 Fall Protection 4.3 Hazard Communication 4.4 Respiratory Protection 4.5 Power Industrial Trucks 4.6 Lockout/Tag-out 4.7 Working at heights (use of ladder, scaffolding) 4.8 Electrical Wiring Methods 4.9 Machine Guarding 4.10 Electrical General Requirements 4.11 Asbestos work requirements 4.12 Excavations work requirements

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Convey OSH work non-conformities to appropriate personnel 1.2 Identify OSH preventive and control requirements in accordance with OSH work policies and procedures 1.3 Identify OSH work activity material, tools and equipment requirements in accordance with workplace policies and procedures 1.4 Arrange/Place required OSH materials, tools and equipment in accordance with OSH work standards 1.5 Execute work activities in accordance with OSH work standards 1.6 Report OSH activity non-compliance work activities to appropriate personnel
2. Resource Implications	**The following resources should be provided:** 2.1 Facilities, materials tools and equipment necessary for the activity
4. Methods of Assessment 5. Context for Assessment	**Competency in this unit may be assessed through:** 3.1 Observation/Demonstration with oral questioning 3.2 Third party report 4.1 Competency may be assessed in the work place or in a simulated work place setting

UNIT OF COMPETENCY	**:**	**EXERCISE EFFICIENT AND EFFECTIVE USTAINABLE PRACTICES IN THE WORKPLACE**
UNIT CODE	**:**	**400311217**
UNIT DESCRIPTOR	**:**	This unit covers knowledge, skills and attitude to identify the efficiency and effectiveness of resource utilization, determine causes of inefficiency and/or ineffectiveness of resource utilization and Convey inefficient and ineffective environmental practices..

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify the efficiency and effectiveness of resource utilization	1.1 Required resource utilization in the workplace is measured using appropriate techniques. 1.2 Data are recorded in accordance with workplace protocol. 1.3 Recorded data are compared to determine the efficiency and effectiveness of resource utilization according to established ***environmental work procedures***.	1.1 Importance of Environmental Literacy 1.2 Environmental Work Procedures 1.3 Waste Minimization 1.4 Efficient Energy Consumptions	1.1 Recording Skills 1.2 Writing Skills 1.3 Innovation Skills
2. Determine causes of inefficiency and/or ineffectiveness of resource utilization	2.1 Potential causes of inefficiency and/or ineffectiveness are listed. 2.2 Causes of inefficiency and/or ineffectiveness are identified through deductive reasoning.	2.1 Causes of environmental inefficiencies and ineffective-ness	2.1 Deductive Reasoning Skills 2.2Critical thinking 2.3 Problem Solving 2.4 Observation Skills

	2.3 Identified causes of inefficiency and/or ineffectiveness are validated thru established environmental procedures.		
3 Convey inefficient and ineffective environmental practices	3.1 Efficiency and effectiveness of resource utilization are reported to *appropriate personnel*. 3.2 Concerns related resource utilization are discussed with appropriate personnel. 3.3 Feedback on information/ concerns raised are clarified with appropriate personnel.	3.1 Appropriate Personnel to address the environmental hazards 3.2 Environmental corrective actions	3.1 Written and Oral Communication Skills 3.2 Critical thinking 3.3 Problem Solving 3.4 Observation Skills 3.5 Practice Environmental Awareness

RANGE OF VARIABLES

VARIABLE	RANGE
1. Environmental Work Procedures	May include: 1.1 Utilization of Energy, Water, Fuel Procedures 1.2 Waster Segregation Procedures 1.3 Waste Disposal and Reuse Procedures 1.4 Waste Collection Procedures 1.5 Usage of Hazardous Materials Procedures 1.7 Labeling Procedures
2. Appropriate Personnel	May include: 2.1 Manager 2.2 Safety Officer 2.3 EHS Offices 2.4 Supervisors 2.5 Team Leaders 2.6 Administrators 2.7 Stakeholders 2.8 Government Official 2.9 Key Personnel 2.10 Specialists 2.11 Himself

EVIDENCE GUIDE

1. Critical aspects of	**Assessment requires evidence that the candidate:**
1. Competency	1.1 Measured required resource utilization in the workplace using appropriate techniques 1.2 Recorded data in accordance with workplace protocol 1.3 Identified causes of inefficiency and/or ineffectiveness through deductive reasoning 1.4 Validate the identified causes of inefficiency and/or ineffectiveness thru established environmental procedures 1.5 Report efficiency and effectives of resource utilization to appropriate personnel 1.6 Clarify feedback on information/concerns raised with appropriate personnel
2. Resource Implications	**The following resources should be provided:** 2.1 Workplace 2.2 Tools, materials and equipment relevant to the tasks 2.3 PPE 2.4 Manuals and references
3.Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Demonstration 3.2 Oral questioning 3.3 Written examination
4. Context for Assessment	4.1 Competency assessment may occur in workplace or any appropriately simulated environment 4.2 Assessment shall be observed while task are being undertaken whether individually or in-group

UNIT OF COMPETENCY	**:**	**PRACTICE ENTREPRENEURIAL SKILLS IN THE WORKPLACE**
UNIT CODE	**:**	**400311218**
UNIT DESCRIPTOR	**:**	This unit covers the outcomes required to apply entrepreneurial workplace best practices and implement cost-effective operations.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Apply entrepreneurial workplace best practices	1.1 ***Good practices*** relating to workplace operations are observed and selected following workplace policy. 1.2 Quality procedures and practices are complied with according to workplace requirements. 1.3 Cost-conscious habits in ***resource utilization*** are applied based on industry standards.	1.1 Workplace best practices, policies and criteria 1.2 Resource utilization 1.3 Ways in fostering entrepreneurial attitudes: • Patience • Honesty • Quality-consciousness • Safety-consciousness • Resourcefulness	1.1 Communication skills 1.2 Complying with Quality procedures
2. Communicate entrepreneurial workplace best practices	2.1 Observed good practices relating to workplace operations are communicated to **appropriate person**. 2.2 Observed quality procedures and practices are communicated to appropriate person. 2.3 Cost-conscious habits in resource utilization are Communicated	2.1 Workplace best practices, policies and criteria 2.2 Resource utilization 2.3 Ways in fostering entrepreneurial attitudes: • Patience • Honesty • Quality-consciousness • Safety-consciousness	2.1 Communication skills 2.2 Complying with Quality procedures 2.3 Following Workplace communication protocol

	based on industry standards	• Resourceful-ness	
3. Implement cost-effective operations	3.1 Preservation and optimization of workplace resources is implemented in accordance with enterprise policy. 3.2 Judicious use of workplace tools, equipment and materials are observed according to manual and work requirements 3.3 Constructive contributions to office operations are made according to enterprise requirements. 3.4 Ability to work within one's allotted time and finances is sustained.	3.1 Optimization of workplace resources 3.2 5S procedures and concepts 3.3 Criteria for cost effectiveness 3.4 Workplace productivity 3.5 Impact of entrepreneurial mindset to workplace productivity 3.6 Ways in fostering entrepreneurial attitudes: ● Quality-consciousness ● Safety - consciousness	3.1 Implementing preservation and optimizing workplace resources 3.2 Observing judicious use of workplace tools, equipment and materials 3.3 Making constructive contributions to office operations 3.4 Sustaining ability to work within allotted time and finances

RANGE OF VARIABLES

VARIABLE	RANGE
1. Good practices	May include: 1.1 Economy in use of resources 1.2 Documentation of quality practices
2. Resources utilization	May include: 2.1 Consumption/ use of consumables 2.2 Use/Maintenance of assigned equipment and furniture 2.3 Optimum use of allotted /available time

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Demonstrated ability to identify and sustain cost-effective activities in the workplace 1.2 Demonstrated ability to practice entrepreneurial knowledge, skills and attitudes in the workplace.
2. Resource Implications	**The following resources should be provided:** 2.1 Simulated or actual workplace 2.2 Tools, materials and supplies needed to demonstrate the required tasks 2.3 References and manuals 2.3.1 Enterprise procedures manuals 2.3.2 Company quality policy
3. Methods of Assessment	**Competency in this unit should be assessed through:** 3.1 Interview 3.2 Third-party report
4. Context for Assessment	4.1 Competency may be assessed in workplace or in a simulated workplace setting 4.2 Assessment shall be observed while tasks are being undertaken whether individually or in-group

COMMON COMPETENCIES

UNIT OF COMPETENCY : **APPLY SAFETY PRACTICES**

UNIT CODE : **MEE721201**

UNIT DESCRIPTOR : This unit covers the competencies required to apply safety practices in the workplace during underwater operations

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify hazardous area	1.1 Hazards are identified correctly in accordance with OHS principles. 1.2 Safety signs and symbols are identified and adhered to.	1.1 symbols and 1.2 Safety precautionary measures 1.3Housekeeping 1.4 Machine tools 1.5 First aid 1.6 Engineering materials 1.7 Fire extinguisher	1.1 Operating machine tools 1.2 Handling tools and materials 1.3 Communicating with superiors and co-workers 1.4 Interpreting instructions
2. Use protective clothing and devices	2.1 Appropriate protective clothing and devices correctly selected and used in accordance with OHS requirements or industry/company policy	2.1. Shop safety signs, symbols and alarms 2.2. Safety precautionary measures 2.3. Housekeeping 2.4 Machine tools 2.5. First aid	2.1 Operating machine tools 2.2 Handling tools and materials 2.3 Communicating with superiors and coworkers 2.4 Interpreting instructions

