



TECHNICAL &  
VOCATIONAL  
EDUCATION &  
TRAINING

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# National Competency Standard for MARINE MECHANIC

## Qualification Code: TRN03S08V1

*[Endorsed by the MALDIVES ACCREDITATION BOARD (MAB)]*

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## **PREFACE**

The ADB Loan 2028 MLD, Employment Skills Training Project's (ESTP) objective is to increase the number of Maldivians, men and women, actively participating in the labor force, employed and self employed. The Project will support the expansion of demand driven employment-oriented skills training in priority occupations and improve the capacity to develop and deliver Competency Based Skill Training (CBST). The Project aims to (i) provide youth with employment-oriented skills training; (ii) improve public perception of training and employment in locally available skills-oriented occupations; (iii) make available employment-related information to more Maldivians; and (iv) strengthen the capacity for labor administration and for labor market analysis.

The objective of the project is to deliver CBST programs to satisfy employer demand-driven needs. The National Competency Standards (NCS) provide the base for this training. Initially training will be focused on five key sectors: tourism, fisheries and agriculture, transport, construction and the social sectors. These sectors are included as priority sectors in the national development plan and play a vital role in the continued economic growth of the country.

The NCS are developed in consultation with Employment Sector Councils representing employers. They are designed using a consensus format endorsed by the Maldives Accreditation Board (MAB) to maintain uniformity of approach and the consistency of content amongst occupations. This single format also simplifies benchmarking the NCS against relevant regional and international standards.

NCS specify the standards of performance of a competent worker and the various contexts in which the work may take place. NCS also describes the knowledge, skills and attitudes required in a particular occupation. They provide explicit advice to assessors and employers regarding the knowledge, skills and attitudes to be demonstrated by the candidates seeking formal recognition for the competency acquired following training or through work experience. By sharing this information, all participants in the training process have the same understanding of the training required and the standard to be reached for certification. Certification also becomes portable and can be recognized by other employers and in other countries with similar standards.

NCS are the foundation for the implementation of the Technical and Vocational Education and Training (TVET) system in Maldives. They ensure that all skills, regardless of where or how they were developed can be assessed and recognized. They also form the foundation for certifying skills in the Maldives National Qualification Framework (MNQF).

NCS are developed by the TVET Section of Ministry of Higher Education, Employment and Social Security. The NCS are endorsed by the Employment Sector Councils of the respective sectors and validated by the Maldives Accreditation Board.

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Date of Endorsement	Date of revision	

## Key for coding Coding Competency Standards and Related Materials

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

<b>1. Endorsement Application for Qualification 01</b>		
<b>2. NATIONAL CERTIFICATE I IN MARINE MECHANIC</b>		
<b>3. Qualification code:</b> TRN03SQ1L108	<b>Total Number of Credits :40</b>	
<b>4. Purpose of the qualification</b>  The holders of this qualification will be will be competent to work in the Maritime Sector as an engine operator (driver). 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.		
<b>5. Regulations for the qualification</b>	National Certificate I in the Marine Mechanic Qualification will be awarded to those who are competent in units 1+2+3+4+5+6+7	
<b>6. Schedule of Units</b>		
<b>Unit Title</b>	<b>Unit Title</b>	<b>Code</b>
1.	Apply safe working practices	TRN03S1U01V1
2.	Prevent, control and fight fires on board	TRN03S1U02V1
3.	Provide first aid on board	TRN03S1U03V1
4.	Operate life-saving appliances and apply survival techniques in the event of vessel abandonment	TRN03S1U04V1
5.	Handle and maintenance of workplace tools and equipments	TRN01S1U03V1
6.	Undertake basic workshop calculations	TRN01S1U04V1
7.	Operate and maintain inboard and outboard engines and propulsion transmission systems	TRN03S2U01V1
<b>7. Accreditation requirements</b>	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.	
<b>8. Recommended sequencing of units</b>	As appearing under the section 06	

