Skills for Employment Investment Program (SEIP)

ASSESSMENT TOOL

FOR

MACHINERY INSTALLATION

(SHIPBUILDING SECTOR)

Finance Division, Ministry of Finance
Government of the People's Republic of Bangladesh

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PART A – THE ASSESSOR

Instructions to Assessor

Assessment is the process of identifying a candidate's skills and knowledge set against the industry established standards in the workplace. It requires the candidate to consistently and over time demonstrate skills, knowledge and attitude that enable confident completion of workplace tasks in a variety of situations.

In judging assessment evidence, the assessor must ensure that the evidence is:

- authentic (the candidate's own work)
- valid (directly related to the current version of the endorsed competency standard)
- reliable (show that the candidate consistently meets the endorsed unit of competency)
- current (reflects the candidate's current capacity to perform the aspect of work covered by the endorsed unit of competency)
- sufficient (covers the full range of elements in the relevant unit of competency)

There are a number of assessment methods that may be employed including but not limited to:

- written examination
- oral questioning
- practical demonstration

A single unit of competency may be assessed or a group of units of competency may be assessed, either in an actual workplace or a simulated workplace environment.

Conducting Assessment

Prior to commencement of assessment, candidates must have the tasks clearly explained to them. Also, the assessor should provide candidates with clear advice and information about the:

- date, time and place for assessment
- structure of assessment
- number of times performance must be demonstrated or observed
- amount or type of assistance candidates can expect
- assessment environment
- resources required for assessment
- performance standards or benchmarks relevant to the qualification

As well as informing the candidate of what they will be required to do during the assessment, the assessor will also need to explain what evidence they will need to provide in response to the various assessment tasks.

If a candidate is required to submit evidence, any explanation must include specific guidance on:

- what to include as evidence
- how to present the evidence
- how to submit the evidence and to whom

Assessing Competence

Competency-based assessment does not award grades, but simply identifies if the candidate has the skills, knowledge and attitudes to undertake the required task to the specified standard.

Therefore, when assessing competency an assessor has two possible results (assessment decisions) that can be awarded:

- Competent (C)
- Not Yet Competent (NYC)

Competent (C)

If the candidate is able to successfully answer and demonstrate what is required to the expected standard of the assessment criteria, they will be deemed as 'Competent'.

The assessor will award 'Competent' if they feel the candidate has the necessary skills, knowledge and attitudes in all assessment tasks for a given package.

Not Yet Competent (NYC)

If the candidate is unable to answer and demonstrate competency to the expected standard, they will be deemed to be 'Not Yet Competent'.

This does not mean the candidate will need to complete all the assessment tasks again. When applying for reassessment, the focus will be on the specific assessment tasks that were not performed to the required standard.

The candidate may be required to:

(a) undertake further training or instruction

(b) undertake the specific assessment task again until they are deemed to be competent

Recording Assessment Information

When all assessment tasks are concluded, the evidence summary sheet should be completed, signed by all parties, and any outstanding activities or issues actioned.

The assessor should ensure that all appropriate forms are completed and signed by all parties.

CHECKLIST FOR ASSESSOR		
Prior to the assessment I have:	**Tick (✓)**	**Remarks**
Ensured the candidate is informed about the venue and schedule of assessment.		
Received current copies of the assessment criteria to be assessed, assessment plan and evidence plan.		
Reviewed the assessment criteria and evidence plan to ensure I clearly understood the instructions and the requirements of the assessment process.		
Identified and accommodated any special needs of the candidate.		
Checked the set-up and resources for the assessment.		
During the assessment I have:		
Introduced myself and confirmed identities of candidates.		
Collected the admission slips.		
Put candidates at ease by being friendly and helpful.		
Checked completed self-assessment guide.		
Explained to candidates the purpose, context and benefits of the assessment.		
Ensured candidates understood the assessment process and the assessment procedure.		
Provided candidates with an overview of the assessment criteria to be used.		
Gave specific and clear instructions to the candidates.		
Observed carefully the specified time limits provided in the assessment package.		
Stayed at the assessment area during the entire duration of the assessment activity.		
Ensured notes are made on unusual conditions or situations during the assessment and include these in the report.		
Did not provide any assistance during the assessment or indicated in any way whether the candidate is or is not performing the activity correctly (intervened only for health and safety reasons).		

Implemented the evidence gathering process and ensured its validity, reliability, fairness and flexibility.		
Collected appropriate evidence and matched relevance to the elements, performance criteria, range of variables and evidence guide in the relevant units of competency.		
Explained the results reporting procedure to the candidate.		
Encouraged candidates to seek clarifications if in doubt about the pre- and post-assessment activity procedures.		
Asked candidates for feedback on the assessment.		
Explained legal, health and safety, and ethical issues, if applicable.		
After the assessment I have:		
Provided feedback on the assessment decision. This includes the following: ▪ clear and constructive feedback on the assessment decision ▪ information on ways of addressing any identified gaps in competency revealed by the assessment ▪ opportunity to discuss the assessment process and outcome ▪ information on reassessment process (if necessary) ▪ information on appeal (if necessary)		
Prepared the necessary assessment reports. This includes the following: ▪ record the assessment decision using the prescribed rating sheet ▪ maintain records of the assessment procedures, evidence collected and assessment decision ▪ endorse assessment decision to BTEB ▪ prepare recommendations for the issuance of certificate		
Thanked candidate for participating in the assessment.		

Assessment Evidence Guide

The purpose of assessment is to confirm that an individual can perform to the standards expected by in the workplace, as expressed in the competency standards.

To attain the certificate of **Machinery Installation,** a candidate must demonstrate competent skill and knowledge in all the units of competency listed below. Upon successful completion of all assessment activities, a candidate shall be awarded with a certificate.

CODE	UNIT OF COMPETENCY
Generic Competencies	
SEIP-SBD-SMI-01-G	Use basic mathematical concepts
SEIP-SBD-SMI-02-G	Apply occupational safety and health (OSH) practice in the workplace
SEIP-SBD-SMI-03-G	Carry out workplace interaction
SEIP-SBD-SMI-04-G	Operate in a team environment
Sector-specific Competencies	
SEIP-SBD-SMI-01-S	Apply basic knowledge of ship and shipbuilding
SEIP-SBD-SMI-02-S	Use hand and power tools
Occupation-specific Competencies	
SEIP-SBD-SMI-01-O	Identify basic machinery installation works
SEIP-SBD-SMI-02-O	Perform machinery setting and levelling
SEIP-SBD-SMI-03-O	Install engine and gear box
SEIP-SBD-SMI-04-O	Install propulsion and steering system
SEIP-SBD-SMI-05-O	Install electrical machinery
SEIP-SBD-SMI-06-O	Install deck machinery

Assessment Evidence Plan

An assessment evidence plan is a document that assists in establishing what evidence needs to be collected by the assessor to ensure that the candidate meets all the appropriate requirements of the competency standard. It usually contains a record of:

- evidence requirements as set out in the competency standard
- who will collect the evidence?
- time period needed to collect the evidence

Occupation:	Machinery Installation					
Unit Name:	Use basic mathematical concepts					
Unit Code:	SEIP-SBD-SMI-01-G					
Assessment Method:	**P**	**O**	**W**			
	Performance *(including demonstration and observation)*	Oral questioning	Written examination *(including short-answer, multiple choice, and true or false questions)*			
Element	**Performance Criteria**			**P**	**O**	**W**
1. Identify calculation requirements in the workplace	**1.1.** Calculation requirements are identified from workplace information.			√		
	1.2. Mathematical problems are constructed from workplace information.			√	√	
2. Select appropriate mathematical methods/concepts for the calculation	**2.1.** Appropriate method is selected to carry out the calculation requirement.			√		√
	2.2. Constructed mathematical problems are solved with appropriate method.			√	√	√
3. Use tools and instruments to perform calculations	**3.1.** Tools and instruments required for computation are identified.			√		
	3.2. Calculation is performed using appropriate tools and instruments accurately.			√	√	√

Occupation:	Machinery Installation					
Unit Name:	Apply occupational safety and health (OSH) practice at workplace					
Unit Code:	SEIP-SBD-SMI-02-G					
Assessment Method:	**P**	**O**	**W**			
	Performance *(including demonstration and observation)*	Oral questioning	Written examination *(including short-answer, multiple choice, and true or false questions)*			
Element	**Performance Criteria**			**P**	**O**	**W**
1. Identify OSH policies and procedures	**1.1.** OSH policies and safe operating procedures are interpreted.			√		√
	1.2. Safety signs and symbols are identified and followed.			√		

	1.3. Response, evacuation procedures and other contingency measures are interpreted correctly.		√	
2. Apply personal health and safety practices	**2.1.** OSH policies and procedures are applied in the workplace including personal protective equipment (PPE).	√		
	2.2. Common health issues are recognised.		√	
	2.3. Common safety issues are identified.	√		
3. Report hazards and risks	**3.1.** Hazards and risks are identified.	√		
	3.2. Hazards and risks assessment and controls are interpreted.	√		
4. Respond to emergencies	**4.1.** Responded to alarms and warning devices.		√	
	4.2. Emergency response plans and procedures are responded to.			√
	4.3. First aid procedures during emergency situations are identified.		√	

Occupation:	Machinery Installation		
Unit Name:	Carry out workplace interaction		
Unit Code:	SEIP-SBD-SMI-03-G		
Assessment Method:	**P**	**O**	**W**
	Performance *(including demonstration and observation)*	Oral questioning	Written examination *(including short-answer, multiple choice, and true or false questions)*

Element	**Performance Criteria**	**P**	**O**	**W**
1. Interpret workplace communication and etiquette	**1.1.** Workplace codes of conduct are interpreted as per organisational guidelines.	√	√	
	1.2. Appropriate lines of communication are maintained with supervisors and colleagues.	√		
	1.3. Workplace interactions are conducted in a courteous manner to gather and convey information.	√		
	1.4. Workplace procedures and matters are comprehended.			√
2. Read and understand workplace documents	**2.1.** Workplace documents are interpreted correctly.	√		√
	2.2. Visual information/symbols/signage are understood correctly and followed.	√		
	2.3. Specific and relevant information are accessed from appropriate sources.	√		
	2.4. Appropriate medium is used to transfer information and ideas.	√		

3. Participate in workplace meetings and discussions	**3.1.** Team meetings are attended on time.		√	
	3.2. Meeting procedures and etiquette are followed.		√	
	3.3. Active participation is ensured, opinions are expressed and heard.	√		
	3.4. Inputs are provided and interpreted in line with the meeting purpose.		√	
4. Practice professional ethics at work	**4.1.** Responsibilities as a team member are performed.	√		
	4.2. Tasks are performed in accordance with workplace procedures.	√		
	4.3. Confidentiality is maintained.	√		
	4.4. Inappropriate and conflicting situations are avoided.	√		

Occupation:	Machinery Installation		
Unit Name:	Operate in a team environment		
Unit Code:	SEIP-SBD-SMI-04-G		
Assessment Method:	**P**	**O**	**W**
	Performance *(including demonstration and observation)*	Oral questioning	Written examination *(including short-answer, multiple choice, and true or false questions)*

Element	**Performance Criteria**	**P**	**O**	**W**
1. Identify team goals and processes	**1.1.** Roles and objectives of the team are identified and interpreted.		√	
	1.2. Roles and responsibilities of team members are identified and interpreted.		√	
2. Identify own role and responsibilities within team	**2.1.** Personal role and responsibilities are identified within the team environment.		√	
	2.2. Reporting relationships are interpreted within team and external to team.			√
3. Communicate and cooperate with team members	**3.1.** Other teammates' tasks are identified and support provided when requested.		√	
	3.2. The team is encouraged through sharing information or expertise, working together to solve problems, and putting team success first.	√		
	3.3. Views and opinions of other team members are interpreted and respected.	√		
4. Practice problem solving within the team	**4.1.** Problems faced at the individual and team level are identified and showed insight into the root-causes of the problems.	√		

	4.2. A range of solutions and courses of action are identified together with benefits, costs, and risks associated with each.		√	
	4.3. The good ideas of others to help develop solutions are recognised and advice sought from those who have solved similar problems.		√	
	4.4. It is looked beyond the obvious and not stopped at the first answers.	√		

Occupation:	Machinery Installation					
Unit Name:	Apply basic knowledge of ship and shipbuilding					
Unit Code:	SEIP-SBD-SMI-01-S					
Assessment Method:	**P**	**O**	**W**			
	Performance *(including demonstration and observation)*	Oral questioning	Written examination *(including short-answer, multiple choice, and true or false questions)*			
Element	**Performance Criteria**			**P**	**O**	**W**
1. Understand basics of shipbuilding	**1.1.** Ship construction terminology and GA plan is interpreted.			√	√	
	1.2. Key areas of ship are identified from general drawing or model ship.			√		
	1.3. Electrical devices, components and equipment are identified and described.			√	√	
	1.4. Classification of society and ISO rules are explained.				√	
2. Obtain information about the industry	**2.1.** Sources of information about industry are identified.				√	
	2.2. Industry information is collected from multiple sources.			√		
	2.3. Information is interpreted and applied to day-to-day work activities.			√		
3. Identify key machines installed on a ship	**3.1.** Key machines installed on a ship are identified.			√		
	3.2. Identified machines are located on ship.			√		

Occupation:	Machinery Installation		
Unit Name:	Use hand and power tools.		
Unit Code:	SEIP-SBD-SPF-02-S		
Assessment Method:	**P**	**O**	**W**
	Performance	Oral questioning	Written examination *(including short-answer,*

	(including demonstration and observation)		*multiple choice, and true or false questions)*		
Element	**Performance Criteria**		**P**	**O**	**W**
1. Identify and inspect hand and power tools	**1.1.** Appropriate hand and power tools are identified.		√		
	1.2. Application of hand and power tools is recognised.		√		
	1.3. Usability of hand and power tools is checked and verified.		√		
2. Use hand tools properly and safely	**2.1.** Appropriate hand tools are selected.		√		
	2.2. Safety precautions are ensured before using hand tools.		√		
	2.3. Unsafe or faulty tools are identified and marked for repair.		√		
	2.4. Measuring tools are checked and calibrated before use.		√		
	2.5. Use hand tools properly and safely to perform work activity.		√		
3. Operate power tools properly and safely	**3.1.** Appropriate power tools are selected.		√		
	3.2. Power supply outlet and electrical cord are inspected and confirmed safe for use in accordance with established workplace safety requirements.		√		
	3.3. Safety precautions are ensured before using power tools in accordance with manufacturer's operating specification.		√		
	3.4. Proper sequence of operation is applied using power tools.		√		
	3.5. Unsafe or faulty power tools are identified and marked for repair.		√		
	3.6. Operate power tools properly and safely to perform work activity.		√		
4. Clean and maintain hand tools and power tools	**4.1.** Dust and foreign matters are removed from power tools in accordance to workplace standard.		√		
	4.2. Condition of tools is checked after use and reported.		√		
	4.3. Appropriate lubricant is applied after use and prior to storage.		√		
	4.4. Measuring tools are checked and calibrated after use.		√		
	4.5. Defective hand and power tools are inspected and repaired or replaced.		√		
	4.6. Hand and power tools are stored and secured in accordance with workplace requirements.		√		

Occupation:	Machinery Installation				
Unit Name:	Identify basic machinery installation works				
Unit Code:	SEIP-SBD-SMI-01-O				
Assessment Method:	**P**	**O**	**W**		
	Performance *(including demonstration and observation)*	Oral questioning	Written examination *(including short-answer, multiple choice, and true or false questions)*		
Element	**Performance Criteria**			**P**	**O**	**W**
1. Determine key machinery installation works	**1.1.** Key machinery for installation is identified and located.			√		√
	1.2. Key machinery installation works are identified and described.				√	
	1.3. Machinery installation plans and drawings are interpreted.			√		
	1.4. Roles and responsibilities of a machinery installer are identified and explained.				√	
2. Identify engine and engine components	**2.1.** Types of engine are identified.					√
	2.2. Components of engine are identified.				√	
	2.3. Functions of different types of engine are described.				√	
3. Identify auxiliary machinery	**3.1.** Types of auxiliary machines are identified.				√	
	3.2. Functions of various auxiliary machinery are described.				√	

Occupation:	Machinery Installation				
Unit Name:	Perform machinery setting and levelling				
Unit Code:	SEIP-SBD-SMI-02-O				
Assessment Method:	**P**	**O**	**W**		
	Performance *(including demonstration and observation)*	Oral questioning	Written examination *(including short-answer, multiple choice, and true or false questions)*		
Element	**Performance Criteria**			**P**	**O**	**W**
1. Prepare for work	**1.1.** Nature and scope of work is identified and clarified.			√	√	
	1.2. Job specification is identified including manufacturer's specifications and instructions for installation of machinery.			√		
	1.3. Levelling tools and lifting equipment are identified and selected as per job requirement.			√	√	

	1.4. Appropriate tools and equipment are selected and set-up to operate lifting equipment.	√		
2. Prepare for setting and levelling	**2.1.** Machinery and components are checked.	√	√	
	2.2. Inspection of machinery and components is carried out as per job specification and standard operating procedure.	√		
3. Carry out setting and levelling	**3.1.** Appropriate engineering principles and techniques are identified and selected.	√		
	3.2. Levelling and alignment calculations are performed.	√		
	3.3. Lifting equipment is levelled using appropriate technique.	√		
	3.4. Tools and equipment are used to lift and hold machinery for installation.	√	√	
	3.5. Levelling and alignment is carried out as per standard operating procedure.	√		
4. Clean and maintain tools and equipment	**4.1.** Machinery and components are cleaned as per standard operating procedure.	√		
	4.2. Waste materials are disposed of.	√		
	4.3. Tools and equipment are stored as per workplace guidelines.	√		

Occupation:	Machinery Installation		
Unit Name:	Install engine and gear box		
Unit Code:	SEIP-SBD-SMI-03-O		
Assessment Method:	**P**	**O**	**W**
	Performance *(including demonstration and observation)*	Oral questioning	Written examination *(including short-answer, multiple choice, and true or false questions)*

Element	**Performance Criteria**	**P**	**O**	**W**
1. Prepare for work	**1.1.** Nature and scope of work is identified and clarified.	√	√	
	1.2. Job specification is identified including manufacturer's specifications and instructions for installation of machinery.	√		
	1.3. Drawings, tools and equipment are identified and selected.	√		
2. Carry out engine installation	**2.1.** Engine and ancillary equipment is prepared for sequential installation.	√		
	2.2. Engine and ancillary equipment is checked for conformance with manufacturer's specifications.	√		
	2.3. Engine and ancillary equipment is installed as per manufacturer's specifications.	√		

	2.4. Adjustments are performed as per standard operating procedure, if required.	√		
3. Carry out gear box installation	**3.1.** Appropriate gear box is selected and fixed as per job specification.	√	√	
	3.2. Gear box is tested and checked for conformance with manufacturer's specifications.	√		
	3.3. Gear box is installed as per manufacturer's specifications.	√		
	3.4. Adjustments are performed as per standard operating procedure, if required.	√		
4. Check level and alignment	**4.1.** Level and alignment is checked against manufacturer's specification.	√		
	4.2. Adjustments and realignment are performed, if necessary.	√		
5. Clean and maintain tools and equipment	**5.1.** Tools and equipment are cleaned as per standard operating procedure.	√		
	5.2. Waste materials are disposed of.	√		
	5.3. Tools and equipment are stored as per workplace guidelines.	√		

Occupation:	Machinery Installation		
Unit Name:	Install propulsion and steering system		
Unit Code:	SEIP-SBD-SMI-04-O		
Assessment Method:	**P**	**O**	**W**
	Performance *(including demonstration and observation)*	Oral questioning	Written examination *(including short-answer, multiple choice, and true or false questions)*

Element	**Performance Criteria**	**P**	**O**	**W**
1. Prepare for work	**1.1.** Nature and scope of work is identified and clarified.	√	√	
	1.2. Job specification is identified including manufacturer's specifications and instructions for installation of machinery.	√		
	1.3. Drawings, tools and equipment are identified and selected.	√		
2. Carry out propeller and propeller shaft installation	**2.1.** Propeller and propeller shaft is prepared for sequential installation.	√	√	
	2.2. Propeller and propeller shaft is checked for conformance with manufacturer's specifications.	√		
	2.3. Propeller and propeller shaft is installed and fixed as per manufacturer's specifications.	√		
	2.4. Adjustments are performed as per standard operating procedure, if required.	√		

3. Carry out rudder and steering system installation	**3.1.** Rudder and steering gear is prepared for sequential installation.	√	√	
	3.2. Rudder and steering gear is checked for conformance with manufacturer's specifications.	√		
	3.3. Rudder and steering gear is installed and fixed as per manufacturer's specifications.	√		
	3.4. Adjustments are performed as per standard operating procedure, if required.	√		
4. Check level and alignment	**4.1.** Level and alignment is checked against manufacturer's specification.	√		
	4.2. Adjustments and realignment are performed, if necessary.	√		
5. Clean and maintain tools and equipment	**5.1.** Tools and equipment are cleaned as per standard operating procedure.	√		
	5.2. Waste materials are disposed of.	√		
	5.3. Tools and equipment are stored as per workplace guidelines.	√		

Occupation:	Machinery Installation					
Unit Name:	Install electrical machinery					
Unit Code:	SEIP-SBD-SMI-05-O					
Assessment Method:	**P**	**O**	**W**			
	Performance *(including demonstration and observation)*	Oral questioning	Written examination *(including short-answer, multiple choice, and true or false questions)*			
Element	**Performance Criteria**			**P**	**O**	**W**
1. Prepare for work	**1.1.** Nature and scope of work is identified and clarified.			√	√	
	1.2. Job specification is identified including manufacturer's specifications and instructions for installation of machinery.			√		
	1.3. Drawings, tools and equipment are identified and selected.			√		
2. Carry out electrical machinery installation	**2.1.** Electrical machinery is prepared for sequential installation.			√	√	
	2.2. Electrical machinery is checked for conformance with manufacturer's specifications.			√		
	2.3. Electrical machinery is installed as per manufacturer's specifications.			√		
	2.4. Pre-start checks are carried out and machinery started to ensure correct operation.			√		

	2.5. Adjustments are performed as per standard operating procedure, if required.	√		
3. Check level and alignment	**3.1.** Level and alignment is checked against manufacturer's specification.	√		
	3.2. Adjustments and realignment are performed, if necessary.	√		
4. Clean and maintain tools and equipment	**4.1.** Tools and equipment are cleaned as per standard operating procedure.	√		
	4.2. Waste materials are disposed of.	√		
	4.3. Tools and equipment are stored as per workplace guidelines.	√		

Occupation:	Machinery Installation				
Unit Name:	Install deck machinery				
Unit Code:	SEIP-SBD-SMI-06-O				
Assessment Method:	**P**	**O**	**W**		
	Performance *(including demonstration and observation)*	Oral questioning	Written examination *(including short-answer, multiple choice, and true or false questions)*		
Element	**Performance Criteria**			**P**	**O**	**W**
1. Prepare for work	**1.1.** Nature and scope of work is identified and clarified.			√	√	
	1.2. Job specification is identified including manufacturer's specifications and instructions for installation of machinery.			√		
	1.3. Drawings, tools and equipment are identified and selected.			√		
2. Carry out deck machinery installation	**2.1.** Deck machinery is prepared for sequential installation.			√	√	
	2.2. Deck machinery is checked for conformance with manufacturer's specifications.			√		
	2.3. Deck machinery is installed as per manufacturer's specifications.			√		
	2.4. Pre-start checks are carried out and machinery started to ensure correct operation.			√		
	2.5. Adjustments are performed as per standard operating procedure, if required.			√		
3. Check level and alignment	**3.1.** Level and alignment is checked against manufacturer's specification.			√		
	3.2. Adjustments and realignment are performed, if necessary.			√		
4. Clean and maintain tools and equipment	**4.1.** Tools and equipment are cleaned as per standard operating procedure.			√		

	4.2. Waste materials are disposed of.	√		
	4.3. Tools and equipment are stored as per workplace guidelines.	√		

PART B – THE CANDIDATE

Instructions to Candidate

To be assessed as competent, you must provide evidence which demonstrates that you can perform to the necessary standard the various elements of these units of competency that comprise of the Certificate in **Machinery Installation**. Assessment of competency requires you to consistently demonstrate skill, knowledge and aptitude (through a variety of assessment tools such as multiple choice, short-answer questions, oral questioning, workplace observation, and practical demonstration) that enables confident completion of workplace tasks in a variety of situations.

In judging the evidence, your assessor must ensure that the evidence is:

- authentic (your own work)
- valid (directly related to the current version of the units of competency)
- reliable (consistently demonstrates of your knowledge and skill)
- current (shows your current capacity to perform the work)
- sufficient (covers the full range of elements comprised within the units of competency)

Furthermore, the assessment process must:

- provide for valid, reliable, flexible and fair assessment
- provide for judgment to be made on the basis of sufficient evidence
- offer valid, authentic and current evidence
- include workplace requirements

There are two types of assessment:

1. Knowledge Assessment - is designed to enable assessment against the various *elements* contained within the units of competency through a variety of activities such as multiple choice, short-answer questions, oral questioning. It is essentially examining your theoretical knowledge.

   This provides the assessor with substantial evidence of your knowledge and aptitude to perform the work relating to the specific unit of competency, in conjunction with other assessment tools such as workplace observation.

   You should complete the knowledge assessment as directed by the assessor and follow all instructions as and when given. If you are unable to complete the knowledge assessment, please speak to the assessor about alternative assessment solutions.

2. Skill Assessment - is designed to enable assessment against the various *performance criteria* contained within the units of competency through, for example, demonstration of skill in a simulated or actual work environment. In essence, it is an examination of your practical ability.

   This provides the assessor with substantial evidence of your ability to perform the work relating to the specific unit of competency to the standard expected by industry (the benchmark).

   You should complete the skill assessment as directed by the assessor and follow all instructions as and when given, ensuring your own health and safety.

Once you have been assessed as competent against all of the units of competency comprising of the qualification being undertaken, you will be awarded your certificate.

You assessor will discuss in more detail the requirements for assessment for each unit of competency at the appropriate time.

And please do not panic if you are not assessed as competent on any part of your qualification at your first attempt. Your assessor will discuss with you any identified skill and knowledge gaps, work through those with you and assist you as much as possible in attaining competency.

Self-Assessment Guide

Before undertaking any assessment, you should review the list of skills, knowledge and aptitudes relating to the assessment (drawn from the units of competency, its various elements and performance criteria) to determine whether you have current competency in these areas.

If you believe you can demonstrate the skills and knowledge required and can successfully complete the various assessment activities, you should then proceed to discuss your assessment with the assessor and complete Assessment Agreement.

However, should you not believe, for whatever reason, that you are not able to successfully complete the various assessment activities, then speak with the assessor. The assessor will assist you in identifying any skill and knowledge gaps, work through those with you and assist you as much as possible in attaining competency.

Please complete the self-assessment checklist below and discuss with the assessor.

Qualification:	**Ship Machinery installation**
Units of competency:	**Generic units:** Use basic mathematical concepts Apply occupational Safety and Health (OSH) practices in the workplace Carry out workplace interaction Operate in a team environment **Sector-specific units:** Apply basic knowledge of ship and shipbuilding Use hand and power tools **Occupation-specific units:** Identify basic machinery installation works Perform machinery setting and levelling Install engine and gear box Install propulsion and steering system Install electrical machinery Install deck machinery

Instructions:

- Read each of the questions in the left-hand column of the chart
- Place a tick (√) in the appropriate box opposite each question to indicate your answer

Can I?	YES	NO
▪ Identify calculation requirements from workplace information		
▪ Select appropriate mathematical method to carry out calculation		
▪ Determine system and units of measurement to be followed		
▪ Complete calculations using appropriate methods such as addition, subtraction, multiplication and division		

▪ Apply to workplace calculation systems and units of measurement for the task		
▪ Access and interpret instructions		
▪ Ask questions to clarify understanding or gain more information		
▪ Record information/instruction properly		
▪ Interpret written instructions		
▪ Respond to work signage		
▪ Follow routine written instructions in sequence		
▪ Give feedback to the workplace supervisor		
▪ Use relevant communication methods to transmit instructions		
▪ Use appropriate non-verbal communication		
▪ Identify and follow channels of communication		
▪ Operate communication tools and equipment and identify and report faults		
▪ Convey information using appropriate forms		
▪ Complete all required documentation accurately and on time		
▪ Record workplace data using approved formats or templates		
▪ Pass written information/instruction to appropriate personnel		
▪ Attend meetings regularly and on time following well-disseminated agenda		
▪ Ensure meeting inputs are consistent with meeting purpose and established protocols		
▪ Express opinions without interruption		
▪ Process and implement meeting outputs		
▪ Interpret OSH policies and safe operating procedures		
▪ Identify and use personal protective equipment (PPE)		
▪ Identify and follow safety signs and symbols		
▪ Interpret response, evacuation procedures and another contingency as per standard		
▪ Apply OSH policies and procedures in the workplace		
▪ Recognise common health issues		
▪ Identify and follow common safety issues		
▪ Identify hazards and risks		
▪ Interpret hazards and risks assessment and controls		
▪ Respond to alarms and warning devices		

▪ Follow emergency response plans and procedures as appropriate to the nature of the emergency and according to workplace procedures		
▪ Follow first aid procedures for dealing with accidents, fires and emergencies whenever necessary within scope of responsibilities		
▪ Identify team goals and processes		
▪ Identify roles and responsibilities of team members		
▪ Identify relationships within team and with other work areas		
▪ Used effective interpersonal skills to interact with team members and to contribute to activities and objectives		
▪ Use formal and informal forms of communication effectively to support team achievement		
▪ Respect and value diversity in team functioning		
▪ Understand views and opinions of other team members and reflect accurately		
▪ Use workplace staff regulation correctly to assist communication		
▪ Identify and clarify duties, responsibilities, authorities, objectives and task requirements with team		
▪ Perform task in accordance with organizational and team requirements, specifications and workplace procedures		
▪ Support other members as required to ensure team achieves goals and requirements		
▪ Follow agreed reporting lines using standard operating procedures		
▪ Identify current and potential problems faced by team		
▪ Identify procedures for avoiding and managing problems		
▪ Solve problems effectively and in a manner that supports the team		
▪ Identify and access appropriate manuals		
▪ Check version and date of manual to ensure up-to-date specifications of tools, equipment, materials and procedures		
▪ Identify relevant drawings and specifications		
▪ Identify terms and abbreviations		
▪ Identify signs and symbols		
▪ Interpret drawings and specifications		
▪ Interpret schedules, dimensions and specifications contained in the drawings		
▪ Collect and pack manuals and documents		
▪ Store manuals and documents appropriately to prevent damage, ready access and updating of information where required		
▪ Identify hand tools		

▪ Interpret application of tools to job requirements		
▪ Check and verify usability of tools		
▪ Prepare hand tools and power tools		
▪ Identify sources of power supply for power tools		
▪ Use appropriate hand tools for the job		
▪ Apply proper and safe use and operation of hand tools		
▪ Observe safety precaution when using hand tools		
▪ Identify unsafe or faulty tools and mark for repair		
▪ Inspect power supply outlet and electrical cord and confirm safe for use in accordance with established workplace safety requirements		
▪ Apply proper sequence of operation in using power tools		
▪ Use power tools safely in accordance to manufacturer's operating specification		
▪ Remove dust and foreign matters from power tools in accordance to workplace standard		
▪ Check condition of tools after use		
▪ Apply appropriate lubricant after use and prior to storage		
▪ Check and calibrate measuring tools		
▪ Inspect and correct or replace defective tools, instruments, power tools and accessories		
▪ Comprehend scope, nature and major fields of shipbuilding sector in the industry		
▪ Comprehend profile of shipbuilding sector/ industry in relation to Bangladesh employment condition		
▪ Outline trends and technologies relevant to the sector		
▪ Identify and interpret relevant policies and guidelines		
▪ Obtain and clarify instructions as to procedures in achieving quality		
▪ Identify job roles and responsibilities of ship machinery installer for shipbuilding sector		
▪ Identify employee relationships within the shipbuilding sector		
▪ Identify common goals, objectives and tasks and clarify with appropriate persons		
▪ Determine individual tasks and agree on according to workplace environment		
▪ Identify and clarify workplace requirements		
▪ Interpret workplace practices		
▪ Use problem-solving strategies to address bottlenecks, inconsistencies and other concerns		

▪ Plan own work activities and communicate progress of work to relevant staff		
▪ Complete work activities based on workplace standards		
▪ Identify difficulties and bottlenecks and put forward solutions		
▪ Monitor own work against workplace standards and identify and act on areas for improvement		
▪ Apply effective interpersonal skills to interact with others and to contribute activities and objectives		
▪ Perform assigned tasks in accordance with job requirements, specifications and workplace environment		
▪ Confirm work requirements with colleagues		
▪ Understand basics of ship, shipbuilding and shipyard		
▪ Understand ships are build according to National and International rules such as Class Rule /ISO/IMO/SOLAS/MARPOL etc.		
▪ Understand General Arrangement plan (GA plan).		
▪ Introduce and identify shipbuilding terminology.		
▪ Understand and identify different parts of a ship		
▪ Identify different location-wise name of a ship		
▪ Introduce and identify ship machineries		
▪ Understand and identify key task of a Machinery Installer		
▪ Introduce with types of ship machineries		
▪ State the name of some important parts of a ship's main engine		
▪ Identify and locate key machinery installed in the ship.		
▪ Identify and describe key machinery installation works in a ship		
▪ Interpret machinery installation plans and drawings		
▪ identify and explain roles and responsibilities of a machinery installer		
▪ Identify types of engines install in the ship		
▪ Identify components of marine engine		
▪ Describe functions of different types of engine		
▪ Identify types of auxiliary machines		
▪ Describe functions of various auxiliary machinery		
▪ Identify and clarify nature and scope of machinery setting and levelling		
▪ Identified job specification including manufacturer's specifications and instructions for installation of machinery		
▪ Identify and select levelling tools and lifting equipment as per job requirement		

▪ Select and set-up appropriate tools and equipment to operate lifting equipment		
▪ Check machinery and components		
▪ Carried out. Inspection of machinery and components as per job specification and standard operating procedure		
▪ Identify and select appropriate engineering principles and techniques for setting and levelling of machineries		
▪ Perform levelling and alignment calculations		
▪ Level lifting equipment using appropriate technique		
▪ Use to lift and hold tools and equipment for machinery installation		
▪ Carried out levelling and alignment as per standard operating procedure		
▪ Understand and follow safety precautions for machinery works		
▪ Wear proper d personal protective equipment (PPE)		
▪ Clean machinery and components as per standard operating procedure		
▪ Dispose of waste materials		
▪ Store tools and equipment as per workplace guidelines		
▪ Identify and clarify nature and scope of installation of engine and gear box		
▪ Identified job specification including manufacturer's specifications and instructions for installation of engine and gear box		
▪ Identify and selectrelated drawings, tools and equipment		
▪ Prepare engine and ancillary equipment for sequential installation		
▪ Check engine and ancillary equipment for conformance with manufacturer's specifications		
▪ Install engine and ancillary equipment as per manufacturer's specifications		
▪ Perform adjustments as per standard operating procedure, if required		
▪ Select and fix appropriate gear box as per job specification		
▪ Test and check gear box conformance with manufacturer's specifications		
▪ Install gear box as per manufacturer's specifications		
▪ Perform adjustments as per standard operating procedure, if required		
▪ Check level and alignment against manufacturer's specification		
▪ Perform adjustments and realignment, if necessary		
▪ Clean machinery and components as per standard operating procedure		

▪ Dispose of waste materials		
▪ Store tools and equipment as per workplace guidelines		
▪ Identify and clarify nature and scope of installation of propulsion and steering system		
▪ Identified job specification including manufacturer's specifications and instructions for installation of propulsion and steering system		
▪ Identify and select related drawings, tools and equipment		
▪ Prepare propeller and propeller shaft for sequential installation		
▪ Check propeller and propeller shaft for conformance with manufacturer's specifications		
▪ InstallPropeller and propeller shaftas per manufacturer's specifications		
▪ Perform adjustments as per standard operating procedure, if required		
▪ Prepare rudder and steering gear for sequential installation.		
▪ Check rudder and steering gearfor conformance with manufacturer's specifications.		
▪ Install rudder and steering gearas per manufacturer's specifications		
▪ Perform adjustments as per standard operating procedure, if required		
▪ Check level and alignment against manufacturer's specification		
▪ Perform adjustments and realignment, if necessary		
▪ Clean machinery and components as per standard operating procedure		
▪ Dispose of waste materials		
▪ Store tools and equipment as per workplace guidelines.		
▪ Identify and clarify nature and scope of installation of electrical machinery		
▪ Identified job specification including manufacturer's specifications and instructions for installation of electrical machinery		
▪ Identify and selectrelated drawings, tools and equipment		
▪ Prepare electrical machinery for sequential installation		
▪ Check electrical machinery for conformance with manufacturer's specifications		
▪ Install electrical machinery as per manufacturer's specifications		
▪ Clean service parts of the pipes by using specified cleaning agent and tools in accordance with manufacturer's specification		
▪ Carry out pre-start checks for electrical machinery and start it to ensure correct operation		

▪ Perform adjustments as per standard operating procedure, if required.		
▪ Check level and alignment against manufacturer's specification		
▪ Perform adjustments and realignment, if necessary		
▪ Cleaned tools and equipment as per standard operating procedure		
▪ Dispose waste materials		
▪ Store tools and equipment as per standard		
▪ Identify and clarify nature and scope of installation of deck machinery		
▪ Identified Job specification including manufacturer's specifications and instructions for installation of deck machinery		
▪ Identify and select related drawings, tools and equipment		
▪ Prepare deck machinery for sequential installation		
▪ Check deck machinery for conformance with manufacturer's specifications		
▪ Install deck machinery as per manufacturer's specifications		
▪ Carry out pre-start checks for deck machinery and start it to ensure correct operation		
▪ Perform adjustments as per standard operating procedure, if required		
▪ Check level and alignment against manufacturer's specification		
▪ Perform adjustments and realignment, if necessary		
▪ Cleaned tools and equipment as per standard operating procedure		
▪ Dispose waste materials		
▪ Store tools and equipment as per workplace guidelines		
▪ Report to supervisor		
I agree to undertake assessment in the knowledge that the information gathered will only be used for educational and professional development purposes, and can only be accessed by concerned assessment personnel and my manager/supervisor.		
Candidate's signature:		**Date:**

PART C – THE ASSESSMENT

Assessment Agreement – Machinery Installation

The purpose of assessment is to confirm that you can perform to the standards expected in the workplace of an occupation, as expressed in the competency standards (after completion of self-assessment and in agreement with assessor).

To help achieve this, an assessment agreement is required to navigate both you and the assessor through the assessment process.

The assessment agreement is designed to provide a clear understanding of what and how you will be assessed and to nominate the tools that may be used to collect the assessment evidence.

You, the assessor and/or workplace supervisor should agree on the assessment requirements, dates and deadlines.

Therefore, to attain the Certificate of Machinery Installation you must demonstrate competence in the following units, as established in the assessment agreement:

CODE	UNIT OF COMPETENCY
Generic Competencies	
SEIP-SBD-SMI-01-G	Use basic mathematical concepts
SEIP-SBD-SMI-02-G	Apply occupational health and safety (OHS) practice in the workplace
SEIP-SBD-SMI-03-G	Carry out workplace interaction
SEIP-SBD-SMI-04-G	Operate in a team environment
Sector-specific Competencies	
SEIP-SBD-SMI-01-S	Apply basic knowledge of ship and shipbuilding
SEIP-SBD-SMI-02-S	Use hand and power tools
Occupation-specific Competencies	
SEIP-SBD-SMI-01-O	Identify basic machinery installation works
SEIP-SBD-SMI-02-O	Perform machinery setting and levelling
SEIP-SBD-SMI-03-O	Install engine and gear box
SEIP-SBD-SMI-04-O	Install propulsion and steering system
SEIP-SBD-SMI-05-O	Install electrical machinery
SEIP-SBD-SMI-06-O	Install deck machinery

After successful completion of learning and assessment, you shall be awarded with a certificate.

Assessment Agreement	
Occupation:	Machinery Installation
Assessment Centre:	
Candidate Name:	
Assessor Name:	
Unit of Competency	
Generic Competencies	
SEIP-SBD-SMI-01-G	Use basic mathematical concepts
SEIP-SBD-SMI-02-G	Apply occupational safety and health (OSH) practice in the workplace
SEIP-SBD-SMI-03-G	Carry out workplace interaction
SEIP-SBD-SMI-04-G	Operate in a team environment
Sector-specific Competencies	
SEIP-SBD-SMI-01-S	Apply basic knowledge of ship and shipbuilding
SEIP-SBD-SMI-02-S	Use hand and power tools
Occupation-specific Competencies	
SEIP-SBD-SMI-01-O	Identify basic machinery installation works
SEIP-SBD-SMI-02-O	Perform machinery setting and levelling
SEIP-SBD-SMI-03-O	Install engine and gear box
SEIP-SBD-SMI-04-O	Install propulsion and steering system
SEIP-SBD-SMI-05-O	Install electrical machinery
SEIP-SBD-SMI-06-O	Install deck machinery

Resources Required for Assessment

Candidates must have access to the following:

- copies of activities, questions, projects nominated by the assessor
- relevant organisational policies, protocols and procedural documents (if required)
- devices or tools to record answers
- appropriate actual or simulated workplace
- all necessary tools and equipment used in performance of the work-based task
- any other resources normally used in the workplace

Assessment Instructions

Candidates should respond to the formative and summative assessments either verbally or in writing as agreed with the assessor. Written responses can be recorded in the spaces provided (if more space is required attach additional pages) or submitted in a word-processed document.

If candidates answer verbally, the assessor should record their answers in detail.

Candidates should also undertake observable tasks that provide evidence of performance. The assessor must provide instruction to candidates on what is expected during observation, and arrange a suitable time and location for demonstration of these skills.

Candidates must fully understand what they are required to do to complete these assessment tasks successfully, then sign the declaration.

Performance Standards
To receive a **satisfactory** result for the assessments, candidates must complete all activities, questions, projects, and tasks nominated by the assessor, to the required standard. Completion of all tasks for a unit of competency, to a satisfactory level, will contribute to an assessment of competence for that specific individual unit (or units if holistic assessment approach is taken). Successful completion of all the units of competency that comprise of the qualification Machinery Installation, will result in the candidate being issued with the relevant, nationally recognised certificate. Assessors must clearly explain the required performance standards.
Declaration
I declare that: ▪ the assessment requirements have been clearly explained to me ▪ all the work completed towards assessment will be my own ▪ cheating and plagiarism are unacceptable

Candidate Signature:		**Date:**	
Assessor Signature:		**Date:**	

PART D – ASSESSMENT TOOLS

Specific Instructions to Assessor

Please read carefully and prepare as necessary:

1. The assessor shall (practical demonstration assessment activities):
    - provide the candidate with the necessary tools, equipment, machinery and materials for completion of one (1) set of the following practical demonstration activities:
        - Set A:
            - Install main engine on foundation
            - Install and set-up gearbox, propeller and propeller shaft, and steering system
        - Set B:
            - Install main engine on foundation
            - Install hydraulic equipment and electrical machinery
        - Set C:
            - Install main engine on foundation
            - Install deck machinery and other accessories
    - provide the candidate with the copy of the specific instruction to candidate
    - allow practical demonstration to be performed within seven (7) hours including preparation of the materials
    - ensure that the candidate **FULLY** understand the instructions before proceeding to the performance of the assessment activity
    - allow fifteen (15) minutes for the candidate to familiarise themselves with the resources to be used during the practical demonstrations
    - ensure that the candidate is wearing appropriate personal protective equipment (PPE) before allowing them to proceed with the assessment activity
2. Assessment shall be based on the performance criteria in each of the units of competency. The evidence gathering method shall be comprised of:

    (a) Written Test (1 hour) – **knowledge evidence**

    (b) Practical Demonstration (7 hours) – **performance evidence**

    The practical demonstration activities will be divided into two (2) tasks (contained in one set):

    (i) Practical Demonstration 1 (4 hours)

    (ii) Practical Demonstration 2 (3 hours)
3. Final assessment is your responsibility as the accredit/certified assessor.
4. At the conclusion of each assessment activity, you will provide feedback to the candidate of the assessment result. The feedback will indicate whether the candidate is:

    ❑ **COMPETENT**

    ❑ **NOT YET COMPETENT**

5. The list of tools, equipment, machinery and materials to be provided for completion of the practical demonstration assessment activities can be found at:

Specific Instructions to Candidate

You should respond to the assessment either in writing or verbally as agreed with the assessor. Written responses can be recorded in the spaces provided; if more space is required attach additional pages or submit a word-processed document.

If you answer verbally, the assessor should record your answers in detail. Please check your recorded answers carefully and thoroughly to ensure that they are accurate.

You may also be undertaking observable activities (i.e. practical demonstration) that provide evidence of performance. The assessor must provide you with clear instructions on what is expected during this type of assessment, and arrange a suitable time and location for demonstration of these skills.

To receive a satisfactory result for the assessments, you must complete all of the assessment activities; including questions, projects and tasks nominated by the assessor, to the required standard.

This assessment is based upon the units of competency in Machinery Installation. Using the performance criteria as a benchmark, evidence will be gathered through:

1. Written Test (1 hour) – a variety of multiple-choice, true of false and short answer theory questions to support your competence with regard to the required knowledge (**knowledge evidence**).

2. Practical Demonstration (7 hours) – observable tasks outlined in the elements and performance criteria of the units of competency, completed to support a judgement of satisfactory performance to the required standard (**performance evidence**).

   There will be one (1) set of practical demonstration activities to complete. The assessor will direct you as to which 'set' you will be required to complete out of the following:

   - Set A:
     - Install main engine on foundation (4 hours)
     - Install and set-up gearbox, propeller and propeller shaft, and steering system (3 hours)
   - Set B:
     - Install main engine on foundation (4 hours)
     - Install hydraulic equipment and electrical machinery (3 hours)
   - Set C:
     - Install main engine on foundation (4 hours)
     - Install deck machinery and other accessories (3 hours)

3. The assessor will provide all necessary tools, equipment, machinery and materials required to complete each assessment activity.

4. These assessments cover all units of competency for Machinery Installation.

5. The assessor will provide you with feedback of your performance after completion of each assessment activity. This feedback shall indicate whether you are:

   ❑ **COMPETENT**

   ❑ **NOT YET COMPETENT**

6. Complete of all assessment activities, to a satisfactory level, will contribute to a final assessment of competence.

Written Test

WRITTEN TEST - INSTRUCTIONS	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Machinery Installation
Unit of Competency	
Generic Competencies	
SEIP-SBD-SMI-01-G	Use basic mathematical concepts
SEIP-SBD-SMI-02-G	Apply occupational safety and health (OSH) practice in the workplace
SEIP-SBD-SMI-03-G	Carry out workplace interaction
SEIP-SBD-SMI-04-G	Operate in a team environment
Sector-specific Competencies	
SEIP-SBD-SMI-01-S	Apply basic knowledge of ship and shipbuilding
SEIP-SBD-SMI-02-S	Use hand and power tools
Occupation-specific Competencies	
SEIP-SBD-SMI-01-O	Identify basic machinery installation works
SEIP-SBD-SMI-02-O	Perform machinery setting and levelling
SEIP-SBD-SMI-03-O	Install engine and gear box
SEIP-SBD-SMI-04-O	Install propulsion and steering system
SEIP-SBD-SMI-05-O	Install electrical machinery
SEIP-SBD-SMI-06-O	Install deck machinery
Assessment Centre:	
Date of Assessment:	
Time of Assessment:	
Instructions:	
Read and understand the directions carefully: ▪ this written examination is based on the performance criteria from all the units of competency in Machinery Installation ▪ this assessment activity will be used to measure your underpinning knowledge ▪ write your answers on the paper provided ▪ answer all the questions as best as possible ▪ you have 1 (one) hour to complete this test	

WRITTEN TEST		
Multiple Choice		
This is a **multiple-choice** of test. Choose the appropriate answer and circle the letter that corresponds with your answer.		
1.	Which is the 50 % of 150?	a. 50 b. 75 c. 125 d. 150
2.	The diameter of a propeller shaft is 200 mm. What is the circumference in mm?	a.528 b. 628 c. 728 d. 428
3.	Ways to build relationships within a team may include?	a. Discuss team member work styles b. Define “team personality” c. Discuss individual goals, hopes, concerns d. All of the above
4.	What does a visual workplace improve?	a. Communication b. Facility operation c. Both a and b d. None of the above
5.	When discussing reporting relationships, what important organisational principle of reporting needs to be taken into consideration?	a. Chain of command b. Chain reaction c. Designation list d. None of the above
6.	What potentially hazardous situation which, if not avoided, may result in minor or moderate injury?	a. Danger b. Caution c. Warning d. Emergency
7.	Which is not a measuring tool?	a. Ammeter b. Grinders c. Multi meter d. Megger
8.	What is the Bow?	a. Forward part of the ship b. After part of the ship

		c. Right side of the ship d. Left side of the ship
9.	What is not a piece lifting equipment?	a. Hydraulic Jack b. Dial indicators c. Crane d. Chain hoist
10.	What is the most common type of engine installed on a ship?	a. Diesel b. Steam c. Gas turbine d. Petrol
11.	A gear box is installed with the main marine engine to convert?	a. High speed to low speed b. low torque to high torque c. a and b d. None of the above
12.	Which of the installation works is considered to be the most difficult one?	a. Engine and gear box b. Propulsion and steering system c. Electrical machinery d. Deck machinery
True or False Quiz		
Tick (√) the box corresponding to the correct answer.		
13.	The right side of the ship is called the port side.	True ☐ False ☐
14.	A marine engine is installed on a ship for the purpose of propulsion.	True ☐ False ☐
Fill in the Missing Blanks		
Write the word or group of words needed to complete the following sentences.		
15.	_____ is used to catch a person to avoid them from falling while working at height.	
16.	A simple hand tool which is used to measure the thickness or diameter of a propeller shaft is known as a _____.	
Short Answer		
Write a short answer in the space provided (not to exceed more than approximately fifty 50 words).		
17.	What is machinery installation?	

18	What are five machines installed on ship?	
19.	What are the main components of a gear box?	
20.	What is a propeller shaft?	
Feedback to candidate:		
Assessment decision for this assessment activity: ☐ **Competent** ☐ **Not Yet Competent**		

Candidate's Signature:		**Date:**	
Assessor' Signature:		**Date:**	

Written Test - Answers

Answers are highlighted in **bold** and ***italics*****.**

Multiple Choice		
1.	Which is the 50 % of 150?	a. 50 ***b. 75*** c. 125 d. 150
2.	The diameter of a propeller shaft is 200 mm. What is the circumference in mm?	a. 528 ***b. 628*** c. 728 d. 428
3.	Ways to build relationships within a team may include?	a. Discuss team member work styles b. Define “team personality” c. Discuss individual goals, hopes, concerns ***d. All of the above***
4.	What does a visual workplace improve?	a. Communication b. Facility operation ***c. Both a and b*** d. None of the above
5.	When discussing reporting relationships, what important organisational principle of reporting needs to be taken into consideration?	***a. Chain of command*** b. Chain reaction c. Designation list d. None of the above
6.	What potentially hazardous situation which, if not avoided, may result in minor or moderate injury?	a. Danger ***b. Caution*** c. Warning d. Emergency
7.	Which is not a measuring tool?	a. Ammeter ***b. Grinders*** c. Multi meter d. Megger
8.	What is the Bow?	***a. Forward part of the ship*** b. After part of the ship c. Right side of the ship

		d. Left side of the ship
9.	What is not a piece lifting equipment?	a. Hydraulic Jack ***b. Dial indicators*** c. Crane d. Chain hoist
10.	What is the most common type of engine installed on a ship?	***a. Diesel*** b. Steam c. Gas turbine d. Petrol
11.	A gear box is installed with the main marine engine to convert?	a. High speed to low speed b. low torque to high torque ***c. a and b*** d. None of the above
12.	Which of the installation works is considered to be the most difficult one?	a. Engine and gear box ***b. Propulsion and steering system*** c. Electrical machinery d. Deck machinery
True or False Quiz		
13.	The right side of the ship is called the port side.	True ☐ **False** √
14.	A marine engine is installed on a ship for the purpose of propulsion.	**True** √ False ☐
Fill in the Missing Blanks		
15.	***Safety belt/harness*** is used to catch a person to avoid them from falling while working at height.	
16.	A simple hand tool which is used to measure the thickness or diameter of a propeller shaft is known as a ***measuring tape***.	
Short Answer		
17.	What is machinery installation?	***Installation means to mount or assemble any device (machinery/equipment) in order to make it ready for final termination.*** ***The machinery installation on board ships means lifting and mounting on to the foundation and tightening the bolt and nuts to function it smoothly. It is tedious work that includes lifting, positioning/setting, levelling and alignment, and testing/commissioning.***
18.	What are five machines installed on ship?	***1. Main engine and gear box***

		2. Propeller shaft and propeller ***3. Steering gear and rudder*** ***4. Electrical machinery*** ***5. Deck machinery***
19.	What are the main components of a gear box?	***The marine gear box is usually known as reduction gear box. Reduction gear assembly consists of a set of rotating gears connected to a wheel work. Main components are:*** ***1. Input shaft*** ***2. Driving pinion*** ***3. Driven pinion*** ***4. Clutch***
20.	What is a propeller shaft?	***A shaft that carries a screw propeller at its end and transmits power from engine to propeller.*** ***The shaft that transmits power from the gearbox to the differential gear in a motor vehicle or from the engine to the propeller in a ship or aircraft.***

Set A: Practical Demonstration 1

PRACTICAL DEMONSTRATION 1	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Machinery Installation
Task:	Install main engine on foundation
Assessment Centre:	
Date of Assessment:	
Time of Assessment:	

Instructions:

Read and understand the directions carefully:

- this practical demonstration is based on the performance criteria from all or some of the units of competency in Machinery Installation
- this assessment activity will be used to measure your underpinning skills
- you will have fifteen (15) minutes to familiarise yourself with the resources to be used
- you have four (4) hours to complete this demonstration

Procedure:

- observe and follow all safety and health (OHS) requirements at all times
- read the specification information provided
- collect all materials needed to complete the task
- perform the task within the given time

Job Specification Information:

1. Identify, read and interpret job specifications, drawings and other workplace documents.
2. Identify and collect required tools, equipment, machinery and materials for task.
3. Inspect worksite for hazards and implement appropriate controls (if necessary).
4. Identify and collect appropriate PPE.
5. Inspect and check tools, equipment, machinery and materials as per job specification.
6. Measure diameter, thickness and length of engine setting as per specification.
7. Prepare lifting equipment and fittings accessories.
8. Set-up lifting equipment, nut and bolt, and level bedplate as required.
9. Mark engine installation parts.
10. Perform tightening of nut and bolt, and other accessories to reduce vibration.
11. Assemble all fittings, accessories and supports.
12. Perform alignment and levelling test.
13. Install engine onto foundation.
14. Carry out adjustments (if necessary).
15. Check level and alignment of installed engine (adjust if necessary).
16. Clean, maintain and store tools, equipment and machinery.
17. Clean work area and dispose of waste materials.

Drawing, Plan, Diagram or Sketch:

The drawing below is the actual installation requirement for the task to be performed. During the installation process, you are to ensure:

- Proper use of tools and equipment for engine installation
- Measurements are taken according to drawing/layout/specification
- Levelling and straightness
- Proper fitting nuts and bolts
- Proper set-up of chocks and hold-down bolts
- Stability of all assembled components

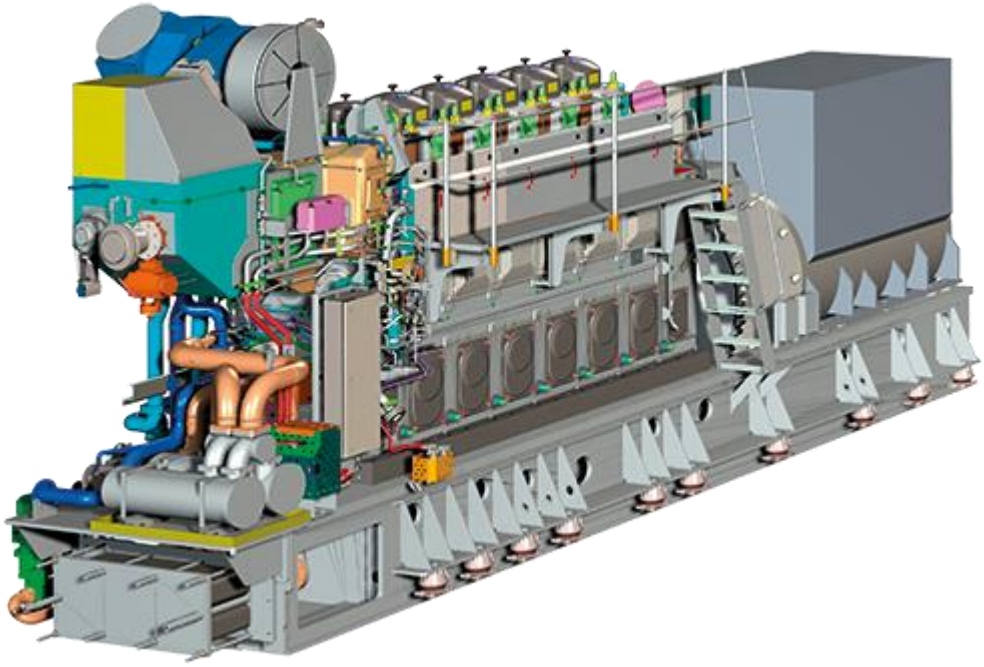


Figure 1: Main Engine installed on foundation ([lifting, positioning, fitting nut and bolt, levelling, testing).

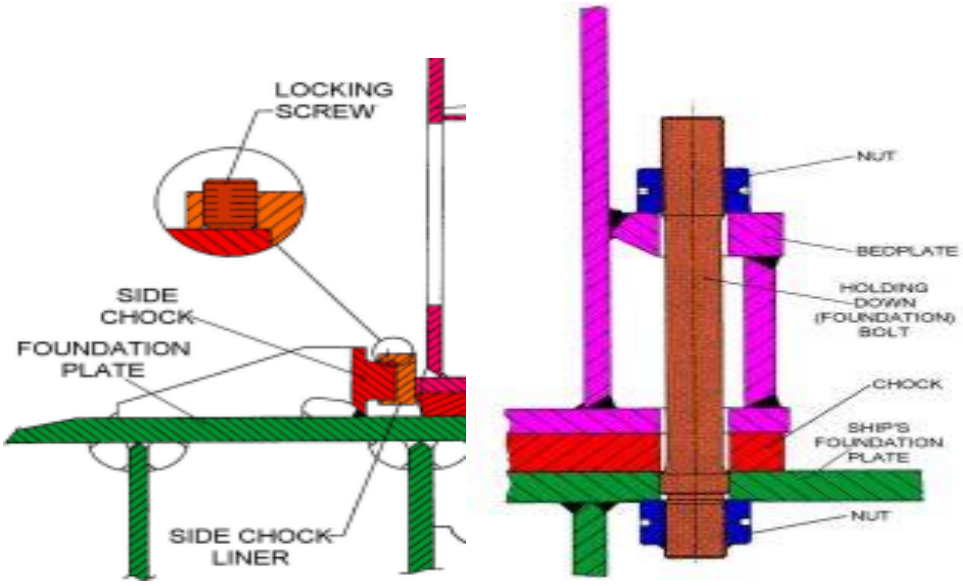


Figure 2: Positiing and fitting of chock and, nut and bolt.

Note:
1. The engine is mounted on resin or cast-iron chocks and bolted to the hull using holding.

2. When the bedplate is in perfect alignment, cast iron chocks are hand fitted between the machined underside of the bedplate and machined spots on the foundation plate. This is a skilled task and 80% contact is the aim.
3. Once the engine is supported by the chocks, the jacks are removed, and the hold-down bolts are tightened using a hydraulic jack to stretch the bolts.
4. Hold-down bolts should be checked regularly for tightness. If they are allowed to come loose, then the mating surfaces will rub against each other and wear away in a process (known as fretting). If this continues and the bolts are subsequently tightened down, the bedplate (and main bearings) will be pulled out of alignment.
5. Side chocks are fitted to prevent the engine from moving sideways due to the movement of the vessel or because of the sideways component of thrust from the reciprocating and rotating parts. The chock is welded to the foundation plate as shown, a liner is hand fitted on a 100:1 taper and then driven home.
6. This is a side chocking arrangement, where after driving the liner home, locking screws are hardened down as shown in Figure 2 above.

Resources Required:

Tools:	Adjustable wrench Open ended spanner Slogging spanner Ring slopping spanner T- box spanner Analog torque wrench Square drive wrench Vice grip Side cutting pliers Combination pliers Straight hand snip Ball-peen hammer Sledge hammer Hacksaw Jaw gear puller Matric tape measure Screwdriver Bolt cutter Allen key set Table vice Electric drill Precision levels Spirit levels Line levels Optical levels Electronic levels Laser levels Master levels Dial indicators Special type dial indicator Fixtures Magnetic bases Feeler gauges Bench centres Plumb line

	Folding wedges
Equipment:	Hydraulic jack Pneumatic jack Lifting device Crane Chain hoist block
Machinery:	Main diesel engine Gear box
Materials:	Bed plate Foundation plate Locking screws Chocks Side chock liner Nuts Bolts
PPE:	Apron Mask Safety helmet Safety goggles Gloves (long) Safety shoes

Set A: Practical Demonstration 1 – Observation Checklist

PRACTICAL DEMONSTRATION 1 – OBSERVATION CHECKLIST	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Machinery Installation
Task:	Install main engine on foundation
Assessment Centre:	
Date of Assessment:	
Instructions:	The tasks listed on the observation checklist of the practical demonstration will provide performance evidence of the candidate. Performance can be observed in an actual workplace or in a simulated working environment. If performance of particular tasks cannot be observed, you may ask the candidate to explain a procedure or enter into a discussion on the subject. The assessment activity (practical demonstration) should: ▪ fit industry requirements in which the assessment will be conducted ▪ adhere, where possible, to reasonable adjustment practices ▪ ensure that suitable performance benchmarks are applied and explained to the candidate

OBSERVATION RECORD		
Performance Criteria	Place a ✓ to show if evidence has been demonstrated competently	
	Yes	**No**
Identified and interpreted relevant policies, guidelines and workplace documents.	☐	☐
Identified and interpreted relevant drawings and specifications.	☐	☐
Collected information about industry from multiple sources (as required).	☐	☐
Interpreted and applied information to day-to-day work activities.	☐	☐
Applied OSH policies and procedures in the workplace.	☐	☐
Identified hazards and risks.	☐	☐
Implemented controls for identified hazards and risks.	☐	☐
Identified and used personal protective equipment (PPE).	☐	☐
Identified and followed safety signs and symbols.	☐	☐
Identified tools, equipment and machinery required for installation.	☐	☐
Inspected and checked tools, equipment and machinery as per standard operating procedure.	☐	☐

Calculated quantity of materials required as per job specification.	☐	☐
Inspected and checked the materials as per job specification.	☐	☐
Performed measurements and calculations as per job specifications.	☐	☐
Identified key areas of ship.	☐	☐
Identified and located key machines installed on a ship.	☐	☐
Identified different types of engines, its parts and functions.	☐	☐
Identified and selected levelling tools and lifting equipment are as per job requirement.	☐	☐
Selected and set-up appropriate tools and equipment to operate lifting equipment.	☐	☐
Checked machinery and components.	☐	☐
Carried out inspection of machinery and components as per job specification and standard operating procedure.	☐	☐
Identified and selected appropriate engineering principles and techniques.	☐	☐
Performed levelling and alignment calculations.	☐	☐
Levelled lifting equipment using appropriate technique.	☐	☐
Used tools and equipment to lift and hold machinery for installation.	☐	☐
Carried out leveling and alignment is as per standard operating procedure.	☐	☐
Monitored own work against workplace standards and identified and acted upon areas for improvement	☐	☐
Identified types of marine engines	☐	☐
Identified components of marine engine	☐	☐
Described functions of different types of engine	☐	☐
Identified types of auxiliary machines	☐	☐
Prepared engine and ancillary equipment for sequential installation.	☐	☐
Checked engine and ancillary equipment for conformance with manufacturer's specifications.	☐	☐
Performed adjustments as per standard operating procedure, if required.	☐	☐
Selected and fixed appropriate gear box as per job specification.	☐	☐
Tested and checked gear box for conformance with manufacturer's specifications.	☐	☐
Installed gear box as per manufacturer's specifications.	☐	☐
Performed adjustments as per standard operating procedure, if required.	☐	☐
Checked level and alignment against manufacturer's specification.	☐	☐
Performed adjustments and realignment if necessary.	☐	☐

Completed work activities based on workplace standards.	☐	☐
Tools and equipment are cleaned, maintained and stored.	☐	☐
Defective or faulty tools and equipment are detected and reported according to standard operating procedure.	☐	☐
Workplace is cleaned and waste material disposed of.	☐	☐
Appropriate lines of communication are maintained with supervisors and colleagues.	☐	☐
Workplace interactions are conducted in courteous manner to gather and convey information.	☐	☐
Used appropriate medium to transfer information and ideas.	☐	☐
Responsibilities as a team member are performed.	☐	☐
Tasks are performed in accordance with workplace procedures.	☐	☐
Other teammates' tasks are identified and provided support.	☐	☐
Active participation is ensured, opinions are expressed and heard.	☐	☐
Inputs are provided and interpreted in line with the meeting purpose.	☐	☐
Problems faced at the individual and team level are identified and showed insight into the root-causes of the problems.	☐	☐
Looked beyond the obvious and did not stop at the first answers.	☐	☐
Confidentiality is maintained.	☐	☐
Inappropriate and conflicting situations are avoided.	☐	☐
The team is encouraged through sharing information or expertise, working together to solve problems, and putting team success first.	☐	☐

Feedback to candidate:

Assessment decision for this assessment activity:

☐ **Competent** ☐ **Not Yet Competent**

Candidate Signature:		**Date:**	
Assessor Signature:		**Date:**	

Set A: Practical Demonstration 2

PRACTICAL DEMONSTRATION 2	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Machinery Installation
Task:	Install and set-up gear box, propeller and propeller shaft, and steering system
Assessment Centre:	
Date of Assessment:	
Time of Assessment:	

Instructions:

Read and understand the directions carefully:

- this practical demonstration is based on the performance criteria from all or some of the units of competency in ship machinery installation
- this assessment activity will be used to measure your underpinning skills
- you will have fifteen (15) minutes to familiarise yourself with the resources to be used
- you have three (3) hours to complete this demonstration

Procedure:

- observe and follow all safety and health (OHS) requirements at all times
- read the specification information provided
- collect all materials needed to complete the task
- perform the task within the given time

Specification Information:

1. Identify, read and interpret job specifications, drawings and other workplace documents.
2. Identify and collect required tools, equipment, machinery and materials for task.
3. Inspect worksite for hazards and implement appropriate controls (if necessary).
4. Identify and collect appropriate PPE.
5. Inspect and check tools, equipment, machinery and materials as per job specification.
6. Select and fix gear box as per job specification.
7. Perform testing of gear box.
8. Install gear box as per manufacturer's specifications.
9. Connect gear box with engine.
10. Check level and alignment (adjust where necessary).
11. Prepare propeller and shaft for installation.
12. Install and fix propeller and shaft as per manufacturer's specifications.
13. Connect propeller shaft with gear box.
14. Connect propeller with propeller shaft.
15. Check level and alignment (adjust where necessary).
16. Prepare rudder and steering gear for installation.
17. Install and fix rudder and steering gear as per manufacturer's specifications.
18. Check level and alignment (adjust where necessary).
19. Carry out any adjustments to machinery as per standard operating procedure.

20. Clean, maintain and store tools, equipment and machinery.
21. Clean work area and dispose of waste materials.

Drawing, Plan, Diagram or Sketch:

The drawing below is the actual installation requirement for the task to be performed. During the installation process, you are to ensure:

- Proper use of tools and equipment for engine, gear box and propeller shaft installation
- Measurements are taken according to drawing/layout/specification
- Levelling and straightness
- Proper fitting of trust blocks, bearings and other accessories
- Proper set-up of chocks, and hold-down bolts
- Stability of all assembled components

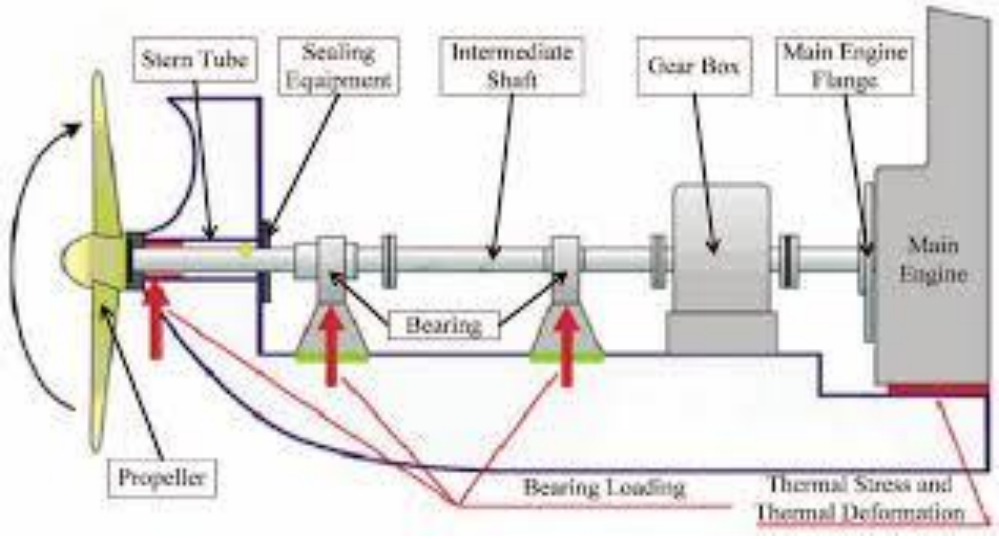


Figure 1: Gear box, propeller shaft and propeller arrangement at a glance.

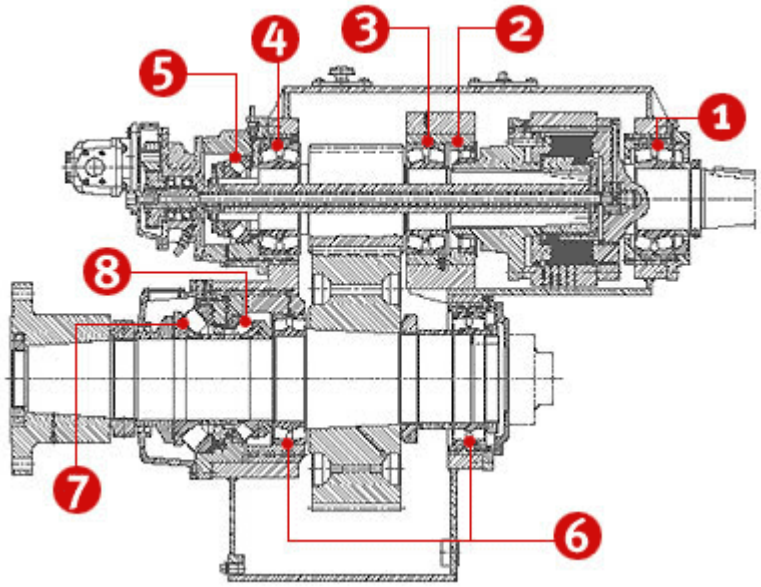


Figure 2; Gear Box set up with propeller shaft: 1, locating bearing,2, floating bearing,3 and 4 two spherical roller bearings,5. spherical roller thrust bearing,6,two spherical roller bearings 7,a spherical roller thrust bearing,8,the smaller spherical roller thrust bearing .

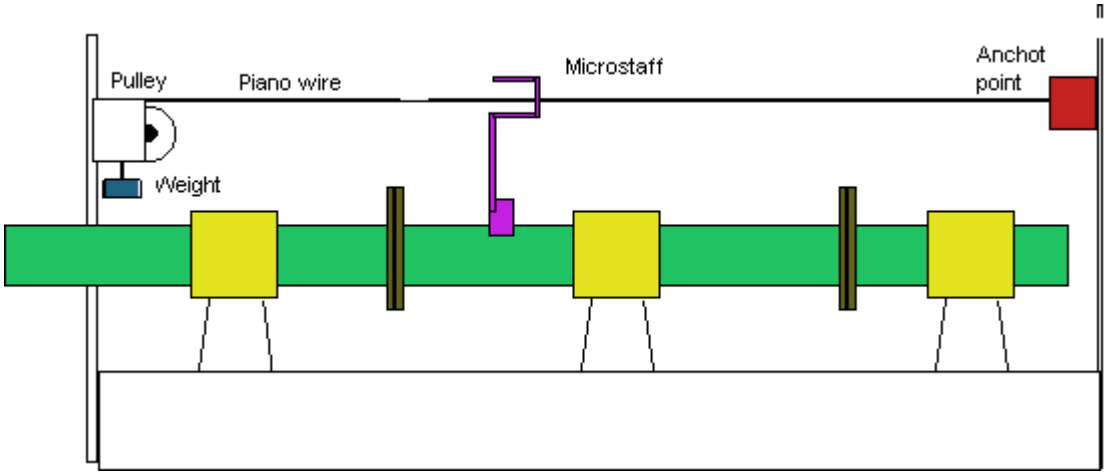


Figure 3: Propeller shaft alignment by piano wire method.

Note:

1. Upon completion of bedplate fitting for engine and gear box its alignment is checked by piano wire and level gauge as per the design. It is welded in a control way and the alignment is checked again in similar way. In the same time it should be ensured that all the heavy structure and astern blocks are welded. If everything found in order then the engine and gear box are placed on its position.
2. The engine must be securely fixed into the ship. As the engine turns the propeller, the propeller tries to push or thrust the propeller shaft and engine crankshaft forward into the ship. The thrust bearing which is situated at the aft end of the engine transmits this thrust from the crankshaft to the bedplate.
3. The bedplate is mounted on chocks and is securely bolted to the engine foundation plate on which it sits and which forms part of the structure of the hull.
4. The engine must also be lined up with the propeller shaft. If the engine output driving flange was higher or lower, or to port or star board of the propeller shaft, then it is easy to visualise that trying to connect them would cause bending stresses to be set up.
5. The engine must also be bolted to a flat surface. If the surface was uneven, then when the bolts were tightened the bedplate would be distorted, which in turn would distort the crankshaft, causing unacceptable stresses to be set up when the engine was running.

Resources Required:

Tools:	Adjustable wrench Open ended spanner Slogging spanner Ring slopping spanner T- box spanner Analog torque wrench Square drive wrench Vice grip Side cutting pliers Combination pliers Straight hand snip Ball-peen hammer Sledge hammer Hacksaw Jaw gear puller Matric tape measure Screw driver Bolt cutter Allen key set Table vice Electric drill Precision levels Spirit levels Line levels Optical levels Electronic levels Laser levels Master levels Dial indicators Special type dial indicator Fixtures Magnetic bases Feeler gauges Bench centres Plumb line Folding wedges
Equipment:	Hydraulic jack Pneumatic jack Lifting device Crane Chain hoist block
Machinery:	Main engine Gear box Propeller shaft Stern tube Trust blocks
Materials:	Locating bearing

	Floating bearing Two spherical roller bearings Spherical roller thrust bearing Two spherical roller bearings Spherical roller thrust bearing Smaller spherical roller thrust bearing Piano wire Pulley Weight Micro staff Anchor point
PPE:	Apron Mask Safety helmet Safety goggles Gloves (long) Safety shoes

Set A: Practical Demonstration 2 – Observation Checklist

PRACTICAL DEMONSTRATION 2 – OBSERVATION CHECKLIST	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Machinery Installation
Task:	Install and set-up gear box, propeller and propeller shaft, and steering system
Assessment Centre:	
Date of Assessment:	
Instructions:	The tasks listed on the observation checklist of the practical demonstration will provide performance evidence of the candidate. Performance can be observed in an actual workplace or in a simulated working environment. If performance of particular tasks cannot be observed, you may ask the candidate to explain a procedure or enter into a discussion on the subject. The assessment activity (practical demonstration) should: ▪ fit industry requirements in which the assessment will be conducted ▪ adhere, where possible, to reasonable adjustment practices ▪ ensure that suitable performance benchmarks are applied and explained to the candidate

OBSERVATION RECORD		
Performance Criteria	Place a ✓ to show if evidence has been demonstrated competently	
	Yes	**No**
Identified and interpreted relevant policies, guidelines and workplace documents.	☐	☐
Identified and interpreted relevant drawings and specifications.	☐	☐
Collected information about industry from multiple sources (as required).	☐	☐
Interpreted and applied information to day-to-day work activities.	☐	☐
Applied OSH policies and procedures in the workplace.	☐	☐
Identified hazards and risks.	☐	☐
Implemented controls for identified hazards and risks.	☐	☐
Identified and used personal protective equipment (PPE).	☐	☐
Identified and followed safety signs and symbols.	☐	☐
Identified tools, equipment and machinery required for installation.	☐	☐
Inspected and checked tools, equipment and machinery as per standard operating procedure.	☐	☐

Calculated quantity of materials required as per job specification.	☐	☐
Inspected and checked the materials as per job specification.	☐	☐
Performed measurements and calculations as per job specifications.	☐	☐
Selected and fixed gear box as per job specification.	☐	☐
Tested and checked gear box for conformance with manufacturer's specifications.	☐	☐
Installed gear box as per manufacturer's specifications.	☐	☐
Performed adjustments as required.	☐	☐
Checked level and alignment against manufacturer's specifications.	☐	☐
Performed adjustments and realignment (if required).	☐	☐
Prepared propeller and shaft for installation.	☐	☐
Checked propeller and shaft for conformance with manufacturer's specifications.	☐	☐
Installed and fixed propeller and shaft as per manufacturer's specifications.	☐	☐
Performed adjustments (if required).	☐	☐
Prepared rudder and steering gear for installation.	☐	☐
Checked rudder and steering gear for conformance with manufacturer's specifications.	☐	☐
Installed and fixed rudder and steering gear as per manufacturer's specifications.	☐	☐
Performed adjustments (if required).	☐	☐
Checked level and alignment against manufacturer's specifications.	☐	☐
Performed adjustments and realignment (if required).	☐	☐
Monitored own work against workplace standards and identified and acted upon areas for improvement.	☐	☐
Completed work activities based on workplace standards.	☐	☐
Tools and equipment are cleaned, maintained and stored.	☐	☐
Defective or faulty tools and equipment are detected and reported according to standard operating procedure.	☐	☐
Workplace is cleaned and waste material disposed of.	☐	☐
Appropriate lines of communication are maintained with supervisors and colleagues.	☐	☐
Workplace interactions are conducted in courteous manner to gather and convey information.	☐	☐
Used appropriate medium to transfer information and ideas.	☐	☐
Responsibilities as a team member are performed.	☐	☐
Tasks are performed in accordance with workplace procedures.	☐	☐
Other teammates' tasks are identified and provided support.	☐	☐

Active participation is ensured, opinions are expressed and heard.	☐	☐
Inputs are provided and interpreted in line with the meeting purpose.	☐	☐
Problems faced at the individual and team level are identified and showed insight into the root-causes of the problems.	☐	☐
Looked beyond the obvious and did not stop at the first answers.	☐	☐
Confidentiality is maintained.	☐	☐
Inappropriate and conflicting situations are avoided.	☐	☐
The team is encouraged through sharing information or expertise, working together to solve problems, and putting team success first.	☐	☐
Feedback to candidate:		
Assessment decision for this assessment activity: ☐ **Competent** ☐ **Not Yet Competent**		

Candidate Signature:		**Date:**	
Assessor Signature:		**Date:**	

Set B: Practical Demonstration 1

PRACTICAL DEMONSTRATION 1	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Machinery Installation
Task:	Install main engine on foundation
Assessment Centre:	
Date of Assessment:	
Time of Assessment:	

Instructions:

Read and understand the directions carefully:

- this practical demonstration is based on the performance criteria from all or some of the units of competency in Machinery Installation
- this assessment activity will be used to measure your underpinning skills
- you will have fifteen (15) minutes to familiarise yourself with the resources to be used
- you have four (4) hours to complete this demonstration

Procedure:

- observe and follow all safety and health (OHS) requirements at all times
- read the specification information provided
- collect all materials needed to complete the task
- perform the task within the given time

Job Specification Information:

1. Identify, read and interpret job specifications, drawings and other workplace documents.
2. Identify and collect required tools, equipment, machinery and materials for task.
3. Inspect worksite for hazards and implement appropriate controls (if necessary).
4. Identify and collect appropriate PPE.
5. Inspect and check tools, equipment, machinery and materials as per job specification.
6. Measure diameter, thickness and length of engine setting as per specification.
7. Prepare lifting equipment and fittings accessories.
8. Set-up lifting equipment, nut and bolt, and level bedplate as required.
9. Mark engine installation parts.
10. Perform tightening of nut and bolt, and other accessories to reduce vibration.
11. Assemble all fittings, accessories and supports.
12. Perform alignment and levelling test.
13. Install engine onto foundation.
14. Carry out adjustments (if necessary).
15. Check level and alignment of installed engine (adjust if necessary).
16. Clean, maintain and store tools, equipment and machinery.
17. Clean work area and dispose of waste materials.

Drawing, Plan, Diagram or Sketch:

The drawing below is the actual installation requirement for the task to be performed. During the installation process, you are to ensure:

- Proper use of tools and equipment for engine installation
- Measurements are taken according to drawing/layout/specification
- Levelling and straightness
- Proper fitting nuts and bolts
- Proper set-up of chocks and hold-down bolts
- Stability of all assembled components

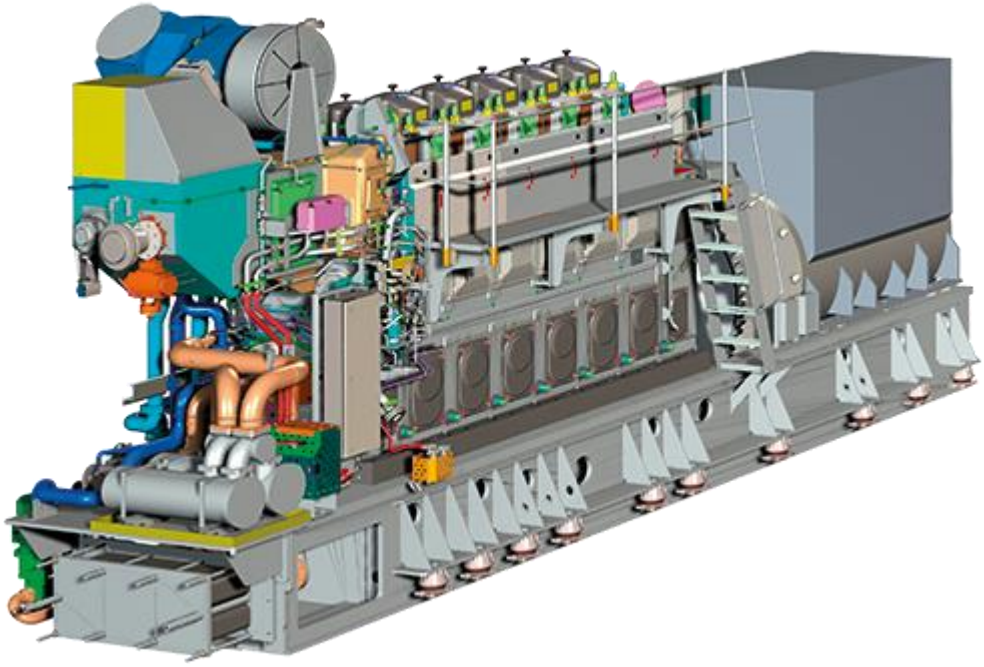


Figure 1: Main Engine installed on foundation ([lifting, positioning, fitting nut and bolt, levelling, testing).

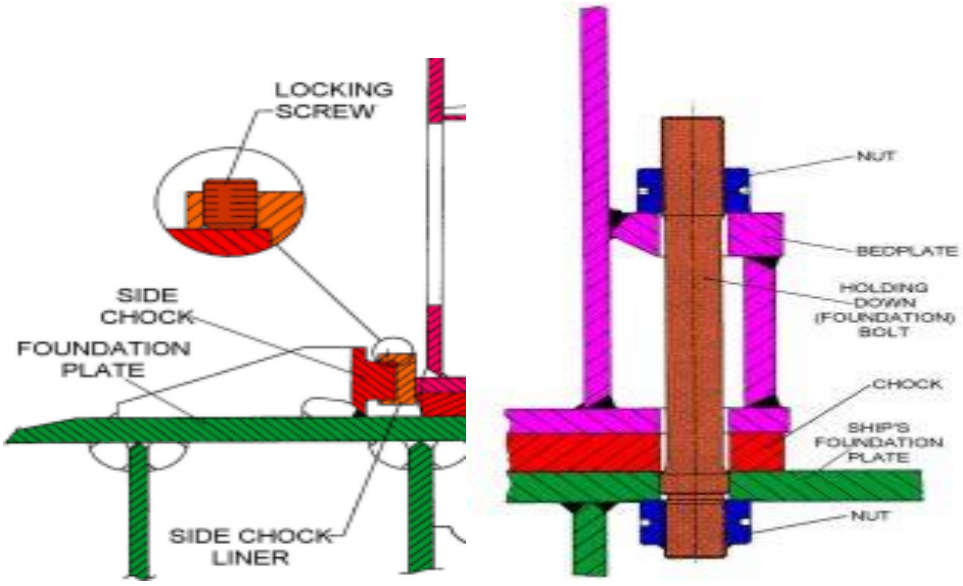


Figure 2: Positiing and fitting of chock and, nut and bolt.

Note:

1. The engine is mounted on resin or cast-iron chocks and bolted to the hull using holding.

2. When the bedplate is in perfect alignment, cast iron chocks are hand fitted between the machined underside of the bedplate and machined spots on the foundation plate. This is a skilled task and 80% contact is the aim.
3. Once the engine is supported by the chocks, the jacks are removed, and the hold-down bolts are tightened using a hydraulic jack to stretch the bolts.
4. Hold-down bolts should be checked regularly for tightness. If they are allowed to come loose, then the mating surfaces will rub against each other and wear away in a process (known as fretting). If this continues and the bolts are subsequently tightened down, the bedplate (and main bearings) will be pulled out of alignment.
5. Side chocks are fitted to prevent the engine from moving sideways due to the movement of the vessel or because of the sideways component of thrust from the reciprocating and rotating parts. The chock is welded to the foundation plate as shown, a liner is hand fitted on a 100:1 taper and then driven home.
6. This is a side chocking arrangement, where after driving the liner home, locking screws are hardened down as shown in Figure 2 above.

Resources Required:

Tools:	Adjustable wrench Open ended spanner Slogging spanner Ring slopping spanner T- box spanner Analog torque wrench Square drive wrench Vice grip Side cutting pliers Combination pliers Straight hand snip Ball-peen hammer Sledge hammer Hacksaw Jaw gear puller Matric tape measure Screwdriver Bolt cutter Allen key set Table vice Electric drill Precision levels Spirit levels Line levels Optical levels Electronic levels Laser levels Master levels Dial indicators Special type dial indicator Fixtures Magnetic bases Feeler gauges Bench centres Plumb line

	Folding wedges
Equipment:	Hydraulic jack Pneumatic jack Lifting device Crane Chain hoist block
Machinery:	Main diesel engine Gear box
Materials:	Bed plate Foundation plate Locking screws Chocks Side chock liner Nuts Bolts
PPE:	Apron Mask Safety helmet Safety goggles Gloves (long) Safety shoes

Set B: Practical Demonstration 1 – Observation Checklist

PRACTICAL DEMONSTRATION 1 – OBSERVATION CHECKLIST	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Machinery Installation
Task:	Install main engine on foundation
Assessment Centre:	
Date of Assessment:	
Instructions:	The tasks listed on the observation checklist of the practical demonstration will provide performance evidence of the candidate. Performance can be observed in an actual workplace or in a simulated working environment. If performance of particular tasks cannot be observed, you may ask the candidate to explain a procedure or enter into a discussion on the subject. The assessment activity (practical demonstration) should: ▪ fit industry requirements in which the assessment will be conducted ▪ adhere, where possible, to reasonable adjustment practices ▪ ensure that suitable performance benchmarks are applied and explained to the candidate

OBSERVATION RECORD		
Performance Criteria	Place a ✓ to show if evidence has been demonstrated competently	
	Yes	**No**
Identified and interpreted relevant policies, guidelines and workplace documents.	☐	☐
Identified and interpreted relevant drawings and specifications.	☐	☐
Collected information about industry from multiple sources (as required).	☐	☐
Interpreted and applied information to day-to-day work activities.	☐	☐
Applied OSH policies and procedures in the workplace.	☐	☐
Identified hazards and risks.	☐	☐
Implemented controls for identified hazards and risks.	☐	☐
Identified and used personal protective equipment (PPE).	☐	☐
Identified and followed safety signs and symbols.	☐	☐
Identified tools, equipment and machinery required for installation.	☐	☐
Inspected and checked tools, equipment and machinery as per standard operating procedure.	☐	☐

Calculated quantity of materials required as per job specification.	☐	☐
Inspected and checked the materials as per job specification.	☐	☐
Performed measurements and calculations as per job specifications.	☐	☐
Identified key areas of ship.	☐	☐
Identified and located key machines installed on a ship.	☐	☐
Identified different types of engines, its parts and functions.	☐	☐
Identified and selected levelling tools and lifting equipment are as per job requirement.	☐	☐
Selected and set-up appropriate tools and equipment to operate lifting equipment.	☐	☐
Checked machinery and components.	☐	☐
Carried out inspection of machinery and components as per job specification and standard operating procedure.	☐	☐
Identified and selected appropriate engineering principles and techniques.	☐	☐
Performed levelling and alignment calculations.	☐	☐
Levelled lifting equipment using appropriate technique.	☐	☐
Used tools and equipment to lift and hold machinery for installation.	☐	☐
Carried out leveling and alignment is as per standard operating procedure.	☐	☐
Monitored own work against workplace standards and identified and acted upon areas for improvement	☐	☐
Identified types of marine engines	☐	☐
Identified components of marine engine	☐	☐
Described functions of different types of engine	☐	☐
Identified types of auxiliary machines	☐	☐
Prepared engine and ancillary equipment for sequential installation.	☐	☐
Checked engine and ancillary equipment for conformance with manufacturer's specifications.	☐	☐
Performed adjustments as per standard operating procedure, if required.	☐	☐
Selected and fixed appropriate gear box as per job specification.	☐	☐
Tested and checked gear box for conformance with manufacturer's specifications.	☐	☐
Installed gear box as per manufacturer's specifications.	☐	☐
Performed adjustments as per standard operating procedure, if required.	☐	☐
Checked level and alignment against manufacturer's specification.	☐	☐
Performed adjustments and realignment if necessary.	☐	☐

Completed work activities based on workplace standards.	☐	☐
Tools and equipment are cleaned, maintained and stored.	☐	☐
Defective or faulty tools and equipment are detected and reported according to standard operating procedure.	☐	☐
Workplace is cleaned and waste material disposed of.	☐	☐
Appropriate lines of communication are maintained with supervisors and colleagues.	☐	☐
Workplace interactions are conducted in courteous manner to gather and convey information.	☐	☐
Used appropriate medium to transfer information and ideas.	☐	☐
Responsibilities as a team member are performed.	☐	☐
Tasks are performed in accordance with workplace procedures.	☐	☐
Other teammates' tasks are identified and provided support.	☐	☐
Active participation is ensured, opinions are expressed and heard.	☐	☐
Inputs are provided and interpreted in line with the meeting purpose.	☐	☐
Problems faced at the individual and team level are identified and showed insight into the root-causes of the problems.	☐	☐
Looked beyond the obvious and did not stop at the first answers.	☐	☐
Confidentiality is maintained.	☐	☐
Inappropriate and conflicting situations are avoided.	☐	☐
The team is encouraged through sharing information or expertise, working together to solve problems, and putting team success first.	☐	☐
Feedback to candidate:		
Assessment decision for this assessment activity: ☐ **Competent** ☐ **Not Yet Competent**		

Candidate Signature:		**Date:**	
Assessor Signature:		**Date:**	

Set B: Practical Demonstration 2

PRACTICAL DEMONSTRATION 2	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Machinery Installation
Task:	Install hydraulic equipment and electrical machinery (centrifugal pump)
Assessment Centre:	
Date of Assessment:	
Time of Assessment:	

Instructions:

Read and understand the directions carefully:

- this practical demonstration is based on the performance criteria from all or some of the units of competency in Machinery Installation
- this assessment activity will be used to measure your underpinning skills
- you will have fifteen (15) minutes to familiarise yourself with the resources to be used
- you have three (3) hour to complete this demonstration

Procedure:

- observe and follow all safety and health (OHS) requirements at all times
- read the specification information provided
- collect all materials needed to complete the task
- perform the task within the given time

Specification Information:

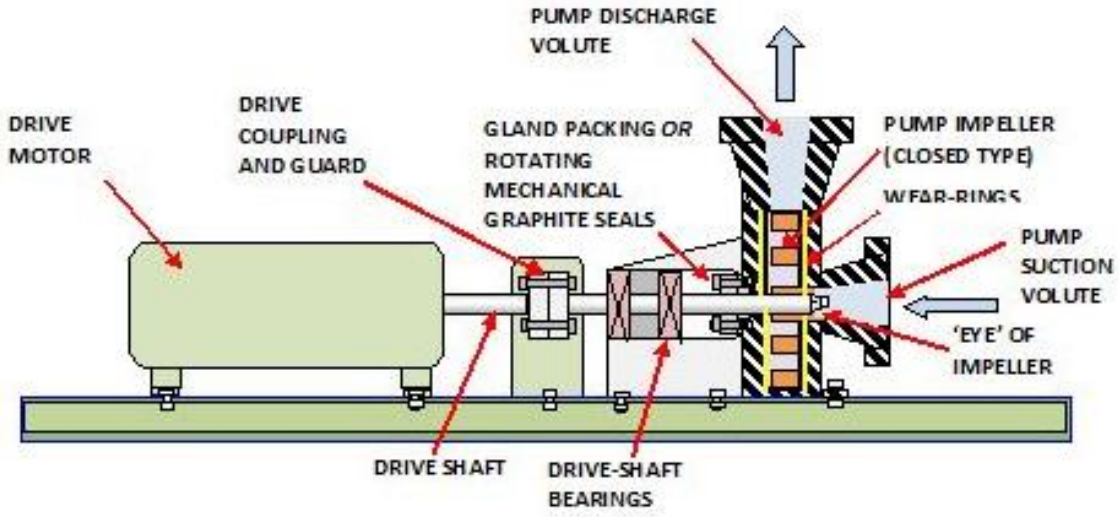
1. Identify, read and interpret job specifications, drawings and other workplace documents.
2. Identify and collect required tools, equipment, machinery and materials for task.
3. Inspect worksite for hazards and implement appropriate controls (if necessary).
4. Identify and collect appropriate PPE.
5. Inspect and check tools, equipment, machinery and materials as per job specification.
6. Prepare hydraulic equipment and/or electrical machinery for installation.
7. Check hydraulic equipment and/or electrical machinery for conformance with manufacturer's specifications.
8. Prepare base according to lay out.
9. Install hydraulic equipment and/or electrical machinery
10. Align pump shaft with the motor shaft.
11. Set pump with motor.
12. Tighten mounting bolts according to prescribed pressure.
13. Carry out pre-start checks to ensure correct operation.
14. Perform adjustments (if required).
15. Check level and alignment as per manufacturer's specifications.
16. Perform adjustments and realignment (If necessary).
17. Clean, maintain and store tools, equipment and machinery.
18. Clean work area and dispose of waste materials.

Drawing, Plan, Diagram or Sketch:

The drawing below is the actual installation requirement for the task to be performed. During the installation process, you are to ensure:

- Proper use of tools and wiring technique
- Compliance in ISO/Class Rule
- Correct installation for motor and pump
- Correct connection for Controlling device
- Check loose connection/ levelling
- Proper test and termination
- Proper fixing and tightness of all accessories
- Safety and integrity for pump and motor assembling/installation

Assemble and align a centrifugal pump with an engine or motor



SECTION THROUGH BASIC HORIZONTAL SINGLE STAGE CENTRIFUGAL PUMP

Resources Required:

Tools:	Adjustable wrench Open ended spanner Slogging spanner Ring slopping spanner T- box spanner Analog torque wrench Square drive wrench Vice grip Side cutting pliers Combination pliers Straight hand snip Ball-peen hammer Sledge hammer Hacksaw Jaw gear puller Matric tape measure Screwdriver Bolt cutter Allen key set Table vice Electric drill Precision levels Spirit levels Line levels Optical levels Electronic levels Laser levels Master levels Dial indicators Special type dial indicator Fixtures Magnetic bases Feeler gauges Bench centres Plumb line Folding wedges
Equipment:	Hydraulic jack Pneumatic jack Lifting device Crane Chain hoist block
Machinery:	Electric motor Centrifugal pump
Materials:	Motor fitting base/foundation Motor drive shaft Drive shaft bearing Coupling and guards

	Gland packing Pump accessories Nuts and bolts
PPE:	Apron Mask Safety helmet Safety goggles Gloves (long) Safety shoes

Set B: Practical Demonstration 2 – Observation Checklist

PRACTICAL DEMONSTRATION 2 – OBSERVATION CHECKLIST	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Machinery Installation
Task:	Install hydraulic equipment and electrical machinery (centrifugal pump)
Assessment Centre:	
Date of Assessment:	
Instructions:	The tasks listed on the observation checklist of the practical demonstration will provide performance evidence of the candidate. Performance can be observed in an actual workplace or in a simulated working environment. If performance of particular tasks cannot be observed, you may ask the candidate to explain a procedure or enter into a discussion on the subject. The assessment activity (practical demonstration) should: ▪ fit industry requirements in which the assessment will be conducted ▪ adhere, where possible, to reasonable adjustment practices ▪ ensure that suitable performance benchmarks are applied and explained to the candidate

OBSERVATION RECORD		
Performance Criteria	Place a ✓ to show if evidence has been demonstrated competently	
	Yes	**No**
Identified and interpreted relevant policies, guidelines and workplace documents.	☐	☐
Identified and interpreted relevant drawings and specifications.	☐	☐
Collected information about industry from multiple sources (as required).	☐	☐
Interpreted and applied information to day-to-day work activities.	☐	☐
Applied OSH policies and procedures in the workplace.	☐	☐
Identified hazards and risks.	☐	☐
Implemented controls for identified hazards and risks.	☐	☐
Identified and used personal protective equipment (PPE).	☐	☐
Identified and followed safety signs and symbols.	☐	☐
Identified tools, equipment and machinery required for installation.	☐	☐
Inspected and checked tools, equipment and machinery as per standard operating procedure.	☐	☐

Calculated quantity of materials required as per job specification.	☐	☐
Inspected and checked the materials as per job specification.	☐	☐
Performed measurements and calculations as per job specifications.	☐	☐
Prepared electrical machinery for sequential installation.	☐	☐
Checked electrical machinery is for conformance with manufacturer's specifications.	☐	☐
Installed electrical machinery is as per manufacturer's specifications.	☐	☐
Carried out pre-start checks of electrical machinery to ensure correct operation.	☐	☐
Performed adjustments as per standard operating procedure, if required.	☐	☐
Checked level and alignment against manufacturer's specification.	☐	☐
Performed adjustments and realignment if necessary.	☐	☐
Monitored own work against workplace standards and identified and acted upon areas for improvement.	☐	☐
Completed work activities based on workplace standards.	☐	☐
Tools and equipment are cleaned, maintained and stored.	☐	☐
Defective or faulty tools and equipment are detected and reported according to standard operating procedure.	☐	☐
Workplace is cleaned and waste material disposed of.	☐	☐
Appropriate lines of communication are maintained with supervisors and colleagues.	☐	☐
Workplace interactions are conducted in courteous manner to gather and convey information.	☐	☐
Used appropriate medium to transfer information and ideas.	☐	☐
Responsibilities as a team member are performed.	☐	☐
Tasks are performed in accordance with workplace procedures.	☐	☐
Other teammates' tasks are identified and provided support.	☐	☐
Active participation is ensured, opinions are expressed and heard.	☐	☐
Inputs are provided and interpreted in line with the meeting purpose.	☐	☐
Problems faced at the individual and team level are identified and showed insight into the root-causes of the problems.	☐	☐
Looked beyond the obvious and did not stop at the first answers.	☐	☐
Confidentiality is maintained.	☐	☐
Inappropriate and conflicting situations are avoided.	☐	☐
The team is encouraged through sharing information or expertise, working together to solve problems, and putting team success first.	☐	☐

Feedback to candidate:			
Assessment decision for this assessment activity: ☐ **Competent** ☐ **Not Yet Competent**			
Candidate Signature:		**Date:**	
Assessor Signature:		**Date:**	

Set C: Practical Demonstration 1

PRACTICAL DEMONSTRATION 1	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Machinery Installation
Task:	Install main engine on foundation
Assessment Centre:	
Date of Assessment:	
Time of Assessment:	

Instructions:

Read and understand the directions carefully:

- this practical demonstration is based on the performance criteria from all or some of the units of competency in Machinery Installation
- this assessment activity will be used to measure your underpinning skills
- you will have fifteen (15) minutes to familiarise yourself with the resources to be used
- you have four (4) hours to complete this demonstration

Procedure:

- observe and follow all safety and health (OHS) requirements at all times
- read the specification information provided
- collect all materials needed to complete the task
- perform the task within the given time

Job Specification Information:

1. Identify, read and interpret job specifications, drawings and other workplace documents.
2. Identify and collect required tools, equipment, machinery and materials for task.
3. Inspect worksite for hazards and implement appropriate controls (if necessary).
4. Identify and collect appropriate PPE.
5. Inspect and check tools, equipment, machinery and materials as per job specification.
6. Measure diameter, thickness and length of engine setting as per specification.
7. Prepare lifting equipment and fittings accessories.
8. Set-up lifting equipment, nut and bolt, and level bedplate as required.
9. Mark engine installation parts.
10. Perform tightening of nut and bolt, and other accessories to reduce vibration.
11. Assemble all fittings, accessories and supports.
12. Perform alignment and levelling test.
13. Install engine onto foundation.
14. Carry out adjustments (if necessary).
15. Check level and alignment of installed engine (adjust if necessary).
16. Clean, maintain and store tools, equipment and machinery.
17. Clean work area and dispose of waste materials.

Drawing, Plan, Diagram or Sketch:

The drawing below is the actual installation requirement for the task to be performed. During the installation process, you are to ensure:

- Proper use of tools and equipment for engine installation
- Measurements are taken according to drawing/layout/specification
- Levelling and straightness
- Proper fitting nuts and bolts
- Proper set-up of chocks and hold-down bolts
- Stability of all assembled components

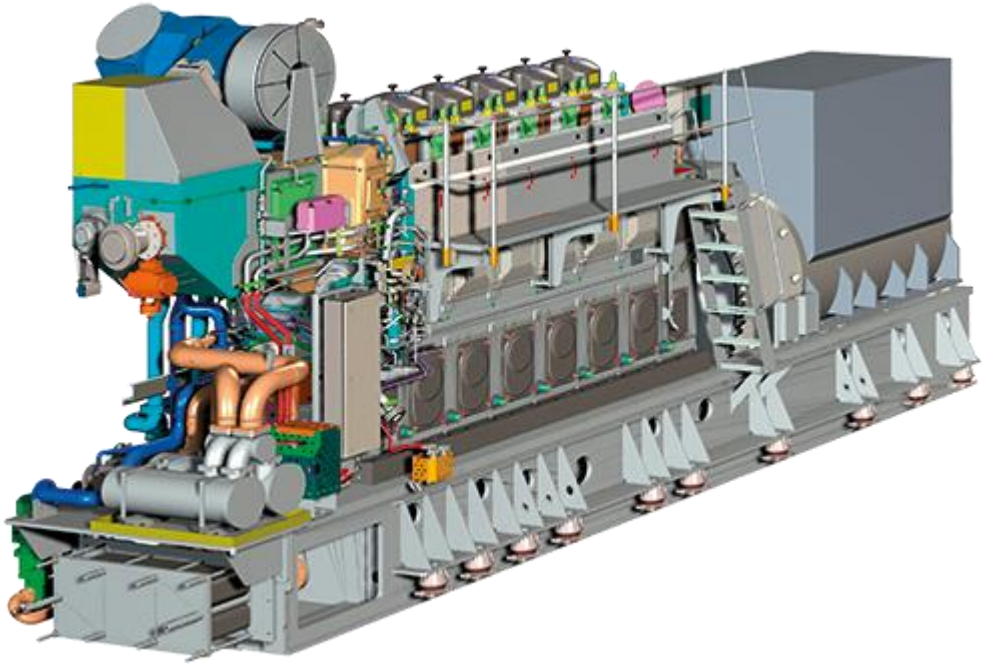


Figure 1: Main Engine installed on foundation ([lifting, positioning, fitting nut and bolt, levelling, testing).

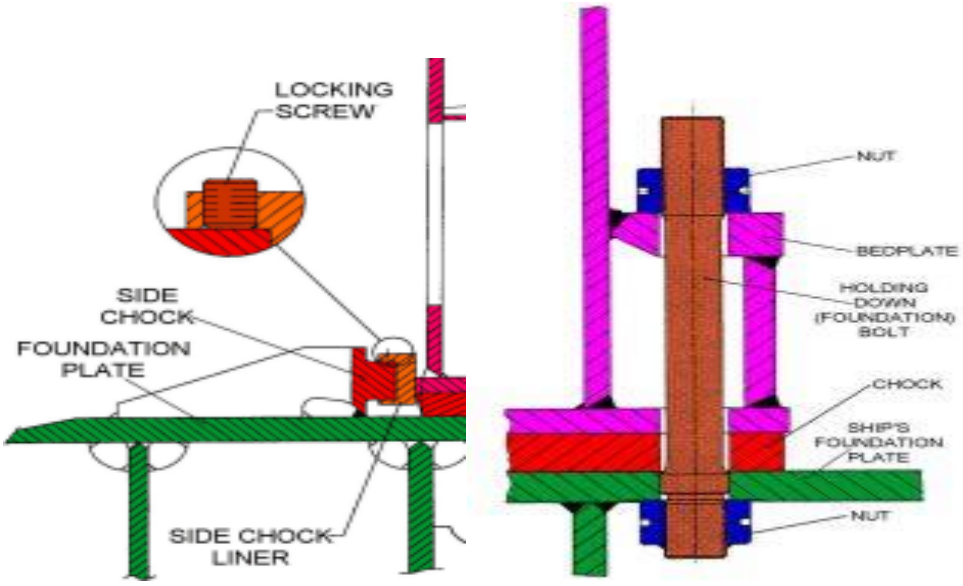


Figure 2: Positiing and fitting of chock and, nut and bolt.

Note:
1. The engine is mounted on resin or cast-iron chocks and bolted to the hull using holding.

2. When the bedplate is in perfect alignment, cast iron chocks are hand fitted between the machined underside of the bedplate and machined spots on the foundation plate. This is a skilled task and 80% contact is the aim.
3. Once the engine is supported by the chocks, the jacks are removed, and the hold-down bolts are tightened using a hydraulic jack to stretch the bolts.
4. Hold-down bolts should be checked regularly for tightness. If they are allowed to come loose, then the mating surfaces will rub against each other and wear away in a process (known as fretting). If this continues and the bolts are subsequently tightened down, the bedplate (and main bearings) will be pulled out of alignment.
5. Side chocks are fitted to prevent the engine from moving sideways due to the movement of the vessel or because of the sideways component of thrust from the reciprocating and rotating parts. The chock is welded to the foundation plate as shown, a liner is hand fitted on a 100:1 taper and then driven home.
6. This is a side chocking arrangement, where after driving the liner home, locking screws are hardened down as shown in Figure 2 above.

Resources Required:

Tools:	Adjustable wrench Open ended spanner Slogging spanner Ring slopping spanner T- box spanner Analog torque wrench Square drive wrench Vice grip Side cutting pliers Combination pliers Straight hand snip Ball-peen hammer Sledge hammer Hacksaw Jaw gear puller Matric tape measure Screwdriver Bolt cutter Allen key set Table vice Electric drill Precision levels Spirit levels Line levels Optical levels Electronic levels Laser levels Master levels Dial indicators Special type dial indicator Fixtures Magnetic bases Feeler gauges Bench centres Plumb line

	Folding wedges
Equipment:	Hydraulic jack Pneumatic jack Lifting device Crane Chain hoist block
Machinery:	Main diesel engine Gear box
Materials:	Bed plate Foundation plate Locking screws Chocks Side chock liner Nuts Bolts
PPE:	Apron Mask Safety helmet Safety goggles Gloves (long) Safety shoes

Set C: Practical Demonstration 1 – Observation Checklist

PRACTICAL DEMONSTRATION 1 – OBSERVATION CHECKLIST	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Machinery Installation
Task:	Install main engine on foundation
Assessment Centre:	
Date of Assessment:	
Instructions:	The tasks listed on the observation checklist of the practical demonstration will provide performance evidence of the candidate. Performance can be observed in an actual workplace or in a simulated working environment. If performance of particular tasks cannot be observed, you may ask the candidate to explain a procedure or enter into a discussion on the subject. The assessment activity (practical demonstration) should: ▪ fit industry requirements in which the assessment will be conducted ▪ adhere, where possible, to reasonable adjustment practices ▪ ensure that suitable performance benchmarks are applied and explained to the candidate

OBSERVATION RECORD		
Performance Criteria	Place a ✓ to show if evidence has been demonstrated competently	
	Yes	**No**
Identified and interpreted relevant policies, guidelines and workplace documents.	☐	☐
Identified and interpreted relevant drawings and specifications.	☐	☐
Collected information about industry from multiple sources (as required).	☐	☐
Interpreted and applied information to day-to-day work activities.	☐	☐
Applied OSH policies and procedures in the workplace.	☐	☐
Identified hazards and risks.	☐	☐
Implemented controls for identified hazards and risks.	☐	☐
Identified and used personal protective equipment (PPE).	☐	☐
Identified and followed safety signs and symbols.	☐	☐
Identified tools, equipment and machinery required for installation.	☐	☐
Inspected and checked tools, equipment and machinery as per standard operating procedure.	☐	☐

Calculated quantity of materials required as per job specification.	☐	☐
Inspected and checked the materials as per job specification.	☐	☐
Performed measurements and calculations as per job specifications.	☐	☐
Identified key areas of ship.	☐	☐
Identified and located key machines installed on a ship.	☐	☐
Identified different types of engines, its parts and functions.	☐	☐
Identified and selected levelling tools and lifting equipment are as per job requirement.	☐	☐
Selected and set-up appropriate tools and equipment to operate lifting equipment.	☐	☐
Checked machinery and components.	☐	☐
Carried out inspection of machinery and components as per job specification and standard operating procedure.	☐	☐
Identified and selected appropriate engineering principles and techniques.	☐	☐
Performed levelling and alignment calculations.	☐	☐
Levelled lifting equipment using appropriate technique.	☐	☐
Used tools and equipment to lift and hold machinery for installation.	☐	☐
Carried out leveling and alignment is as per standard operating procedure.	☐	☐
Monitored own work against workplace standards and identified and acted upon areas for improvement	☐	☐
Identified types of marine engines	☐	☐
Identified components of marine engine	☐	☐
Described functions of different types of engine	☐	☐
Identified types of auxiliary machines	☐	☐
Prepared engine and ancillary equipment for sequential installation.	☐	☐
Checked engine and ancillary equipment for conformance with manufacturer's specifications.	☐	☐
Performed adjustments as per standard operating procedure, if required.	☐	☐
Selected and fixed appropriate gear box as per job specification.	☐	☐
Tested and checked gear box for conformance with manufacturer's specifications.	☐	☐
Installed gear box as per manufacturer's specifications.	☐	☐
Performed adjustments as per standard operating procedure, if required.	☐	☐
Checked level and alignment against manufacturer's specification.	☐	☐
Performed adjustments and realignment if necessary.	☐	☐

Completed work activities based on workplace standards.	☐	☐
Tools and equipment are cleaned, maintained and stored.	☐	☐
Defective or faulty tools and equipment are detected and reported according to standard operating procedure.	☐	☐
Workplace is cleaned and waste material disposed of.	☐	☐
Appropriate lines of communication are maintained with supervisors and colleagues.	☐	☐
Workplace interactions are conducted in courteous manner to gather and convey information.	☐	☐
Used appropriate medium to transfer information and ideas.	☐	☐
Responsibilities as a team member are performed.	☐	☐
Tasks are performed in accordance with workplace procedures.	☐	☐
Other teammates' tasks are identified and provided support.	☐	☐
Active participation is ensured, opinions are expressed and heard.	☐	☐
Inputs are provided and interpreted in line with the meeting purpose.	☐	☐
Problems faced at the individual and team level are identified and showed insight into the root-causes of the problems.	☐	☐
Looked beyond the obvious and did not stop at the first answers.	☐	☐
Confidentiality is maintained.	☐	☐
Inappropriate and conflicting situations are avoided.	☐	☐
The team is encouraged through sharing information or expertise, working together to solve problems, and putting team success first.	☐	☐

Feedback to candidate:

Assessment decision for this assessment activity:

☐ **Competent** ☐ **Not Yet Competent**

Candidate Signature:		**Date:**	
Assessor Signature:		**Date:**	

Set C: Practical Demonstration 2

PRACTICAL DEMONSTRATION -2	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Machinery Installation
Task:	Install deck machinery and other accessories (capstan and winch)
Assessment Centre:	
Date of Assessment:	
Time of Assessment:	

Instructions:

Read and understand the directions carefully:

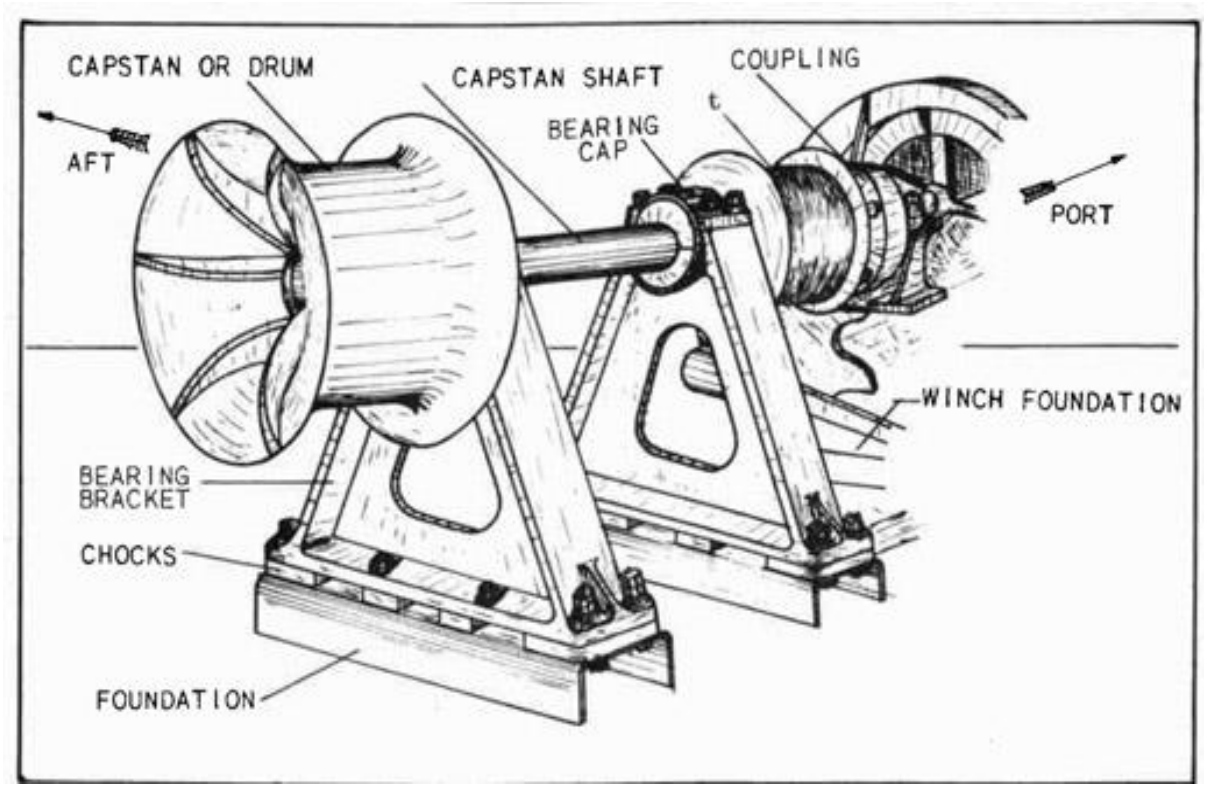
- this practical demonstration is based on the performance criteria from all or some of the units of competency in Machinery Installation
- this assessment activity will be used to measure your underpinning skills
- you will have fifteen (15) minutes to familiarise yourself with the resources to be used
- you have three (3) hours to complete this demonstration

Procedure:

- observe and follow all safety and health (OHS) requirements at all times
- read the specification information provided
- collect all materials needed to complete the task
- perform the task within the given time

Job Specification Information:

1. Identify, read and interpret job specifications, drawings and other workplace documents.
2. Identify and collect required tools, equipment, machinery and materials for task.
3. Inspect worksite for hazards and implement appropriate controls (if necessary).
4. Identify and collect appropriate PPE.
5. Inspect and check tools, equipment, machinery and materials as per job specification.
6. Measure and calculate distance of holes on foundation.
7. Prepare foundation according to job specifications.
8. Prepare fitting and tightening of nuts and bolts.
9. Mark out according to plan.
10. Prepare deck machinery (capstan and winch) for installation.
11. Assemble all fittings, accessories and supports (including shaft, bearings, and chocks).
12. Check deck machinery for conformance with manufacturer's specifications.
13. Install deck machinery as per manufacturer's specifications.
14. Carry out pre-start checks to ensure correct operation.
15. Perform adjustments (if required).
16. Check level and alignment as per manufacturer's specifications.
17. Perform adjustments and realignment (If necessary).
18. Clean, maintain and store tools, equipment and machinery.
19. Clean work area and dispose of waste materials.

Drawing, Plan, Diagram or Sketch:
The drawing below is the actual installation requirement for the task to be performed. During the installation process, you are to ensure: ▪ Proper use of tools, equipment and erection technique ▪ Measurements according to task drawing ▪ Maintain levelling and straightness ▪ Compliance in ISO/IMO/Class Rules ▪ Correct connection of capstan shaft and bearing caps ▪ Correct connection coupling for winch ▪ Correct connection for deferent accessories ▪ Proper fittings of all accessories and termination ▪ Proper firings and tightness of all connections for plugs and bearing brackets **<u>Perform set-up/installation of deck machinery (capstan and winch on foundation) with accessories (as shown in below figure)</u>**   

Resources Required:	
Tools:	Adjustable wrench Open ended spanner Slogging spanner Ring slopping spanner T-box spanner Analog torque wrench Square drive wrench Vice grip Side cutting pliers Combination pliers Straight hand snip

	Ball-peen hammer Sledge hammer Hacksaw Jaw gear puller Matric tape measure Screwdriver Bolt cutter Allen key set Table vice Electric drill
Equipment:	Mooring equipment Anchoring equipment Cargo handling equipment and hatch covers Lifeboats and life rafts Firefighting equipment
Machinery:	Winches Windlass Crane Davit Safeguards and protective devices for winches
Materials:	Capstan Chock Plug Bearing Coupling Anchor Anchor chain
PPE:	Apron Mask Safety helmet Safety goggles Gloves (long) Safety shoes

Set C: Practical Demonstration 2 – Observation Checklist

PRACTICAL DEMONSTRATION 2 – OBSERVATION CHECKLIST	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Machinery Installation
Task:	Install deck machinery and other accessories (capstan and winch)
Assessment Centre:	
Date of Assessment:	
Instructions:	The tasks listed on the observation checklist of the practical demonstration will provide performance evidence of the candidate. Performance can be observed in an actual workplace or in a simulated working environment. If performance of particular tasks cannot be observed, you may ask the candidate to explain a procedure or enter into a discussion on the subject. The assessment activity (practical demonstration) should: ▪ fit industry requirements in which the assessment will be conducted ▪ adhere, where possible, to reasonable adjustment practices ▪ ensure that suitable performance benchmarks are applied and explained to the candidate

OBSERVATION RECORD		
Performance Criteria	Place a ✓ to show if evidence has been demonstrated competently	
	Yes	**No**
Identified and interpreted relevant policies, guidelines and workplace documents.	☐	☐
Identified and interpreted relevant drawings and specifications.	☐	☐
Collected information about industry from multiple sources (as required).	☐	☐
Interpreted and applied information to day-to-day work activities.	☐	☐
Applied OSH policies and procedures in the workplace.	☐	☐
Identified hazards and risks.	☐	☐
Implemented controls for identified hazards and risks.	☐	☐
Identified and used personal protective equipment (PPE).	☐	☐
Identified and followed safety signs and symbols.	☐	☐
Identified tools, equipment and machinery required for installation.	☐	☐
Inspected and checked tools, equipment and machinery as per standard operating procedure.	☐	☐

Calculated quantity of materials required as per job specification.	☐	☐
Inspected and checked the materials as per job specification.	☐	☐
Performed measurements and calculations as per job specifications.	☐	☐
Prepared deck machinery for sequential installation.	☐	☐
Checked deck machinery is for conformance with manufacturer's specifications.	☐	☐
Installed deck machinery is as per manufacturer's specifications.	☐	☐
Carried out pre-start checks of deck machinery to ensure correct operation.	☐	☐
Performed adjustments as per standard operating procedure, if required.	☐	☐
Checked level and alignment against manufacturer's specification.	☐	☐
Performed adjustments and realignment if necessary.	☐	☐
Monitored own work against workplace standards and identified and acted upon areas for improvement.	☐	☐
Completed work activities based on workplace standards.	☐	☐
Tools and equipment are cleaned, maintained and stored.	☐	☐
Defective or faulty tools and equipment are detected and reported according to standard operating procedure.	☐	☐
Workplace is cleaned and waste material disposed of.	☐	☐
Appropriate lines of communication are maintained with supervisors and colleagues.	☐	☐
Workplace interactions are conducted in courteous manner to gather and convey information.	☐	☐
Used appropriate medium to transfer information and ideas.	☐	☐
Responsibilities as a team member are performed.	☐	☐
Tasks are performed in accordance with workplace procedures.	☐	☐
Other teammates' tasks are identified and provided support.	☐	☐
Active participation is ensured, opinions are expressed and heard.	☐	☐
Inputs are provided and interpreted in line with the meeting purpose.	☐	☐
Problems faced at the individual and team level are identified and showed insight into the root-causes of the problems.	☐	☐
Looked beyond the obvious and did not stop at the first answers.	☐	☐
Confidentiality is maintained.	☐	☐
Inappropriate and conflicting situations are avoided.	☐	☐
The team is encouraged through sharing information or expertise, working together to solve problems, and putting team success first.	☐	☐

Feedback to candidate:			
Assessment decision for this assessment activity: ☐ **Competent** ☐ **Not Yet Competent**			
Candidate Signature:		**Date:**	
Assessor Signature:		**Date:**	

Oral Questions (Optional)

ORAL QUESTIONS - INSTRUCTIONS	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Machinery Installation
Unit of Competency	
Generic Competencies	
SEIP-SBD-SMI-01-G	Use basic mathematical concepts
SEIP-SBD-SMI-02-G	Apply occupational safety and health (OSH) practice in the workplace
SEIP-SBD-SMI-03-G	Carry out workplace interaction
SEIP-SBD-SMI-04-G	Operate in a team environment
Sector-specific Competencies	
SEIP-SBD-SMI-01-S	Apply basic knowledge of ship and shipbuilding
SEIP-SBD-SMI-02-S	Use hand and power tools
Occupation-specific Competencies	
SEIP-SBD-SMI-01-O	Identify basic machinery installation works
SEIP-SBD-SMI-02-O	Perform machinery setting and levelling
SEIP-SBD-SMI-03-O	Install engine and gear box
SEIP-SBD-SMI-04-O	Install propulsion and steering system
SEIP-SBD-SMI-05-O	Install electrical machinery
SEIP-SBD-SMI-06-O	Install deck machinery
Assessment Centre:	
Date of Assessment:	
Time of Assessment:	
Instructions:	
Read and understand the directions carefully: ▪ these oral questions are based on the performance criteria from all the units of competency in Piping ▪ oral questions are designed to enable additional assessment of your underpinning knowledge ▪ you should present your responses as directed by the assessor ▪ answer all the questions asked by the assessor as best as possible	

ORAL QUESTIONS			
Question		Place a ✓in the appropriate box to show if evidence has been demonstrated competently	
		Yes	**No**
1.	What is the percentage of female workers if there are 8 male workers and 2 female workers in a team?	☐	☐
2.	What are the different types of hazards?	☐	☐
3.	What are the levelling tools used for machinery installation?	☐	☐
4.	What is the lifting equipment used in machinery installation?	☐	☐
5.	What are your duties and responsibilities as a Machinery Installer?	☐	☐
6.	What are the key installation works in machinery installation?	☐	☐
7.	What is a generator and outline its function?	☐	☐
8.	What is a marine boiler and what are its uses?	☐	☐
9.	What is a purifier and its functions?	☐	☐
10.	What is the difference between fuel and lubricant?	☐	☐
11.	What is the difference between machine and engine?	☐	☐
12.	What are the different parts/components of an engine?	☐	☐
13.	What types of auxiliary machines are installed on a ship?	☐	☐
14.	What is reduction gear and the functions of a gear box?	☐	☐
15.	What is a propulsion and steering system?	☐	☐
16.	What is propeller shaft alignment?	☐	☐
17.	What are the functions of the rudder and propeller?	☐	☐
18.	What is pump and its function?	☐	☐
19.	What types of electrical machinery are installed on a ship?	☐	☐
20.	What types of deck machinery are installed on a ship?	☐	☐
Feedback to candidate:			
Assessment decision for this assessment activity: ☐ **Competent** ☐ **Not Yet Competent**			
Candidate Signature:		**Date:**	
Assessor Signature:		**Date:**	

Oral Questioning Guideline

General Guidelines For Effective Questioning
▪ Keep questions short and focused on one key concept
▪ Ensure that questions are structured
▪ Test the questions to check that they are not ambiguous
▪ Use `open-ended questions such as `what if...?' and `why...?' questions, rather than closed questions
▪ Keep questions clear and straight forward and ask one at a time
▪ Use words that the candidate is able to understand
▪ Look at the candidate when asking questions
▪ Check to ensure that the candidate fully understands the questions
▪ Ask the candidate to clarify or re-phrase their answer if the assessor does not understand the initial response
▪ Confirm the candidate's response by repeating the answer back in his/her own words
▪ Encourage a conversational approach with the candidate when appropriate, to put him or her at ease
▪ Use questions or statements as prompts for keeping focused on the purpose of the questions and the kind of evidence being collected
▪ Use language at a suitable level for the candidate
▪ Listen carefully to the answers for opportunities to find unexpected evidence
▪ Follow up responses with further questions, if useful, to draw out more evidence or to make links between knowledge areas
▪ Compile a list of acceptable responses to ensure reliability of assessments

Oral Questions (Optional) - Answers

Answers are highlighted in **bold** and *italics*.

ORAL QUESTIONS		
Question		**Answer**
1.	What is the percentage of female workers if there are 8 male workers and 2 female workers in a team?	***20%***
2.	What are the different types of hazards?	***There are five types of hazards:*** ***1. Physical*** ***2. Chemical*** ***3. Biological*** ***4. Psychological*** ***5. Ergonomic***
3.	What are the levelling tools used for machinery installation?	▪ ***Precision*** ▪ ***Spirit*** ▪ ***Line*** ▪ ***Optical*** ▪ ***Electronic*** ▪ ***Laser*** ▪ ***Master*** ▪ ***Dial indicators*** ▪ ***Special type dial indicator*** ▪ ***Fixtures*** ▪ ***Magnetic bases*** ▪ ***Feeler gauges*** ▪ ***Bench centres*** ▪ ***Plumb line*** ▪ ***Folding wedges***
4.	What is the lifting equipment used in machinery installation?	▪ ***Hydraulic jack*** ▪ ***Pneumatic jack*** ▪ ***Lifting device*** ▪ ***Crane*** ▪ ***Chain hoist*** ▪ ***Block***
5.	What are your duties and responsibilities as a Machinery Installer?	***Marine Machinery installer have to install Maine Engine including gear box, propulsion and steering system, auxiliary machineries, deck machineries as well as repair and maintenance of mechanical controlling device keeping safety and hazards.***
6.	What are the key installation works in machinery installation?	▪ ***Main engine*** ▪ ***Gear box system*** ▪ ***Propulsion system*** ▪ ***Electrical system*** ▪ ***Steering system*** ▪ ***Deck machinery***
7.	What is a generator and outline its function?	***A machine that converts mechanical energy into electricity to serve as a power source for other machines.***

		It is a device that produces electric current , usually by rotating a conductor in a magnetic field, thereby generating current through electromagnetic induction. This sort of generator produces an alternating current (AC).
8.	What is a marine boiler and what are its uses?	***Boiler is an important piece of instrument that is used in a ship. It is used to generate steam. The steam generation through these boilers are used to turn the steam turbine to produce electricity.*** ***Uses:*** ***1. For propulsion to drive steam ship*** ***2. For electrical power generation on steam and few motor ship*** ***3. Used to drive cargo pump in tanker ship and use to operate many other devices.***
9.	What is a purifier and its functions?	***Purifier removes water and suspended solids particles from oils.*** ***On a ship, the purifiers are usually found in the engine room. There are typically two types. One type is the fuel oil purifiers. These remove contaminants including water from the fuel oil. The other type is the lube oil purifiers which do the same job for the lubricating oil.***
10.	What is the difference between fuel and lubricant?	***Fuel - a substance that can be consumed to produce energy; diesel fuel, diesel oil - a heavy mineral oil used as fuel in diesel engines.*** ***Lubricant - a substance, such as grease or oil, that reduces friction when applied as a surface coating to moving parts. It is also defined as a slippery liquid, gel, or oil that is used to reduce friction on or soreness of body tissue.***
11.	What is the difference between machine and engine?	***Machine: Machine is an apparatus used for the generation of mechanical power. It has many parts, each with a definite function, together performing a particular task Machine comprises of engine as one of its parts. Machine is a static device.*** ***Engine: Engine is a machine with moving parts that converts power into motion. Engine runs the machine. Engine is the heart of the machine, due to which the machine works.***
12.	What are the different parts/components of an engine?	▪ ***Cylinder block*** ▪ ***Cylinder*** ▪ ***Cylinder head*** ▪ ***Rocker arms***

		▪ ***Push rod*** ▪ ***Piston*** ▪ ***Combustion chamber*** ▪ ***Inlet manifold*** ▪ ***Exhaust manifold*** ▪ ***Injector*** ▪ ***Connecting rod*** ▪ ***Crank shaft*** ▪ ***Cam shaft*** ▪ ***Piston rings*** ▪ ***Engine inlet/exhaust valves*** ▪ ***Fly wheel*** ▪ ***Shell bearing***
13.	What types of auxiliary machines are installed on a ship?	▪ ***Generator*** ▪ ***Pump*** ▪ ***Purifier*** ▪ ***Boiler*** ▪ ***Cooler*** ▪ ***Heaters*** ▪ ***Air compressors*** ▪ ***Heat exchangers*** ▪ ***Distillation equipment*** ▪ ***Oil-water separators*** ▪ ***Sewage treatment plants and incinerators***
14.	What is reduction gear and the functions of a gear box?	***A reduction gear is an arrangement by which an input speed can be lowered for a requirement of slower output speed, with same or more output torque. Reduction gear assembly consists of a set of rotating gears connected to a wheel work. The high-speed incoming motion from the wheel work is transmitted to the set of rotating gears.*** *A* ***marine diesel engine gearbox consists of Couplings, clutches etc.***
15.	What is a propulsion and steering system?	***Propulsion means to push forward or drive an object forward. The term is derived from two Latin words: pro, meaning before or forward; and pellere, meaning to drive A propulsion system consists of a source of mechanical power, and a propulsor (Propeller).*** ***Marine propulsion is the mechanism or system used to generate thrust to move a ship or boat across water.*** ***Steering System maintain manoeuvre of a ship. When steering gear set to required position, rudder is moved & when rudder reach the required position, steering gear must be set to off position.***

		This system uses the three-solenoid valve.
16.	What is propeller shaft alignment?	***Shaft alignment is the positioning of the rotational centres of two or more shafts such that they are co-linear when the machines are under normal operating conditions. Proper shaft alignment is not dictated by the total indicator reading (TIR) of the coupling hubs or the shafts, but rather by the proper centres of rotation of the shaft supporting members (the machine bearings).***
17.	What are the functions of the rudder and propeller?	***The ships rudder maintains manoeuvrability to hold the ship in desired direction.*** ***On the other hand, the propeller produces trust to move the ship forward or aft.***
18.	What is pump and its function?	***A pump is a device that moves fluids (liquids or gases). . A marine pump is an important auxiliary equipment in marine industry and ship building industry. These marine pumps can be serviced for cooling, circulating, ballast, general service(G/S) and other purposes.***
19.	What types of electrical machinery are installed on a ship?	▪ ***Generator*** ▪ ***Transformer*** ▪ ***Motor***
20.	What types of deck machinery are installed on a ship?	▪ ***Winches*** ▪ ***Windlass*** ▪ ***Crane*** ▪ ***Davit*** ▪ ***Safeguards and protective devices for winches***

Assessment Evidence Summary Sheet

EVIDENCE SUMMARY SHEET			
Candidate Name:			
Assessor Name:			
Qualification:	Certificate in Machinery Installation		
Assessment Centre:			
Date(s) of Assessment:			
The performance of the candidate in the following unit or units of competency and the methods engaged to assess performance are as follows:			
Unit of Competency	**Assessment Method**	**Competent**	**Not Yet Competent**
All units of competency comprising of the qualification	Written Test	☐	☐
	Practical Demonstration 1 (Set ….)	☐	☐
	Practical Demonstration 2 (Set ….)	☐	☐
	Oral Questioning (optional)	☐	☐
Note: Issuance of a certificate will only be given to a candidate who has successfully been assessed as competent for **ALL** units of competency.			
Recommendation			
❑ Issuance of Statement of Achievement (*indicate title of SOA, if full Certificate is not met)*	❑ Submission of additional documents Specify:	❑ Reassessment Specify:	
Did the candidate overall performance meet the required evidence/standard?		☐ Yes ☐ No	
Overall Evaluation:	❑ **Competent** ❑ **Not Yet Competent**		
General Comments:			
Candidate Signature:		Date:	
Assessor Signature:		Date:	
Institution Manager Signature:		Date:	

CANDIDATES COPY

(Please presents this form when you claim your Certificate)

ASSESSMENT RESULTS SUMMARY			
Qualification:	Certificate in Machinery Installation		
Name of Candidate:		**Date:**	
Name at Assessment Centre:		**Date:**	
Assessment Results:	❑ **Competent** ❑ **Not Yet Competent**		
Recommendation:	❑ Issuance of SOA *(indicate title of SOA, if full certificate is not met)*		
	❑ Submission of additional documents – specify:		
	❑ Reassessment - specify:		
Assessed by: (name and signature)		**Date:**	
Attested by: (name and signature):		**Date**	

Assessment Validation Map

This identifies how the assessment tools in this resource may assess:

- elements and performance criteria
- critical aspects of assessment
- skills and knowledge
- employability skills

Unit of Competency:	SEIP-SBD-SMI-01-G – Use basic mathematical concepts		
Element	**Assessment Method**		
	Written	**Practical**	**Oral**
1. Identify calculation requirements in the workplace.	1, 2	A1, A2, B1, B2, C1, C2	1
2. Select appropriate mathematical methods/concepts for the calculation.	1, 2	A1, A2, B1, B2, C1, C2	1
3. Use tools and instruments to perform calculations	1, 2	A1, A2, B1, B2, C1, C2	1
Unit of Competency:	SEIP-SBD-SMI-02-G – Apply occupational health and safety (OHS) practice in the workplace		
Element	**Assessment Method**		
	Written	**Practical**	**Oral**
1. Identify OHS policies and procedures.	15	A1, A2, B1, B2, C1, C2	
2. Apply personal health and safety practices.	6	A1, A2, B1, B2, C1, C2	
3. Report hazards and risks.		A1, A2, B1, B2, C1, C2	
4. Respond to emergencies.			2
Unit of Competency:	SEIP-SBD-SMI-03-G – Carry out workplace interaction		
Element	**Assessment Method**		
	Written	**Practical**	**Oral**
1. Interpret workplace communication and etiquette.	4	A1, A2, B1, B2, C1, C2	

2. Read and understand workplace documents.		A1, A2, B1, B2, C1, C2	
3. Participate in workplace meetings and discussions.		A1, A2, B1, B2, C1, C2	
4. Practice professional ethics at work.		A1, A2, B1, B2, C1, C2	

Unit of Competency:	SEIP-SBD-SMI-04-G – Operate in a team environment

Element	**Assessment Method**		
	Written	**Practical**	**Oral**
1. Identify team goals and work processes.	3		
2. Identify own role and responsibilities within team.			5
3. Communicate and co-operate with team members.	5	A1, A2, B1, B2, C1, C2	
4. Practice problem solving within the team.		A1, A2, B1, B2, C1, C2	

Unit of Competency:	SEIP-SBD-SMI-01-S – Apply basic knowledge of ship and shipbuilding

Element	**Assessment Method**		
	Written	**Practical**	**Oral**
1. Understand basics of shipbuilding.	8, 13	A1, A2, B1, B2, C1, C2	
2. Obtain information about the industry		A1, A2, B1, B2, C1, C2	10
3. Identify key machines installed on a ship.		A1, A2, B1, B2, C1, C2	6

Unit of Competency:	SEIP-SBD-SMI-02-S – Use hand and power tools

Element	**Assessment Method**		
	Written	**Practical**	**Oral**
1. Identify and inspect hand tools and power tools.	7	A1, A2, B1, B2, C1, C2	3

2. Use hand tools properly and safety.	16	A1, A2, B1, B2, C1, C2	
3. Operate power tools properly and safely.		A1, A2, B1, B2, C1, C2	
4. Clean and maintain hand and power tools.		A1, A2, B1, B2, C1, C2	

Unit of Competency:	SEIP-SBD-SMI-01-O – Identify basic machinery installation works

Element	**Assessment Method**		
	Written	**Practical**	**Oral**
1. Determine key machinery installation works.	12, 17	A1, A2, B1, B2, C1, C2	6
2. Identify engine and engine components.	14, 18		11, 12
3. Identify auxiliary machinery.			8, 13

Unit of Competency:	SEIP-SBD-SMI-02-O – Perform machinery setting and levelling

Element	**Assessment Evidence Method**		
	Written	**Practical**	**Oral**
1. Prepare for work.	9	A1, A2, B1, B2, C1, C2	4
2. Prepare for setting and levelling.		A1, A2, B1, B2, C1, C2	
3. Carry out setting and levelling.		A1, A2, B1, B2, C1, C2	
4. Clean and maintain tools and equipment.		A1, A2, B1, B2, C1, C2	

Unit of Competency:	SEIP-SBD-SMI-03-O – Install engine and gear box

Element	**Assessment Method**		
	Written	**Practical**	**Oral**
1. Prepare for work.	10	A1, B1, C1	
2. Carry out engine installation.		A1, B1, C1	

3. Carry out gear box installation.	11, 19	A2	14
4. Check level and alignment.		A1, A2	
5. Clean and maintain tools and equipment.		A1, A2, B1, B2, C1, C2	

Unit of Competency:	SEIP-SBD-SMI-04-O – Install propulsion and steering system		
Element	**Assessment Method**		
	Written	**Practical**	**Oral**
1. Prepare for work.		A2	17
2. Carry out propeller and propeller shaft installation.	20	A2	15
3. Carry out rudder and steering system installation.		A2	15
4. Check level and alignment.		A2	16
5. Clean and maintain tools and equipment.		A1, A2, B1, B2, C1, C2	

Unit of Competency:	SEIP-SBD-SMI-05-O – Install electrical machinery		
Element	**Assessment Method**		
	Written	**Practical**	**Oral**
1. Prepare for work.		B2	19
2. Carry out electrical machinery installation.		B2	19
3. Check level and alignment.		B2	
4. Clean and maintain tools and equipment.		A1, A2, B1, B2, C1, C2	

Unit of Competency:	SEIP-SBD-SMI-06-O – Install deck machinery		
Element	**Assessment Method**		
	Written	**Practical**	**Oral**
1. Prepare for work.		C2	20
2. Carry out deck machinery installation.		C2	9, 18
3. Check level and alignment.		C2	
4. Clean and maintain tools and equipment.		C2	