		2.6. Engineering materials 2.7. Fire extinguisher	
3. Perform safe handling of tools, equipment and materials	3.1 Safety procedures for pre-use check and operation of tools and equipment followed in accordance with industry/ company policies. 3.2 Tools, equipment and materials handled safely in accordance with OHS requirements and industry/ company policies.	3.1 Shop safety signs, symbols and alarms 3.2 Safety precautionary measures 3.2 Housekeeping 3.3 Machine tools 3.4 First aid 3.5 Engineering materials 3.6 Fire extinguishers	3.1 Operating machine tools 3.2 Handling tools and materials 3.3 Communicating with superiors and co- workers 3.4 Interpreting instructions
4. Perform first aid	4.1 First aid treatment of injuries are carried out according to recommended procedures	4.1 Shop safety signs, symbols and alarms 4.2 Safety precautionary measures 4.3Housekeeping 4.4 Machine tools 4.5 First aid 4.6 Engineering materials 4.7 Fire extinguishers	4.1 Operating machine tools 4.2 Handling tools and materials 4.3 Communicating with superiors and co-workers 4.4Interpreting instructions

5. Use fire extinguisher	5.1 Fire extinguisher selected and operated correctly according to the type of fire.	5.1 Shop safety signs, symbols and alarms 5.2 Safety precautionary measures	5.1 Operating machine tools 5.2 Handling tools and materials

RANGE OF VARIABLES

VARIABLE	RANGE
1. Hazards	Hazard may include but are not limited to 1.1. Physical Hazards ● Sharp or Abrasive Surfaces ● Moving Propellers ● Falling Objects ● Entanglement 1.2. Environmental Hazards ● Poor Visibility: ● Cold Water Temperatures: ● Strong Currents or Tides: ● Marine Life 1.3. Chemical Hazards ● Toxic Coatings ● Cleaning Chemicals 1.4 Mechanical Hazards ● Tool-Related Injuries ● Vibration and Noise 1.5 Health and Respiratory Hazards ● Contaminated Water ● Decompression Sickness ● Hypoxia or Hyperoxia 1.6 Operational Hazards ● Equipment Failure ● Inadequate Training ● Improper Communication 1.7 Vessel-Related Hazard

	● Sudden Vessel Movement ● Electromagnetic Interference 1.8 Psychological Hazards ● Claustrophobia or Anxiety ● Fatigue
2. Protective clothing and devices	Protective clothing and devices may include but is not limited to: 2.1 Protective clothing ● Wet Suit or Dry Suit ● Dive Gloves ● Booties ● Hood or Helmet Liner 2.2 Breathing Equipment ● Surface-Supplied Air System (SSA) ● Full-Face Dive Mask or Helmet 2.3 Safety Devices ● Harness ● Communication System ● Cutting Tools ● Underwater Light

3. Injuries	Injuries may include: 3.1 On Board Vessel ● Slips, Trips, and Falls ● Musculoskeletal Injuries ● Cuts and Lacerations ● Burns ● Electrical Shock ● Crushing Injuries ● Exposure to Hazardous Materials ● Hypothermia and Heat Exhaustion 3.2 Underwater ● Drowning or Near-Drowning ● Barotrauma ● Decompression Sickness (The Bends) ● Cuts and Lacerations ● Hypothermia ● Chemical Burns ● Underwater Equipment Malfunctions ● Disorientation or Panic ● Entanglement ● Fatigue or Exhaustion
4 Type of fires	Fires involving or caused by: 4.1 common combustibles (wood, cloth, paper, rubber and plastic) 4.2 flammable liquids (gasoline, oil, solvents, paints, etc.) 4.3 energized electrical equipment (wiring, fuse boxes, circuit breakers, appliances, etc. 4.4 combustible metals (magnesium, sodium, etc.)

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 identified hazardous area 1.2 used protective clothing and devices

	1.3 handled tools, equipment and materials properly 1.4 performed first aid 1.5 used fire extinguisher
2. Underpinning knowledge and attitude	2.1 Shop safety signs, symbols and alarms 2.2 Safety precautionary measures 2.3 Housekeeping 2.4 Machine tools
	2.5 First aid 2.6 Engineering materials 2.7 Fire extinguishers
3. Underpinning skills	3.1 Operating machine tools 3.2 Handling tools and materials 3.3 Communicating with superiors and co-workers 3.4 Interpreting instructions
4. Resource implications	The following resources must be provided 4.1 Tools, equipment and facilities appropriate to processes or activity 4.2 Materials relevant to the proposed activity
5. Method of assessment	Competency must be assessed through: 5.1Demonstration 5.2Written or oral short answer questions 5.3Practical exercises
6. Context for assessment	6.1 Competency may be assessed in the workplace or in simulated workplace environment.

UNIT OF COMPETENCY	**:**	**INTERPRET SHIP DESIGN**
UNIT CODE	**:**	
UNIT DESCRIPTOR	**:**	This unit applies to individuals working in marine engineering, naval architecture, shipbuilding, or related industries. It includes interpreting design documents to support construction, maintenance, and repair processes.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Analyze ship design documentation	1.1 Accurately identify and interpret key components of **ship design documents**, including structural, system, and operational diagrams. 1.2 Recognize the different **types of ships** and understand the meaning of symbols, terminologies, and notations used in ship design documentation.. 1.3 Ensure design documentation is complete and consistent before proceeding with construction, modification, or repair work.	1.1 Principles of ship design and naval architecture, including stability, buoyancy, and structural integrity. 1.2 Components and functions of ship systems (e.g., propulsion, steering, electrical, and safety systems). 1.3 Standard ship design symbols, notations, and terminology. 1.4 Regulations and standards for ship design and construction (e.g., SOLAS, MARPOL, class society rules). 1.5 Methods for reading and interpreting technical drawings and schematics. 1.6 Measurement systems, scaling, and dimensional	1.1. Reading and interpreting blueprints, technical drawings, and schematics. 1.2. Analyzing ship design data for accuracy, completeness, and applicability. 1.3. Conveying technical information to stakeholders, including engineers and crew.

		analysis in design documents.	1.4. Identifying and resolving discrepancies or conflicts in design documents. 1.5. Ensuring accurate interpretation of symbols, scales, and dimensions.
2. Interpret ship structure and layout	2.1 Correctly identify the ship's primary structural components, such as the hull, decks, bulkheads, and superstructure 2.2 Analyze the **ship's layout** to accurately locate functional spaces like engine rooms, cargo holds, and accommodation areas. 2.3 Use accurate measurements and scale interpretation to confirm that the design aligns with regulatory and operational requirements.	2.1 Principles of ship design and naval architecture, including stability, buoyancy, and structural integrity. 2.2 Components and functions of ship systems (e.g., propulsion, steering, electrical, and safety systems). 2.3 Standard ship design symbols, notations, and terminology. 2.4 Regulations and standards for ship design and construction (e.g., SOLAS, MARPOL, class society rules). 2.5 Methods for reading and interpreting technical drawings and schematics.	2.1 Reading and interpreting blueprints, technical drawings, and schematics. 2.2 Analyzing ship design data for accuracy, completeness, and applicability. 2.3 Conveying technical information to stakeholders, including engineers and crew 2.4 Identifying and

		2.6 Measurement systems, scaling, and dimensional analysis in design documents.	resolving discrepancies or conflicts in design documents 2.5 Ensuring accurate interpretation of symbols, scales, and dimensions.
3. Determine ship systems and their integration	3.1 Correctly identify the components and functions of key ship systems (propulsion, electrical, plumbing, safety). 3.2 Correctly identify the components and functions of key **ship systems** (propulsion, electrical, plumbing, safety). 3.3 Assess whether systems meet operational, safety, and regulatory requirements, including redundancy or backup systems	3.1 Principles of ship design and naval architecture, including stability, buoyancy, and structural integrity. 3.2 Components and functions of ship systems (e.g., propulsion, steering, electrical, and safety systems). 3.3 Standard ship design symbols, notations, and terminology. 3.4 Regulations and standards for ship design and construction (e.g., SOLAS, MARPOL, class society rules) 3.5 Methods for reading and interpreting technical drawings and schematics. 3.6 Measurement systems, scaling, and dimensional	3.1 Reading and interpreting blueprints, technical drawings, and schematics. 3.2 Analyzing ship design data for accuracy, completeness, and applicability. 3.3 Conveying technical information to stakeholders, including engineers and crew. 3.4 Identifying and resolving discrepancies or

		analysis in design documents.	conflicts in design documents. 3.5 Ensuring accurate interpretation of symbols, scales, and dimensions.
4. Apply Design Information in Operational Contexts	4.1 Effective **Practical application** of design data ensures that work is carried out correctly, on schedule, and within budget, while meeting safety standards 4.2 Identify any discrepancies or conflicts in design documentation that may impact operational performance or safety, and take corrective action 4.3 Communicate design-related issues and information clearly and accurately to all stakeholders (e.g., engineers, construction team, regulatory authorities).	4.1 Principles of ship design and naval architecture, including stability, buoyancy, and structural integrity. 4.2 Components and functions of ship systems (e.g., propulsion, steering, electrical, and safety systems). 4.3 Standard ship design symbols, notations, and terminology 4.4 Regulations and standards for ship design and construction (e.g., SOLAS, MARPOL, class society rules). 4.5 Methods for reading and interpreting technical drawings and schematics 4.6 Measurement systems, scaling, and	4.1 Reading and interpreting blueprints, technical drawings, and schematics. 4.2 Analyzing ship design data for accuracy, completeness, and applicability. 4.3 Conveying technical information to stakeholders, including engineers and crew. 4.4 Identifying and resolving discrepancies or conflicts in design