<b>1. Endorsement Application for Qualification 02</b>		
<b>2. NATIONAL CERTIFICATE III IN MARINE MECHANIC</b>		
<b>3. Qualification code:</b> TRN03SQ2L208	<b>Total Number of Credits :83</b>	
<b>4. Purpose of the qualification</b>  The holders of the level two qualifications are expected to possess all the relevant knowledge and skills to work as Marine Mechanics in 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.		
<b>5. Regulations for the qualification</b>	National Certificate II 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  +13+14+15+16+17+18+19	
<b>6. Schedule of Units</b>		
<b>Unit Title</b>	<b>Unit Title</b>	<b>Code</b>
1	Apply safe working practices	TRN03S1U01V1
2	Prevent, control and fight fires on board	TRN03S1U02V1
3	Provide first aid on board	TRN03S1U03V1
4	Operate life-saving appliances and apply survival techniques in the event of vessel abandonment	TRN03S1U04V1
5	Handle and maintenance of workplace tools and equipments	TRN01S1U03V1
6	Undertake basic workshop calculations	TRN01S1U04V1
7	Operate and maintain inboard and outboard engines and propulsion transmission systems	TRN03S2U01V1
8	Maintain the Workshop	TRN03S2U03V1
9	Undertake inspection and servicing engines (inboard and outboard)	TRN03S2U04V1
10	Undertake inspection and servicing cooling systems	TRN01S2U04V1
11	Undertake petrol fuel systems servicing	TRN01S2U05V1
12	Service ignition system components	TRN01S2U07V1

13	Service diesel fuel system	TRNo1S2Uo6V1
14	Test, service and replace battery	TRNo3S2Uo5V1
15	Inspect and service marine transmissions and propellers (Outboard and Stern Drive)	TRNo3S2Uo6V1
16	Inspect and service jet drive propulsion system	TRNo3S2Uo7V1
17	Inspect and repair marine electrical systems/components	TRNo3S2Uo8V1
18	Operate and service engine water pump	TRNo3S2Uo9V1
19	Operate and service diesel/petrol electric generator	TRNo3S2U10V1
<b>7. Accreditation requirements</b>		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.
<b>8. Recommended sequencing of units</b>		As appearing under the section 05



**UNITS DETAILS**

<b>Unit Title</b>	<b>Unit Title</b>	<b>Code</b>	<b>Level</b>	<b>No of credits</b>
1	Apply safe working practices	TRN03S1U01V1	1	5
2	Prevent, control and fight fires on board	TRN03S1U02V1	1	6
3	Provide first aid on board	TRN03S1U03V1	2	6
4	Operate life-saving appliances and apply survival techniques in the event of vessel abandonment	TRN03S1U04V1	2	6
5	Handle and maintenance of workplace tools and equipments	TRN01S1U03V1	2	6
6	Undertake basic workshop calculations	TRN01S1U04V1	2	5
7	Operate and maintain inboard and outboard engines and propulsion transmission systems	TRN03S2U01V1	2	6
8	Maintain the Workshop	TRN03S2U03V1	1	4
9	Undertake inspection and servicing engines (inboard and outboard)	TRN03S2U04V1	2	4
10	Undertake inspection and servicing cooling systems	TRN01S2U04V1	2	2
11	Undertake petrol fuel systems servicing	TRN01S2U05V1	2	3
12	Service ignition system components	TRN01S2U07V1	2	3
13	Service diesel fuel system	TRN01S2U06V1	2	3
14	Test, service and replace battery	TRN03S2U05V1	2	3
15	Inspect and service marine transmissions and propellers (Outboard and Stern Drive)	TRN03S2U06V1	3	4
16	Inspect and service jet drive propulsion system	TRN03S2U07V1	2	4
17	Inspect and repair marine electrical systems/components	TRN03S2U08V1	2	4
18	Operate and service engine water pump	TRN03S2U09V1	2	4
19	Operate and service diesel/petrol electric generator	TRN03S2U10V1	2	4

## Packaging of National Qualifications:

National Certificate I in Marine Mechanic will be awarded to those who are competent in units  
1+2+3+4+5+6+7

Qualification Code: TRNo3SQ1L108

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

Qualification Code: TRNo3SQ2L208

## Competency Standard for

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### MARINE MECHANIC

Unit No	Unit Title
8.	Apply safe working practices
9.	Prevent, control and fight fires on board
10.	Provide first aid on board
11.	Operate life-saving appliances and apply survival techniques in the event of vessel abandonment
12.	Handle and maintenance of workplace tools and equipments
13.	Undertake basic workshop calculations
14.	Operate and maintain inboard and outboard engines and propulsion transmission systems
15.	Maintain the Workshop
16.	Undertake inspection and servicing engines (inboard and outboard)
17.	Undertake inspection and servicing cooling systems
18.	Undertake petrol fuel systems servicing
19.	Service ignition system components
20.	Service diesel fuel system
21.	Test, service and replace battery
22.	Inspect and service marine transmissions and propellers (Outboard and Stern Drive)
23.	Inspect and service jet drive propulsion system
24.	Inspect and repair marine electrical systems/components
25.	Operate and service engine water pump
26.	Operate and service diesel/petrol electric generator

## 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.

<b>UNIT TITLE</b>	Apply safe working practices				
<b>DESCRIPTOR</b>	This unit involves the skills and knowledge required to implement regulatory requirements for occupational health and safety on board a commercial vessel, including following and applying established maritime safe working practices and procedures and hazard control strategies				
<b>CODE</b>	TRNo3S1Uo1V1	<b>LEVEL</b>	1	<b>CREDIT</b>	5

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
1. Identify and follow workplace procedures for hazard identification and risk control	1.1. To day-to-day work activities safety regulations and established vessel's safety and hazard control practices and procedures are obtained, interpreted and applied 1.2. Workplace procedures for dealing with shipboard accidents, fire and emergencies are known and followed 1.3. To minimize or eliminate risk to personnel, vessel and the environment hazards in the workplace are identified and appropriate action is taken to report them 1.4. In accordance with established shipboard safety practices and procedures, personal protection clothing and equipment is correctly used 1.5. In the event of a shipboard emergency and equipment to secure the vessel and its machinery, appropriate assistance is provided 1.6. In the event of a shipboard emergency, established emergency and contingency plans are followed
2. Contribute to arrangements for the management of health and safety	2.1 In accordance with workplace procedures and relevant occupational health and safety legislation, workplace health and safety issues and identified safety hazards are raised with designated personnel 2.2 Within workplace procedures, health and safety issues are raised with designated personnel 2.3 For health and safety management in the workplace

	within vessel's procedures, participative arrangements are contributed
3. Complete health and safety records	3.1 Health and safety records are completed 3.2 Legal requirements for the maintenance of records of occupational injury and diseases are followed

## Range statement

Safe working practices and hazard control strategies must be applied at all times of the day and at all times and at all operations. Emergencies may include loss of propulsion, loss of electrical power, loss of steerage, flooding of vessel, fire or explosion, loss of refrigeration, loss of water making ability, fuel oil, lubrication oil, steam and gas leaks and overheating and over speed of machinery, governors, and emergency trips.

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

- A vessel, safety manuals if appropriate and safety equipments and tools.

## 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 including a training vessel. Vessel may include any Maldivian or international commercial vessel.

### Critical aspects (for assessment)

Assessment must confirm appropriate knowledge and skills to:

- Identify and follow workplace procedures for hazard identification and risk control
- Contribute to arrangements for the management of safety onboard a vessel
- Complete workplace safety records as required
- Communicate effectively with others on workplace safety matters

### Assessment conditions

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 and needs to be undertaken within relevant marine authority approved and audited arrangements by a registered training organization.

### Resources required for assessment

Relevant working environment to offer practical and theoretical assignments, exercises, case studies and other assessments that demonstrate the skills and knowledge to contribute to the application of safe working practices and safety hazard control onboard a vessel; and/or on a commercial or training vessel.

## UNDERPINNING KNOWLEDGE AND SKILLS

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"><li>• Knowledge of relevant maritime and safety regulations</li><li>• Develop appropriate knowledge on</li><li>• Safety policies</li><li>• Safety procedures</li><li>• Plant and equipment maintenance</li><li>• Hazard identification</li><li>• Risk assessment and control</li><li>• Safety instruction</li><li>• Safety training and provision of information</li></ul>	<ul style="list-style-type: none"><li>• Participate in a range of practical and theoretical assignments, exercises, case studies and other assessments that demonstrate the skills and knowledge to contribute to the application of safe working practices and safety hazard control onboard a vessel; and/or contribute to the application of safe working practices and hazard control and safety hazard control on a commercial or training vessel</li></ul>

<b>UNIT TITLE</b>	Prevent, control and fight fires on board				
<b>DESCRIPTOR</b>	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, and the execution and coordination of fire-fighting operations for the type and size of vessel involved.				
<b>CODE</b>	TRNo3S1Uo2V1	<b>LEVEL</b>	1	<b>CREDIT</b>	6

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
1. Manage fire prevention procedures	1.1. Fire hazards on board a vessel are 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 a vessel Correct techniques are applied 2.5 Where applicable, portable fire-fighting equipment is confirmed as operational following recharging
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 fire fighting equipment and procedures, interior fires are extinguished



## 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<sub>2</sub>, dry chemical and wet foam, fire blankets, sprinkler systems, fire pumps main and emergency fire pump and fire hoses.

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

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

- Fire fighting tools and equipments

## 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)
- 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.

### 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

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"> <li>• Knowledge of relevant maritime regulations</li> <li>• Fire-fighting techniques applicable to different classes of fire on board a vessel</li> <li>• Role and function of standard fire-fighting organization models used on board vessels</li> <li>• Maritime communication techniques applicable to fire prevention and fire-fighting activities on board a vessel</li> <li>• 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</li> <li>• Sources of information on fire prevention and extinguishment on board vessels</li> </ul>	<ul style="list-style-type: none"> <li>• The chemistry of fire and its relationship to materials typically carried on vessels</li> <li>• Principles underlying the spread of fire and its extinguishment</li> <li>• The different classes of fire, their characteristics and strategies and equipment needed for their extinguishment</li> <li>• 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</li> <li>• Relevant regulations, codes of practice, policies and procedures related to the to the maintenance of fire-detection, fire-fighting equipment and systems</li> <li>• Methods for checking and replacing consumable materials in typical fire-</li> </ul>

	detection and fire- fighting equipment and systems on board various types and sizes of vessels
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<b>UNIT TITLE</b>	Provide first aid on board				
<b>DESCRIPTOR</b>	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 life saving 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.				
<b>CODE</b>	TRNo3S1Uo3V1	<b>LEVEL</b>	2	<b>CREDIT</b>	6

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
1. Perform immediate life saving 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

	<p>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</p>
<p>3. Manage wounds and bleeding</p>	<p>3.1 Severe external bleeding is correctly controlled in a real or simulated situation</p> <p>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</p> <p>3.3 A real or simulated laceration, abrasion and a deep puncture wound is correctly manage in accordance with established first aid procedures</p> <p>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</p>
<p>4. Manage burns</p>	<p>4.1 Immediate rescue procedures are correctly used in real or simulated first aid situations involving a burned casualty</p> <p>4.2 The severity of burn is correctly assessed in terms of depth, position and size in accordance with established procedures</p> <p>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</p>
<p>5. Manage bone, joint and muscle injuries</p>	<p>5.1 Symptoms and signs of fractures (simple and complicated) are correctly recognized in accordance with established first aid procedures</p> <p>5.2 Problems and treatment associated with dislocated joints are correctly managed in accordance with established procedures</p> <p>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</p> <p>5.4 The symptoms and signs of sprains and strains are correctly identified in accordance with established</p>

	procedure
6. Adapt first aid procedures for remote situations	<p>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</p> <p>6.2 Identify and discuss the factors involved in the prevention of heat and cold exposure</p> <p>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</p> <p>6.4 A real or simulated ill or injured person in remote conditions is correctly, cared for until help arrives, including the monitoring of airway, breathing and heart beat, the control of pain, hydration and maintenance of body temperature</p> <p>6.5 A real or simulated casualty with severe injuries in a remote situation is correctly cared for, including the preparation for transport</p> <p>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</p>

## 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 task are being undertaken whether individually or in-group

### Critical aspects (for assessment)

Assessment requires evidence that the candidate:

- Performed immediate life saving 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

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"><li>• Duties and responsibilities of the designated first aid officer on board a vessel</li><li>• Knowledge on ways in which disease can spread on board a vessel and ways of preventing the spread</li><li>• Legal issues related to administration of drugs and medicines on board a vessel</li><li>• Knowledge of body structures and functions relevant to possible injury, illnesses and disease that may be encountered on board a vessel</li><li>• Maritime communication techniques related to health care and receiving radio medical advice from shore based advisers</li><li>• Marine publications containing information on first aid and medical treatment on board a vessel</li></ul>	<ul style="list-style-type: none"><li>• Medical first aid procedures</li><li>• Procedures for conducting an initial patient first aid treatment</li><li>• Managing injuries and medical emergencies</li><li>• Managing medicine resources</li><li>• Techniques for care of wounds</li><li>• Correct methods of Expired Air Resuscitation (EAR), External Cardiac Compression (ECC) and Cardio Pulmonary Resuscitation (CPR)</li></ul>



<b>UNIT TITLE</b>	Operate life-saving appliances and apply survival techniques in the event of vessel abandonment				
<b>DESCRIPTOR</b>	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.				
<b>CODE</b>	TRNo3S1Uo4V1	<b>LEVEL</b>	2	<b>CREDIT</b>	6

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
1. Practice survival techniques	1.1. In accordance with established survival practice, safely jumped from a height into the water 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 life saving 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 Immersion suit, various thermal protective aids, life-

	jacket and other life saving clothing are correctly donned and used
3. Participate in abandon vessel drills	<p>3.1 In accordance with regulatory requirements and company procedures, abandon vessel musters and drills are attended</p> <p>3.2 On identifying muster signals appropriate to the indicated emergency and complies with established procedures action taken</p> <p>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</p>

## 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 task 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

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"> <li>• Knowledge on relevant maritime regulations dealing with survival at sea following abandonment of vessel</li> <li>• Incidents that may result in an emergency on board vessel and the appropriate response in each case</li> <li>• Value of training and emergency drills for enhancing chances of survival at sea</li> <li>• Location of personal lifesaving appliances on a vessel</li> <li>• Construction, outfit and particular characteristics of various types of life boats, life rafts and rescue boats</li> </ul>	<ul style="list-style-type: none"> <li>• Procedures for emergency response on board vessels including abandoning vessel</li> <li>• Procedures for correctly operating and using lifesaving appliances and personal safety equipment on board vessels and survival craft and specifically :                         <ul style="list-style-type: none"> <li>➢ Donning a life jacket using a life jacket light and whistle</li> <li>➢ Donning an immersion suit</li> <li>➢ Deployment of a mob combination light and smoke float</li> <li>➢ Use of hand-held pyrotechnics</li> <li>➢ Threats to survival on abandonment of a vessel and appropriate strategies for countering these threats</li> </ul> </li> <li>• Ways of maximizing detectability and location of survival craft using pyrotechnic distress signals and VHF radios,</li> </ul>

<b>UNIT TITLE</b>	Handle and maintenance of workplace tools and equipments				
<b>DESCRIPTOR</b>	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.				
<b>CODE</b>	TRNo1S1U03V1	<b>LEVEL</b>	2	<b>CREDIT</b>	6

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
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 other 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

### 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

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

- All the available workshop tools and equipments
- A fully operational workshop with all equipments 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

### 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

### 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

## UNDERPINNING KNOWLEDGE AND SKILLS

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"><li>• Safety regulations/requirements, equipment, material and personal safety requirements</li><li>• Tool and equipment selection procedures</li><li>• Basic maintenance procedures for tooling and equipment</li><li>• Tool and equipment safety and operating</li><li>• Procedures</li><li>• Types, characteristics, uses and limitations of hand tooling</li><li>• Types, characteristics, uses and limitations of workplace equipment</li></ul>	<ul style="list-style-type: none"><li>• Demonstrate understanding of workplace</li><li>• safety</li><li>• Identify appropriate tools and equipments</li><li>• Undertake maintenance of tools and equipments used in the workplace</li><li>• Operate tools and equipments safely</li></ul>

<b>UNIT TITLE</b>	Undertake basic workshop calculation				
<b>DESCRIPTOR</b>	This unit includes identifying caring, handling and use of measuring instruments.				
<b>CODE</b>	TRNo1S1Uo4V1	<b>LEVEL</b>	2	<b>CREDIT</b>	5

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
1. Select measuring instruments	1.1. Object or component to be measured identified 1.2. Correct specifications from relevant sources obtained 1.3. Appropriate measuring instrument according to job requirements selected
2. Carry out measurements and calculation	2.1 Measuring tools in line with job requirements selected 2.2 Accurate measurements related to the job undertaken 2.3 Appropriate calculations to complete work tasks using the four basic process of addition (+), subtraction (-), multiplication (x) and division (/) performed 2.4 Calculations involving fractions, percentages and mixed numbers are used to complete workplace tasks performed 2.5 Numerical computation and correct for accuracy checked 2.6 Instruments to the limit of accuracy of the tool read
3. Maintain measuring instruments	3.1 Measuring instruments protected from corrosion 3.2 Measuring instruments properly handed, to avoid dropping or damage 3.3 Measuring instruments cleaned before and after using

## Range statement

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.

## ASSESSMENT GUIDE

### Forms of assessment

Assessments of the workshop measuring instruments need to be undertaken in a real or simulated working environment using existing workplace tools.

### Assessment context

Competency elements must be assessed in a safe working environment

Assessment may be conducted in a workplace or simulated environment

### Critical aspects (for assessment)

Assessment requires evidence that the candidate:

- Selected measuring instruments
- Carried-out measurements and calculations
- Maintained measuring instruments

### Assessment conditions

Competency must be assessed through:

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

### Special notes for assessment

Attempts need to be made in completing measurements in all the measuring instruments mentioned in the unit.

### Resources required for assessment

The following resources must be provided:

- Workplace location
- Measuring instrument appropriate to servicing processes
- Instructional materials relevant to the propose activity

## UNDERPINNING KNOWLEDGE AND SKILLS

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

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"><li>• Types of Measuring instruments and its uses</li><li>• Safe handling procedures in using measuring instruments</li><li>• Four fundamental operation of mathematics</li><li>• Formula for Volume, Area, Perimeter and other geometric figures</li></ul>	<ul style="list-style-type: none"><li>• Caring and Handling measuring instruments</li><li>• Calibrating and using measuring instruments</li><li>• Performing calculation by Addition,</li><li>• Subtraction, Multiplication and Division</li><li>• Visualizing objects and shapes</li><li>• Interpreting formula for volume, area, perimeter and other geometric figures</li></ul>

<b>UNIT TITLE</b>	Operate and maintain inboard and outboard engines and propulsion transmission systems				
<b>DESCRIPTOR</b>	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.				
<b>CODE</b>	TRNo3S2U01V1	<b>LEVEL</b>	2	<b>CREDIT</b>	6

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
1. Operate inboard and outboard engines and propulsion systems	<p>1.1. In accordance with manufacturers' instructions and established marine practice inboard and outboard engines and propulsion systems are prepared, started, and shut down</p> <p>1.2. Inboard and outboard engines and propulsion systems are operated within specified limits</p> <p>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</p>
2. Carry out basic, routine checking and maintenance procedures on inboard and outboard engines and propulsion systems	<p>2.1 The performance of inboard and outboard engines and propulsion systems is monitored</p> <p>2.2 In accordance with vessel's procedures and survey requirements and manufacturer's instructions, preventative and remedial maintenance programs are carried out</p> <p>2.3 Poor performance and faulty operation are identified and appropriate action initiated</p> <p>2.4 Routine service checks and procedures are followed to maintain the serviceability of inboard and outboard engines and propulsion systems</p> <p>2.5 In accordance with manufacturer's instructions and vessel's procedures maintenance and service records are completed</p>
3. Follow safety and hazard control	3.1 Safety, hazard minimization and pollution control procedures and national and international regulations

procedures	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
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## 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 a small vessel.
- Carry out preventative servicing and remedial maintenance on small internal combustion engines and propulsion systems on a small vessel.
- Identify typical problems related to the operation, servicing and maintenance of internal combustion engines and propulsion systems on a small 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 a small 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

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"><li>• Relevant safety and pollution control legislation and codes of practice</li><li>• Types of engines and propulsion systems used on small vessels propulsion power, including their principle features and operating characteristics</li><li>• 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</li><li>• Types of maintenance records that must be maintained on a vessel to meet the requirements of the company and regulatory authorities</li></ul>	<ul style="list-style-type: none"><li>• Procedures for the operation, servicing and routine maintenance of internal combustion engines and propulsion systems on a small vessel</li><li>• Safety, environmental and hazard control precautions and procedures relevant to the operation and routine maintenance of internal combustion engines and propulsion systems</li><li>• Maritime communication techniques needed during the operation and maintenance of internal combustion engines and propulsion systems on small vessels</li></ul>

<b>UNIT TITLE</b>	Maintain the workshop				
<b>DESCRIPTOR</b>	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.				
<b>CODE</b>	TRNo3S2Uo2V1	<b>LEVEL</b>	1	<b>CREDIT</b>	4

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
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. Store/arrange tools and shop equipment	2.1 Tools/equipment checked and stored in their respective shelves/location 2.2 Corresponding labels posted and visible 2.3 Tools 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/equipment	4.1 Complete inventory of tools/equipment maintained 4.2 Damaged tools/equipment/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/facilities
- Maintained equipment, 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

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"><li>• Service procedures</li><li>• Relevant technical information</li><li>• Safe handling of Equipment and tools</li><li>• Vehicle safety requirements</li><li>• Workshop policies</li><li>• Personal safety procedures</li><li>• Fire Extinguishers and prevention</li><li>• Storage/Disposal of hazardous/flammable materials</li><li>• Positive Work Values (Perseverance, Honesty, Patience, Attention to Details)</li></ul>	<ul style="list-style-type: none"><li>• Handling/Storing of tools/equipment/supplies and material</li><li>• Cleaning grease/lubricants</li><li>• Disposing of wastes and fluid</li><li>• Preparing inventory of workshop tools, cleaning materials and equipments</li><li>• Monitoring of workshop tools, cleaning materials and equipments</li></ul>



<b>UNIT TITLE</b>	Undertake inspection and servicing engines (inboard and outboard)				
<b>DESCRIPTOR</b>	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.				
<b>CODE</b>	TRNo3S2Uo4V1	<b>LEVEL</b>	2	<b>CREDIT</b>	4

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
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 equipments 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

	<p>2.6 Results with manufacturer/component supplier specifications to indicate compliance or non-compliance analyzed and compared</p> <p>2.7 Documentation of the results undertaken with evidence and supporting information and recommendation(s) are made</p> <p>2.8 Report results in accordance with workplace procedures</p>
3. Prepare to service engines	<p>3.1 Safety requirements, including individual workplace safety requirements and personal protection throughout the work observed</p> <p>3.2 Procedures and information requirements identified and sourced</p> <p>3.3 Appropriate tools identified and selected</p> <p>3.4 Resources required for servicing and identify and prepare support equipments identified</p>
4. Carry out servicing	<p>4.1 Servicing jobs in accordance with workplace procedures and manufacturer/component supplier specifications observed</p> <p>4.2 Cylinder head removed and serviced</p> <p>4.3 Serviced cylinder head assembled and installed</p> <p>4.4 Engine oil, oil filter, fuel filter replaced</p> <p>4.5 Valve Clearance adjusted</p> <p>4.6 Cylinder head bolts and other loose bolts tightened to correct torque</p>
5. Prepare vehicle for use or storage	<p>5.1 Complete servicing schedules documented</p> <p>5.2 Final inspection to ensure protective guards and safety features in place undertook</p> <p>5.3 Final inspection to ensure work completed to workplace expectations undertook</p> <p>5.4 Vehicle cleaned for use or storage to workplace expectations</p>

### 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 ignition, two stroke spark ignition and four stroke compression ignition.

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:

- 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 inspecting and documenting and interpreting analysis results
- Conducting inspection and servicing of a range of engines in accordance with workplace and manufacturer/component supplier requirements and specifications
- Completing the work within workplace timeframes
- Equipment is presented to customer in compliance with workplace requirements

### 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

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"><li>• Safety and environmental regulations/requirements, equipment, material and personal safety requirements</li><li>• Dangers of working with engines</li><li>• Operating principles of engines, lubrication, cooling and fuel systems and their relationship to each other</li><li>• Types and layout of service/repair manuals<ul style="list-style-type: none"><li>➢ inspection procedures</li><li>➢ service procedures</li><li>➢ enterprise quality procedures</li><li>➢ work organization and planning processes</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Work safely with equipments</li><li>• Observe personal safety and safety of others</li><li>• Work safely with engines</li><li>• Identify all the major engine components</li><li>• Undertake inspection, adjust, drain, replace or change and tighten relevant engine parts</li><li>• Competent to read and understand service/repair manuals</li></ul>

<b>UNIT TITLE</b>	Undertake Inspection and servicing cooling systems				
<b>DESCRIPTOR</b>	This unit covers the competence required to carry out the inspection and service of air and liquid cooling systems in an engine.				
<b>CODE</b>	TRN01S2U04V1	<b>LEVEL</b>	2	<b>CREDIT</b>	2

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
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

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

### 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:

- 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 analysis results
- Identification of application, purpose and operating principles
- Conducting inspection, servicing and operational testing in accordance with workplace and manufacturer/component supplier specifications
- Completing service of cooling systems and associated components within workplace timeframes
- Equipment is presented to customer in compliance with workplace requirements

### 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

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"><li>• Workplace safety and environmental regulations/requirements, equipment, material and personal safety requirements</li><li>• Dangers of working with coolants</li><li>• Identification of application, purpose and operating principles of cooling system components</li><li>• Inspection procedures</li><li>• Types and layout of service/repair manuals</li><li>• (hard copy and electronic)</li></ul>	<ul style="list-style-type: none"><li>• Safe working skills</li><li>• Identification of cooling system components</li><li>• Undertake inspection and servicing of cooling system components</li><li>• Read and use service literature</li><li>• Cooling system service procedures</li></ul>



<b>UNIT TITLE</b>	Undertake petrol fuel systems Servicing				
<b>DESCRIPTOR</b>	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				
<b>CODE</b>	TRN01S2U05V1	<b>LEVEL</b>	2	<b>CREDIT</b>	3

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
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 stroke and/or four stroke, spark ignition fuel systems
- Components include carburettors (all positions, electronic, fixed venturi, variable venturi), fuel 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 petrol 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 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

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"><li>• Safety regulations/requirements, equipment,</li><li>• material and personal safety requirements</li><li>• Dangers of working with petrol</li><li>• Mechanical and electronic fuel systems</li></ul>	<ul style="list-style-type: none"><li>• Work safely</li><li>• Identify parts</li><li>• Service parts as per the requirement</li><li>• Read manuals</li></ul>

<ul style="list-style-type: none"><li>• Service procedures</li><li>• Vehicle safety procedures</li><li>• Types and layout of service/repair manuals</li><li>• (hard copy and electronic)</li><li>• Workplace quality procedures</li></ul>	
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<b>UNIT TITLE</b>	servicing ignition systems Components				
<b>DESCRIPTOR</b>	This competency unit includes inspecting and servicing ignition system components.				
<b>CODE</b>	TRNo1S2Uo7V1	<b>LEVEL</b>	2	<b>CREDIT</b>	3

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
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

## 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

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

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"><li>• Ignition system construction and operation</li><li>• appropriate to application</li><li>• Measuring and testing procedures for ignition system components</li></ul>	<ul style="list-style-type: none"><li>• Using tools when testing and repairing ignition system</li><li>• Using ignition system test instrument and Equipment</li><li>• Observing proper procedures</li></ul>

<b>UNIT TITLE</b>	service diesel fuel system				
<b>DESCRIPTOR</b>	This unit covers competence required for servicing diesel fuel system in both automotive and marine engines.				
<b>CODE</b>	TRNo1S2U06V1	<b>LEVEL</b>	2	<b>CREDIT</b>	3

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
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	<p>3.1 Venting of the fuel system carried out</p> <p>3.2 Service schedule documentation completed</p> <p>3.3 Final inspection made to ensure safety features in place</p> <p>3.4 Final inspection made to ensure work is to workplace expectations</p> <p>3.5 Job card processed in accordance with workplace procedures</p>

## Range statement

### Unit scope

- Servicing procedures may be performed on diesel fuel systems in light vehicles and out door 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

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"><li>• Safety regulations/requirements, equipment, material and personal safety requirements</li><li>• Dangers of working with diesel</li><li>• Mechanical and electronic fuel</li></ul>	<ul style="list-style-type: none"><li>• Work safely</li><li>• Identify parts</li><li>• Service parts as per the requirement</li><li>• Read manuals</li></ul>

<p>systems</p> <ul style="list-style-type: none"><li>• Service procedures</li><li>• Vehicle safety procedures</li><li>• Types and layout of service/repair manuals</li><li>• (hard copy and electronic)</li><li>• Workplace quality procedures</li></ul>	
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<b>UNIT TITLE</b>	Test, service and replace battery				
<b>DESCRIPTOR</b>	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.				
<b>CODE</b>	TRNo3S2Uo5V1	<b>LEVEL</b>	2	<b>CREDIT</b>	3

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
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

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

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"><li>• Safe handling of battery electrolyte and acids</li><li>• Servicing procedures</li><li>• Battery charging procedures</li></ul>	<ul style="list-style-type: none"><li>• Testing procedures of both, load and specific gravity</li><li>• Identification of battery types</li><li>• Charging Practice</li></ul>

<b>UNIT TITLE</b>	Inspect and service marine transmissions and propellers (Outboard and Stern Drive)				
<b>DESCRIPTOR</b>	This unit identifies the competence required to carry out inspection and service of outboard and stern drive transmissions and/or their associated components				
<b>CODE</b>	TRN03S2U06V1	<b>LEVEL</b>	3	<b>CREDIT</b>	4

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



<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"><li>• Equipment safety requirements</li><li>• Construction and operation of transmissions (relevant to application)</li><li>• Types of lubricants and their application</li><li>• Propeller drive system lubricants/fluids and their application</li><li>• Operating principles of propeller drive systems</li></ul>	<ul style="list-style-type: none"><li>• Removal, replacement, repair and service procedures</li><li>• Measuring and testing procedures</li><li>• