TECHNICAL &
VOCATIONAL
EDUCATION &
TRAINING

National Competency Standard for Marine Mechanic Qualifications Code: $TRN_{03}S_{18}V_2$

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KEY FOR CODING

Coding Competency Standards and Related Materials

DESCRIPTION	REPRESENTED BY
Industry Sector as per ESC (Three letters)	Construction Sector **(CON)** Fisheries and Agriculture Sector **(FNA)** Transport sector (**TRN)** Tourism Sector **(TOU)** Social Sector **(SOC)** Foundation **(FOU)**
Competency Standard	**S**
Occupation within an industry Sector	**Two digits 01-99**
Unit	**U**
Common Competency	**1**
Core Competency	**2**
Optional/ Elective Competency	**3**
Assessment Resources Materials	**A**
Learning Resources Materials	**L**
Curricula	**C**
Qualification	**Q1, Q2 etc**
MNQF level of Qualification	**L1, L2 etc**
Version Number	**V1, V2 etc**
Year of endorsement of standard, qualification	**By two digits Example- 07**

1.Endorsement Application for Qualification 01	
2. NATIONAL CERTIFICATE III IN MARINE MECHANIC	
3. Qualification code: TRN03SQ1L308	**Total Number of Credits :75**
4. Purpose of the qualification The holders of this qualification will be will be competent to work in the Maritime Sector as an Assistant Mechanic. The level one qualification presented here will facilitate preparing students to the entry-level workplace tasks and the competency units are mapped in such a way to fulfill the knowledge and skills requirements of the "Assistant Mechanic" occupation within the local Maritime Industry. Referred mechanics can undertake general functional assessment of the small/medium marine engines and its systems and perform necessary repair and maintenance tasks.	
5. Regulations for the qualification	National Certificate III in the Marine Mechanic Qualification will be awarded to those who are competent in units 1+2+3+4+5+6+7+8+9+10+11+12+13+14+15+ 16+17+18+19+20+21+22+23+24+25

6. Schedule of Units

Unit No	Unit Title	Code
1	General Industry Knowledge	TRN03S1U01V2
2	Practice good work ethics	TRN03S1U02V2
3	Personal and workplace Hygiene	TRN03S1U03V2
4	Occupational Health and Safety	TRN03S1U04V2
5	Customer care	TRN03S1U05V2
6	Workplace communications	TRN03S1U06V2
7	Policies and procedures	TRN03S1U07V2
8	Firefighting and damage control	TRN03S1U08V2
9	Provide first aid on board	TRN03S1U09V2
10	Operate life-saving appliances and apply survival techniques in the event of vessel abandonment	TRN03S1U10V2

11	Handle and maintenance of workplace tools and equipment and undertake basic workshop calculations	TRN03S1U11V2
12	Maintain the Workshop	TRN03S1U12V2
13	Interpret technical drawings	TRN03S1U13V2
14	Use power tools/hand held operations	TRN03S1U14V2
15	Operate and maintain inboard and outboard engines and propulsion transmission systems	TRN03S1U15V2
16	Test, service and replace battery	TRN03S1U16V2
17	Repair Transmission system	TRN03S1U17V2
18	Hull maintenance	TRN03S1U18V2
19	RO plant	TRN03S1U19V2
20	AC system	TRN03S1U20V2
21	Maintain maritime telecommunication systems and navigational aids	TRN03S1U21V2
22	Service ignition system components	TRN03S1U22V2
23	Service diesel fuel system	TRN03S1U23V2
24	Operate and service engine water pump	TRN03S1U24V2
25	Operate and service diesel/petrol electric generator	TRN03S1U25V2

7. Accreditation requirements	The training provider should place trainees in relevant maritime vessels, workshop/garage or similar training facilities to provide the trainees the hands-on experience exposure related to this qualification.
8. Recommended sequencing of units	As appearing under the section 06

1.Endorsement Application for Qualification 02	
2. NATIONAL CERTIFICATE IV IN MARINE MECHANIC	
3. Qualification code: TRN03SQ2L408	**Total Number of Credits :174**
4. Purpose of the qualification The holders of the level four qualifications are expected to possess all the relevant knowledge and skills to work as Marine Mechanic in the local Maritime Industry. Referred marine mechanics can install, inspect and maintain the propulsion systems, engines, pumps and other pieces of technical equipment that make boats and other maritime vessels function effectively	
5. Regulations for the qualification	National Certificate IV in the Marine Maintenance Qualification will be awarded to those who are competent in unit 1+2+3+4+5+6+7+8+9+10+11+12+15+17+18+19+20+ 21+26+27+28+29+30+31+32+33+34+35+36

6. Schedule of Units

Unit No	Unit Title	Code
1	General Industry Knowledge	TRN03S1U01V2
2	Practice good work ethics	TRN03S1U02V2
3	Personal and workplace Hygiene	TRN03S1U03V2
4	Occupational Health and Safety	TRN03S1U04V2
5	Customer care	TRN03S1U05V2
6	Workplace communications	TRN03S1U06V2
7	Policies and procedures	TRN03S1U07V2
8	Firefighting and damage control	TRN03S1U08V2
9	Provide first aid on board	TRN03S1U09V2
10	Operate life-saving appliances and apply survival techniques in the event of vessel abandonment	TRN03S1U10V2
11	Handle and maintenance of workplace tools and equipment and undertake basic workshop calculations	TRN03S1U11V2

12	Maintain the Workshop	TRN03S1U12V2
15	Operate and maintain inboard and outboard engines and propulsion transmission systems	TRN03S1U15V2
17	Hull maintenance	TRN03S1U16V2
18	Repair Transmission system	TRN03S1U17V2
19	Operate and monitor RO plant	TRN03S1U18V2
20	Diagnose and Repair AC system	TRN03S1U19V2
21	Maintain maritime telecommunication systems and navigational aids	TRN03S1U20V2
26	Perform engineering measurements	TRN03S1U21V2
27	Undertake inspection and servicing engines (inboard and outboard)	TRN03S1U22V2
28	Undertake inspection and servicing cooling system	TRN03S1U23V2
29	Undertake petrol fuel systems servicing	TRN03S1U24V2
30	Inspect and service marine transmissions and propellers (Outboard and Stern Drive)	TRN03S1U25V2
31	Inspect and service jet drive propulsion system	TRN03S2U01V2
32	Inspect and service electrical systems/components	TRN03S2U02V2
33	Dismantle and evaluate engine blocks and sub-assemblies	TRN03S1U03V2
34	Apply metal to rebuild engine components	TRN03S2U04V2
35	Power Generation and Distribution	TRN03S2U30V2
36	Overhaul Engines and associated engine components	TRN03S2U31V2

7. Accreditation requirements	The training provider should place trainees in relevant maritime vessels, workshop/garage or similar training facilities to provide the trainees the hands-on experience exposure related to this qualification.
8. Recommended sequencing of units	As appearing under the section 06

UNITS DETAILS

Unit Title	Unit Title	Code	Level	No of credits
1	General Industry Knowledge	TRN03S1U01V2	3	3
2	Practice good work ethics	TRN03S1U02V2	3	3
3	Personal and workplace Hygiene	TRN03S1U03V2	3	3
4	Occupational Health and Safety	TRN03S1U04V2	3	3
5	Customer care	TRN03S1U05V2	3	3
6	Workplace communications	TRN03S1U06V2	3	3
7	Policies and procedures	TRN03S1U07V2	3	3
8	Firefighting and damage control	TRN03S1U08V2	3	3
9	Provide first aid on board	TRN03S1U09V2	3	3
10	Operate life-saving appliances and apply survival techniques in the event of vessel abandonment	TRN03S1U10V2	3	3
11	Handle and maintenance of workplace tools and equipment and undertake basic workshop calculations	TRN03S1U11V2	3	3
12	Maintain the Workshop	TRN03S1U12V2	3	3
13	Interpret technical drawings	TRN03S1U13V2	3	3
14	Use power tools/hand held operations	TRN03S1U14V2	3	3
15	Operate and maintain inboard and outboard engines and propulsion transmission systems	TRN03S1U15V2	3	3
16	Test, service and replace battery	TRN03S1U16V2	3	3
17	Hull maintenance	TRN03S1U17V2	3	3
18	Repair Transmission system	TRN03S1U18V2	3	3
19	Operate and monitor RO plant	TRN03S1U19V2	3	3
20	Diagnose and Repair AC system	TRN03S1U20V2	3	3
21	Communication sets and navigational aids	TRN03S1U21V2	3	3

22	Service ignition system components	TRN03S1U22V2	3	3
23	Service diesel fuel system	TRN03S1U23V2	3	3
24	Operate and service engine water pump	TRN03S1U24V2	3	5
25	Operate and service diesel/petrol electric generator	TRN03S1U25V2	3	5
26	Perform engineering measurements	TRN03S2U01V2	4	6
27	Undertake inspection and servicing engines (inboard and outboard)	TRN03S2U02V2	4	6
28	Undertake inspection and servicing cooling system	TRN03S2U03V2	4	12
29	Undertake petrol fuel systems servicing	TRN03S2U04V2	4	12
30	Inspect and service marine transmissions and propellers (Outboard and Stern Drive)	TRN03S2U30V2	4	12
31	Inspect and service jet drive propulsion system	TRN03S2U31V2	4	12
32	Inspect and repair marine electrical systems/components	TRN03S2U32V2	4	12
33	Dismantle and evaluate engine blocks and sub-assemblies	TRN03S2U33V2	4	12
34	Apply metal to rebuild engine components	TRN03S2U34V2	4	12
35	Power Generation and Distribution	TRN03S2U35V2	4	12
36	Overhaul Engines and associated engine components	TRN03S2U36V2	4	12

Packaging of National Qualifications:

National Certificate III in Marine Mechanic will be awarded to those who are competent in units 1+2+3+4+5+6+7+8+9+10+11+12+13+14+15+16+17+18+19+20+21+22+23+24+25

Qualification Code: TRN03SQ1L318

National Certificate IV in Marine Mechanic will be awarded to those who are competent in units 1+2+3+4+5+6+7+8+9+10+11+12+15+17+18+19+20+21+26+27+28+29+30+31+32+33+34+35+36

Qualification Code: TRN03SQ2L418

Competency Standard for

MARINE MECHANIC

Unit No	Unit Title
1	General Industry Knowledge
2	Practice good work ethics
3	Personal and workplace Hygiene
4	Occupational Health and Safety
5	Customer care
6	Workplace communications
7	Policies and procedures
8	Firefighting and damage control
9	Provide first aid on board
10	Operate life-saving appliances and apply survival techniques in the event of vessel abandonment
11	Handle and maintenance of workplace tools and equipment and undertake basic workshop calculations
12	Maintain the Workshop
13	Interpret technical drawings
14	Use power tools/hand held operations
15	Operate and maintain inboard and outboard engines and propulsion transmission systems
16	Test, service and replace battery
17	Hull maintenance
18	Repair Transmission system
19	Operate and monitor RO plant
20	Diagnose and Repair AC system
21	Maintain maritime telecommunication systems and navigational aids

22	Service ignition system components
23	Service diesel fuel system
24	Operate and service engine water pump
25	Operate and service diesel/petrol electric generator
26	Perform engineering measurements
27	Undertake inspection and servicing engines (inboard and outboard)
28	Undertake inspection and servicing cooling system
29	Undertake petrol fuel systems servicing
30	Inspect and service marine transmissions and propellers (Outboard and Stern Drive)
31	Inspect and service jet drive propulsion system
32	Inspect and repair marine electrical systems/components
33	Dismantle and evaluate engine blocks and sub-assemblies
34	Apply metal to rebuild engine components
35	Power Generation and Distribution
36	Overhaul Engines and associated engine components

BRIEF DESCRIPTION OF THE CURRENT AND FUTURE CONDITIONS IN THE SECTOR:

Maldivians are never far from the sea and can never ignore the sea; be it for survival, security, progress or pleasure. For Maldivians, the maritime transport is not only an economic benefit, but it is also a basic component of their everyday life and national security. There is a growing awareness among the Maldivians that the ocean influences their daily life. Maritime transport also carries practically all the items that the country is in need and provides the basis for transportation and travel between islands.

There are about 10,000 Maritime vessels in the Maldives. Few of them are manned with qualified engineers or a mechanic to look after its marine engine and the auxiliary machines. Therefore, in case of engine failure and black out at high sea, most of the vessels requires assistance from other sources. Some of the cases lead to organize search and rescue program through National Coast Guard. Consequently, the Ministry of Transport and Civil Aviation deems that it is necessary to improve the capacity of the mechanics who are serving on board vessels providing marine transport in the inland water of the Maldives. Such programs further maybe benefited by other leading sectors such as fisheries, tourism and social sector.

DESCRIPTION OF THE WORK AND WORKING CONDITIONS:

Domestic Maritime Transport is a highly professional sector. It increasingly requires professional skills in the nautical and technical field as well as regarding security and logistics. Training in this sector needs to be adapted in line with the advanced demands in order to realize and encourage a competent and up-to-date profession. Programs of recruitment, education and training need to be developed to attract young people in the sector and maintain the necessary skills.

This Course will provide theoretical knowledge to persons with specified practical skill to gain employment in marine related/ mechanically oriented field. And they will be able to operate and maintain marine diesel engines and auxiliary machines on board marine vessels.

On completion of the course the graduates will have developed the skill and knowledge to look of the marine engines.

Unit 01

UNIT TITLE	General Industry Knowledge				
DESCRIPTOR	This unit involves the basic skills and knowledge required to develop and update knowledge of the local maritime industry, including the role of different industry sectors and key legal and ethical issues that must be considered by maritime industry personnel in their day-to-day work.				
CODE	TRN03S1U01V2	LEVEL	3	CREDIT	3

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Seek information on the maritime industry	1.1. sources of information on the local maritime industry identified correctly 1.2. Access and update specific information on relevant sector(s) of work Access and use knowledge of the maritime industry in the correct context to enhance the quality of work performance
2. Identify the Source and apply information on legal and ethical issues which impact on the maritime industry	2.1 Obtain information on legal and ethical issues to assist effective work performance 2.2 Conduct day-to-day activities in accordance with legal obligations and ethical industry practices
3. Update maritime industry knowledge	3.1 Identify and use a range of opportunities to update general knowledge of the maritime industry 3.2 Monitor current issues of concern to the industry 3.3 Share updated knowledge with customers and colleagues as appropriate, and incorporate into day-to-day work activities

Range Statement

This unit applies to all sectors of the maritime industry.

Information sources and opportunities to update knowledge may include:

- Media
- Reference Books
- Libraries
- Unions
- Industry Associations and Organisations
- Industry Journals
- Computer Data, Including Internet
- Personal Observations and Experience
- Industry Seminars or Training Courses
- Informal networking
- Legal issues which impact on the industry include:
- Consumer Protection
- Duty of Care
- Equal Employment Opportunity
- Anti-Discrimination
- Workplace Relations
- Consumer Protection
- Health and Safety

Ethical issues impacting on the industry may relate to:

- Confidentiality
- Commission Procedures

Environmental issues may include:

- Protection of Natural and Cultural Integrity
- Minimal Impact Operations
- Environmental Sustainability
- Waste Management
- Energy-Efficient Operations
- Land Ownership
- Land Access and Usage

Economic and social issues may include:

- Employment
- Effect on Local Amenities/Facilities
- Issues of concern to the industry may be related to:
- Government Initiatives
- Emerging Markets
- Environmental and Social Issues
- Labor Issues
- Industry Expansion or Retraction

ASSESSMENT GUIDE

Forms of assessment

Assessment methods must be chosen to ensure that ability to develop and update knowledge can be practically demonstrated. Methods must include assessment of knowledge as well as assessment of practical skills.

The following examples are appropriate for this unit:

- Case studies and problem-solving exercises to assess application of knowledge to different situations and contexts
- Questions to assess knowledge of different aspects of the maritime industry
- Review of portfolios of evidence and third-party workplace reports of on-the-job performance by the candidate.

Assessment context

Assessment must ensure:

- Project or work activities that allow the candidate to demonstrate the application of knowledge to specific maritime industry contexts and situations

Critical aspects (for assessment)

Evidence of the following is critical:

- Ability to source industry information
- General knowledge of the maritime industry, including main roles, functions and inter-relationships of different sectors, with a more detailed knowledge

Assessment conditions

This is a core unit that underpins effective performance in all other units and combined training and assessment may be appropriate.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Different sectors of the maritime industry and their inter-relationships, including a general knowledge of the structure, roles and functions of the different sectors • Major cross-industry and sector-specific organisations • Overview of quality assurance in the maritime industry and the roles and responsibilities of individual staff members in quality assurance • Overview of how to organise time and work in different industry contexts • Maritime industry information sources • Basic research skills: - Identification of relevant information - Questioning techniques to obtain information • Time management • Basic computer skills needed to access the internet • Communication skills • Research skills Sorting and summarising information • Legislation (both state and federal) which applies across the industry in the following areas (name, primary objective and impact on individual staff only): - Consumer protection - Duty of care - Equal employment opportunity - Anti-discrimination - Workplace relations - Overview of current and emerging technology used across the maritime industry, including e-business	• Time management • Basic computer skills needed to access the internet • Communication skills • Research skills

Unit 02

UNIT TITLE	Practice good work ethics				
DESCRIPTOR	This unit covers character development, establishing of good work habits and ethics foundational to a successful career				
CODE	TRN03S1U02V2	**LEVEL**	3	**CREDIT**	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Commitment	1.1. Priorities are made to achieve organizational goals and objectives 1.2. Perseverance and hard work to maintain the set priorities in order to achieve of organizational goals and objectives 1.3. Teachability and eagerness to learn 1.4. Demonstrate creativity in job role
2. Honesty	2.1 Dependable and accountable for cashier operations, stocks, equipment and business resources 2.2 Courage to uphold what is true and admit when mistakes are made
3. Integrity	3.1. Demonstrating an ongoing commitment to do the right thing in every situation. 3.2. Conduct above-board and observe fairness in the course of business
4. Punctuality	4.1. Reporting to duty on time 4.2. Does not go absent without valid reasons 4.3. Adhering to leave application policies
5. Excellence	5.1. Overall striving, at times beyond stated responsibilities, in every aspect of the job, to be the best an individual can be.