		dimensional analysis in design documents.	documents. 4.5 Ensuring accurate interpretation of symbols, scales, and dimensions.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Type of Ship	Type of ships may include but is not limited to 1.1 Commercial Ships: 1.2 Passenger Ships: 1.3 Specialized Ships: 1.4 Recreational Vessels
2. Ship Design Documents	Documentation may include 2.1 General Arrangement (GA) Drawings: 2.1.1 Structural Drawing 2.1.2 System Diagrams 2.1.3 Material Specifications
3. Ship Layout	Ship Layout may vary from 3.1 Simple Layouts 3.2 Complex Layouts:
4. Ship System	Type of Systems 4.1 Ship Type and Functionality 4.2 Power and Propulsion Systems 4.3 Ship Structure and Materials 4.4 Navigational Systems 4.5 Safety and Emergency Systems 4.6 Environmental and Emissions Control 4.7 Water and HVAC System 4.8 Automation and Control Systems 4.9 Crew and Accommodation System 4.10 Regulatory Compliance and Maintenance 4.11 Operational Considerations

5. Practical Application	Practical Application may include: 5.1 Operational Environment 5.2 System Complexity 5.3 Resource Availability 5.4 Performance Requirements 5.5 Cost and Budget Consideration 5.6 Regulatory Compliance 5.7 Maintenance and Support

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate interpreted Ship design: 1.1 Accurately identify and interpret key components of **ship design documents**, including structural, system, and operational diagrams. 1.2 Identify the meaning of symbols, terminologies, and notations used in ship design documentation. 1.3 Ensure design documentation is complete and consistent before proceeding with construction, modification, or repair work. 1.4 Correctly identify the ship's primary structural components, such as the hull, decks, bulkheads, and superstructure. 1.5 Analyze the **ship's layout** to accurately locate functional spaces like engine rooms, cargo holds, and accommodation areas. 1.6 Use accurate measurements and scale interpretation to confirm that the design aligns with regulatory and operational requirements. 1.7 Correctly identify the components and functions of key **ship systems** (propulsion, electrical, plumbing, safety). 1.8 Analyze the integration of systems to ensure they work cohesively within the overall design and operational requirements. 1.9 Assess whether systems meet operational, safety, and regulatory requirements, including redundancy or backup systems. 1.10 Use design documentation to plan, manage, and execute construction, maintenance, or repair activities efficiently 1.11 Identify any discrepancies or conflicts in design documentation that may impact operational performance or safety, and take corrective action

	1.12 Communicate design-related issues and information clearly and accurately to all stakeholders
2. Resource implications	The following resources must be provided 2.1 Ship Design Manuals/Guide 2.2 Standard Operating Procedures (SOPs) 2.3 Industry Guidelines and Codes 2.4 Detailed drawings (e.g., general arrangement drawings, structural drawings) that need to be interpreted. 2.4 Simulated work environment 2.5 Access to Regulatory Documentation
3. Method of assessment	Competency must be assessed through: 3.1 direct observation 3.2 written or oral short answer questions 3.3 demonstration 3.4 project/work sample 3.5 portfolio
4. Context for assessment	Competency may be assessed in the workplace or in 4.1 simulated workplace environment.

UNIT OF COMPETENCY	:	**PERFORM CALCULATIONS FOR UNDERWATER ACTIVITIES**
UNIT CODE	:	
UNIT DESCRIPTOR	:	This unit involves performing various calculations to ensure the accurate estimation of resources, time, and costs involved in underwater operations. These calculations are crucial for ensuring efficient operations, compliance with safety and environmental regulations, and optimal cost management

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify Calculation Requirements	1.1 Accurately assess the task requirements based on the type of vessel and condition 1.2 Gather necessary data and documentation on related to the **vessel's size, type.**	1.1 Understanding different materials and coatings, and how they impact cleaning methods. 1.2 Knowledge of different affects performance. 1.3 Ability to calculate time estimates based on project scope, size of vessel, and chosen methods. 1.4 Understanding the types and quantities of materials and personnel required 1.5 Familiarity with how to calculate operational costs, including labor, materials, equipment, and disposal. 1.6 Awareness of the environmental	1.1 Analytical Skills: 1.2 Problem-Solving Skills 1.3 Attention to Detail: 1.4 Communication Skills: 1.5 Technical Proficiency

		impact of underwater cleaning, including waste disposal and chemical usage.	
2. Time and Resource Calculations	2.1 Accurately calculate time estimates for cleaning and polishing based on previous job data or industry standards 2.2 Ensure resource requirements are within operational limits, optimizing efficiency 2.3 Make calculations that consider **environmental factors** (e.g., weather, water temperature) that can affect operational time.	2.1 Understanding different materials and coatings, and how they impact cleaning methods. 2.2 Knowledge of different affects performance. 2.3 Ability to calculate time estimates based on project scope, size of vessel, and chosen methods. 2.4 Understanding the types and quantities of materials and personnel required 2.5 Familiarity with how to calculate operational costs, including labor, materials, equipment, and disposal 2.6 Awareness of the environmental impact of underwater cleaning, including waste disposal and chemical usage	2.1 Analytical Skills: 2.2 Problem-Solving Skills 2.3 Attention to Detail: 2.4 Communication Skills: 2.5 technical Proficiency
3. Cost Estimation Accuracy	3.1 Use relevant pricing data for	Understanding different materials and coatings, and	3.1 Analytical Skills:

	materials, labor, and equipment to create a precise cost estimation 3.2 Ensure that all costs, including safety precautions, are included in the final budget. 3.3 Provide detailed, transparent cost breakdowns for clients or stakeholders	how they impact cleaning methods. 3.2 Knowledge of different affects performance. 3.3 Ability to calculate time estimates based on project scope, size of vessel, and chosen methods. 3.4 Understanding the types and quantities of materials and personnel required 3.5 Familiarity with how to calculate operational costs, including labor, materials, equipment, and disposal 3.6 Awareness of the environmental impact of underwater cleaning, including waste disposal and chemical usage	3.2 Problem-Solving Skills 3.3 Attention to Detail: 3.4 Communication Skills 3.5 Technical Proficiency

4. Measure and Analyze Data	4.1 take accurate measurements of cleaned or polished surfaces to confirm compliance with industry standard 4.2 Compare before-and-after performance data to demonstrate improvements in fuel efficiency or vessel performance.	4.1 Understanding different materials and coatings, and how they impact cleaning methods. 4.2 Knowledge of different affects performance. 4.3 Ability to calculate time estimates based on project scope, size of vessel, and chosen methods. 4.4 Understanding the types and quantities of materials and personnel required 4.5 Familiarity with how to calculate operational costs, including labor, materials, equipment, and disposa 4.6 Awareness of the environmental impact of underwater cleaning, including waste disposal and chemical usage	4.1 Analytical Skills: 4.2 Problem-Solving Skills 4.3 Attention to Detail: 4.4 Communication Skills: 4.5 Technical Proficiency

RANGE OF VARIABLES

VARIABLE	RANGE
1. Vessel Size and Type	Different vessel categories (e.g., large tankers, cargo ships, luxury yachts) will require varied calculations
2. Environmental Factors	Water depth, temperature, and weather conditions can all impact the operation's duration and resource use.

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate performed calculations: 1.1 Accurate identification of the scope of calculations and variables. 1.2 Effective time and resource planning that aligns with the complexity of the task and environmental factors 1.3 Comprehensive cost estimation that covers all foreseeable expenses, including safety and environmental considerations. 1.4 Precise data collection and analysis to ensure operational objectives are met and opportunities for improvement are identified.
2. Resource implications	The following resources must be provided 2.1 Tools and facilities appropriate to processes or activity 2.2 Materials relevant to the proposed activity
3. Method of assessment	Competency must be assessed through: 3.1 written or oral short answer questions 3.2 practical exercises
4. Context for assessment	Competency may be assessed in the workplace or in simulated 4.1 workplace environment.

UNIT OF COMPETENCY	**:**	**CONTRIBUTE TO QUALITY SYSTEM**
UNIT CODE	**:**	**MEE721204**
UNIT DESCRIPTOR	**:**	This unit involves competence required to inspect work against specification and standards and apply quality standards to work.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Inspect work done	1.1 Appropriate inspections are conducted to ensure company ***quality systems and procedures*** are maintained / followed. 1.2 Job specifications/work order and quality standards are identified. 1.3 Faults/Defects are identified and rectified according to company procedures.	1.1 Communication/ feedback methods- written and verbal 1.2 Company systems, processes and work quality requirements 1.2 Work inspection techniques 1.3 Quality assurance principles 1.4 Safety precautionary measures 1.5 Handling materials, tools and equipment	1.1 Problem solving skills 1.2 Communicating with superiors and co-workers 1.3 Interpreting job specification and work order

2. Apply quality standards to work	2.1 Inspections are conducted throughout the manufacturing processes to ensure quality standards are maintained. 2.2 Appropriate quality standards are applied throughout the production/ fabrication process. 2.3 All activities are coordinated throughout the workplace to ensure efficient quality work outcomes 2.4 Records of work quality are maintained according to the company requirements	2.1 Communication/ feedback methods-written and verbal 2.2 Company systems, processes and work quality requirements 2.3 Work inspection techniques 2.4 Quality assurance principles 2.5 Safety precautionary measures 2.6 Handling materials, tools and equipment	2.1 Problem solving skills 2.2 Communicating with superiors and co-workers 2.3 Interpreting job specification and work order

3 Protect company property and customer interests	3.1 Possible damage to ***company property*** is avoided by adherence to company quality 3.2 procedures. Quality of work is reviewed to ensure customer requirements and company standards are met.	3.1 Communication/ feedback methods-written and verbal 3.2 Company systems, processes and work quality requirements 3.3 Work inspection techniques 3.4 Quality assurance principles 3.5 Safety precautionary measures 3.6 Handling materials, tools and equipment	3.1 Problem solving skills 3.2 Communicating with superiors and co-workers 3.3 Interpreting job specification and work order

RANGE OF VARIABLES

VARIABLE	RANGE
1. Quality system and procedures	Quality system and procedures may be contained in: 1.1 work instructions 1.2 safe work procedures 1.3 product specifications 1.4 equipment maintenance schedules 1.5 technical procedures adopted or specifically prepared standards 1.6 company/industry rules
2. Company property	Company properties includes : 2.1 production and/or fabrication equipment 2.2 hand and power tools 2.3 OH&S paraphernalia 2.4 facilities

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 inspected work done against specification 1.2 applied quality standards to work 1.3 protected company property and customer interests
2. Resource implications	The following resources must be provided 2.1 Tools, equipment and facilities appropriate to processes or activity 2.2 Materials relevant to the proposed activity
3. Method of assessment	Competency must be assessed through: 3.1 Demonstration 3.2 Written or oral short answer questions 3.3 Practical exercises
4. Context for assessment	Competency may be assessed in the workplace or in simulated workplace environment.

UNIT OF COMPETENCY	**:**	**USE HAND TOOLS**
UNIT CODE	**:**	
UNIT DESCRIPTOR	**:**	This unit of competencies required to use hand tools for underwater maintenance

ELEMENTS	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Select hand tools	1.1 ***Hand tools*** selected are appropriate to the requirements of the ***task*** 1.2 Unsafe or defective tools are identified and marked for repair according to procedure.	1.1 Types and uses of hand tools 1.2 Hand tool defects 1.3 Procedure, principles and techniques in maintenance of hand tools	1.1 Handling tools and material 1.2 Communicating with superiors and coworkers 1.3 Interpreting instructions
2. Use hand tools	2.1 Hand tools are used to produce the desired outcomes to job specification 2.2 Task performed in accordance with company or industry safety procedure.	2.1 Types and uses of hand tools 2.2 Hand tool defects 2.3 Procedure, principles and techniques in maintenance of hand tools	2.1 Handling tools and materials 2.2 Communicating with superiors and coworker 2.3 Interpreting instructions

3. Maintain hand tools	3.1 Routine maintenance of hand tools is undertaken according to standard operating procedures, principles and techniques. 3.2 Hand tools are stored in designated locations in accordance with manufacturer's instruction/standard operating procedure.	3.1 Types and uses of hand tool 3.2 Hand tool defects 3.3 Procedure, principles and techniques in maintenance of hand tools	3.1 Handling tools and materials 3.2 Communicating with superiors and coworkers 3.3 Interpreting instructions

RANGE OF VARIABLES

VARIABLE	RANGE
1. Hand tools	Hand tools includes but not limited to: 1.1 Scrapers and Cleaning Tools 1.2 Polishing Tools 1.3 Cutting Tools 1.4 Grinding Tool 1.5 Diving and Safety tools 1.6 Wrenches and Fasteners 1.7 Sealant and Adhesive Application Tools 1.8 Measuring and Inspection Tools 1.9 Cleaning and Debris Removal Tools
2. Task	Tasks may include: 2.1 Adjusting 2.2 Dismantling 2.3 Assembling 2.4 Finishing of item or components
3. Routine maintenance	Routine maintenance may include*:* 3.1 Cleaning 3.2 Lubricating 3.3 Tightening 3.4 Simple tool repair 3.5 Hand sharpening

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1Selected and used hand tools appropriate to the job 1.2Performed routine maintenance and storage of hand tools
2. Resource implications	The following resources must be provided 2.1 Tools, equipment and facilities appropriate to the process or activity 2.2 Materials relevant to the proposed activity
3. Method of assessment	Competency must be assessed through: 3.1 Demonstration 3.2 Written or oral short answer questions 3.3 Practical exercises
4. Context for assessment	Competency may be assessed in the workplace or in simulated workplace environment.

UNIT OF COMPETENCY	**:**	**TAKE IMMEDIATE ACTION UPON ENCOUNTERING AN ACCIDENT OR OTHER MEDICAL EMERGENCY**
UNIT CODE	**:**	
UNIT DESCRIPTOR	**:**	This unit covers the knowledge, skills, and attitudes in taking immediate action upon encountering an accident or other medical emergency

ELEMENTS	**PERFORMANCE CRITERIA** ***Italicized*** terms are elaborated in the Range of Variables	**REQUIRED KNOWLEDGE**	**REQUIRED SKILLS**
1. Determine the need of casualty	1.1 ***Patient*** condition is determined in accordance with established first aid procedures and the nature of injury or illness is established. 1.2 Probable cause, nature and extent of ***injuries*** is identified and appropriate action is taken to prevent further harm to the victim and to self. 1.3 The position of the patient is adjusted to optimize personal	1.1 Relevant sections of maritime regulations 1.2 Emergencies, injuries and medical problems that may occur on board a vessel and appropriate action, treatments and solutions 1.3 Relevant OH&S and health legislation and policies 1.4 Duties and responsibilities of the designated first aid officer on board a vessel 1.5 First aid procedures 1.6 Shipboard procedures for:	1.1 Providing first-aid on board a vessel 1.2 Identifying and problems and emergencies and taking appropriate courses of action 1.3 Applying aseptic and other precautionary techniques when carrying out first-aid procedures on board a vessel

	comfort for the medical condition or injury concerned. 1.4 Where there are doubts over the seriousness of the injury or illness and how to treat the patient, assistance is sought from senior officers or shore-based medical advisers.	1.6.1 conducting an initial patient first aid assessment 1.6.2 managing injuries 1.6.3 managing medical emergencies 1.6.4 carrying out resuscitation techniques 1.7 Techniques for care of wounds 1.8 Ways in which disease can spread on board a vessel and ways of preventing the spread 1.9 Legal issues related to the administration of drugs and medicines on board a vessel 1.10 Knowledge of body structures and functions relevant to possible injury, illnesses and disease that may be encountered	

		on board a vessel 1.11 Maritime communication techniques related to health care and receiving radio medical advice from shore-based advisers 1.12 Marine publications containing information on first aid and medical treatment on board a vessel	
2. Administer first-aid to the victim	2.1 Appropriate first aid procedures are used to treat the identified injury or illness in accordance with the first-aider's limits of responsibility. 2.2 Aseptic techniques are applied during any wound dressing. 2.3 Hygiene measures are used that are appropriate for the	2.1 Relevant sections of maritime regulations 2.2 Emergencies, injuries and medical problems that may occur on board a vessel and appropriate action, treatments and solutions 2.3 Relevant OH&S and health legislation and policies 2.4 Duties and responsibilities of the designated	2.1 Providing first-aid on board a vessel 2.2 Identifying and problems and emergencies and taking appropriate courses of action 2.3 Applying aseptic and other precautionary techniques when carrying out first-aid procedures on board a vessel

	degree of illness or injury. 2.4 Cardio-pulmonary resuscitation techniques are correctly applied where required. 2.5 Condition of the patient is regularly monitored both visually and through appropriate measures of bodily signs. 2.6Health precautions and disease prevention measures are implemented in accordance with regulatory requirements and company procedures. 2.7 Appropriate action is taken if there are signs of a deterioration in the condition of the patient. 2.8 Where necessary, assistance is provided in the preparation	first aid officer on board a vessel 2.5 First aid procedures 2.6 Shipboard procedures for: 2.6.1 conducting an initial patient first aid assessment 2.6.2 managing injuries 2.6.3 managing medical emergencies 2.6.4 carrying out resuscitation techniques 2.7 Techniques for care of wounds 2.8 Ways in which disease can spread on board a vessel and ways of preventing the spread 2.9 Legal issues related to the administration of drugs and medicines on board a vessel 2.10 Knowledge of body structures and	

	and transporting of the victim.	functions relevant to possible injury, illnesses and disease that may be encountered on board a vessel 2.11 Maritime communication techniques related to health care and receiving radio medical advice from shore-based advisers 2.12 Marine publications containing information on first aid and medical treatment on board a vessel	

RANGE OF VARIABLES

VARIABLE	RANGE
1. Patient	May include patient having: 1.1 Heart attack 1.2 Stroke 1.3 Asthma attack 1.4 Diabetes 1.5 Epilepsy seizures
2. Injuries	Injuries on board a vessel may include: 1.4 External bleeding 1.4.1 An amputation 1.4.2 A foreign body in the eye 1.4.3 A penetrating chest wound 1.4.4 A nose bleed 1.4.5 Internal bleeding 1.4.6 Fractures, sprains, strains and dislocations 1.4.7 Electric shock 1.4.8 Asphyxia 1.4.9 Barotrauma 1.4.10 Decompression Sickness (The Bends) 1.4.11 Drowning or Near-Drowning 1.4.12 Hypothermia 1.4.13 Underwater Equipment Malfunctions 1.4.14 Fatigue or Exhaustion 1.4.15 Entanglement 1.4.16 Disorientation or Panic 1.4.17 Chemical Burns

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate : 1.1 identified and prioritized the need for medical first aid in life-threatening medical emergencies 1.2 administered first aid on board a vessel\ 1.3 communicated effectively with others during medical emergencies and health care
2. Resource Implications	The following resources should be provided: 2.1 workplace with recommended facilities 2.2 tools and equipment appropriate to the activity 2.3 materials relevant to the proposed activity and tasks
3. Methods of Assessment	Competency in this unit must be assessed through:\ 3.1 Demonstration and questioning of related underpinning Knowledge 3.2 Written examination 3.3 Portfolio
4. Context of Assessment	4.1 Competency may be assessed in workplace or in a simulated workplace setting

UNIT OF COMPETENCY	**:**	**TAKE PRECAUTIONS TO PREVENT POLLUTION OF THE MARINE ENVIRONMENT**
UNIT CODE	**:**	**MTM834213**
UNIT DESCRIPTOR	**:**	This unit covers the knowledge, skills and attitudes in taking precautions towards protection of the marine environment

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Practice compliance with legislative requirements for protection of the marine environment	1.1 Relevant regulations and procedures for the ***protection of the marine environment*** are identified. 1.2 Appropriate action is taken in day-to-day work to ensure compliance with relevant regulations and procedures for the protection of the marine environment as required. 1.3 Appropriate action is taken where incidences	1.1. Completing activities aimed at compliance with relevant regulatory requirements for protection of the marine environment 1.2. Identifying and evaluating problems related to compliance with relevant regulations for environmental protection and determining an appropriate course of action 1.3. Following anti-pollution procedures	1.1 Completing activities aimed at compliance with relevant regulatory requirements for protection of the marine Environment 1.2 Identifying and evaluating problems related to compliance with relevant regulations for environmental protection and determining an appropriate courses of action 1.3 Following anti-pollution procedures

	of non-compliance or potential non-compliance are identified in accordance with regulations and procedures 1.4 Any breach of regulations and procedures concerning protection of the marine environment is rectified and/or reported as required within the limits of the crew's/ officer's responsibility.		

2.Practice anti-pollution procedures	***2.1 Anti-pollution procedures*** applicable to vessel operations are followed in the course of day-to-day work. 2.2 Appropriate ***preventive measures*** are undertaken to prevent pollution of the marine environment in accordance with regulations and procedures. 2.3 Inputs are provided in the reparation of reports and other documentation related to the protection of marine environment in accordance with ***regulations*** and procedures.	2.1 Relevant legislation, codes of practice, policies and procedures to protect the marine environment 2.2 Impact of shipping on the marine environment and the effects of operational or accidental pollution on it 2.3 Basic environmental protection procedure 3.3 Pollution control problems and related measures to protect the marine environment 3.4 Complexity and diversity of the marine environment 3.5 Requirements under local and/or international legislation and conventions for reporting incidents related to breaches of the statutory codes and measures for the protection of the marine environment	2.1 Completing activities aimed at compliance with relevant regulatory requirements for protection of the marine environment 2.2 Identifying and evaluating problems related to compliance with relevant regulations for environmental protection and determining an appropriate courses of action 2.3 Following anti-pollution procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1. Protection of the marine environment	Protection of the marine environment may be observed: 1.1 By day or night in both normal and emergency situations 1.2 Under any possible conditions of sea and weather 1.3 While underway 1.4 During berthing and unberthing operations 1.5 While anchoring or mooring 1.6 While moored or at anchor 1.7 During loading and unloading operations 1.8 During maintenance operations
2. Anti-pollution procedures	Anti-pollution procedures include checking of items and equipment such as: 2.1 Pumps 2.2 Valves 2.3 Emission control equipment 2.4 Water management equipment including: cooling water, ballast water and bilge systems 2.5 Waste storage and recycling equipment 2.6 Ballast management equipment
3. Preventive measures	Preventative measures to protect the marine environment may include: 3.1 Prevention of spillages of cargo 3.2 Prevention of spillage s of fuel and oil 3.3 Control of polluting emissions of gas and smoke 3.4 Effective management of waste, pollution and recycling processes 3.5 Effective management of ballast operations 3.6 Shipboard housekeeping 3.7 Pollution control instructions
4. Regulations	Applicable regulations may include: 4.1 MARPOL Convention 4.2 IMO STCW Code and Convention related to the protection of marine environment 4.3 Relevant international and/or local legislation related to the protection of the marine environment

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 practiced compliance with legislative requirements for protection of the marine environment 1.2 practiced preventative and remedial anti-pollution procedures as per relevant regulations and procedures 1.3 identified typical pollution control problems and take appropriate action 1.4 communicate effectively with others concerning measures to protect the marine environment
2. Resource Implications	The following resources should be provided: 2.1. workplace with recommended facilities 2.2. tools and equipment appropriate to the activity 2.3. materials relevant to the proposed activity and tasks
3. Methods of Assessment	Competency in this unit must be assessed through: 3.1. Demonstration and questioning of related underpinning knowledge 3.2. Written examination 3.3. Portfolio
4. Context of Assessment	4.1 Competency may be assessed in the workplace or in a simulated workplace setting

CORE COMPETENCIES

UNIT OF COMPETENCY	**:**	**PERFORM UNDERWATER HULL CLEANING**
UNIT CODE	**:**	**AB-MTM03710700835301**
UNIT DESCRIPTOR	**:**	This unit covers the skills and knowledge required to perform underwater hull cleaning on marine vessels. It includes planning, executing, and documenting cleaning activities while ensuring compliance with safety and environmental regulations.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Undertake pre-dive preparations	*1.1* ***Tools, equipment, and testing devices*** needed to carry out the task were obtained in accordance with established procedures and checked for correct operation and safety, ensuring readiness and compliance with operational standards. 1.2 ***Environmental considerations***, including weather conditions, water conditions,	**SCIENCE** 1.1 Knowledge of tools, equipment, and testing devices relevant to underwater operations, and understanding how to check for correct operation and safety features. 1.2 Knowledge of environmental factors, including weather, water conditions, dive site characteristics, and marine life, and how these factors influence dive planning and safety.	1.1 Assembling and inspecting dive gear 1.2 Executing Dive Plan 1.3 Maintaining neutral buoyancy to avoid disturbing the underwater environment 1.4 Briefing and debriefing effectively the dive teams 1.5 Responding to underwater emergencies, such as assisting a panicked diver or executing a controlled emergency ascent 1.6 Identifying and avoiding potential hazardous marine life

	dive site characteristics, and marine life, were accurately identified and assessed in accordance with safety protocols and operational requirements. 1.3 ***Personal conditions*** health and physical were assessed and addressed before the dive, ensuring fitness for diving in accordance with safety guidelines and medical requirements. 1.4 A clear ***dive plan***, including depth, time, and objectives, was established in accordance with operational requirements, safety protocols, and dive team coordination. 1.5 All necessary permits and permissions for the dive site were obtained, verified for validity, and	**TECHNOLOGY** 1.1 Understanding of the technological aspects of tools and equipment used in underwater operations, including their maintenance, operation, and safety checks. 1.2 Knowledge of communication and tracking systems used in underwater operations, including methods for checking functionality and ensuring safe use during the dive. **ENVIRONMENT** 1.1 Ability to assess the dive site's environmental conditions, including weather, water conditions, and marine life, and understand how these factors affect the safety and success of a dive. 1.2 Awareness of the environmental impact of diving activities, including potential effects on marine ecosystems and best practices	

	complied with regulatory and operational requirements. 1.6 The pre-dive briefing covering all aspects of the dive plan, safety procedures, emergency protocols, and team roles was conducted thoroughly in accordance with standard diving practices.	for minimizing harm. **MATHEMATICS** 1.1 Proficiency in calculating dive parameters such as depth, time, and the necessary adjustments based on environmental factors or personal conditions. 1.2 Ability to apply mathematical principles when evaluating dive plans and safety protocols, such as decompression tables, ascent rates, and gas usage calculations.	

2. Assess ship's hull for underwater cleaning operations	2.1 The pre-cleaning assessment to determine the extent of fouling and the condition of the hull was conducted following established inspection procedures and safety guidelines. 2.2 The cleaning plan including the selection of appropriate	**SCIENCE** 2.1 Knowledge of inspection procedures for determining the extent of fouling and understanding how various hull conditions affect underwater operations. 2.2 Understanding the scientific principles behind cleaning techniques (e.g., chemical	2.1 Demonstrating diving skills 2.2 Solving problems and adapting to changing conditions 2.3 Applying cleaning techniques\ 2.4 Coordinating and communicating effectively 2.5 Maintaining safety awareness

	cleaning techniques and equipment was developed in accordance with industry standards and environmental considerations 2.3 The proper setup of support vessels and communication systems for the underwater operation was ensured, meeting safety, operational, and coordination requirements.	properties, abrasion, or water pressure) used to remove fouling from hulls. **TECHNOLOGY** 2.1 Familiarity with the tools, equipment, and testing devices used for hull inspections and cleaning, and how to operate them effectively and safely. 2.2 Knowledge of the technology behind cleaning equipment (e.g., high-pressure washers, scrapers) and how to select the right tools based on the cleaning requirements 2.3 Understanding of the communication systems (e.g., radios, underwater communication devices) used in underwater operations and their setup to ensure operational success. **ENVIRONMENT** 2.1 Ability to assess the environmental impact of hull cleaning procedures, including any	

		potential damage to marine life or ecosystems, and ensuring environmental best practices. 2.2 Awareness of industry standards and environmental considerations when selecting cleaning techniques and equipment to minimize environmental harm 2.3 Understanding environmental factors like weather conditions and marine life that may affect cleaning operations or safety, and incorporating this into the operation planning. **MATHEMATICS** 2.1 Ability to apply measurements and calculations (e.g., water pressure, surface area) to determine the extent of fouling or the correct application of cleaning methods 2.2 Proficiency in calculating the proper settings for cleaning equipment (e.g., pressure, time) to ensure efficiency	

		without damaging the hull.	
3. Execute underwater hull cleaning	3.1 Appropriate cleaning techniques, such as brushing, scraping, and high-pressure water jetting, to remove fouling from the hull were used ensuring effectiveness while minimizing damage to the surface and adhering to environmental standards. 3.2 The cleaning equipment was operated safely and effectively, ensuring no damage to the hull surface or coating, in compliance with manufacturer guidelines and safety protocols. 3.3 ***Effective communication*** with the surface team throughout the cleaning process was maintained ensuring coordination, safety, and	**SCIENCE** 3.1 Knowledge of cleaning techniques (e.g., brushing, scraping, high-pressure water jetting) and their scientific principles, including how they interact with different materials and surfaces to remove fouling effectively while minimizing damage. 3.2 Understanding of how cleaning equipment operates, including the physics behind pressure and force applied during cleaning, and its effects on hull surfaces. 3.3 Knowledge of post-cleaning inspection procedures, including understanding how to assess if fouling was properly removed and identifying any potential areas that need further attention. **TECHNOLOGY** 3.1 Familiarity with the various	3.1 Demonstrating diving skills 3.2 Solving problems and adapting to changing conditions 3.3 Applying cleaning techniques 3.4 Coordinating and communicating effectively 3.5 Maintaining safety awareness

	immediate response to any issues or changes. 3.4 Waste collection to prevent environmental contamination was monitored and managed effectively ensuring compliance with environmental standards and proper disposal procedures. 3.5 Waste is disposed in accordance with ***environmental regulations*** and company policy 3.6 A thorough inspection after cleaning was conducted to ensure fouling had been removed and to identify any areas requiring further attention.	cleaning technologies, including specialized tools like water jet systems, scrapers, and brushes, and their proper application to hull cleaning. 3.2 Understanding of how to safely operate cleaning equipment (e.g., water jets, brushes), including calibration, setup, and adherence to safety guidelines and operational procedures 3.3 Knowledge of communication technologies used during underwater operations, including radios or underwater communication systems, to maintain effective coordination and safety. **ENVIRONMENT** 3.1 Awareness of the environmental impact of different cleaning techniques, ensuring that selected methods are safe for marine ecosystems and adhere to environmental standards.	

		3.2 Understanding of waste management practices to prevent environmental contamination during cleaning and ensuring compliance with environmental regulations related to waste collection. 3.3 Knowledge of proper waste disposal methods, including compliance with environmental regulations and company policies, to prevent contamination. **MATHEMATICS** 3.1 Ability to calculate and adjust cleaning parameters such as pressure, duration, and surface area to ensure optimal cleaning without damaging the hull. 3.2 Proficiency in calculating the amount of waste generated during cleaning and ensuring proper containment and disposal. 3.3 Ability to assess the cleaning process quantitatively, such as	

		evaluating the extent of fouling removal based on predefined standards.	

4 Undertake post-dive procedures	4.1 Divers completed all required safety stops and ascended at the recommended rate, adhering to dive safety protocols and minimizing the risk of decompression sickness 4.2 Divers were monitored for any signs or symptoms of DCS, such as joint pain, dizziness, or numbness, and immediate medical attention was sought if symptoms appeared, in accordance with dive safety and emergency procedures. 4.3 Check-ins with dive buddies were conducted to ensure the completeness of post-dive procedures, confirming all ***safety***	**SCIENCE** 4.1 Knowledge of dive safety protocols and the scientific principles behind decompression sickness (DCS), including how to manage ascent rates and safety stops to minimize risks 4.2 Understanding the signs and symptoms of DCS and how to assess and respond to them effectively. 4.3 Understanding how to document dive parameters (depth, duration, water temperature) accurately, and how these factors contribute to overall dive safety and post-dive analysis.	4.6 Recording dive log entries 4.7 Maintaining equipment 4.8 Monitoring health and administering first aid 4.9 Communicating during debriefing 4.10 Troubleshooting equipment

	protocols were followed and any necessary reports or assessments were completed. 4.4 Any signs of damage or wear in the equipment that may have occurred during the dive, including cuts, abrasions, or other issues that required repair, were checked, ensuring all gear was in proper working condition for future use. 4.5 Dive details, including depth, duration, water temperature, and any notable observations or issues, were recorded accurately, ensuring comprehensive documentation for future reference and analysis 4.6 Proper documentation and reporting were observed, ensuring all relevant details were accurately recorded and communicated in accordance with operational	4.4 Knowledge of debriefing techniques and how to analyze dive performance, identifying areas of improvement for future operations 4.5 Understanding the importance of reviewing dive profiles to assess deviations and their potential impact on safety and dive outcomes. **TECHNOLOGY** 4.1 Familiarity with dive equipment, including its maintenance and checks for damage, and the technology used to monitor its condition. 4.2 Knowledge of proper documentation tools and software used to record dive data, ensuring accuracy and compliance with operational standards. 4.3 Understanding the technology used to monitor and track dive parameters in real time, ensuring adherence to the dive plan	

	and regulatory requirements. 4.7 A debriefing session to discuss the dive, including what went well and any issues or concerns was conducted ensuring a thorough review for continuous improvement and safety enhancement. 4.8 Dive was reviewed according to the planned dive profile and discuss any deviations 4.9 The dive was reviewed according to the planned dive profile, and any deviations were discussed, ensuring that all variations were addressed and analyzed for safety and operational effectiveness.	and identifying any necessary deviations. **ENVIRONMENT** 4.1 Awareness of how environmental factors (e.g., pressure, water temperature) affect dive profiles and how these variables influence the risk of DCS. 4.2 Understanding the environmental impact of dive operations on equipment, ensuring proper care and maintenance to prevent contamination or damage during subsequent use. 4.3 Knowledge of environmental safety practices during post-dive debriefings, ensuring no negative impact on the dive site or ecosystem. **MATHEMATICS** 4.1 Proficiency in calculating ascent rates, decompression limits, and other dive parameters to ensure a safe	

		dive profile and prevent DCS. 4.2 Ability to calculate necessary adjustments to equipment or dive parameters based on observed damage or wear during post-dive checks. 4.3 Ability to accurately record dive parameters and assess them in relation to the planned dive profile. 4.4 Proficiency in analyzing dive data and comparing actual conditions with the planned dive profile to assess deviations and their potential effects on safety.	

RANGE OF VARIABLES

VARIABLE	RANGE
1. Tools, equipment, and testing devices	May include: 2.1 Diving Equipment 2.1.1 Surface-Supplied Diving Systems – 2.1.2 Scuba Gear 2.1.3 Dry Suits/Wet Suits 2.1.4 Communication Systems 2.1.5 Weight Belts and Buoyancy Control Devices (BCD) 2.2 Inspection and Testing Devices 2.2.1 Underwater Cameras and Video Systems 2.2.2 Ultrasonic Thickness Gauges –. 2.2.3 Magnetic Particle Inspection (MPI) Equipment. 2.2.4 Eddy Current Testers 2.2.5 Dye Penetrant Kits 2.2.6 Acoustic Leak Detectors. 2.2.7 Diver's Compass and Depth Gauge 2.3 Cleaning and Surface Preparation Tools 2.3.1 Hydraulic and Pneumatic Brushes 2.3.2 High-Pressure Water 2.3.3 Scrapers and Chisels 2.3.4 Needle Scalers 2.4 Cutting and Welding Equipment 2.4.1 Underwater Welding Machines (SMAW, FCAW) 2.4.2 Oxy-Arc Cutting Equipment 2.4.3 Plasma Cutters \ 2.5 Fastening and Repair Tools 2.5.1 Underwater Adhesives and Epoxy Compounds 2.5.2 Patch and Clamping Systems 2.5.3 Hydraulic and Pneumatic Impact Wrenches 2.6 Lifting and Positioning Equipment 2.6.1 Lift Bags and Buoyancy Aids 2.6.2 Winches and Rigging Equipment
2. Environmental Consideration	May include: 2.7 Preventing the release of invasive species or harmful chemical in the water 2.8 Environment Awareness and Conservation 2.9 Marine Ecosystem Protection 2.10 Regulatory Compliance 2.11 Knowledge of the local dive site, including water temperature, currents and weather conditions 2.12 Water Conditions 2.13 Weather Conditions
3. Personal conditions	Personal Conditions may include:

	3.1 Physical Fitness 3.2 Physiology and Fitness 3.3 Decompression Theory and Post-Dive Safety Medical Conditions Mental Readiness
4. Dive Plan	May include: 4.11 Dive Tables and Profiles (scope of work 4.12 Environmental Condition 4.13 Emergency Procedure 4.14 Dive Log Maintenance 4.15 Surface Support
5. Cleaning Techniques and Equipment	May include: 5.1 Tool Handling 5.2 Technique Proficiency 5.3 Technological Integration 5.4 Equipment maintenance\ 5.5 Safety Equipment
6. Effective Communication	May include: 6.1 Coordinating and collaborating with the adive team and support 6.2 Cultural sensitivity and respect for diverse work environment 6.3 Hand Signals 6.4 Dive Briefing 6.5 Clear Documentation 6.6 reporting Standards 6.7 Debriefing Session
7. Environmental Regulation	May include: 7.1 Environmental Impact 7.2 Understanding Local and International regulations governing hull cleaning process
8. Safety protocols	May include: 7.1 Pre-Dive Safety Checks 7.2 Dive Plan and Risk Assessment 7.3 Buddy System and Communication 7.4 Emergency Procedures 7.5 Air Supply Management 7.6 Proper Use of Personal Protective Equipment (PPE) –. 7.7 Decompression and Ascent Control 7.8 Environmental Considerations 7.9 Worksite Security. 7.10 Post-Dive Safety Procedures

EVIDENCE GUIDE

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1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Followed safety protocols for divers, including proper use of diving equipment, adherence to decompression schedules, and effective communication systems to prevent accidents 1.2 Minimized the ecological impact of hull cleaning by using environmentally friendly methods and chemicals that do not harm marine life 1.3 Adheres to local, national, and international environmental regulations for hull cleaning practices 1.4 Ensured that all fouling organisms and debris are effectively removed from the hull without damaging the underlying surface or coatings. 1.5 Conducted thorough inspections before and after cleaning to assess the level of fouling and the effectiveness of the cleaning process 1.6 Used the right tools and equipment for the specific hull material and fouling to avoid damage and achieve efficient cleaning 1.7 Performed preventive maintenance to prevent excessive fouling and extend intervals between cleaning to reduce long-term cost 1.8 Ensured that no damage is done to the vessel's anti-fouling coating during cleaning 1.9 Identified and report any damage to the hull or coating during cleaning 1.10 Maintained and provide a detailed records of cleaning operations for regulatory compliance and future maintenance planning
2. Resource Implications	The following resources should be provided: 2.1 Simulated workplace environment 2.2 Workplace standards, procedures, policies, guidelines 2.3 Tools and equipment relevant to work activities
3. Methods of Assessment	Competency in this unit may be assessed through: 2.4 Demonstration and Oral Questioning 2.5 Direct observation 2.6 Written examination
4. Context for Assessment	4.1 Competency may be assessed in the actual workplace or simulated environment provided by the institutions with TESDA registered programs.

UNIT OF COMPETENCY	**:**	**CARY OUT MINOR UNDERWATER HULL REPAIR**
UNIT CODE	**:**	**AB-MTM03710700835302**
UNIT DESCRIPTOR	**:**	This unit covers the skills and knowledge required to perform minor hull repairs on marine vessels, including inspection, planning, execution, quality control and documentation of repair activities in accordance with regulatory standards and industry best practices

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Assess hull damage	1.1 Visible signs of damage, corrosion, and wear in the hull was inspected ensuring thorough assessment in accordance with inspection procedures 1.2 ***Non-destructive testing (NDT)*** to assess internal and hidden damages was used ensuring accuracy and compliance with industry standards for damage detection. 1.3 The ***damage type*****,** extent, and location of the hull were documented, ensuring accurate and detailed records for future	**SCIENCE** 1.1. Knowledge of the physical and chemical processes that cause damage, corrosion, and wear on hulls, and how to visually identify these signs. 1.2. Understanding the principles and applications of non-destructive testing (NDT), including various NDT methods (e.g., ultrasonic, magnetic particle, radiographic) and their effectiveness in detecting internal and	1.1. Conducting technical inspections 1.2. Performing structural analysi 1.3. Assessing corrosion 1.4. Estimating costs 1.5. Assessing compliance 1.6. Conducting risk assessments 1.7. Demonstrating diving skills 1.8. Adapting to changing conditions

	reference and repair planning.	hidden damages 1.3. Knowledge of damage documentation practices, including how to properly categorize and record the type, extent, and location of hull damage for future analysis and repair planning. **TECHNOLOGY** 1.1 Familiarity with the tools and technologies used in hull inspections, such as magnifying equipment, cameras, and visual inspection tools for detecting signs of damage. 1.2 Knowledge of NDT technologies, including the equipment used to perform tests (e.g., ultrasonic testing machines, X-ray systems) and the protocols for interpreting	

		results accurately. 1.3 Understanding of digital or paper-based documentation systems for recording damage details and ensuring compliance with regulatory or internal standards for accurate record-keeping. **ENVIRONMENT** 1.1 Awareness of how environmental conditions (e.g., saltwater, temperature, marine growth) contribute to hull damage, corrosion, and wear. 1.2 Understanding the environmental impact of hull inspections and testing, particularly with NDT methods, and ensuring that testing procedures minimize harm to the marine environment. **MATHEMATICS** 1.1 Ability to measure and assess the	

		extent of hull damage accurately, using standard measurement techniques or units (e.g., size of corrosion, thickness of material) 1.2 Proficiency in calculating or estimating repair requirements based on the extent and location of hull damage, considering factors such as material strength and cost of repair.	
2. Plan and prepare hull repair	2.1 A comprehensive repair plan including the scope of work, materials needed, labor requirements, and timelines was developed ensuring thorough planning in accordance with operational standards. 2.2 Repair work permit and approval were obtained, ensuring compliance with regulatory and operational requirements before	**SCIENCE** 2.1 Knowledge of how to assess the scope of work for hull repairs, including understanding material science, labor requirements, and time management for effective planning. 2.2 Understanding the legal and regulatory frameworks that govern repair permits and	2.1 Developing a comprehensive repair plan 2.2 Obtaining repair work permits and approvals 2.3 Ensuring compliance with regulations and industry standards 2.4 Removing marine growth, old coatings, and corrosion 2.5 Preparing surfaces through grinding, sandblasting, or priming

	proceeding with repairs 2.3 The repair plan was ensured to comply with ***relevant regulations***, classification society rules, and industry standards, guaranteeing adherence to legal and safety guidelines. 2.4 Marine growth, old coatings, and corrosion from the hull surface using appropriate cleaning methods were removed ensuring the surface was properly prepared for repair work. 2.5 The surface was prepared by grinding, sandblasting, or applying primers to ensure proper adhesion of repair materials, following industry best practices for surface preparation.	the importance of complying with these standards for safety and operational efficiency. 2.3 Familiarity with relevant regulations, classification society rules, and industry standards that govern repair processes, ensuring that the repair plan meets all legal, technical, and safety requirement 2.4 Understanding the effects of marine growth, old coatings, and corrosion on hull surfaces, and the chemical and physical processes behind their removal 2.5 Knowledge of surface preparation techniques, including grinding, sandblasting, and the application of primers, and how these processes ensure	

		proper adhesion of repair materials. **TECHNOLOGY** 2.1 Familiarity with repair planning tools and software, used for scheduling labor, material procurement, and tracking timelines. 2.2 Knowledge of permit management systems and technologies used to obtain, verify, and track repair work permits. 2.3 Awareness of technology used to ensure compliance with classification society rules and industry standards, including digital platforms for regulatory documentation and reporting. 2.4 Understanding of cleaning technologies, including methods for removing marine growth and	

		corrosion, such as pressure washing, scraping, or chemical treatments. 2.5 Proficiency with surface preparation tools and technologies, such as sandblasters, grinders, and primer applications, to ensure correct surface treatment before repairs. **ENVIRONMENT** 2.1 Awareness of environmental considerations related to repair planning, such as waste management, noise control, and minimizing disruptions to marine life and ecosystems during the repair process. 2.2 Knowledge of the environmental impact of cleaning methods used to remove marine growth and corrosion, ensuring compliance with environmental	

		regulations and minimizing harm to surrounding ecosystems. 2.3 Understanding the environmental regulations related to the disposal of materials like primers, chemicals, and debris from surface preparation processes. **MATHEMATICS** 2.1 Ability to calculate material quantities and labor needs for repair tasks based on the scope of work and planned timelines. 2.2 Knowledge of measurement and documentation techniques to track repair progress, material usage, and labor efficiency throughout the repair process. 2.3 Ability to calculate the amount of cleaning agent or abrasive material required for surface preparation, ensuring	

		effective cleaning without excessive waste. 2.4 Proficiency in determining the optimal amount of primer or surface treatment needed, considering the surface area and material specifications.	
3. Execute minor hull repairs	3.1 The appropriate ***repair technique*** based on the type and extent of damage was selected ensuring effectiveness and compliance with industry standards. 3.2 Patching or structural repairs were ensured to align properly with the existing hull structure, maintaining structural integrity and adhering to engineering specifications 3.3 Protective coatings and paints were applied to repaired areas to prevent future corrosion and wear, following	**SCIENCE** 3.1 Understanding of structural integrity principles and how patching or structural repairs should be aligned with the existing hull structure to ensure safety, durability, and compliance with engineering specifications 3.2 Knowledge of protective coatings and paints, including their chemical properties, how they prevent corrosion, and the importance of following manufacturer instructions	3.1 Ensuring proper alignment of patching or structural repairs 3.2 Applying protective coatings and paints 3.3 Applying repair materials according to specifications 3.4 Cleaning and smoothing surfaces for proper bonding

	manufacturer instructions and environmental safety standards. 3.4 The chosen repair material was applied according to specifications, ensuring proper adhesion, curing, or setting times as per operational guidelines. 3.5 The surface was cleaned and smoothed to ensure proper bonding of repair materials, following surface preparation best practices to guarantee a lasting repair.	and environmental safety standards during application. 3.3 Understanding the chemical and physical properties of the repair material, ensuring proper application for adhesion, curing, or setting, and knowledge of the factors affecting these processes (e.g., temperature, humidity). 3.4 Awareness of surface preparation methods, including the science behind cleaning and smoothing surfaces to optimize bonding, ensuring that repair materials adhere effectively. **TECHNOLOGY** 3.1 Familiarity with structural repair techniques and technologies used to ensure proper alignment and	

		strength when patching or reinforcing hulls. 3.2 Knowledge of coating and painting technologies, including tools (e.g., sprayers, rollers) and techniques that ensure even, durable applications. 3.3 Proficiency with tools and equipment used for applying repair materials, and understanding how different materials require specific application techniques to achieve desired results (e.g., adhesives, resins, sealants). 3.4 Knowledge of cleaning tools and technologies (e.g., abrasives, solvents, power tools) used to prepare the surface for optimal bonding of repair materials.	

		ENVIRONMENT 3.1 Awareness of how the repair process and materials impact the environment, ensuring that structural repairs do not cause harm to the surrounding ecosystem. 3.2 Understanding environmental considerations in the use of protective coatings and paints, ensuring compliance with environmental regulations to prevent contamination of marine or air environments 3.3 Knowledge of sustainable repair materials and practices, including environmentally friendly options that comply with industry standards and reduce environmental impact. 3.4 Awareness of best practices for surface cleaning, ensuring that	

		cleaning agents or techniques used do not damage the environment or disrupt marine life. **MATHEMATICS** 3.1 Ability to calculate measurements and dimensions for repairs, ensuring that patching or structural repairs are accurately aligned with the hull structure. 3.2 Proficiency in estimating the correct amount of protective coatings and paints required based on surface area and material specifications. 3.3 Ability to determine the necessary application rates and curing times for repair materials, based on manufacturer specifications and operational guidelines. 3.4 Knowledge of surface area calculations to determine the	

		amount of cleaning or smoothing required to ensure proper bonding for the repair materials.	
4 Prepare documentation and report	4.1 The results of the quality control check were documented and reported, ensuring thorough tracking of repair quality and adherence to standards 4.2 Detailed records of repair activities, including materials used, measurements taken, and repair methods employed, were maintained, and comprehensive repair reports were provided to regulatory bodies, classification societies, and vessel owners.	**SCIENCE** 4.1 Knowledge of quality control principles and practices, including how to assess repair quality, identify discrepancies, and ensure adherence to standards throughout the repair process. 4.2 Understanding the importance of documentation in repair activities, ensuring accuracy in recording materials, measurements, and methods used to facilitate compliance with regulatory bodies and classification societies. **TECHNOLOGY** 4.1 Familiarity with quality control tools and technologies (e.g., inspection	4.1 Documenting and reporting quality control check results 4.2 Maintaining detailed records of repair activities 4.3 Providing comprehensive repair reports to regulatory bodies

		software, checklists, or automated systems) used to document and report the results of quality assessments 4.2 Proficiency in digital or paper-based documentation systems to record and manage detailed repair activity records, ensuring proper reporting to relevant regulatory authorities. **ENVIRONMENT** 4.1 Awareness of environmental regulations and standards that govern repair quality control, ensuring that repairs meet not only safety and operational standards but also environmental compliance. 4.2 Understanding the environmental impact of repair activities and ensuring detailed records include	

		adherence to environmental guidelines, particularly for waste management and material disposal. **MATHEMATICS** 4.1 Ability to analyze data from quality control checks, using mathematical techniques to assess the quality of repairs, such as tolerances, measurements, or statistical sampling. 4.2 Knowledge of how to accurately record and calculate the necessary quantities and measurements of materials used during repairs, ensuring thorough documentation for compliance and analysis.	

RANGE OF VARIABLES

VARIABLE	RANGE
1. Non-destructive testing (NDT)	May include: 1.1 Ultrasound 1.2 Radiography 1.3 Magnetic particle inspection 1.4 Penetrant testing
2. Damage Type	May include: 2.1 Cracks 2.2 Dents 2.3 Corrosion 2.4 Pitting Extent of Damage 2.5 Localized Damage 2.6 Widespread Damage
3. Relevant Regulations	May include: 3.1 Classification Society Standards 3.2 IMO Regulations 3.3 Flag State Requirements 3.4 Port State Control 3.5 Load Line Regulations 3.6 Ship Construction Regulations 3.7 Emergency preparedness and Response 3.8 Environmental and Occupational Safety 3.9 Documentation and Record Keeping 3.10 Inspection and Survey Requirements
4. Repair Techniques	May include: 4.1 Plating and Patch Repairs 4.2 Epoxy and Resin Repairs 4.3 Reinforcement 4.4 Corrosion Treatment and Prevention 4.5 Structural Repairs 4.6 Temporary Repair 4.7 Material-specific repairs

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Inspected hull structure to identify visible signs of damage, corrosion and wear. 1.2 Conducted Non-destructive Testing 1.3 Adhered to rigorous safety protocols, including the use of appropriate personal protective equipment (PPE) 1.4 Used and maintained diving equipment, tools and materials. 1.5 Adhered to environmental regulations and safeguard marine environment. 1.6 Assessed and adopted to underwater site conditions 1.7 Assessed and documented accurately hull damage underwater using underwater cameras for inspection 1.8 Monitored and evaluated the condition of the repaired area 1.9 Established proper communication with the dive and support team 1.10 Documented the repair process accurately 1.11 Complied with regulatory requirements
2. Resource Implications	The following resources should be provided: 4.1 Simulated workplace environment 4.2 Workplace standards, procedures, policies, guidelines 4.3 Tools and equipment relevant to work activities
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Demonstration and oral questioning 3.2 Direct observation 3.3 Written examination 3.4 Portfolio
4. Context for Assessment	4.1 Competency may be assessed in the actual workplace or simulated environment provided by the institutions with TESDA registered programs.

GLOSSARY OF TERMS

Abrasive Cleaning - A method of cleaning that involves the use of abrasive materials, such as sand or grit, to remove stubborn biofouling. This technique must be used carefully to avoid damaging the hull's protective coatings.

Anti-fouling Coatings - Special coatings applied to the hull to prevent or reduce the accumulation of biofouling. These coatings make it more difficult for marine organisms to attach to the hull.

Biofouling - The accumulation of microorganisms, plants, algae, or small animals on the hull of a ship. Biofouling increases drag and fuel consumption, and can cause structural damage if not removed.

Brush Kart - A remotely operated or diver-operated vehicle equipped with rotating brushes designed for cleaning the hull of a ship. The brush kart moves along the hull surface, scrubbing off biofouling and other debris.

Cavitation - The formation of vapor cavities (bubbles) in a liquid due to the motion of an object, such as a propeller. In hull cleaning, cavitation is often used to describe the effect of high-pressure water jets used to dislodge biofouling.

Diver-operated Cleaning Systems - Systems that are operated manually by divers to clean the hull. These may include brushes, scrapers, or water jet systems that are handled directly by the diver.

Environmentally Friendly Cleaning - Techniques and tools designed to minimize the environmental impact of hull cleaning. This includes the use of non-toxic cleaning methods and proper disposal of removed biofouling.

Fouling Release Coating - A type of anti-fouling coating that allows biofouling to be easily removed during hull cleaning. These coatings are usually less toxic than traditional anti-fouling paints.

High-Pressure Water Jet - A tool that uses high-pressure water streams to remove marine growth from the hull. The pressure of the water is strong enough to clean the surface without damaging the protective coatings.

Hull Scrapers - Tools or devices used to manually or mechanically remove biofouling from the hull surface. They can be handheld by divers or attached to automated equipment.

Hydrodynamic Efficiency - The efficiency with which a vessel moves through water. Maintaining a clean hull is crucial for preserving hydrodynamic efficiency, which directly impacts fuel consumption and speed.

ROV (Remotely Operated Vehicle) - A robot used to clean the hull without the need for a diver. These vehicles can be equipped with cleaning tools like brushes, scrapers, or water jets and are controlled remotely from the surface.

Sacrificial Anode - A metal anode that is attached to the hull and designed to corrode instead of the hull. During cleaning, care must be taken to avoid damaging these anodes.

Sloughing - The natural process where biofouling or coatings peel away from the hull due to water movement or the application of cleaning techniques.

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