Range Statement

Appropriate sources:

1.1 Supervisors
1.2 Instructors
1.3 Team Members
1.4 Customers

Resource:

3.1 One-on-One Mentorship
3.2 Peer-to-peer influence

Protocols:

4.1 Organisational goals and objectives
4.2 Duty rosters
4.3 Leave application policy

ASSESSMENT GUIDE

Form of assessment

- Direct Observation
- Peer Survey
- Oral Interview

Assessment context

- Competency is to be assessed individually on the job, which reflects a range of opportunities for character development
- Peer written survey may be conducted out of workplace at the end of the training period
- Independent Oral Interview at the end of the training period

Critical aspects

It is essential the competencies are fully observed over the course of the training period holistically, and evident that competencies, with emphasis to excellence, have been incorporated in the candidate's value system. This unit may be assessed in conjunction with all units, which form part of the normal job role.

Assessment conditions

- It is preferable that assessment reflects a process rather than an event and over a period of time
- Peer written survey may be conducted in a separate environment removed from the candidate to ensure objective evaluation
- Independent Oral Interview to be conducted in a conducive relaxed environment

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning knowledge	Underpinning skills
• Honesty, integrity and punctuality are fundamental values of any profession • Pursuit of excellence is instrumental to personal development • Principles of accountability in business resources • Right priorities contributing to achievement of organisational goals and objectives will lead to career advancement • Teachability, eagerness to learn, together with hard work and perseverance will spur creativity, resulting in success.	• Ability to take ownership of organisational goals and objectives • Setting right priorities • Ability to look at the "big picture" and go above and beyond the stated responsibilities when situation calls for • Work hard, Work smart • Asking the right questions • Report for duty on time • Procedures and communication for leave application • Admit to failures and mistakes • Creative ideas for job performance and productivity

Unit 03

UNIT TITLE	Personal and Workplace Hygiene				
DESCRIPTOR	This unit covers the knowledge and skills required to observe workplace hygiene procedures in maintaining the personal presentation and grooming standard. This unit deals with necessary skills and knowledge required for maintaining the hygiene of workers and the hygienic practices that should be applied while on the job.				
CODE	TRN03S1U03V2	**Level**	3	**Credit**	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Observe personal grooming, hygiene and personal presentation standards	1.1 Grooming, hygiene and personal presentation practices maintained at professional standard in line with industry norms and organisational procedures. 1.2 Adequate level of personal cleanliness observed throughout the work 1.3 Understanding effects of poor personal hygiene and avoidance in all practices.
2. Following Hygiene procedures	2.1 Workplace hygiene procedures followed, in line with organisational procedures and legal requirements. 2.2 Eating, drinking, smoking, spitting, scratching, or other such behaviors are avoided at all times on the job.
3. Identify and avoid hygiene risks	3.1 Potential hygiene risks are identified in line with organisational procedures and legal requirements. 3.2 Action to minimize and remove risks within individual's scope of responsibilities, compliant to organisational procedures and legal requirements.

Range Statement

Hygiene procedures may include, not limited to:

- Safe and hygienic handling of tools and equipment
- Regular hand washing
- Avoidance of cross contamination
- Safe handling and disposal of garbage
- Cleaning and sanitization procedures
- Oral hygiene and personal hygiene
- Regular maintenance of haircut and facial hair, nails
- Ensure report for duty in clean fresh uniform
- Avoidance of touching of hair or scratching at workplace

Hygiene risks may include and not limited to:

- Poor personal hygiene practices
- Poor work practices
- Airborne dust

Minimization and/ or removal of risks:

- Auditing staff skills and providing adequate training and refresher training
- Ensuring policies and procedures are strictly followed
- Audits and follow-up action of audits and incidents

Tools, equipment and material used in this unit may include:

- Organisation guidelines to workplace hygiene
- National legal requirements for workplace hygiene
- Organisation guidelines to personal grooming standards
- Organisation Chart for line of communications for report risks beyond individual's
- Cleaning products for hygiene maintenance of industry standards

ASSESSMENT GUIDE

Forms of assessment

Competency in this unit may be assessed through:

- Practical examination
- Practical demonstration
- Direct observation through the training period

Assessment context

- Assessment must reflect and events processes that occur over a period of time.
- Theoretical assessment of this unit must be carried out in an examination room where proper examination rules are followed.
- Assessment of hygienic work practices must be constantly evaluated.

Critical aspects (for assessment)

Assessment required evidence that the candidate:

- Followed hygiene procedures
- Identified and responded to hygiene risk
- Practiced personal grooming and hygiene

Assessment conditions

Assessment must reflect and events processes that occur over a period of time

- Theoretical assessment of this unit must be carried out in an examination room where proper examination rules are followed.
- Assessment of hygienic work practices must be constantly evaluated.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Typical hygiene and control procedures in the maritime industries • Overview of legislation and regulation in relation to personal and general hygiene • Knowledge on factors which contribute to workplace hygiene problems	• Ability to follow correct hygiene procedures and instructions • Habitual application to and internalization of hygiene principles

Unit 04

UNIT TITLE	Occupational Health and Safety				
DESCRIPTOR	This unit describes the importance of health and safety in the occupation. It identifies the key safety hazards within the work area and recognizes the correct manner in which to safely carry out the tasks of the job, for the benefit of the trainee, colleagues, and customers.				
CODE	TRN03S1U04V2	**Level**	3	**Credit**	3

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Follow workplace health, safety and security procedures	1.1. Health, safety and security procedures followed in line with operational policies and procedures and laws and regulations 1.2. Illnesses reported through proper channels of communication, using relevant forms and formats, in line with enterprise procedures 1.3. Safety and security breaches reported through proper channels of communication, in line with enterprise procedures
2. Deal with emergency situations	2.1 Emergency situations recognized and appropriate procedures followed in line with enterprise procedures 2.2 Assistance sought and cooperation given in emergency situations in line with enterprise procedures 2.3 Emergency incidences reported in line with enterprise procedures
3. Identify and prevent hygiene risks	3.1. Hygiene risks identified, prevented and avoided in line with enterprise procedures 3.2. Hygiene risks reported to appropriate persons and corrective action taken in line with enterprise procedures
4. Clean the work area	4.1. Cleaning tasks accomplished to enterprise standards 4.2. Proper method for cleaning selected and employed for appropriate task
5. Secure work premise	5.1 Work premises closed and locked at the end of work, in line with enterprise procedures

Range Statement

Procedures included:

- Guidelines for safe handling of equipment and tools
- Emergency procedures
- Fire safety procedures
- Security and safety guidelines
- Cleaning and decontamination procedures
- Waste handling procedures
- Cleaning chemicals handling guidelines
- Accident and incidence reporting procedures
- Basic first aid procedures

Tools, equipment and material used in this unit may include:

- Relevant Procedure guidelines and manuals

ASSESSMENT GUIDE

Forms of assessment

This may include and not limited to:

- Written Test
- Oral Questions and Answers

Assessment context

Assessment of this unit must be completed on the job or in a simulated work environment, which reflects a range of safe working practices. In the case of written test, it should be done in a classroom environment.

Critical aspects (for assessment)

It is essential that competence is fully observed and there is ability to transfer competence to changing circumstances and to respond to unusual situations in the critical aspects of:

- Communicating effectively with others involved in or affected by the work.
- Identifying and assessing hazardous situations and rectifying, or reporting to the relevant persons.
- Safely handling and storage of dangerous and/or hazardous goods and substances.
- Applying safe manual handling practices.
- Safely and effectively operating equipment and utilising materials over the full range of functions and processes for work undertaken on worksite.
- This unit may be assessed in conjunction with all and units, which form part of the normal job role.

Assessment conditions

Assessment must reflect and events processes that occur over a period of time.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• General knowledge on safe practices • Communication procedures • Relevant workplace procedures and guidelines	• Undertake safe manual handling jobs • Competent to follow safety regulations • Competent to work safely with workplace equipment, materials and colleagues

Unit 05

UNIT TITLE	Customer Care				
DESCRIPTOR	This unit of competency deals with the knowledge, skills, and attitudes in providing effective customer care with the goal of repeat business and positive word of mouth publicity.				
CODE	TRN03S1U05V2	**Level**	3	**Credit**	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Understanding the role of an assistant mechanic	1.1 Know the general roles and responsibilities of an assistant mechanic 1.2 ensure the basics are understood 1.3 Responsible for on the spot decisions related to the problem identified
2. Essential points of Service	2.1 Know the importance of customer service to achieve organisational goals 2.2 Greet Customers promptly with a warm smile 2.3 Create an appealing atmosphere for customer and staff interaction, forming a warm welcoming environment 2.4 Identify and meet customers' needs through verbal and non-verbal skills, backed by expert knowledge of products 2.5 Offer prompt, efficient and pleasant service
3. Service Recovery	1.1 Listen. Nature and details of complaint are established and agreed with the customer 1.2 Responsibility for resolving the complaint is taken within limit of responsibility and not taken personally. 1.3 Appropriate action is taken to resolve the complaint to the customers satisfaction wherever possible

Range Statement

Steps of service recovery may include and not limited to:

1. Listen, acknowledge customer and hear their complaints
2. Don't take complaints personally and don't be defensive
3. Offer sincere apologies
4. Offer alternatives or remedy, ask what will make things better
5. Never deny, explain, or shift the blame. Take ownership of the complaint

Factors to consider in communication may include and not limited to:

- Body language
- Dressing and accessories
- Gestures and mannerisms
- Voice tonality and volume
- Use of space
- Culturally specific communication customs and practices

Cultural and social differences may include and not limited to:

- Modes of greeting, fare welling and
- Body language/ use of body gestures
- Formality of language

Greeting and conversation points may include and not limited to:

- Eye contact and facial expression
- Modes of greeting and farewell
- Enquiry and addressing customer by name
- Time-lapse before a response

ASSESSMENT GUIDE

Forms of assessment

Competency in this unit must be assessed through

- Oral examinations
- Direct observation of the course of the training

Assessment context

Assessment may be done in the workplace or in a simulated workplace setting

Critical aspects (for assessment)

Assessment requires evidence that the candidate:

- Understand the importance of good customer service to achieve organisation goals
- Demonstrates and understands, factors and steps to good customer service
- Provide service recovery

Assessment conditions

Assessment must reflect events and processes that occur over a period of time.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Role and responsibility of a marine mechanic • Importance of customer service • Factors and steps to effective customer service • Steps to service recovery	• Effective communication skills • Non-verbal communication - body language • Interpersonal and rapport building with colleagues and customers • Active listening • Problem solving

Unit 06

UNIT TITLE	Workplace Communication				
DESCRIPTOR	This unit addresses the need for effective communication in a work environment towards customers, colleagues, and external parties. Selecting the best method of communication appropriate for different situations, identifying and overcoming communication barriers				
CODE	TRN03S1U06V2	**Level**	3	**Credit**	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Communication with customers and colleagues	1.1 Effective verbal and non-verbal communication with customers, colleagues and associates, effective delivery of intended messages to advance organisational goals 1.2 Appropriate lines of communications are followed 1.3 Appropriate choice of method for communication with external parties in a range of circumstances 1.4 Respect and honor in work place communication within a team and external parties
2. Effective workplace meetings and discussions	2.1 Participation of relevant meetings and discussions 2.2 Active listening 2.3 Questions asked and responding effectively 2.4 Clear expressions of opinions 2.5 Meeting and discussion outcomes interpreted and implemented correctly
3. Identifying and overcoming barriers to communication	3.1 Identifying cause of breakdown in communications 3.2 Assessment of emotional barriers 3.3 Resolving conflicts and misunderstandings

Range Statement

Internal Procedures and Resource:

- Organisational chart
- Communication guidelines
- Management training session on communications

External literature on:

- Verbal and non-verbal communications
- Emotional Quotient
- Effective workplace communication

ASSESSMENT GUIDE

Competency may be assessed through:

- Written Test
- Direct Observation
- Oral Interview
- Case Study/ Role play

Assessment context

Competencies may be assessed in a workplace for direct observation and in classroom environment for the written test, interview and case study/ role play.

Critical aspects (for assessment)

Assessment requires evidence of competencies in a candidate for the following points:

- Communication could be verbal and non-verbal with all points of business contacts
- Existence of barriers to effective communication and ways to overcome them
- Active listening is an essential component of communication
- Resolving conflicts and misunderstanding
- Ability to communicate effectively over the phone

Assessment conditions

Assessment may be conducted in the work environment over the duration of the training. Case study and role play may be conducted in pairs. Written Test and Oral Interview are to be conducted in a quiet, conducive setting.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Effective communication • Organisation channels of communication • Various methods of communication • Barriers and solutions to communication	• Active listening skills • Conflict resolution

Unit 07

UNIT TITLE	Policies and Procedures				
DESCRIPTOR	This unit covers the competence in terms of knowledge and skills required to understand and follow company policies and procedures and applicable legislation together with application of ethics to all activities at work				
CODE	TRN03S1U07V3	LEVEL	3	CREDIT	3

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Follow written or spoken policies, maintenance policy and procedures	1.1 Relevant written or spoken workplace policies, maintenance policy and procedures clearly understood 1.2 Job responsibilities clearly noted and followed 1.3 Work place agreements clearly understood and work consistent with this requirement 1.4 Work place policies and procedures supported by the job role, properly followed 1.5 Relevant work instructions or standard operating procedures sourced 1.6 Relevant work instructions or standard operating procedures correctly interpreted and accurately followed 1.7 Operating instructions for equipment accurately followed 1.8 Clarification sought and obtained from supervisor or another appropriate person when necessary
2. Follow legislative and certification requirements	2.1 Relevant sections of applicable legislation followed as per the procedures or instructions 2.2 Requirements of the relevant industry certification followed as per the procedures or instructions 2.3 Legislative requirements related to employment issues followed 2.4 General requirements for tourism regulations and standards strictly followed as per the procedures or work instructions in line with enterprise procedures 2.5 Legislation pertinent to personnel and administrative procedures followed as per the instructions
3. Work ethically	3.1 Actions within the job description and consistent with the organizational philosophy

Policy and procedures relevant to the work may cover areas:

- Job descriptions
- Workplace agreements
- Duty rosters
- Grievance procedures
- Confidentially requirements
- Appropriate relationship with clients
- Gifts and gratitude
- Administrative system of the workplace including filing, record keeping, workplace programs and time table management system, use of equipment, staff roster
- Maintenance policy

Tools, equipment and materials required may include:

Materials may include written workplace policies and procedures, hard or soft copies of the applicable legislation, copies of operating procedures or work instructions, quality manuals and procedure manuals etc.

ASSESSMENT GUIDE

Forms of assessment

- Continuous and holistic assessment is suitable for this unit.
- Evidence of performance may be provided by customers, team leaders/members or other persons, subject to agreed authentication arrangements

Assessment context

Assessment of this unit must be completed on the job or in a simulated work environment under the normal range of work conditions.

Critical aspects (for assessment)

It is essential that competence is fully observed and there is ability to transfer competence to changing circumstances and to respond to unusual situations in the critical aspects of:

- Following company policies and procedures, within the scope of the work
- Following job responsibilities and agreements
- Interpreting and following work instructions or operating procedures
- Interpret and follow maintenance policy
- Essential requirements of relevant sections of the applicable legislation
- Following applicable legislation
- Essential knowledge of relevant certification requirements
- Following requirements for particular certification
- Applying ethics to all workplace activities
- Maintaining confidentiality at work
- Obtaining clarifications from relevant personnel
- Recognizing and resolving conflicts or referring to appropriate person

Assessment conditions

It is preferable that assessment reflects a process rather than an event and occurs over a period of time to cover varying circumstances over the normal range of work activities.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Essential knowledge of the company policies and procedures • Detailed knowledge of maintenance policy • Detailed knowledge of the work covered in the job description • Working knowledge of the requirements in the operating procedures or work instructions • Working knowledge of applicable legislation • Working knowledge of applicable certification requirements • Working knowledge of the requirements for working ethically and the consequences of not following these • General knowledge of the consequence of not adhering to workplace agreements and disclosing confidential information	• Ability to source written policies and procedures • Ability to follow company policies and procedures • Ability to follow maintenance policy • Ability to follow job responsibilities • Ability to source and follow operating procedures or work instructions • Competent to work according to applicable legislation • Ability to follow requirements for the certification • Undertake necessary measures to apply ethics at work • Ability to understand requirements and follow workplace agreements • Maintain confidentiality at work

Unit 08

UNIT TITLE	Firefighting and Damage Control				
DESCRIPTOR	This unit involves the skills and knowledge required to prevent, control and fight fires on board a commercial vessel, including management of fire prevention measures, initiation and management of evacuation, emergency shutdown and isolation procedures, damage control and the execution and coordination of fire-fighting operations for the type and size of vessel involved.				
CODE	TRN03S1U08V2	LEVEL	3	CREDIT	3

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Manage fire prevention procedures	1.1. Fire hazards on board a vessel is identified and action taken 1.2. Fire prevention equipment and systems are regularly checked and appropriate action is taken 1.3. To ensure on-board personnel are aware of the dangers of fire, how to prevent it educational activities are organized 1.4. Personnel on board a vessel are made aware of emergency procedures to be followed in the event of fire
2. Operate portable fire-fighting equipment	2.1 A, B and C classes of fires are correctly identified in accordance with accepted fire-fighting practice 2.2 To fight specific classes of fires, correct portable fire-fighting equipment is selected and used 2.3 Using a fire blanket Class F fires are correctly extinguished 2.4 For the use of hose lines to extinguish fires on board vessel correct techniques are applied 2.5 Where applicable, portable fire-fighting equipment is confirmed as operational following recharging 2.6 Equipment and personal safety equipment used for fighting fires are correctly selected for type of fire 2.7 Fire is controlled using firefighting equipment according to workplace emergency procedures 2.8 Equipment is stored safely according to workplace procedures

3. Conduct interior search and rescue and fire-fighting operations (where applicable,)	3.1 Search and rescue operations in a smoke-filled environment conducted 3.2 Using appropriate firefighting equipment and procedures, interior fires are extinguished
4. Develop plans for damage control following a shipboard emergency	4.1 Possible damage scenarios are identified and methods of damage control are devised by the vessel's management team as per standard operating procedures 4.2 Plans of action for dealing with shipboard damage, particularly that involving the integrity of the vessel's hull, are developed by the vessel's management team in accordance with regulatory requirements and company procedures 4.3 Planned damage control procedures for dealing with damage to the vessel and its hull are documented as per company and regulatory requirements 4.4 Appropriate resources are organised in readiness for possible deployment should there be damage to the vessel during an emergency

Range statement

Fire detection and fire-fighting systems applicable will depend on the type of vessel concerned and may include fire detection devices and systems, portable fire extinguishers including foam, water, CO_2, dry chemical and wet foam, fire blankets, sprinkler systems, fire pumps main and emergency fire pump, firefighting rig and fire hoses.

Consumable materials and items that may be used in fire detection and firefighting equipment may include dry and wet chemicals used in fire extinguishers and batteries for fire detectors.

Damage control measures in a fire or explosion emergency may include:

- use of appropriate firefighting equipment and techniques such as various types of fire extinguishers, fire blankets, fire hoses and nozzles, and foam applicators
- activation of fixed firefighting sprinklers and systems
- fire extinguishment methodologies
- boundary cooling techniques

Tools, equipment and material used in this unit may include

- firefighting outfits and associated equipment
- life-jackets
- exposure suits
- BA set, masks
- survival craft
- radio devices, including EPIRBs
- DC equipment (torch with cell, flood lights, asbestos sheets, canvas sheets, plugs and wedges, hand saw, scissors, hammers/mallets)

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be holistic and must include real or simulated workplace activities.

Assessment context

The application of competency is to be assessed in the workplace or realistically simulated workplace. Work is performed as a member of a team under broad operational requirements, with limited accountability and responsibility for self and others in achieving the prescribed outcomes. It involves the application of accepted principles and practice to the prevention and fighting of fire on board vessel. Participation as a member of a fire-fighting team is involved.

Critical aspects (for assessment)

Assessment must confirm appropriate knowledge and skills to:

- Manage and implement fire prevention measures and procedures on board a vessel
- Assess the operational capability of fire-detection and fire- fighting equipment and systems and initiate any required maintenance or replenishment action
- Use and recharge the various types of portable fire extinguishers typically used on board a vessel
- Participate in interior search and rescue and fire-fighting teams (where applicable, if firefighting organization covered)
- Implement safety principles and policies when carrying out fire prevention and fire-fighting duties
- Communicate effectively with others as required during fire prevention activities and fire emergencies
- Develop plans for damage control following a shipboard emergency

Assessment conditions

Assessment of this unit must be undertaken within relevant marine authority approved and audited arrangements by a registered training organization:

- As a minimum, assessment of knowledge must be conducted through appropriate written/oral examinations
- Appropriate practical assessment must occur at the registered training organization, and/or on an appropriate working or training vessel.
- Special notes for assessment
- Assessment of competence must comply with the assessment requirements of the relevant maritime regulations.

Resources required for assessment

Simulated fire-fighting assessment exercises may require access to a fire training and assessment facility capable of simulating fire-fighting activities in a marine environment. Assessments must be conducted in accordance with relevant safety requirements. Protective clothing must be worn in accordance with current maritime practices and local and international standards.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Knowledge of relevant maritime regulations • Fire-fighting techniques applicable to different classes of fire on board a vessel • Role and function of standard fire-fighting organization models used on board vessels • Maritime communication techniques applicable to fire prevention and fire-fighting activities on board a vessel • Problems that can occur with fire-detection and fire- fighting equipment and operations on board a vessel and appropriate reporting and remedial action and solutions • Sources of information on fire prevention and extinguishment on	• The chemistry of fire and its relationship to materials typically carried on vessels • Principles underlying the spread of fire and its extinguishment • The different classes of fire, their characteristics and strategies and equipment needed for their extinguishment • Types of fire-detection, fire- fighting equipment and systems used on board vessels, their features, principles of operation and the procedures for their use and maintenance • Relevant regulations, codes of practice, policies and procedures related to the to the maintenance of fire-detection, fire-

board vessels • General principles of damage control and the manner in which watertight integrity of hull is maintained on a vessel, including the importance of preparation, control and repair • The concept of reserve buoyancy and its relevance to damage control on board vessels • Statutory requirements pertaining to damage control in vessels • Ways of controlling damage during a flooding emergency, including the use of various shipboard items that can be used for damage control purposes such as mattresses, canvas and clothing	fighting equipment and systems • Methods for checking and replacing consumable materials in typical fire-detection and fire- fighting equipment and systems on board various types and sizes of vessels • Complete documentation and reporting requirements on matters related to the development of emergency and damage control plans and the handling of emergency situations on board a vessel • Work as a team with others on matters relevant to the development of emergency and damage control plans and the handling of emergency situations on board a vessel • Take appropriate initiatives related to the development of emergency and damage control plans and the handling of emergency situations on board a vessel

Unit 09

UNIT TITLE	Provide first aid on board				
DESCRIPTOR	This unit identifies the competence required to perform first aid treatment to crew and / or passengers during a medical emergency on board a vessel, including the performance of immediate lifesaving first aid until qualified medical assistance is available, the recognition of symptoms and signs of acute illness and or injury and the taking of appropriate action.				
CODE	TRN03S1U09V2	LEVEL	3	CREDIT	3

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Perform immediate lifesaving first aid pending the arrival of medical assistance	1.1. The priorities of First Aid Care are correctly applied in real or simulated first aid situation 1.2. An unconscious casualty is correctly placed in stable side position and the steps in clearing the airways to promote breathing in accordance with established first aid procedures 1.3. The correct method of Expired Air Resuscitation (EAR), External Cardiac Compression (ECC) and Cardio Pulmonary Resuscitation (CPR) is applied in real life resuscitation situation or in a simulated exercise using a mannequin
2. Recognize the symptoms and acute illness and or injury and take appropriate action	2.1 The conditions requiring special first aid procedures are correctly identified 2.2 A real or simulated unconscious casualty is cared for in accordance with established first aid procedures 2.3 Causes of respiratory failure and breathing difficulty are correctly identified and appropriate care is provided for a real or simulated casualty with obstructed breathing 2.4 The symptoms and signs of casualty with angina pain, heart attack and heart failure are correctly identified 2.5 The symptoms and signs of poisoning, bites and stings are correctly identified and appropriate immediate management of the conditions is provided in real or simulated situation

	2.6 A real or simulated conscious casualty with an acute illness and or injury is cared for in accordance with established first aid procedures
3. Manage wounds and bleeding	3.1 Severe external bleeding is correctly controlled in a real or simulated situation 3.2 The symptoms and signs of severe internal bleeding are correctly identified and appropriate immediate management of these conditions is provided in a real or simulated situation 3.3 A real or simulated laceration, abrasion and a deep puncture wound is correctly managed in accordance with established first aid procedures 3.4 The signs of wound infections are correctly identified and a real or simulated wound infection is correctly managed in accordance with established procedures
4. Manage burns	4.1 Immediate rescue procedures are correctly used in real or simulated first aid situations involving a burned casualty 4.2 The severity of burn is correctly assessed in terms of depth, position and size in accordance with established procedures 4.3 The correct method of treatment for burns and associated shock is correctly applied in real or simulated first aid situations involving a burned casualty
5. Manage bone, joint and muscle injuries	5.1 Symptoms and signs of fractures (simple and complicated) are correctly recognized in accordance with established first aid procedures 5.2 Problems and treatment associated with dislocated joints are correctly managed in accordance with established procedures 5.3 First aid treatment of pelvic and chest injuries and fractures of limbs, including immobilization techniques is correctly performed in accordance with established procedures 5.4 The symptoms and signs of sprains and strains are correctly identified in accordance with established procedure

6. Manage electric shock	6.1 Separate the Person from Current's Source 6.2 Provide CPR, if Necessary 6.3 Check for Other Injuries 6.4 The correct method of treatment for the shock is identified and sent for further treatment (where necessary)
7. Adapt first aid procedures for remote situations	6.1 Safety precautions needed to prevent accidents, illness and injuries and infection in remote areas situations are correctly applied in real or simulated situations 6.2 Identify and discuss the factors involved in the prevention of heat and cold exposure 6.3 The symptoms and signs of real or simulated casualty exposed to heat or cold are correctly identified including hyperthermia and hypothermia and appropriate management of the casualty carried out in accordance with established procedures 6.4 A real or simulated ill or injured person in remote conditions is correctly, cared for unit help arrives, including the monitoring of airway, breathing and heartbeat, the control of pain, hydration and maintenance of body temperature 6.5 A real or simulated casualty with severe injuries in a remote situation is correctly cared for, including the preparation for transport 6.6 First aid resources and emergency equipment required for remote area situations is correctly identified and used in real or simulated situations in accordance with established first aid procedures

Range statement

First aid Care on board a vessel may need to be provided in situation involving acute illness or injury, laceration, abrasion and a deep puncture wounds, respiratory failure and breathing difficulty, shock as a result of severe injury, abdominal, pelvic and chest injuries, fractures of limbs, poisoning, bites and stings, sprains, strains and dislocations, facial, ear and eye injuries and suspected head, neck and back injuries.

Tools, equipment and material used in this unit may include

- Vessels/ medicine cabinet
- First aid boxes
- Emergency first aid carry bags
- Specific first aid resources
- Roller bandages
- Triangular bandages
- Face masks
- Cleaning swabs
- Cleaning brush
- Cleaning materials
- Medicines
- Vessel's Medicine Cabinet
- First Aid Boxes
- Emergency first aid carry bags

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be holistic and must include real or simulated workplace activities.

Assessment context

Competency may be assessed in workplace or in a simulated workplace setting. Assessment shall be observed while tasks are being undertaken whether individually or in-group

Critical aspects (for assessment)

Assessment requires evidence that the candidate:

- Performed immediate lifesaving first aid
- Recognized the symptoms and signs of acute illness and or injury and take appropriate action
- Managed wounds and bleeding
- Managed burns
- Managed bone, joints and muscle injuries
- Adapted first aid procedures for remote situation
- Communicated effectively with others during provision of first aid.
- Prepared report on first aid situations and activities in accordance with company and regulatory requirements

Assessment conditions

Conditions requiring special first aid procedures may include explosion injuries, burns, poisons, hypothermia and hyperthermia.

Special notes for assessment

First aid on board a vessel may need to be provided in situations involving acute illness and/or injury, laceration, abrasion and a deep puncture wounds, respiratory failure and breathing difficulty, shock as a result of severe injury, abdominal, pelvic and chest injuries, fractures of limbs, poisoning, bites and stings, sprains, strains and dislocations, facial, ear and eye injuries, suspected head, neck and back injuries.

Resources required for assessment

First aid resources may include vessel's medicine cabinet, first aid boxes, emergency first aid carry bags, specific first aid resources such as roller bandages, triangular bandages, splints face shields, face masks, cleaning swabs, cleaning brush, cleaning solution and non-adhesive dressings.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Duties and responsibilities of the designated first aid officer on board a vessel • Knowledge on ways in which disease can spread on board a vessel and ways of preventing the spread • Legal issues related to administration of drugs and medicines on board a vessel • Knowledge of body structures and functions relevant to possible injury, illnesses and disease that may be encountered on board a vessel • Maritime communication techniques related to health care and receiving radio medical advice from shore-based advisers • Marine publications containing information on first aid and medical treatment on board a vessel	• Medical first aid procedures • Procedures for conducting an initial patient first aid treatment • Managing injuries and medical emergencies • Managing medicine resources • Techniques for care of wounds • Correct methods of Expired Air Resuscitation (EAR), External Cardiac Compression (ECC) and Cardio Pulmonary Resuscitation (CPR)

Unit 10

UNIT TITLE	Operate life-saving appliances and apply survival techniques in the event of vessel abandonment				
DESCRIPTOR	This unit identifies the competence required to perform survival techniques during ship abandonment either individually or in a team environment with some accountability for the safety of self and other. This includes response to abandon vessel in both simulated and real emergency circumstances.				
CODE	TRN03S1U10V2	LEVEL	3	CREDIT	3

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Practice survival techniques	1.1. In accordance with established survival practice, safely jumped from a height into water (with or without life jacket). 1.2. In accordance with established survival practice, performed swimming while wearing life jacket and floated without a life jacket 1.3. In accordance with established survival practice inverted life raft is righted while wearing a life jacket. 1.4. To maneuver survival craft in rough weather and sea conditions, appropriate handling strategies are applied. 1.5. In accordance with accepted survival medical practice, signs of hypothermia or other distress are identified and treated 1.6. In accordance with accepted survival practice and manufacturer's instructions, exposure cover is deployed on an open life boat
2. Operate lifesaving and survival equipment	2.1 Location and accessibility of life saving and survival equipment is established 2.2 Appropriate methods of boarding survival craft to avoid dangers to other survivors are adopted 2.3 In accordance with instructions and accepted survival practice, survival equipment is operated

	2.4 In accordance with manufacturer's instructions and regulatory protocols survival radio equipment is operated 2.5 various thermal protective aids, life-jacket and another lifesaving clothing are correctly donned and used
3. Participate in abandon vessel drills	3.1 In accordance with regulatory requirements and company procedures, abandon vessel musters and drills are attended 3.2 On identifying muster signals appropriate to the indicated emergency and complies with established procedures action taken 3.3 On the use of life-saving equipment and procedures to be followed in the event of the order to abandon vessel, information is obtained and correctly interpreted
4. Perform man overboard drill	4.1 shout 'man overboard' to alert the crew. 4.2 Press the MOB button on the GPS. 4.3 Throw a life buoy and dan buoy to the MOB. Mark the MOB with a buoyant smoke flare. 4.4 Allocate a crewmember to point at the MOB in the water. 4.5 Send a DSC distress alert and a Mayday. 4.6 Keep pointing; don't lose sight of the MOB. 4.7 If the motor has been started, prepare a throwing line. 4.8 The skipper will bring the boat alongside the MOB, with the boat pointing into the wind and the propeller stopped. 4.9 Get a line around the MOB and get them aboard.
5. Guest lecture	5.1 Attend guest Lecture by Coast Guard about maritime safety and Regulations.

Range statement

Emergencies that may lead to abandonment of vessel include collision resulting in damage to the integrity of the vessel's hull, fire, foundering and flooding of vessel's compartment

Tools, equipment and material used in this unit may include

- All the relevant tools and equipments for survival

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be holistic and must include real or simulated workplace activities.

Assessment context

Competency may be assessed in workplace or in a simulated workplace setting. Assessment shall be observed while tasks are being undertaken whether individually or in-group

Critical aspects (for assessment)

- Assessment requires evidence that the candidate:
- Practiced survival techniques in suitably simulated situations
- Operated and used the various types of survival equipment typically found on a vessel in suitably simulated situations
- Participated in abandon vessels musters and drills
- Communicated effectively with others as required when operating survival craft and ancillary survival equipment

Assessment conditions

Competency should be assessed in demonstration and questioning of related underpinning knowledge, written examination and portfolio of the participant.

Special notes for assessment

Assessment needs reflect the real or simulated work practices.

Resources required for assessment

The following resources should be provided:

- Workplace location
- Tools and equipment appropriate to schedule housekeeping activities and to monitor and maintain working condition
- Material relevant to the proposed activity and tasks

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Knowledge on relevant maritime regulations dealing with survival at sea following abandonment of vessel • Incidents that may result in an emergency on board vessel and the appropriate response in each case • Value of training and emergency drills for enhancing chances of survival at sea • Location of personal lifesaving appliances on a vessel • Construction, outfit and particular characteristics of various types of life boats, life rafts and rescue boats • Knowledge on man overboard	• Procedures for emergency response on board vessels including abandoning vessel • Procedures for correctly operating and using lifesaving appliances and personal safety equipment on board vessels and survival craft and specifically: ➢ Donning a life jacket using a life jacket light and whistle ➢ Deployment of a mob combination light and smoke float ➢ Use of hand-held pyrotechnics ➢ Threats to survival on abandonment of a vessel and appropriate strategies for countering these threats • Ways of maximizing delectability and location of survival craft using pyrotechnic distress signals and VHF radios • Perform man overboard drill

Unit 11

UNIT TITLE	Handle and maintenance of workplace tools and equipment and undertake basic workshop calculations				
DESCRIPTOR	This unit covers the competence required to select, safely use and maintain workplace tooling and equipment. The unit includes identification and confirmation of work requirement, preparation for work, selection, use, servicing, maintenance and storage of tooling and equipment and completion of work finalization. This unit also includes identifying caring, handling and use of measuring instruments.				
CODE	TRN03S1U11V2	LEVEL	3	CREDIT	3

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Select correct tooling and equipment for workplace applications	1.1. Tooling and equipment selected to meet job requirements 1.2. Suitable tooling and equipment selected for use within the workplace environment 1.3. Tooling and equipment selected according to enterprise procedures/policies
2. Use of tooling and equipment	2.1 Tooling and equipment used in a safe manner to prevent injury to self and others 2.2 Tooling and equipment used in a manner that does not cause damage to another workplace equipment 2.3 Observations noted during the use of tooling/ equipment
3. Service and maintain workplace tooling and equipment	3.1 Tooling and equipment regularly checked against manufacturer/component supplier recommendations to ensure safe operating condition 3.2 Damaged/worn tooling and equipment tagged and removed from the workplace for repair or replacement and reported in accordance with enterprise requirements 3.3 Tooling/equipment are serviced, adjusted and/or maintained per manufacturer/component supplier schedule to ensure safe and correct operation, within the scope of responsibility 3.4 Servicing and maintenance operations carried out according to industry regulations/guidelines,

	enterprise procedures/policies
4. Store and secure tooling and equipment	4.1 Tooling and equipment cleaned, checked and stored 4.2 Tooling and equipment securely stored 4.3 Documents completed according to enterprise policies and procedures
5. Select measuring instruments	5.2 Object or component to be measured identified 5.3 Correct specifications from relevant sources obtained 5.4 Appropriate measuring instrument according to job requirements selected
6. Carry out measurements and calculation	6.1 Measuring tools in line with job requirements selected 6.2 Accurate measurements related to the job undertook 6.3 Appropriate calculations to complete work tasks using the four-basic process of addition (+), subtraction (-), multiplication (x) and division (/) performed 6.4 Calculations involving fractions, percentages and mixed numbers are used to complete workplace tasks performed 6.5 Numerical computation and correct for accuracy checked 6.6 Instruments to the limit of accuracy of the tool read
7. Maintain measuring instruments	7.1 Measuring instruments protected from corrosion 7.2 Measuring instruments properly handed, to avoid dropping or damage 7.3 Measuring instruments cleaned before and after using

Range statement

Tooling and equipment may include computer hardware/ software, calculators, general office equipment, hand and power tooling, specialist tooling for removal/adjustment, storage racks, protective covers, measuring devices, plastics repair equipment, sealing equipment, adhesive equipment, heating equipment, templates, welding equipment, service workshop manuals, product manuals, hydraulic breaker tooling, line oilers, filters and gauges, alternator and starting motor bench testers, paint mixers, key cutters, multimeters, load testers, brake and drum lathes, fuel injector cleaners, ignition module test instruments

Maintenance methods may include routine maintenance to tooling and equipment as per schedules, labelling faulty tooling and equipment, minor repairs to tooling and equipment, and the chocking, jacking and supporting of machines on level and incline planes

Measuring instruments include:

- Multitester
- Plastigauge
- Micrometer (In-out, depth)
- Straight Edge

- Vernier caliper (Out, inside)
- Thickness gauge
- Dial Gauge with Mag. Std.
- Torque Gauge
- Small Hole gauge
- Telescopic Gauge
- Try square
- Protractor
- Combination gauge
- Steel rule of machines on level and incline planes

Specific requirements may include hydraulic jacks, air bags and overhead cranes for lifting heavy machines

In calculation, kinds of Part measurements include:

- Volume
- Circumference
- Area
- Length
- Displacement
- Thickness
- Inside diameter
- Outside diameter
- Taper
- Oil clearance
- Out of roundness
- End play/thrust clearance

Tools, equipment and material used in this unit may include

- All the above measuring instruments.
- Appropriate materials for measuring.
- All the available workshop tools and equipment
- A fully operational workshop with all equipment and tools

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

Application of competence is to be assessed in the workplace or simulated worksite and needs to occur using standard and authorized work practices, safety requirements and environmental constraints.

Critical aspects (for assessment)

It is essential that competence in this unit signifies ability to transfer competence to changing circumstances and to respond to unusual circumstances in the critical aspects of:

- Selection and safe use of hand tooling
- Selection and safe use of workplace equipment
- Basic maintenance of tooling and equipment within the scope of operator responsibility
- Selection and safe use of personal protective equipment
- Selected measuring instruments
- Carried-out measurements and calculations
- Maintained measuring instruments

Assessment conditions

It is preferable that assessment reflects a process rather than an event and occurs over a period of time to cover varying quality circumstances. Evidence of performance may be provided by customers, team leaders/members or other persons subject to agreed authentication arrangements

Competency must be assessed through:

- Observation with questioning
- Written or oral examination
- Interview
- Demonstration with questioning

Special notes for assessment

Competence in this unit may be assessed in conjunction with other functional units which together form part of the holistic work role

Resources required for assessment

The following resources should be made available:

- Workplace location or simulated workplace
- Material relevant to the use and maintenance of workplace tooling and equipment
- Equipment, hand and power tooling appropriate to the use and maintenance of workplace Tooling and equipment
- Activities covering mandatory task requirements
- Specifications and work instructions
- Measuring instrument appropriate to servicing processes
- Instructional materials relevant to the propose activity

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Safety regulations/requirements, equipment, material and personal safety requirements • Tool and equipment selection procedures • Basic maintenance procedures for tooling and equipment • Tool and equipment safety and operating • Procedures • Types, characteristics, uses and limitations of hand tooling • Types, characteristics, uses and limitations of workplace equipment • Types of Measuring instruments and its uses • Safe handling procedures in using measuring instruments • Four fundamental operation of mathematics • Formula for Volume, Area, Perimeter and other geometric figures	• Demonstrate understanding of workplace safety • Identify appropriate tools and equipments • Undertake maintenance of tools and equipments used in the workplace • Operate tools and equipment safely • Caring and Handling measuring instruments • Calibrating and using measuring instruments • Performing calculation by Addition, • Subtraction, Multiplication and Division • Visualizing objects and shapes • Interpreting formula for volume, area, perimeter and other geometric figures

Unit 12

UNIT TITLE	Maintain the workshop				
DESCRIPTOR	This unit deals with inspecting and cleaning of the work area including tools, equipment and facilities. Storage and checking of tools/ equipment and disposal of used materials are also incorporated in this competency.				
CODE	TRN03S1U12V2	LEVEL	3	CREDIT	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Inspect/clean tools and work area	1.1. Cleaning solvent used as per workshop/tools cleaning requirement 1.2. Work area checked and cleaned 1.3. Wet surface/spot in work area wiped and dried
2. Arrange spare parts and keep record	2.1 Tools/spare parts checked and stored in their respective shelves/location 2.2 Corresponding labels posted and visible 2.3 Tools and spare parts safely secured and logged in the records
3. Dispose wastes/used lubricants	3.1 Containers for used lubricants visibly labeled 3.2 Wastes/used lubricants disposed as per workshop operating regulations
4. Report damaged tools/spare parts	4.1 Complete inventory/record of tools/spare parts maintained 4.2 Damaged tools/spare parts/facilities identified and repair recommendations are given 4.3 Reports prepared have no errors/discrepancies

Range statement

Work areas include:

- Workshop areas for servicing/repairing light and/or heavy vehicle and/or plant transmissions and/or outdoor power equipment.
- Open workshop/garage and enclosed, ventilated office area
- Other variables may include workshop with mess hall, wash room, comfort room

Cleaning requirements include cleaning solvent, inventory of supplies, tools, equipment, facilities, Rags, Broom, Mop, Pail, Used oil container and Dust/waste bin

Tools, equipment and material used in this unit may include

- All workshop tools and cleaning materials
- A fully operational workshop with all equipments and tools including cleaning materials

ASSESSMENT GUIDE

Forms of assessment

Assessment for this competency unit needs to be holistic and must be well integrated with the work involved in a shop or a simulated environment.

Assessment context

Competency must be assessed on the job or in a simulated environment. The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

Critical aspects (for assessment)

Assessment requires evidence that the candidate:

- Cleaned workshop tools/spare parts /facilities
- Maintained spare parts, tools and facilities
- Disposed of wastes and used lubricants/fluid as per required procedure

Assessment conditions

Competency must be assessed through:

- Written/Oral Questioning
- Demonstration
- The assessment of underpinning knowledge and practical skills may be combined.

Special notes for assessment

Work areas include:

- Workshop areas for servicing/repairing light and/or heavy vehicle and/or plant transmissions and/or outdoor power equipment
- Open workshop/garage and enclosed, ventilated office area

Resources required for assessment

The following resources must be provided:

- Workplace: Real or simulated work area
- Appropriate Tools & equipment
- Materials relevant to the activity

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Service procedures • Relevant technical information • Safe handling of Equipment and tools • Vehicle safety requirements • Workshop policies • Personal safety procedures • Fire Extinguishers and prevention • Storage/Disposal of hazardous/flammable materials • Positive Work Values (Perseverance, Honesty, Patience, Attention to Details)	• Handling/Storing of tools/equipment/spare parts and material • Cleaning grease/lubricants • Disposing of wastes and fluid • Preparing inventory of workshop tools, cleaning materials and spare parts • Monitoring of workshop tools, cleaning materials and spare parts

Unit 13

UNIT TITLE	Interpret technical drawings				
DESCRIPTOR	This unit involves the skills and knowledge to interpret technical drawing applying to any of the full range of engineering disciplines.				
CODE	TRN03S1U13V2	LEVEL	3	CREDIT	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Select correct technical drawing	1.1. Drawing is checked and validated against job requirements or equipment. 1.2. Drawing version is checked and validated.
2. Interpret technical drawing	2.1. Components, assemblies or objects are recognised as required. 2.2. Dimensions are identified as appropriate to field of employment. 2.3. Instructions are identified and followed as required. 2.4. Material requirements are identified as required. 2.5. Symbols are recognised in the drawing as appropriate.
3. Essential computer-based skills for workplace	3.1 Operate • Microsoft Office • Spreadsheets • PowerPoint • Email 3.2 Job specific skill • 3D (Computer Aided Design) CAD • AutoCAD

Range statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Tools, equipment and material used in this unit may include

- drawings
- all tools, equipment, materials and documentation required.
- Computer and software

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

The underpinning knowledge and skills may be assessed on or off-the-job.

The assessment of practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment in simulated workplace conditions is acceptable.

Critical aspects (for assessment)

Assessment must confirm appropriate knowledge and skills to:

- check and validate drawing version
- recognise components, assemblies or objects required
- required instructions are followed and identified
- recognise the symbols present in the drawings appropriately
- identify required materials
- perform basic computer-based skills

Assessment conditions

Competency should be assessed in demonstration and questioning of related underpinning knowledge, written examination and portfolio of the participant.

Special notes for assessment

The assessment of practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment in simulated workplace conditions is acceptable.

Resources required for assessment

Access is required to opportunities to either:

- Participate in a range of exercises, case studies and other simulated practical and knowledge assessments that demonstrate the skills and knowledge to operate and access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills

• relationship between the views contained in the drawing
• objects represented in the drawing
• units of measurement used in the preparation of the drawing
• dimensions of the key features of the objects depicted in the drawing
• understanding of the instructions contained in the drawing
• the actions to be undertaken in response to those instructions
• the materials from which the object(s) are made
• any symbols used in the drawing as described in range statement
• hazard and control measures associated with interpreting technical drawings, including housekeeping
• safe work practices and procedures
	• checking the drawing against job requirements/related equipment in accordance with standard operating procedures
	• confirming the drawing version as being current in accordance with standard operating procedures
	• where appropriate, obtaining the current version of the drawing in accordance with standard operating procedures
	• reading, interpreting information on the drawing, written job instructions, specifications, standard operating procedures, charts, lists and other applicable reference documents
	• checking and clarifying task related information
	• undertaking numerical operations, geometry and calculations/formulae within the scope of this unit
	• operate
	  • Microsoft Office
	  • Spreadsheets
	  • PowerPoint
	  • Email
	• Job specific skill
	  • 3D (Computer Aided Design) CAD
	  • AutoCAD

Unit 14

UNIT TITLE	Use power tools/ hand held operations				
DESCRIPTOR	This unit involves the skills and knowledge to use a range of hand held power tools and fixed power tools for hand held operations for a variety of general engineering applications.				
CODE	TRN03S1U14V2	LEVEL	3	CREDIT	3

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Use power tools	1.1. Power tools are selected appropriate to the task requirements. 1.2. Power tools are used for a determined sequence of operations - which may include clamping, alignment and adjustment to produce desired outcomes - to job specifications which may include finish, size or shape. 1.3. All safety requirements are adhered to before, during and after use. 1.4. Unsafe or faulty tools are identified and marked for repair before, during and after use according to designated procedures. 1.5. Operational maintenance of tools, including hand sharpening, is undertaken according to standard workplace procedures, principles and techniques. 1.6. Power tools are stored safely in appropriate location according to standard workshop procedures and manufacturers' recommendations.

Range statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Tools, equipment and material used in this unit may include

- Electric or pneumatic/hydraulic drills
- Grinders
- Jigsaws
- Nibblers
- cutting saws
- sanders
- planers
- routers
- pedestal grinders

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

The underpinning knowledge and skills may be assessed on or off-the-job.

The assessment of practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment in simulated workplace conditions is acceptable.

Critical aspects (for assessment)

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Assessment conditions

Competency should be assessed in demonstration and questioning of related underpinning knowledge, written examination and portfolio of the participant.

Special notes for assessment

The assessment of practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment in simulated workplace conditions is acceptable.

Resources required for assessment

Access is required to opportunities to either:

- Participate in a range of exercises, case studies and other simulated practical and knowledge assessments that demonstrate the skills and knowledge to operate and access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• application of different power tools • clamping/securing methods • adjustments/alignments to a range of power tools • common faults and/or defects in power tools • procedures for marking unsafe or faulty power tools for repair • routine maintenance requirements of a range of power tools • tool sharpening techniques for a range of power tools • storage location and procedures of a range of power tools • hazards/control measures associated with power tools • use and application of personal protective equipment • safe work practices and procedures	• reading and following information on standard operating procedures • following verbal instructions • selecting power tools appropriate to the task • using power tools safely • using clamping/securing devices • identifying power tool defects • maintaining power tools using appropriate techniques • sharpening tools/tool bits within the scope of this unit • Storing power tools according to manufacturers'/ standard operating procedures.

Unit 15

UNIT TITLE	Operate and maintain inboard and outboard engines and propulsion transmission systems				
DESCRIPTOR	This unit involves the skills and knowledge required to operate and carry out basic routine maintenance on inboard and outboard engines and propulsion systems on a small vessel.				
CODE	TRN03S1U15V2	LEVEL	3	CREDIT	3

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Operate inboard and outboard engines and propulsion systems	1.1. In accordance with manufacturers' instructions and established marine practice inboard and outboard engines and propulsion systems are prepared, started, and shut down 1.2. Inboard and outboard engines and propulsion systems are operated within specified limits 1.3. In accordance with vessel's procedures, records of performance of inboard and outboard engines and propulsion systems are maintained on running sheets and operations logs/databases
2. Carry out basic, routine checking and maintenance procedures on inboard and outboard engines and propulsion systems	2.1 The performance of inboard and outboard engines and propulsion systems is monitored 2.2 In accordance with vessel's procedures and survey requirements and manufacturer's instructions, preventative and remedial maintenance programs are carried out 2.3 Poor performance and faulty operation are identified and appropriate action initiated 2.4 Routine service checks and procedures are followed to maintain the serviceability of inboard and outboard engines and propulsion systems 2.5 In accordance with manufacturer's instructions and vessel's procedures maintenance and service records are completed
3. Follow safety and hazard control procedures	3.1 Safety, hazard minimization and pollution control procedures and national and international regulations are followed at all times 3.2 To minimize or eliminate risk to personnel, vessel and the environment, operational and maintenance hazards are identified and action is taken

Range statement

Inboard and outboard engines and propulsion systems may include low speed, medium and high-speed diesel and gasoline engines, stern tube bearing, direct drive shaft, reduction gears and shafts and shaft bearing.

Tools, equipment and material used in this unit may include

Inboard and outboard engines installed on boats, hand and power tools, and the components installed on the propulsion mechanism.

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be holistic and must include real or simulated workplace activities.

Assessment context

The application of competency is to be assessed in the workplace or realistically simulated workplace. It involves the organization of maintenance operations on a vessel and the application of solutions to a defined range of maintenance problems.

Critical aspects (for assessment)

Assessment must confirm appropriate knowledge and skills to:

- Operate internal combustion engines and propulsion systems on vessel.
- Carry out preventative servicing and remedial maintenance on small internal combustion engines and propulsion systems on vessel.
- Identify typical problems related to the operation, servicing and maintenance of internal combustion engines and propulsion systems on vessel.
- Exercise all required safety, environmental and hazard control precautions and procedures during operation and routine maintenance of maintenance of internal combustion engines and propulsion systems.
- Communicate effectively with others when operating and carrying out maintenance on internal combustion engines and propulsion systems on vessel.

Assessment conditions

As a minimum, assessment of knowledge must be conducted through appropriate written/oral examinations and appropriate practical assessment must occur at the maritime training organization, and/or on an appropriate working or training vessel.

Special notes for assessment

This unit of competency must be assessed in conjunction with other units that form part of a job role of a Marine Engine Driver.

Resources required for assessment

Following resources or opportunities need to be provided to either:

- Participate in a range of exercises, case studies and other simulated practical and knowledge assessments that demonstrate the skills and knowledge to operate and maintain internal combustion engines and propulsion systems on small vessels.
- Operate and maintain internal combustion engines and propulsion systems on an operational small commercial or training vessel

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Relevant safety and pollution control legislation and codes of practice • Types of engines and propulsion systems used on small vessels propulsion power, including their principle features and operating characteristics • Problems related to the operation and maintenance of internal combustion engines and propulsion systems on small vessels and appropriate action and solutions within limits of responsibility of a Marine Engine Driver • Types of maintenance records that must be maintained on a vessel to meet the requirements of the company and regulatory authorities	• Procedures for the operation, servicing and routine maintenance of internal combustion engines and propulsion systems on a small vessel • Safety, environmental and hazard control precautions and procedures relevant to the operation and routine maintenance of internal combustion engines and propulsion systems • Maritime communication techniques needed during the operation and maintenance of internal combustion engines and propulsion systems on small vessels

Unit 16

UNIT TITLE	Test, service and replace battery				
DESCRIPTOR	This unit identifies the competence required to service, remove, replace, test and charge batteries. The competency is applicable to batteries fitted to vehicles, plant and equipment and marine applications. It may also be applied to the service, replacement and charging of batteries in electric vehicles such as golf buggies and electric forklifts.				
CODE	TRN03S1U16V2	LEVEL	3	CREDIT	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Test batteries	1.1. Batteries are tested without causing damage to any component or system 1.2. Correct information is accessed and interpreted from appropriate manufacturer specifications 1.3. Appropriate test equipment is selected 1.4. Tests are performed and results analysed in accordance with manufacturer specifications 1.5. Testing is carried out according to industry safety procedures/policies
2. Remove and replace batteries	2.1 Batteries are removed and replaced without causing damage to any component or system 2.2 Appropriate tools and equipment are selected and used 2.3 Action is taken to prevent loss of vehicles electronic memory if applicable 2.4 Removal/replacement is carried out according to industry safety procedures/policies
3. Service and charge batteries	3.1 Battery is charged using the appropriate battery charger 3.2 Electrolyte levels are checked and topped up as necessary 3.3 Battery/terminals are cleaned 3.4 Service and charging activities are carried out according to industry safety procedures/policies

Range statement

This unit can be applied to engine with electric start used in marine applications. Test may include load tests, specific gravity tests, interpreting manufacturer information and fast/trickle charging.

Tools, equipment and material used in this unit may include

Tool and equipments may include hand tools, testing equipment including load tester, hydrometer, multimeters or voltmeter, battery charger and special tools for removal/adjustment

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

Application of competence is to be assessed in workplace or simulated worksite

Assessment is to occur using standard and authorized work practices, safety requirements and environmental constraints

Critical aspects (for assessment)

It is essential that competence is fully observed and there is the ability to transfer the competency to changing circumstances and to respond to unusual situations in the critical aspects of:

- Removing/replacing batteries
- Servicing and charging batteries
- Testing and jump-starting vehicles

Assessment conditions

The assessment of practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment in simulated workplace conditions is acceptable.

Special notes for assessment

It is preferable that assessment reflects a process rather than an event and occurs over a period of time to cover varying quality circumstances. Evidence of performance may be provided by customers, team leaders/members or other persons subject to agreed authentication arrangements.

Resources required for assessment

- Hand tools, testing equipment including load tester, hydrometer, multimeter or voltmeter, battery charger
- Special tools for removal/adjustment

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Safe handling of battery electrolyte and acids • Servicing procedures • Battery charging procedures	• Testing procedures of both, load and specific gravity • Identification of battery types • Charging Practice

Unit 17

UNIT TITLE	Hull Maintenance				
DESCRIPTOR	This unit of competency describes the skills and knowledge required to repair the damages to the hull of a vessel using approved methods, materials and equipment.				
CODE	TRN03S1U17V2	LEVEL	3	CREDIT	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Prepare for work	1.1. Confirm nature and scope of work to be carried out 1.2. Locate occupational health and safety (OHS) and workplace environmental and sustainable procedures and practices, applicable to the work 1.3. Access and interpret repair method, workshop manuals and manufacturer information 1.4. Check and prepare tools, equipment and materials 1.5. Set up work area

2. Inspect hull deterioration and damage and complete repairs	2.1. Inspect hull and identify deterioration and damage
	• Corrosion
	  ○ Leaks
	  ○ Blistered or peeling paintwork
	  ○ Deposits around stainless steel fixtures
	  ○ Reference electrode testing
	• Prevention of corrosion
	  ○ Zinc protection
	  ○ Keeping electrical circuits dry
	  ○ Electrical bonding
	  ○ Prevent pools of water from forming
	  ○ cathodic protection
	  ○ paints
	• hull survey
	• water tight and gas tight integrity
	2.2. Carry out repairs in accordance with vessel manufacturer and component specifications, workplace, environmental and sustainable procedures and practices
	2.3. Test repairs, make required adjustments and re-test

3 Stability	3.1 Stress and stability calculation 3.2 Stress and stability maintenance 3.3 Knowledge of • GM and GZ curves • Draft and trim • Free surface effect • Angle of heel • Angle of list • Angle of loll
4. Clean up work area and maintain equipment	4.1 Clean and inspect equipment and tooling according to workplace requirements 4.2 Tag unserviceable equipment and faults identified in accordance with workplace requirements 4.3 Clean work area, dispose of waste and scrap, and store tools and equipment in accordance with workplace procedures 4.4 Finalise and process work completion documentation and give to appropriate persons, as required

Range statement

Repairs may include:

- wood repairs
- plastic repairs
- composite material repairs
- aluminum repairs
- steel repairs
- fiberglass repairs

Information/documents may include:

- verbal, written and graphical instructions issued by authorised internal and external persons
- parts listing prices and catalogues
- inventory systems
- material safety data sheets (MSDS)
- diagrams or sketches
- engineer's design specifications and instructions
- manufacturer specifications
- workplace specifications and requirements

Tools, equipment and material used in this unit may include

- hand tools
- testing equipment, including multimeters
- power tools
- air tools
- specialist tools and equipment

ASSESSMENT GUIDE

Forms of assessment

Assessment for this competency unit needs to be holistic and must be well integrated with the work involved in a shop or a simulated environment.

Assessment context

Competency must be assessed on the job or in a simulated environment. The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

Critical aspects (for assessment)

Assessors must be satisfied that the candidate can competently and consistently:

- observe safety procedures and requirements
- communicate effectively with others involved in or affected by the work
- select methods and techniques which are appropriate to the circumstances
- complete preparatory activity in a systematic manner
- carry out repairs to a range of faults in vessel hulls and using a variety of materials, including aluminum, wood and composite materials within workplace timeframes
- test prior to placing in service
- complete workplace and equipment records and workplace clean-up requirements.

Assessment conditions

Competency must be assessed through:

- Written/Oral Questioning
- Demonstration
- The assessment of underpinning knowledge and practical skills may be combined.

Resources required for assessment

The following resources must be provided:

- Workplace: Real or simulated work area
- Appropriate Tools & equipment
- Materials relevant to the activity

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills

• types of materials used in vessel hulls
• repair methods related to vessel hulls
• use and application of testing, measuring and specialised servicing equipment
• inspection techniques
• manufacturer and component supplier specifications, including workshop manuals and repair guides
• organisational policies and procedures, including quality, reporting and recording procedures, related to the repair of vessel hulls
• GM and GZ curves
• Draft and trim
• Free surface effect
• Angle of heel
• Angle of list
• Angle of loll
	• technical skills to the level required to
	  ○ inspect hull and identify deterioration and damage, carry out repairs in accordance with vessel manufacturer and component specifications, workplace, environmental and sustainable procedures and practices
	  ○ Test repairs, make required adjustments and re-test
	  ○ use workplace technology related to the diagnosis and repair of marine hulls, to use specialist tooling and equipment and computerised measuring equipment, and to report and record actions
	• literacy skills to the level required to research, analyse and interpret information related to work orders and manufacturer and component supplier requirements, and to record maintenance details
	• numeracy skills to the level required to correctly complete tests and measurements, including assessing tolerances, applying accurate measurements and calculating material requirements
	• Stress and stability calculation
	• Stress and stability maintenance

Unit 18

UNIT TITLE	Repair Transmission System				
DESCRIPTOR	This unit covers the competence required to carry out removal, repair and replacement of manual transmissions.				
CODE	TRN03S1U18V2	LEVEL	3	CREDIT	3

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Prepare to undertake testing of transmission system	1.1. Nature and scope of work requirements are identified and confirmed 1.2 Procedures and information such as workshop manuals and specifications, and tooling, are sourced 1.3. Method options are analysed and those most appropriate to the circumstances are selected and prepared 1.4. Technical and/or calibration requirements for testing of transmission system is sourced and support equipment is identified and prepared 1.5. Warnings in relation to working with transmission systems are observed
2. Test transmission system and analyse results	2.1. Methods for tests are implemented in accordance with workplace procedures and manufacturer/component supplier specifications 2.2. test is conducted for abnormalities 2.3. Results are compared with manufacturer/component supplier specifications to indicate compliance or non-compliance 2.4. Results are documented with evidence and supporting information and recommendation(s) made 2.5. Report is processed in accordance with workplace procedures
3. Prepare to repair transmissions	3.1. Procedures and information are identified and sourced 3.2. Technical and tool requirements for repair are identified and support equipment is identified and prepared
4. Carry out repairs	4.1. Methods for repairs are implemented in accordance with workplace procedures 4.2 transmission is repaired without causing damage to any component or system
5. Prepare vehicle/ equipment for use or storage	5.1. Repair schedule documentation is completed 5.2. Vehicle/equipment is cleaned for use or storage to workplace expectations

Range statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Tools, equipment and material used in this unit may include

Tooling and equipment may include hand tooling, meters, gauges and load testing devices

Materials may include fluids, spare parts and cleaning materials

ASSESSMENT GUIDE

Forms of assessment

Assessment for this competency unit needs to be holistic and must be well integrated with the work involved in a shop or a simulated environment.

Assessment context

Competency must be assessed on the job or in a simulated environment. The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

Critical aspects (for assessment)

Assessors must be satisfied that the candidate can competently and consistently:

- Observe safety procedures and requirements
- Communicate effectively with others involved in or affected by the work
- Select methods and techniques, appropriate to the circumstances
- Complete preparatory activity in a systematic manner
- Interpret testing results
- Identify of application, purpose and operation
- Conduct repairs in accordance with workplace and manufacturer/component supplier requirements
- Complete repair of transmissions and associated components within workplace timeframes

Assessment conditions

Competency must be assessed through:

- Written/Oral Questioning
- Demonstration
- The assessment of underpinning knowledge and practical skills may be combined.

Resources required for assessment

The following resources must be provided:

- Workplace: Real or simulated work area
- Appropriate Tools & equipment
- Materials relevant to the activity

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• dangers of working with transmissions • the identification of application, purpose and operation • the identification of component parts to include physical, fluid, gases and heat generation • types and layout of service/repair manuals (hard copy and electronic) • diagnostic procedures • repair procedures	• Interpret text, symbols and wiring diagrams in information relating to transmission system testing and repair equipment from manufacturer specifications and workplace instructions and procedures.

Unit 19

UNIT TITLE	Operate and monitor RO plant				
DESCRIPTOR	This unit deals with the skills and knowledge required to operate and monitor reverse osmosis plant.				
CODE	TRN03S1U19V2	LEVEL	3	CREDIT	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Plan and Prepare work	1.1 Safety issues are identified to comply with enterprise/site requirements 1.2 Work requirements are identified from relevant personnel and documentation 1.3 Documentation to determine plant status is assessed and evaluated 1.4 Localised plant inspection and field preparation for service are carried out in accordance with manufacturer and enterprise procedures 1.5 Plant operational prerequisites are established in accordance with manufacturer and enterprise procedures 1.6 Where appropriate, the teams and individual roles and responsibilities within the team are identified and, where required, assist in the provision of the on-the-job training
2. Operate plant	2.1 Plant is operated in accordance with enterprise and manufacturer operating procedures 2.2 Plant is monitored and observed to detect deviations from normal operating conditions 2.3 Corrective actions taken to rectify abnormalities in accordance with manufacturer and enterprise procedures

3. Test plant operations	3.1 Tests are performed in accordance with defined procedures applicable to the operational test 3.2 Plant is observed for correct operational response 3.3 Corrective action is taken when response is not in accordance with documentation, plant integrity or personnel safety requirements 3.4 Plant is returned to required operational status upon completion of test
4. Analyse plant faults	4.1 Causes of abnormal plant operating conditions are identified by analysing the technical and operational information in a logical and sequential manner 4.2 Corrective action taken is in accordance with enterprise/site procedures 4.3 Plant integrity and personnel safety is maintained through consultation with appropriate personnel, and reference to plant, technical and operational documentation
5. Monitor and inspect plant	5.1 Plant to be monitored/inspected is physically identified 5.2 Plant is monitored/inspected for normal operation or to detect deviations 5.3 Corrective action taken is in accordance with enterprise/site procedures 5.4 Appropriate personnel are notified when defects are detected
6. Complete documentation	6.1 Documentation is updated and plant problems, movements, abnormalities and status are reported and logged in accordance with enterprise/site procedures

Range statement

Systems, plant and/or equipment may include: electrical supply switchboard(s) and transformers; reverse osmosis membranes and pressure vessels; electrical motors; pumps; valves, actuators and dampers (electric, hydraulic, pneumatic and manual); safety showers and eyewash equipment; lime, ferric chloride storage and delivery plant; high pressure/high capacity chlorine storage cylinders and associated delivery equipment; high capacity sulphuric acid storage tanks and associated delivery equipment; safety shower and eyewash equipment; and supervisory, protection and alarm and control equipment.

Tools, equipment and material used in this unit may include

- hand tools
- testing equipment, including multimeters
- power tools
- air tools
- specialist tools and equipment

ASSESSMENT GUIDE

Forms of assessment

Assessment for this competency unit needs to be holistic and must be well integrated with the work involved in a shop or a simulated environment.

Assessment context

Competency must be assessed on the job or in a simulated environment. The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

Critical aspects (for assessment)

Assessors must be satisfied that the candidate can competently and consistently:

- Operation of reverse osmosis plant
- Operationally testing plant
- Analysing plant faults
- Monitoring plant operation
- Knowledge of the properties of gases, their use and precautions to be taken
- Dealing with an unplanned event by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Assessment conditions

Competency must be assessed through:

- Written/Oral Questioning
- Demonstration
- The assessment of underpinning knowledge and practical skills may be combined.

Resources required for assessment

The following resources must be provided:

- Workplace: Real or simulated work area
- Appropriate Tools & equipment
- Materials relevant to the activity

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	**Underpinning Skills**
• Relevant company/site safety procedures • Relevant plant and equipment, its location and operating parameters • Plant status • Enterprise recording procedures • Communication principles • Control and data acquisition systems • Computers and software • Emergency procedures • Basic motor performance • Basic pump and compressor performance • Valve, dampers and actuator types and characteristics	• Apply relevant Occupational Health and Safety regulations • Apply relevant enterprise/site safety procedures • Identify plant status • Prepare plant/equipment for operation • Organise resources • Operate reverse osmosis plant • Apply diagnostic and testing techniques • Identify and respond to abnormal plant operating conditions • Use relevant hand tools • Communicate effectively • Apply data analysis techniques and tools • Use diagrams, drawings and symbols.

Unit 20

UNIT TITLE	Diagnose and repair AC systems				
DESCRIPTOR	This unit describes the performance outcomes required to diagnose and repair air conditioning systems including heating, ventilation, air conditioning and cooling (HVAC) systems that are fitted to a range of vehicles and equipment for passenger convenience and comfort.				
CODE	TRN03S1U20V2	LEVEL	3	CREDIT	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Prepare to diagnose and repair air conditioning and HVAC system	1.1. Workplace instructions are used to determine job requirements 1.2. Workplace health and safety (WHS) requirements are observed throughout the work 1.3. Procedures and information are sourced and interpreted 1.4. Australian Refrigeration Council (ARC) code of practice is sourced and complied with 1.5. Options for diagnosing faults are identified and used, using appropriate tools and diagnostic techniques 1.6. Tools and equipment are identified for effective diagnosis and repair methods 1.7. Critical precautions in relation to working with air conditioning, refrigerant and refrigerant oils are observed
2. Diagnose air conditioning and HVAC system	2.1. Air conditioning and HVAC systems are tested to isolate faults according to workplace procedures and without causing damage to components or systems as a result of inappropriate testing procedure 2.2. Faults are identified from test results and causes of faults are determined 2.3. Diagnosis findings are reported according to workplace procedures, including recommendations for necessary repairs or adjustments

3. Repair air conditioning and HVAC system	3.1. Repair options are analysed and those most appropriate to the circumstances are selected 3.2. Appropriate tools and recognised techniques and materials are selected and prepared 3.3. Repairs and component replacements and adjustments are carried out without causing damage, according to workplace procedures and manufacturer and component supplier specifications
4. Retest air conditioning and HVAC system	4.1. Retests are carried out to ensure correct and safe air conditioning and HVAC system performance operation 4.2. Post-repair testing is carried out according to workplace procedures and relevant legislation
5. Prepare vehicle and equipment for delivery to customer after repair is completed	5.1. Final inspection is made to ensure work is to workplace expectations 5.2. Vehicle is cleaned to workplace expectations and presented ready for use 5.3. Workplace documentation is processed according to workplace procedures 5.4. Appropriate decal sticker is placed in engine compartment
6. Clean up work area and finalise work processes	6.1. Material that can be reused is collected and stored in the appropriate designated area and according to workplace sustainability practices 6.2. Waste and scrap are removed following workplace procedures and disposed of according to environmental regulations 6.3. Equipment and work area are cleaned and inspected for serviceable condition according to workplace procedures 6.4. Faulty equipment is identified, tagged and isolated according to workplace procedures and WHS regulations 6.5. Operator maintenance is completed according to manufacturer and component supplier specifications, site procedures and relevant industry codes of practice 6.6. Tools and equipment are maintained according to workplace procedures

Range statement

Repairs may include:

- wood repairs
- plastic repairs
- composite material repairs
- aluminum repairs
- steel repairs
- fiberglass repairs

Information/documents may include:

- verbal, written and graphical instructions issued by authorised internal and external persons
- parts listing prices and catalogues
- inventory systems
- material safety data sheets (MSDS)
- diagrams or sketches
- engineer's design specifications and instructions
- manufacturer specifications
- workplace specifications and requirements

Tools, equipment and material used in this unit may include

- hand tools
- testing equipment, including multimeters
- power tools
- air tools
- specialist tools and equipment

ASSESSMENT GUIDE

Forms of assessment

Assessment for this competency unit needs to be holistic and must be well integrated with the work involved in a shop or a simulated environment.

Assessment context

Competency must be assessed on the job or in a simulated environment. The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

Critical aspects (for assessment)

Assessors must be satisfied that the candidate can competently and consistently:

- observe safety procedures and requirements
- communicate effectively with others involved in or affected by the work
- select methods and techniques which are appropriate to the circumstances
- complete preparatory activity in a systematic manner
- carry out repairs to a range of faults in vessel hulls and using a variety of materials, including aluminum, wood and composite materials within workplace timeframes
- test prior to placing in service
- complete workplace and equipment records and workplace clean-up requirements.

Assessment conditions

Competency must be assessed through:

- Written/Oral Questioning
- Demonstration
- The assessment of underpinning knowledge and practical skills may be combined.

Resources required for assessment

The following resources must be provided:

- Workplace: Real or simulated work area
- Appropriate Tools & equipment
- Materials relevant to the activity

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	**Underpinning Skills**
• refrigerant saturation temperatures in relation to ambient temperatures and changing levels of humidity • graphic symbols and diagrams • use of manifold gauges and surface probe thermocouples for complete system analysis • accessing and interpreting diagnostic trouble codes (DTC) • diagnostic flow charts • analysis of system operation using gauges, temperature probes, electrical test equipment, scan tools, oscilloscopes and another industry-relevant test equipment Visual, aural and functional assessments, including: • component damage and wear • component corrosion • vacuum and leaks Repair procedures, including: • component removal and replacement procedures component and associated system adjustment procedures	• repairing various air conditioning and HVAC systems Literacy skills to: • read and follow information in written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents • obtain and record measurements • document required repairs and parts Numeracy skills to: • test, measure and analyse test equipment results compared to desired system performance • assess tolerances and apply accurate measurements and adjustments Technical skills to use workplace technology and tools relating to repairing air conditioning and HVAC systems, including: • specialist tools and equipment • measuring equipment • computerised technology technology skills to: • operate diagnostic and test equipment • use technology to collect, analyse and provide information

Unit 21

UNIT TITLE	Maintain maritime telecommunication systems and navigational aids				
DESCRIPTOR	This unit involves the skills and knowledge required to define the sequence of work required to restore and maintain marine telecommunication and navigational systems; prepare work area and resources for telecommunication and navigational systems; service and maintain telecommunication and navigation systems to schedule; and rectify unacceptable or unscheduled variation to telecommunication and navigational systems.				
CODE	TRN03S1U21V2	LEVEL	3	CREDIT	3

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Define the sequence of work required to restore and maintain marine telecommunication and navigational systems.	1.1 The defined work sequence is in accordance with the maintenance plan specification. 1.2 Maintenance activities are planned in accordance with technical, legislative, safety, and procedural specifications. 1.3 The sequence and scope of planned work are completed within agreed time scales. 1.4 The timing and conduct of work maintain planned routine operational demand for systems and equipment. 1.5 Restrictions and variances to work schedules are anticipated and communicated to the supervising officer within a time frame which enables corrective action to be taken. 1.6 Sequence of work plans to utilise available resources and results in the restoration of systems within agreed parameters.
2. Prepare work area and resources for telecommunication and navigational systems.	2.1 The equipment and materials selected are safe, serviceable, and of a type and quantity required to carry out the tasks. 2.2 Restrictions and variances to resources are identified, recorded, and reported in accordance with procedures, codes of practice, and legislative requirements.

	2.3 Materials and equipment are safely handled, stored, and secured in accordance with work procedures and codes of practice. 2.4 Work area, machinery, and equipment are confirmed as safe and comply with legislative requirements and codes of practice prior to the commencement of work. 2.5 Work area is accessible and free from obstruction for the receiving and storage of materials and resources needed for the work to proceed. 2.6 Specifications, plans, materials, and equipment are available at the workplace according to the maintenance schedule.
3. Service and maintain telecommunication and navigation systems to schedule.	3.1 Maintenance is carried out in accordance with established safety rules and regulations. 3.2 The sequence and scope of work activities conform with routine maintenance and servicing plans and schedules. 3.3 Variance from plans and schedules is agreed prior to continuing. 3.4 System settings are completed to specification. 3.5 Static checks and tests are completed to statutory regulations and technical requirements. 3.6 Maintenance and servicing are completed to specification within agreed time frame.
4. Rectify unacceptable or unscheduled variation to telecommunication and navigational systems.	4.1 Maintenance is planned and carried out in accordance within established safety rules and regulations. 4.2 Dismantling and reassembly procedures and equipment conform with technical specification and agreed work plan. 4.3 Dismantled parts are stored, handled, and cleaned in accordance with codes of practice and safety requirements. 4.4 The selected method for restoring equipment or system is within identified operational and physical constraints. 4.5 Repair of defective parts is completed to manufacturer's or instructed standard utilising accepted engineering practices. 4.6 Replacement parts meet system and equipment manufacturer's specifications. 4.7 Product and components are restored to specification within the agreed time schedules. 4.8 Static checks and tests are completed to statutory regulations and technical requirements.

Range statement

Telecommunication and electronic navigational systems
include:
- Radio navigational equipment;
- electronic navigational equipment;
- radar systems;
- radio communication equipment;
- ancillary communication and entertainment equipment.

Ensuring the serviceability includes the repair of damage to equipment, tools, and machinery.

Recognition of hazards to: - Personnel, plant, environment.

Maintenance activities include: - scheduled maintenance and servicing; - restoration.

Scheduled maintenance and servicing include: -

- replacement of consumables
- minor adjustments
- replacement of faulty components
- operational changeovers.

Restoration includes: -

- Repair
- recondition
- replacement
- dismantling
- construction
- fabrication
- insulation.

Work includes:

- preparation of work area
- preparation of resources
- preparation of plant (including isolation from live components and systems)
- completing restoration or maintenance.

Technical requirements are defined by:

- Company or Organisational rules, procedures and
- regulations;
- Manufacturer's guidelines;
- Manufacturer's drawings and plans;
- Manufacturer's manuals;
- Supervisor's instructions

ASSESSMENT GUIDE

Forms of assessment

Assessment for this competency unit needs to be holistic and must be well integrated with the work involved in a shop or a simulated environment.

Assessment context

Competency must be assessed on the job or in a simulated environment. The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

Critical aspects (for assessment)

Assessors must be satisfied that the candidate can competently and consistently:

- Define the sequence of work required to restore and maintain marine telecommunication and navigational systems.
- Prepare work area and resources for telecommunication and navigational systems.
- Service and maintain telecommunication and navigation systems to schedule.
- Rectify unacceptable or unscheduled variation to telecommunication and navigational systems.

Assessment conditions

Competency must be assessed through:

- Written/Oral Questioning
- Demonstration
- The assessment of underpinning knowledge and practical skills may be combined.

Resources required for assessment

The following resources must be provided:

- Workplace: Real or simulated work area
- Appropriate Tools & equipment
- Materials relevant to the activity

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Knowledge of work sequence is in accordance with the maintenance plan specification. • Knowledge of maintenance activities in accordance with technical, legislative, safety, and procedural specifications. • Knowledge of sequence and scope of planned work	• Repair of defective parts/system of maritime telecommunication system and navigational aids • Perform static checks and tests

Unit 22

UNIT TITLE	servicing ignition systems Components				
DESCRIPTOR	This competency unit includes inspecting and servicing ignition system components.				
CODE	TRN03S1U22V2	LEVEL	3	CREDIT	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Identify Ignition System Components	1.1. All the ignition system parts identified
2. Check Ignition System	2.1 Appropriate inspection of spark plug, contact points, rotor, distributor cap, ignition switch carried out
3. Service Ignition Parts	3.1 Spark plugs for ignition inspected and serviced 3.2 Spark plugs with appropriate procedures; removed and installed

Range statement

Ignition System components/parts include:

- Spark plug
- Ignition switch
- Distributor Cap
- Contact Point
- Conventional ignition system
- Rotor
- Magneto system (not including system associated with electronics engine management)

Other variables may include:

- Single and dual points, single and multiple distributors, ballast and non-ballast primary circuits, suppressed and non-suppressed high-tension leads.
- Advanced mechanism (both mechanical and vacuum operated)
- CDI and magnetic pulse

Tools, equipment and material used in this unit may include

- Hand tools and Power tools, air tools.
- Testing equipment including:
- Multimeters
- Voltmeter
- Ohmmeter
- Tachometer
- spark plug cleaner/tester

Actual vehicle equipped with conventional ignition System

ASESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

Competency must be assessed on the job or simulated environment.

The assessment of practical skills must take place after a period of supervised practice and repetitive experience

Critical aspects (for assessment)

Assessment requires evidence that the candidate:

- Checked and Serviced Ignition System
- Tested ignition system/components

Assessment conditions

Competency must be assessed through:

- Direct observation
- Written/Oral questions

Special notes for assessment

At the end of the unit, must have developed knowledge and skills in identifying and checking ignition system components, their performance and identification of basic faults.

Resources required for assessment

The following resources must be provided:

- Work place location
- Tools and equipment appropriate to servicing processes
- Materials relevant to the proposed activity
- Drawings and specifications relevant to the task

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Ignition system construction and operation appropriate to application • Measuring and testing procedures for ignition system components	• test and repair of ignition system • inspect spark plug, contact points, rotor, distributor cap, ignition switch with proper procedures • remove and install spark plug with proper procedures

Unit 23

UNIT TITLE	service diesel fuel system				
DESCRIPTOR	This unit covers competence required for servicing diesel fuel system in both automotive and marine engines.				
CODE	TRN03S1U23V2	LEVEL	3	CREDIT	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Prepare to service diesel fuel system components	1.1. Nature and scope of work requirements identified and confirmed 1.2. Safety requirements, including individual workplace regulatory requirements and personal protection needs observed throughout the work 1.3. Procedures and information such as workshop manuals and specifications, and tooling required sourced 1.4. Methods appropriate to the circumstances selected and prepared in accordance with standard operating procedures 1.5. Resources required for servicing sourced and support equipment is identified and prepared 1.6. Warnings in relation to working with diesel observed
2. Service diesel fuel system components	2.1 Correct information accessed and interpreted from manufacturer/component supplier specifications 2.2 Idle speed and acceleration inspected and if necessary, corrected 2.3 Fuel tank and fuel pipes for loose inspected and if necessary, corrected 2.4 Fuel filters inspect and if necessary replaced 2.5 Service of diesel fuel system/components carried out in accordance with manufacturer/component supplier specifications 2.6 Diesel fuel system components service completed without causing damage to any component or system 2.7 Adjustments made during the serviced in accordance with manufacturer/component supplier specifications 2.8 Engine run and diesel fuel system tested for correct operation

3. Prepare fuel system for normal operation	3.1 Venting of the fuel system carried out 3.2 Service schedule documentation completed 3.3 Final inspection made to ensure safety features in place 3.4 Final inspection made to ensure work is to workplace expectations 3.5 Job card processed in accordance with workplace procedures

Range statement

Unit scope

- Servicing procedures may be performed on diesel fuel systems in light vehicles and outdoor power equipment
- Components include fuel injection pumps, fuel filters, fuel lift pumps; mechanical and electrical.

Methods are to include aural, visual and functional assessments (including damage, corrosion, fluid leaks, and wear and safety aspects)

Tools, equipment and material used in this unit may include

Tooling and equipment may include hand tooling, power tooling, exhaust gas analyzer, vacuum gauge, pressure gauge tachometer and multimeters. Materials may include oils and lubricants, minor spare parts and cleaning material

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

Application of competence is to be assessed in workplace or simulated worksite

Assessment is to occur using standard and authorized work practices, safety requirements and environmental constraints

Critical aspects (for assessment)

It is essential that competence is fully observed and there is the ability to transfer the competence to changing circumstances and to respond to unusual situations in the critical aspects of:

- Observing safety procedures and requirements
- Communicating effectively with others involved in or affected by the work
- Selecting methods and techniques appropriate to the circumstances
- Completing preparatory activity in a systematic manner
- Accurately interpreting the service schedules
- Conducting the service of a range of diesel fuel systems in accordance with workplace and Manufacturer/component supplier requirements
- Completing work in the agreed timeframe
- Completing workplace/equipment documentation

Assessment conditions

Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge

Assessment must be by direct observation of tasks, with questioning on underpinning knowledge and it must also reinforce the integration of key competencies

Assessment may be applied under project related conditions and require evidence of process

Special notes for assessment

It is preferable that assessment reflects a process rather than an event and occurs over a period of time to cover varying quality circumstances. Evidence of performance may be provided by customers, team leaders/members or other persons subject to agreed authentication arrangements.

Resources required for assessment

The following resources should be made available:

- Workplace location or simulated workplace
- Material relevant to servicing diesel fuel systems
- Equipment, hand and power tooling appropriate to servicing petrol fuel systems
- Activities covering mandatory task requirements
- Specifications and work instructions

UNDERPINNING KNOWLEDGE AND SKILLS

Analyst groups might be advised to include Key Competencies and Levels in this section

Underpinning Knowledge	Underpinning Skills
• Safety regulations/requirements, equipment, material and personal safety requirements • Dangers of working with diesel • Mechanical and electronic fuel systems service procedures • Vehicle safety procedures • Types and layout of service/repair manuals (hard copy and electronic) • Workplace quality procedures	• Work safely • Identify parts • Service parts as per the requirement • Read manuals

Unit 24

UNIT TITLE	Operate and maintain engine water pump				
DESCRIPTOR	This unit involves the skills and knowledge required to operate and carry out basic routine maintenance of small engine water pumps on maritime vessels.				
CODE	TRN03S1U24V2	LEVEL	3	CREDIT	5

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Operate small engine water pumps	1.1. Safety, hazard minimization and pollution control procedures for operating small engine water pumps are followed at all times 1.2. In accordance with manufacturers' instructions and established marine practice small engine water pumps are prepared, started, and shut down 1.3. Small engine water pumps are operated within specified limits 1.4. In accordance with vessel's procedures, records of performance of small engine water pumps are maintained on running sheets and operations logs/databases
2. Carry out basic, routine checking and maintenance procedures on small engine water pumps	2.1 The performances of small engine water pumps are monitored 2.2 In accordance with vessel's procedures and survey requirements and manufacturer's instructions, preventative and remedial maintenance programs of small engine water pumps are carried out 2.3 Poor performance and faulty operation are identified and appropriate action initiated 2.4 Routine service checks and procedures are followed to maintain the serviceability of small engine water pumps 2.5 In accordance with manufacturer's instructions and vessel's procedures, maintenance and service records of small engine water pumps are completed

Range statement

A small engine water pumps may include approximately 10 Hp diesel and gasoline engine water pumps

Tools, equipment and material used in this unit may include

Small diesel and petrol engines, hand and power tools, and the relevant tools for the basic maintenance of centrifugal or reciprocating engine pumps.

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

The underpinning knowledge and skills may be assessed on or off-the-job.

The assessment of practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment in simulated workplace conditions is acceptable.

Critical aspects (for assessment)

Assessment must confirm appropriate knowledge and skills to:

- Operate small engine water pumps safely
- Carry out preventative and remedial maintenance on small engine pumps.
- Identify typical problems related to the operation and maintenance of engines pumps on a vessel and take appropriate fault-finding and corrective action.
- Exercise all required safety, environmental and hazard control precautions and procedures during operation and routine maintenance of maintenance of engines, machinery and auxiliary power systems

Assessment conditions

Competency should be assessed in demonstration and questioning of related underpinning knowledge, written examination and portfolio of the participant.

Special notes for assessment

The assessment of practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment in simulated workplace conditions is acceptable.

Resources required for assessment

Access is required to opportunities to either:

- Participate in a range of exercises, case studies and other simulated practical and knowledge assessments that demonstrate the skills and knowledge to operate and maintain small engine water pumps.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Types and functions of small engine water pumps • Construction details of engine water pumps • Functions of pump parts • Operational procedures of pumps	• Identify parts of the pump • Start and run pumps safely • Inspect and maintain pumps • Undertake pump repair

Unit 25

UNIT TITLE	Operate and service diesel/petrol electric generator				
DESCRIPTOR	This unit involves the skills and knowledge required to operate and carry out basic routine maintenance of small diesel/petrol electric generator.				
CODE	TRN03S1U25V2	LEVEL	3	CREDIT	5

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Operate diesel/petrol electric generator	1.1. Safety, hazard minimization and pollution control procedures for operating diesel/petrol electric generator are followed at all times 1.2. In accordance with manufacturers' instructions and established marine practice diesel/petrol electric generator are prepared, started, and shut down 1.3. Diesel/petrol electric generators are operated within specified limits 1.4. In accordance with vessel's procedures, records of performance of diesel/petrol electric generator are maintained on running sheets and operations logs/databases
2. Carry out basic, routine checking and maintenance procedures on diesel/petrol electric generator	2.1 The performances of diesel/petrol electric generator are monitored. 2.2 In accordance with vessel's procedures and survey requirements and manufacturer's instructions, preventative and remedial maintenance programs of diesel/petrol electric generator are carried out 2.3 Poor performance and faulty operation are identified and appropriate action initiated 2.4 Routine service checks and procedures are followed to maintain the serviceability of diesel/petrol electric generator 2.5 In accordance with manufacturer's instructions and vessel's procedures, maintenance and service records of diesel/petrol electric generator are completed

Range statement

A diesel/petrol electric generator may include approximately up to 20KVA. diesel /petrol electric generators.

Tools, equipment and material used in this unit may include

Small diesel/petrol electric generator, hand and power tools, and the relevant tools for the basic maintenance of centrifugal or reciprocating engine pumps

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

The underpinning knowledge and skills may be assessed on or off-the-job.

The assessment of practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment in simulated workplace conditions is acceptable.

Critical aspects (for assessment)

Assessment must confirm appropriate knowledge and skills to:

- Operate diesel/petrol electric generator safely
- Carry out preventative and remedial maintenance on diesel/petrol electric generator.
- Identify typical problems related to the operation and maintenance of diesel/petrol electric generator on a vessel and take appropriate fault-finding and corrective action.
- Exercise all required safety, environmental and hazard control precautions and procedures during operation and routine maintenance of maintenance of diesel/petrol electric generator.

Assessment conditions

Competency should be assessed in demonstration and questioning of related underpinning knowledge, written examination and portfolio of the participant.

Special notes for assessment

The assessment of practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment in simulated workplace conditions is acceptable.

Resources required for assessment

Access is required to opportunities to either:

- Participate in a range of exercises, case studies and other simulated practical and knowledge assessments that demonstrate the skills and knowledge to operate and maintain diesel/petrol electric generator.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Types and functions of small diesel/petrol electric generator • Construction details of diesel/petrol electric generator • Functions of diesel/petrol electric generator parts	• Identify parts of the diesel/petrol electric generator • Start and run diesel/petrol electric generator safely • Inspect and maintain diesel/petrol electric generator

Unit 26

UNIT TITLE	Perform engineering measurements				
DESCRIPTOR	This unit involves the skills and knowledge to use of mechanical measuring devices and associated calculations.				
CODE	TRN03S2U01V2	LEVEL	4	CREDIT	6

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Select appropriate device or equipment	1.1. Measurement requirements are determined from specifications. 1.2. Appropriate device or equipment is selected according to standard operating procedures, to achieve required outcome.
2. Obtain measurements using a range of measuring devices	2.1. Correct and appropriate measuring technique is used. 2.2. Measurements are accurately obtained. 2.3. Dimensions are determined or verified using basic calculations, where required.
3. Maintain measuring devices	3.1. Routine care and storage of devices is undertaken to manufacturers' specifications or standard operating procedures. 3.2. Routine adjustments to devices are made and checked.
4. Communicate measurements as required	4.1. Measurements are accurately recorded, where required. 4.2. Freehand sketch which depicts required information is prepared, as required.

Range statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Information to assist effective work performance may include and not limited to:

- Drawings
- Sketches
- job instructions
- schematics
- diagrams
- technical manuals

Tools, equipment and material used in this unit may include

Protractors, combination squares, set squares, dial indicators, thermometers, tapes, rules, micrometers, Vernier-scaled measuring equipment

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

The underpinning knowledge and skills may be assessed on or off-the-job.

The assessment of practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment in simulated workplace conditions is acceptable.

Critical aspects (for assessment)

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Assessment conditions

Competency should be assessed in demonstration and questioning of related underpinning knowledge, written examination and portfolio of the participant.

Special notes for assessment

The assessment of practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment in simulated workplace conditions is acceptable.

Resources required for assessment

Access is required to opportunities to either:

- Participate in a range of exercises, case studies and other simulated practical and knowledge assessments that demonstrate the skills and knowledge to operate and access to all tools, equipment, materials and documentation required. The candidate must have access to all tools, equipment, materials and documentation required.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• correct application of a range of measuring devices • correct and appropriate measuring technique for a range of measuring devices • addition, subtraction, multiplication, division, fractions, decimals to the scope required by this unit • procedures for handling and storing a range of measuring devices • procedures for adjusting and zeroing a range of measuring devices • methods of communicating measurements by drawings, as required • safe work practices and procedures	• selecting the appropriate measuring device for given measuring tasks • using appropriate measuring technique • reading all measurements taken accurately to the finest graduation of the selected measuring device • handling and storing measuring devices in accordance with manufacturers' specifications or standard operating procedures • verifying all measuring devices before use • making, where appropriate, routine adjustments to measuring devices • reading, interpreting and following information on written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents • planning and sequencing operations • checking and clarifying task related information • checking for conformance to specifications • undertaking numerical operations involving addition, subtraction, multiplication, division, fractions and decimals within the scope of this unit • preparing drawings as required

Unit 27

UNIT TITLE	Undertake inspection and servicing engines (inboard and outboard)				
DESCRIPTOR	This unit covers the competence required to carry out the inspection and service of two and four stroke spark ignition and two and four stroke compression ignition engines.				
CODE	TRN03S1U02V2	LEVEL	4	CREDIT	6

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Prepare to undertake the inspection of engines	1.1. Nature and scope of work requirements identified and confirmed 1.2. Safety requirements, including individual workplace regulatory requirements and personal protection needs throughout the work observed 1.3. Requirements and source procedures and information such as workshop manuals and specifications, and tooling identified 1.4. Methods appropriate to the circumstances and prepared in accordance with standard operating procedures selected 1.5. Resources required for inspection of engine systems and support equipment identified and sourced 1.6. Warnings in relation to working with engine systems observed
2. Conduct engine System inspections and analyze results	2.1 Engine systems in accordance with workplace procedures and manufacturer/component supplier specifications for engine servicing inspected 2.2 Engines started 2.3 Engines run up to operating temperature 2.4 Leaks, abnormal noises and pressures inspected 2.5 Engine oil, idle speed and acceleration, fuel tank and fuel pipes for loose, fan belt tension and damage, engine coolant concentration and level, cooling system for leakage, exhaust pipes mounts for loose and damage, engine operating conditions and engine mounts and mounting bolts checked

	2.6 Results with manufacturer/component supplier specifications to indicate compliance or non-compliance analyzed and compared 2.7 Documentation of the results undertaken with evidence and supporting information and recommendation(s) are made 2.8 Report results in accordance with workplace procedures
3. Prepare to service engines	3.1 Safety requirements, including individual workplace safety requirements and personal protection throughout the work observed 3.2 Procedures and information requirements identified and sourced 3.3 Appropriate tools identified and selected 3.4 Resources required for servicing and identify and prepare support equipment identified
4. Prepare engine for use or storage	4.1 Complete servicing schedules documented 4.2 Final inspection to ensure protective guards and safety features in place undertook 4.3 Final inspection to ensure work completed to workplace expectations undertook 4.4 Engine cleaned for use or storage to workplace expectations

Range statement

Inspection and servicing of engines includes the assessment and adjustment/replacement of components in accordance with specifications including those associated with light vehicles. It includes four stroke spark ignitions, two stroke spark ignitions and four stroke compression ignitions.

Repair activities related to the engine servicing is limited up to a top overhaul of which cylinder head/components are inspected, repaired and serviced.

Tools, equipment and material used in this unit may include

Tooling and equipment may include hand tooling, meters, gauges, load testing devices and oil sample analysis equipment

Material may include oils, lubricants, sealants, filters and cleaning material.

ASSESSMENT GUIDE

Forms of assessment

Competence in this unit may be assessed in conjunction with other functional units which together form part of the holistic work role.

Assessment context

Application of competence is to be assessed in the workplace or simulated worksite

Assessment is to occur using standard and authorized work practices, safety requirements and environmental constraints

Assessment is to comply with individual workplace requirements.

Critical aspects (for assessment)

It is essential that competence in this unit signifies ability to transfer competence to changing circumstances and to respond to unusual circumstances in the critical aspects of:

- Observe safety procedures and requirements
- Communicate effectively with others involved in or affected by the work
- Select methods and techniques appropriate to the circumstances
- Complete preparatory activity in a systematic manner
- Inspect, document and interpret analysis results
- Conduct inspection and servicing of a range of engines in accordance with workplace and manufacturer/component supplier requirements and specifications
- Complete the work within workplace timeframes

Assessment conditions

It is preferable that assessment reflects a process rather than an event and occurs over a period of time to cover varying quality circumstances.

Special notes for assessment

Evidence of performance may be provided by customers, team leaders/members or other persons subject to agreed authentication arrangements.

Resources required for assessment

- Workplace location or simulated workplace
- Material relevant to the inspection and servicing of engines
- Equipment, hand and power tooling appropriate to the inspection and servicing of engines
- Activities covering mandatory task requirements
- Specifications and work instructions.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Safety and environmental regulations/requirements, equipment, material and personal safety requirements • Dangers of working with engines • Operating principles of engines, lubrication, cooling and fuel systems and their relationship to each other • inspection procedures • service procedures • enterprise quality procedures • work organization and planning processes	• Work safely with equipment • Observe personal safety and safety of others • Work safely with engines • Identify all the major engine components • Undertake inspection, adjust, drain, replace or change and tighten relevant engine parts • Competent to read and understand service/repair manuals

Unit 28

UNIT TITLE	Undertake Inspection and servicing cooling systems				
DESCRIPTOR	This unit covers the competence required to carry out the inspection and service of air and liquid cooling systems in an engine.				
CODE	TRN03S2U03V2	LEVEL	4	CREDIT	12

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Prepare to undertake the inspection of cooling systems	1.1. Nature and scope of work requirements identified and confirmed 1.2. Safety requirements, including individual workplace regulatory requirements and personal protection needs throughout the work observed 1.3. Procedures and information such as workshop manuals and specifications, and tooling required sourced 1.4. Methods appropriate to the circumstances selected and prepared in accordance with standard operating procedures 1.5. Resources required for cooling system inspection sourced and support equipment identified and prepared 1.6. Warnings in relation to working with pressurised cooling systems observed
2. Inspect cooling systems and analyse results	2.1 Cooling systems inspection implemented in accordance with workplace procedures and manufacturer/component supplier specifications 2.2 Results compared with manufacturer/component supplier specifications to indicate compliance or non-compliance 2.3 Results documented with evidence and supporting information and recommendation(s) made 2.4 Report processed in accordance with workplace procedures
3. Prepare to service cooling systems	3.1 Safety requirements, including individual workplace regulatory requirements and personal protection needs observed throughout the work 3.2 Procedures and information required identified and sourced

	3.3 Resources required for servicing cooling systems identified and support equipment identified and prepared
4. Carry out servicing	4.1 Service implemented in accordance with workplace procedures and manufacturer/component supplier specification 4.2 Adjustments made during the service in accordance with manufacturer/component supplier specifications 4.3 Flushing and filling of the coolant carried out
5. Prepare equipment for use or storage	5.1 Servicing schedule documentation completed 5.2 Final inspection made to ensure protective guards, safety features and cowlings are in place 5.3 Final inspection made to ensure work to meet workplace standards 5.4 Equipment cleaned for use or storage to meet workplace expectations

Range statement

Servicing to include fluids, filters, adjustments and operational testing, visual inspections and documents

Methods include:

- Visual, aural and functional assessments (including, damage, corrosion, fluid levels/leaks, wear)
- Specific requirements:
- Fluid cooled systems, air cooled systems, combination systems

Other variables may include:

- Thermostats, water pumps, hoses, ducting, fans, drive belts, heat exchanger, electric and viscous fans, sealed and non-sealed systems, interior heater and coolant heater manifold
- Ferrous and non-ferrous metals
- Keel cooling, heat exchanger, raw water cooling, sacrificial anodes
- Cooling system additives

Tools, equipment and material used in this unit may include

- Tooling and equipment may include hand tooling, meters, gauges and pressure testing Devices.
- Materials may include coolant, spare parts and cleaning material

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated

workplace activities.

Assessment context

Application of competence is to be assessed in workplace or simulated worksite

Assessment is to occur using standard and authorized work practices, safety requirements and environmental constraints.

Critical aspects (for assessment)

It is essential that competence in this unit indicates the ability to apply competence to changing circumstances and to respond to unusual circumstances in the critical aspects of:

- Select methods and techniques appropriate to the circumstances
- Complete preparatory activity in a systematic manner
- Identify of application, purpose and operating principles
- Conduct inspection, servicing and operational testing in accordance with workplace and manufacturer/component supplier specifications
- Complete service of cooling systems and associated components within workplace timeframes

Assessment conditions

Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge

Assessment must be by direct observation of tasks, with questioning on underpinning knowledge and it must also reinforce the integration of key competencies

Assessment may be applied under project related conditions and require evidence of process

Assessment must confirm a reasonable inference that competence is able not only to be satisfied under the particular circumstance, but is able to be transferred to other circumstances

Special notes for assessment

It is preferable that assessment reflects a process rather than an event and occurs over a period of time to cover varying quality circumstances. Evidence of performance may be provided by customers, team leaders/members or other persons subject to agreed authentication arrangements

Resources required for assessment

The following resources should be made available:

- Workplace location or simulated workplace
- Material relevant to the inspection and servicing of cooling systems
- Equipment, hand and power tooling appropriate to the inspection and servicing of cooling systems
- Activities covering mandatory task requirements
- Specifications and work instructions

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Workplace safety and environmental • regulations/requirements, equipment, material and personal safety requirements • Dangers of working with coolants • Identification of application, purpose and operating principles of cooling system components • Inspection procedures • Types and layout of service/repair manuals (hard copy and electronic)	• Safe working skills • Identification of cooling system components • Undertake inspection and servicing of cooling system components • Read and use service literature • Cooling system service procedures

Unit 29

UNIT TITLE	Undertake petrol fuel systems Servicing				
DESCRIPTOR	This unit covers the competence required to carry out servicing on mechanical and electric/electronic petrol fuel system/components in an engine. The unit includes identification and confirmation of work requirement, preparation for work, servicing of petrol fuel system components and completion of work finalisation processes, including clean-up and documentation. The competence does not include electronic fuel injection or electronic engine management systems				
CODE	TRN03S2U04V2	LEVEL	4	CREDIT	12

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Prepare to service petrol fuel system components	1.1. Nature and scope of work requirements identified and confirmed 1.2. Safety requirements, including individual workplace regulatory requirements and personal protection needs observed throughout the work 1.3. Procedures and information such as workshop manuals and specifications, and tooling required sourced 1.4. Methods appropriate to the circumstances selected and prepared in accordance with standard operating procedures 1.5. Resources required for servicing sourced and support equipment identified and prepared 1.6. Warnings in relation to working with petrol observed
2. Service petrol fuel system components	2.1 Correct information accessed and interpreted from manufacturer/component supplier specifications 2.2 Idle speed and acceleration inspected 2.3 Fuel tank and fuel pipes inspected for loose 2.4 Service of petrol fuel system/components carried out in accordance with manufacturer/component supplier specifications 2.5 Petrol fuel system components service completed without causing damage to any component or system 2.6 Adjustments made during the service in accordance with manufacturer/component supplier specifications 2.7 Engine run and petrol fuel system tested for correct operation

3. Prepare fuel system for normal operation	3.1 Service schedule documentation completed 3.2 Final inspection made to ensure safety features in place 3.3 Final inspection made to ensure work is to workplace expectations 3.4 Job card processed in accordance with workplace procedures

Range statement

- Servicing procedures may be performed on petrol fuel systems in automotive and marine engines.
- Systems may be two strokes and/or four strokes, spark ignition fuel systems
- Components include carburetors (all positions, electronic, fixed venturi, variable venturi), fuel pumps, mechanical and electrical.
- Lube oil system

Methods are to include aural, visual and functional assessments (including damage, corrosion, fluid leaks, and wear and safety aspects)

Tools, equipment and material used in this unit may include

Tooling and equipment may include hand tooling, power tooling, exhaust gas analyzer, vacuum gauge, pressure gauge tachometer and multimeters.

Materials may include oils and lubricants, minor spare parts and cleaning material

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

Application of competence is to be assessed in workplace or simulated worksite

Assessment is to occur using standard and authorized work practices, safety requirements and environmental constraints

Critical aspects (for assessment)

It is essential that competence is fully observed and there is the ability to transfer the competence to changing circumstances and to respond to unusual situations in the critical aspects of:

- Observe safety procedures and requirements
- Communicate effectively with others involved in or affected by the work
- Select methods and techniques appropriate to the circumstances
- Complete preparatory activity in a systematic manner
- Accurately interpret the service schedules
- Conduct the service of a range of petrol fuel systems in accordance with workplace and Manufacturer/component supplier requirements
- Complete work in the agreed timeframe
- Complete workplace/equipment documentation

Assessment conditions

Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge

Assessment must be by direct observation of tasks, with questioning on underpinning knowledge and it must also reinforce the integration of key competencies

Assessment may be applied under project related conditions and require evidence of process

Special notes for assessment

It is preferable that assessment reflects a process rather than an event and occurs over a period of time to cover varying quality circumstances. Evidence of performance may be provided by customers, team leaders/members or other persons subject to agreed authentication arrangements.

Resources required for assessment

The following resources should be made available:

- Workplace location or simulated workplace
- Material relevant to servicing petrol fuel systems
- Equipment, hand and power tooling appropriate to servicing petrol fuel systems
- Activities covering mandatory task requirements
- Specifications and work instructions

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Safety regulations/requirements, equipment, • material and personal safety requirements • Dangers of working with petrol • Mechanical and electronic fuel systems • Service procedures • Vehicle safety procedures • Types and layout of service/repair manuals (hard copy and electronic) • Workplace quality procedures	• Work safely • Identify parts • Service parts as per the requirement • Read manuals

Unit 30

UNIT TITLE	Inspect and service marine transmissions and propellers (Outboard and Stern Drive)				
DESCRIPTOR	This unit identifies the competence required to carry out inspection and service of outboard and stern drive transmissions and/or their associated components				
CODE	TRN03S2U30V2	LEVEL	4	CREDIT	12

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Inspect and service outboard and stern drive transmissions and/or associated components	1.1. Correct information is accessed and interpreted from appropriate manufacturer specifications 1.2. Without causing damage to any component or system, an inspection of the parts undertaken 1.3. Visual inspection and functional assessment of the parts examined 1.4. Service, repairs and adjustments to system components are carried out in accordance with current specifications for methods, equipment used and tolerance relative to the system. 1.5. All transmission system repair and removal/replacement activities are carried out 1.6. Appropriate workplace documentation is completed and dealt with relevant to service and repair outcomes
2. Inspect and Service propeller drive systems and/or associated components	2.1 Without causing damage to any component or system, an inspection of the parts undertaken 2.2 Correct information is accessed and interpreted from appropriate manufacturer specifications 2.3 Services to propeller drive system components are carried out 2.4 Appropriate workplace documentation is completed and dealt with relevant to service outcomes 2.5 According to industry safety procedures/policies, all propeller drive system service activities are carried out

Range statement

This competency standard applies to marine outboard and/or stern drive transmissions and propellers. Tasks may include visual inspection, routine inspections such as oil replacement, engine aligning, and wear of stern drive tubes, straightness of shafts, propeller wear out and water leakage from glands

Tools, equipment and material used in this unit may include

They include hand tools, power tools, special tools for removal/adjustment, lubricant dispensing equipment, measuring equipment, meters, lifting equipment and test equipment

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

Application of competence is to be assessed in workplace or simulated worksite

Assessment is to occur using standard and authorized work practices, safety requirements and environmental constraints

Critical aspects (for assessment)

It is essential that competence is fully observed and there is the ability to transfer the competency to changing circumstances and to respond to unusual situations in the critical aspects of:

- Safe working practices
- Interpreting and communicating procedural information
- Transmission/components service and repair procedures
- Service of propeller systems on marine craft.
- Manual handling methods

Assessment conditions

Competency should be assessed in demonstration and questioning of related underpinning knowledge, written examination and portfolio of the participant.

Special notes for assessment

Assessment may be undertaken for visual, aural and functional assessment (including: fluid leakage, selection) and testing under working conditions.

Resources required for assessment

- Hand tools, power tools, special tools for removal/adjustment, lubricant dispensing equipment
- Lifting equipment
- Fluid handling equipment
- Measuring equipment, meters, lifting equipment

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Equipment safety requirements • Construction and operation of transmissions (relevant to application) • Types of lubricants and their application • Propeller drive system lubricants/fluids and their application • Operating principles of propeller drive systems	• Removal, replacement, repair and service procedures • Measuring and testing procedures • Inspection procedures and techniques of propeller drive components

Unit 31

UNIT TITLE	Inspect and service jet drive propulsion system				
DESCRIPTOR	This unit identifies the competence required to carry out the inspection and service of jet drive propulsion systems and/or associated components				
CODE	TRN03S2U31V2	LEVEL	4	CREDIT	12

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Inspect jet drive propulsion systems and associated components	1.1. components of the jet propulsion system and their functions identified 1.2. Components of the jet propulsion system inspected 1.3. Inspection reports prepared
2. Service jet drive propulsion systems and associated components	2.1 Without causing damage to any component or system, jet drive propulsion service is completed 2.2 From appropriate manufacturer specifications, correct information is accessed and interpreted 2.3 Service to jet drive propulsion system installation is carried out 2.4 Appropriate workplace documentation is completed and dealt with 2.5 According to existing safety procedures, service of jet drive propulsion systems is carried out

Range statement

This competency standard applies to marine applications: single hull, multi hull, single and multi-engine, personal water craft.

Tools, equipment and material used in this unit may include

Tools, equipment and resources may include hand tools, precision tools, micrometer, dial indicator, feeler gauges, specialist service tools, and pressure testing equipment.

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

The underpinning knowledge and skills may be assessed on or off-the-job.

The assessment of practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment in simulated workplace conditions is acceptable.

The prescribed outcome must be able to be achieved without direct supervision.

Critical aspects (for assessment)

It is essential that competence is fully observed and there is the ability to transfer the competency to changing circumstances and to respond to unusual situations in the critical aspects of:

- Servicing jet drive propulsion systems and/or associated components

Assessment conditions

Competency should be assessed in demonstration and questioning of related underpinning knowledge, written examination and portfolio of the participant.

Special notes for assessment

The assessment of practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment in simulated workplace conditions is acceptable.

Resources required for assessment

Following resources must be provided:

- Hand tools, precision tools, equipment may include: micrometer, dial indicator,
- Feeler gauges, specialist service tools, pressure testing equipment.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Equipment/Material safety requirements • Operating principles of jet drive propulsion systems • Service procedures	• Apply personal safety requirements • Access, interpret & apply technical information • Use relevant tools & equipment • Test propulsion unit for normal operation • Service jet drive propulsion systems

Unit 32

UNIT TITLE	Inspect and service electrical systems/components				
DESCRIPTOR	This unit identifies the competence required to correctly inspect, test and service electrical circuits/systems and carry out minor repairs. Minor repairs include replacement of fuses, bulbs and terminals, wiring repairs such as open circuits/short circuits/earthing.				
CODE	TRN03S2U32V2	LEVEL	4	CREDIT	12

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Identify and test systems/components and identify faults	1.1. Without causing damage to any component or system, systems/components are identified and tested 1.2. From appropriate manufacturer specification, correct information is accessed and interpreted 1.3. To determine faults using appropriate tools and techniques, tests are carried out 1.4. Faults are identified and preferred repair action determined. 1.5. According to industry procedures/policies, tests are carried out
2. Repair marine electrical systems/components	2.1 Marine electrical systems/components are repaired without causing damage to any component or marine craft/system 2.2 Necessary repair or component replacement is carried out using appropriate tools, techniques and materials. 2.3 Repairs are carried out according to safety procedures and policies

Range statement

Undertake inspection of low voltage marine electrical system/components such as: basic lighting, switchboard, fuse panels, electric pumps, anticorrosive systems and navigation aids

Tools, equipment and material used in this unit may include

They include in hand tools, test lamp, multimeters, and power/air tools, special tools for removal/replacement, special testing equipment, and soldering equipment

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

The underpinning knowledge and skills may be assessed on or off-the-job.

The assessment of practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment in simulated workplace conditions is acceptable.

Critical aspects (for assessment)

It is essential that competence is fully observed and there is the ability to transfer the competency to changing circumstances and to respond to unusual situations in the critical aspects of:

- Performing minor repairs to circuit wiring
- Testing and identifying faults
- Repair of marine electrical systems/components

Assessment conditions

Competency should be assessed in demonstration and questioning of related underpinning knowledge, written examination and portfolio of the participant.

Special notes for assessment.

Assessments may include:

- Testing and electrical measurements
- Fault finding using aural, visual and functional assessments for damage, corrosion, wear and electrical defects.
- Reading/interpreting wiring diagrams
- Soldering
- Crimping
- Repairing components and wiring

Resources required for assessment

Following resources need to be supplied.

- Hand tools, test lamp, multimeters
- Power/air tools, special tools for removal/replacement, special testing equipment, soldering equipment

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Interpretation technical materials, graphic symbols and diagrams • Operation of marine systems and components relevant to application • Procedures for the repair and testing of marine electrical systems/components	• Safely and correctly use tools and equipment • Test and identify faults in marine electrical systems/components • Perform electrical connections; crimping and soldering • Repair marine electrical systems • Select and use appropriate materials for repair of marine electrical systems/components

Unit 33

UNIT TITLE	Dismantle and evaluate engine blocks and sub-assemblies				
DESCRIPTOR	This unit involves the skills and knowledge to use of mechanical measuring devices and associated calculations.				
CODE	TRN03S2U33V2	LEVEL	4	CREDIT	12

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Prepare to dismantle engine block and sub-assemblies	1.1 Workplace instructions are used to determine job requirements, including method, process and equipment 1.2 Information is accessed, procedures and methods are analysed, and appropriate tooling options are selected for dismantling engines and sub-assemblies 1.3 Tools and measuring equipment are checked and prepared for operation 1.4 Safe operating procedures and workplace health and safety (WHS) and environmental requirements are observed throughout the work 1.5 Engine is set up for dismantling using appropriate lifting equipment and avoiding fluid spillage 1.6 Engine block and sub-assemblies are cleaned in line with appropriate environmental constraints, and positions of auxiliary equipment are recorded
2. Dismantle engine block and sub-assemblies	2.1. Correct information is accessed and interpreted from manufacturer or component supplier specifications 2.2. Covers and ancillary components are removed, cleaned and stored without causing damage to components or system according to workshop requirements 2.3. Engine blocks and sub-assemblies are dismantled and laid out in a logical order using approved methods, tools and equipment and without causing damage to components or system 2.4. Component parts are cleaned using appropriate cleaning agents for the type of material and kept in a logical order in preparation for evaluation
3. Determine repair procedures	3.1. Correct information is accessed and interpreted from manufacturer and component supplier specifications 3.2. Engine block and sub-assembly components are inspected, measured and tested against manufacturer and component supplier specifications and tolerances 3.3. Inspection, measurement and testing are completed without causing damage to components or system 3.4. Engine block and sub-assembly components are evaluated against measurements, tests and inspections made 3.5. Repair requirements are identified and reported according to workplace policy and procedures

	3.6. Workplace documentation is completed and dealt with in line with inspection, measurement and testing outcomes
4. Finalise dismantle and evaluation processes	4.1. Work performed is documented 4.2. Final inspection is made to ensure safety features are in place 4.3. Engine block and sub-assemblies are prepared for storage according to workplace requirements 4.4. Workplace documentation is processed according to workplace procedures

Range statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Information to assist effective work performance may include and not limited to:

- computer-generated instructions
- verbal instructions
- written instructions.
- engineer's design specifications and instructions
- instructions issued by authorised workplace or external persons
- workplace specifications and requirements
- regulatory and legislative requirements relating to the automotive industry, including local Design Rules
- safe work procedures relating to the operation of machinery associated with dismantling engine components
- verbal, written and graphical instructions, signage, work schedules, plans, specifications, work bulletins, memos, material safety data sheets (MSDS), diagrams or sketches.

Tools, equipment and material used in this unit may include

- depth micrometers
- dial bore gauges
- dial indicators
- inside and outside micrometers
- pullers
- other specialised tools.

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

The underpinning knowledge and skills may be assessed on or off-the-job.

The assessment of practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment in simulated workplace conditions is acceptable.

Critical aspects (for assessment)

Assessment must confirm appropriate knowledge and skills to:

- observe safety procedures and requirements
- select dismantling and evaluation methods and techniques appropriate to the circumstances
- complete preparatory activity in a systematic manner
- complete the dismantling and evaluation of a range of engine blocks and sub-assemblies
- measure and check work against manufacturer and component supplier specifications
- evaluate components according to workplace requirements and specifications
- determine required repair procedures
- complete the dismantling and evaluation of engine blocks and sub-assembly components within workplace timeframes
- complete work without damage to tools and equipment or injury to persons.

Assessment conditions

Competency should be assessed in demonstration and questioning of related underpinning knowledge, written examination and portfolio of the participant.

Special notes for assessment

The assessment of practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment in simulated workplace conditions is acceptable

Resources required for assessment

Access is required to opportunities to either:

- appropriate worksite
- multi-cylinder engine blocks appropriate to the workplace, including those with and without cylinder sleeves
- equipment and hand, air and power tools appropriate to dismantling and evaluating engine blocks and sub-assembly components
- specifications and work instructions.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills

• manual-handling techniques, including:
  • using machinery for lifting engine blocks and engine components
  • using slings, chains and other lifting equipment according to safe work practices
• dismantling methods and procedures, including:
  • reasons for selecting the chosen tools, techniques and equipment
  • hazards and fluid control measures associated with the removal of engines and engine components, including housekeeping
  • pre-evaluation checks to determine suitability of component to be re-used
  • reasons for checking end floats before disassembly
  • cleaning solutions and cleaning procedures of components
  • use of pullers, presses and specialised tools, and the application of heat to dismantle components, such as gears, pulleys and dowels
  • procedures for recording the facing directions of pistons, connecting rods, main and big-end caps and positions of removable counterweights and counterweight shafts assemblies
  • precautions to be aware of when removing the connecting rod cap in relation to snap-broken rods
  • removing crankshaft and identifying main bearing caps that have lost register
  • removing dry and wet sleeves
  • dismantling pistons from connecting rods
  • removing camshaft bearings and balance/idler shaft bearings
  • removing welsh plugs and oil gallery plugs
  • removing diesel injection pumps
  • dismantling components that have seized, bent or broken, including seized stud and bolt removal
	• technical skills to:
	  • dismantle engine blocks without causing damage to components
	  • clean parts using appropriate solutions and procedures
	  • identify components for re-use or replacement
	  • check for abnormal wear and defects
	  • check for conformance to specifications
	  • measure to specified tolerances and dimensions
	  • identify repair procedures
	• literacy skills to:
	  • understand quality procedures
	  • read, interpret and follow job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents
	  • obtain and record measurements
	  • document required repairs and parts
	• numeracy skills to use mathematical ideas and techniques to:
	  • assess tolerances and clearances
	  • apply accurate measurements
	  • calculate component dimensions

• measuring, testing and evaluating procedures, including:
  • characteristics of surface finishes and wear patterns as applied to cylinder bores, crankshafts, pistons, gears, cam followers, camshafts, bearings and bushes, block facings, parting faces of connecting rod and main bearing caps
  • crack testing components
  • testing hardness of alloy cylinder blocks, pistons, crankshaft journals and camshaft followers
  • straightness of shafts
  • taper, ovality and wear of:
  • crankshaft and camshaft journals
  • main bearing and connecting rod tunnels
  • cylinder bores in conventional engine blocks and the parent bores of engine blocks with dry sleeves
  • camshaft lobe lift
  • main bearing tunnels for alignment
  • connecting rod alignment and little-end bore size
  • cylinder block flatness and deck height
  • piston ring land clearance, piston skirt wear and gudgeon pin to piston clearance
  • cylinder liner registers in both the upper and lower parts of the cylinder block
  • oil pump for serviceability
  • idler gear hub to bearing clearance	

Unit 34

UNIT TITLE	Apply metal to rebuild engine components				
DESCRIPTOR	This unit involves the skills and knowledge to use industry-accepted methods to apply metal spray, hard chrome and weld materials to rebuild components. It involves determining repair requirements and rebuilding engine components in an engine reconditioning process.				
CODE	TRN03S2U34V2	LEVEL	4	CREDIT	12

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Prepare to undertake metal building procedures	1.1. Workplace instructions are used to determine job requirements, including method, process and equipment 1.2. Information is sourced, procedures and methods are analysed, and appropriate tooling options are selected for rebuilding engine components 1.3. Tools and measuring equipment are checked and prepared for operation 1.4. Safe operating procedures and workplace health and safety (WHS) and environmental requirements are observed throughout the work 1.5. Engine component is prepared for metal application
2. Apply metal to engine components	2.1 Correct information is accessed and interpreted from manufacturer and component supplier specifications 2.2 Metal application process is used to rebuild damaged engine components 2.3 Rebuild method is completed in readiness for further repair without causing damage to components or system
3. Finalise rebuild process	3.1 Surfaces of component are finished to manufacturer and component supplier specifications and allowable tolerances 3.2 Finishing work is completed without causing damage to the component 3.3 Surfaces are protected with a rust prevention solution 3.4 Components are prepared for further process or storage 3.5 Workplace documentation is processed according to workplace procedures

Range statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Information to assist effective work performance may include and not limited to:

- computer-generated instructions
- verbal instructions
- written instructions.
- local standards
- engineer's design specifications and instructions
- instructions issued by authorised workplace or external persons
- workplace specifications and requirements
- regulatory and legislative requirements relating to the automotive industry, including Australian Design Rules
- safe work procedures relating to the operation of machinery associated with rebuilding engine components
- verbal, written and graphical instructions, signage, work schedules, plans, specifications, work bulletins, memos, material safety data sheets (MSDS), diagrams or sketches.

Tools, equipment and material used in this unit may include

- clamps
- dial indicators
- hand and power tools
- inside and outside micrometres
- lifting equipment
- welding equipment, such as:
- roll welders
- short arc welding equipment
- gas metal arc welders
- gas tungsten arc welders
- metal spraying equipment
- hard chroming equipment.

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

The underpinning knowledge and skills may be assessed on or off-the-job.

The assessment of practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment in simulated workplace conditions is acceptable.

Critical aspects (for assessment)

Assessment must confirm appropriate knowledge and skills to:

- observe safety procedures and requirements
- select methods and techniques for applying metal appropriate to the circumstances
- complete preparatory activity in a systematic manner
- rebuild a range of engine components according to workplace, manufacturer and component supplier requirements
- complete work without damage to tools and equipment or injury to persons.

Assessment conditions

Competency should be assessed in demonstration and questioning of related underpinning knowledge, written examination and portfolio of the participant.

Special notes for assessment

The assessment of practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment in simulated workplace conditions is acceptable.

Resources required for assessment

Access is required to opportunities to either:

- Participate in a range of exercises, case studies and other simulated practical and knowledge assessments that demonstrate the skills and knowledge to operate and access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• personal protective equipment (PPE) for using welding equipment and machines to rebuild engine components • hazards associated with welding equipment • procedures for identifying existing heat treatment processes, including nitriding, tuff riding, and induction hardening • engine and engine component structures • specific welding procedures, including: • manual metal arc welding (MMAW) • gas metal arc welding (GMAW) • gas tungsten arc welding (GTAW) • flux core • metal spraying • submerged arc • procedures for hard chrome application • repair operations for components, including: • crankshaft journals, camshaft journals and lobes, seal areas, crankshaft nose and keyway, and pulley retaining thread damage • crankshaft radius treatment, including: • shot peening • radius rolling • deep fillet radius rolling	• technical skills to: • identify and rectify weld defects • identify worn and damaged cutting and grinding tools • mount and position cutting and grinding tools • set machining parameters to achieve job requirements and maximise tool life • measure to specified tolerances and dimensions • literacy skills to: • read and interpret routine job instructions, specifications, drawings and standard operating procedures • identify and analyse technical information • understand quality procedures • numeracy skills to use mathematical ideas and techniques to: • calculate time • assess tolerances • apply accurate measurements • calculate material requirements • establish quality checks • optimise workflow and productivity

Unit 35

UNIT TITLE	Power Generation and Distribution				
DESCRIPTOR	This unit involves the skills and knowledge required to understand the process and purpose of a power generation and distribution system and its components				
CODE	TRN03S1U35V2	LEVEL	4	CREDIT	12

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Fundamentals of distribution system	1.1 Understand the process and purpose of a power generation and distribution system and its components 1.2 Understand Primary distribution configuration 1.3 Explain Primary voltage level 1.4 Understand the purpose and process of Sub-transmission system
2. Transformers	2.1 Understand the basics of transformers 2.2 Explain the distribution transformers 2.3 Know Single phase transformers 2.4 Know Three phase transformers 2.5 Understand the loadings 2.6 Explain Losses
3. Voltage regulations	3.1 Understand the voltage regulations o Voltage standards o Voltage drops o Regulation techniques o regulators
4. Faults	4.1 Explain the general fault characters 4.2 Understand the fault calculators
5. short-circuit protection	5.1 perform basic distribution protection 5.2 understand protection equipment 5.3 explain transformer fusing

Range statement

Power Supply may include:

- Main switchboards
- Emergency switchboards
- Generator panels
- Motor starter panels
- Consumer panels
- Uninterrupted power supply (UPS)
- Rectifier units and battery chargers

Power Management may include:

- Various power management systems

Power Distribution may include:

- Distribution boxes
- Motor starter boxes
- Shore connection boxes
- Test panels
- Lighting distribution panel
- Emergency switch-off panel

Tools, equipment and material used in this unit may include

Power generation and distribution system in shipboards and relevant tools required

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be holistic and must include real or simulated workplace activities.

Assessment context

The application of competency is to be assessed in the workplace or realistically simulated workplace. It involves the organization of maintenance operations on a vessel and the application of solutions to a defined range of maintenance problems.

Critical aspects (for assessment)

Assessment must confirm appropriate knowledge and skills to:

- Recognize and understand the process and purpose of an electrical power distribution system.
- Explain the common components of a distribution system
- Explain different transformers
- Explain the voltage regulations
- Explain the general fault characters
- Perform short-circuit protection

Assessment conditions

As a minimum, assessment of knowledge must be conducted through appropriate written/oral examinations and appropriate practical assessment must occur at the maritime training organization.

Resources required for assessment

Following resources or opportunities need to be provided to either:

- Participate in a range of exercises, case studies and other simulated practical and knowledge assessments that demonstrate the skills and knowledge to understand the process and purpose of power generation and distribution system and its components.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Process and purpose of power generation and distribution system • Transformers • Voltage regulations • Faults • Short-circuit protection	• Critical thinking • Work safely and efficiently

Unit 36

UNIT TITLE	Overhaul Engines and Associated Engine Components				
DESCRIPTOR	This unit involves the fundamental knowledge and skill-building techniques for overhauling of marine (inboard/outboard) engines.				
CODE	TRN03S1U36V2	LEVEL	4	CREDIT	12

1. Fundamentals of different engines	1.1 explain how an inboard/outboard engine operates 1.2 explain the logical sequence of dismantling the specific engine 1.3 explain how to dismantle engine and relevant components without causing any damages to the engine or components 1.4 perform cleaning of components for inspection
2. Engine inspection procedure for overhaul	2.1 Explain the procedure for engine inspection to be overhauled 2.2 Technical and tooling requirements for overhaul are identified and support equipment is identified and prepared 2.3 SWL rating of lifting devices, engine cradles, slings and shackles are confirmed against the load to be lifted
3. Overhaul engine and its components	3.1 Explain the procedures for performing inboard/outboard engine overhaul 3.2 Describe the serviceability and repair method of each component of the engine
4. Assemble engine and components	4.1 Describe the procedures for assembling the engine and relevant components without causing any damages to the engine or components 4.2 Explain how the engine should be checked for operation prior to starting and after starting 4.3 Perform cleaning of engine after the overhaul.

Range statement

Inboard and outboard engines and propulsion systems may include low speed, medium and high-speed diesel and gasoline engines, stern tube bearing, direct drive shaft, reduction gears and shafts and shaft bearing.

Tools, equipment and material used in this unit may include

Inboard and outboard engines installed on boats, relevant tools and equipment for engine overhaul

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be holistic and must include real or simulated workplace activities.

Assessment context

The application of competency is to be assessed in the workplace or realistically simulated workplace.

Critical aspects (for assessment)

Assessment must confirm appropriate knowledge and skills to:

- explain how an inboard/outboard engine operates
- explain the logical sequence of dismantling the specific engine
- explain how to dismantle and assemble engine and relevant components without causing any damages to the engine or components
- Explain the procedure for engine inspection to be overhauled
- Technical and tooling requirements for overhaul are identified and support equipment is identified

Assessment conditions

As a minimum, assessment of knowledge must be conducted through appropriate written/oral examinations and appropriate practical assessment must occur at the maritime training organization, and/or on an appropriate working or training vessel.

Resources required for assessment

Following resources or opportunities need to be provided to either:

- Participate in a range of exercises, case studies and other simulated practical and knowledge assessments that demonstrate fundamental knowledge and skill-building techniques for overhauling of marine (inboard/outboard) engines.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
• Fundamentals of different engines • Engine inspection procedure for overhaul • procedure for engine inspection to be overhauled • procedures for performing inboard/outboard engine overhaul • serviceability and repair method of each component of the engine • procedures for assembling the engine and relevant components without causing any damages to the engine or components • how to check the engine prior to starting and after starting	• Clean engine and its components • Work safely and efficiently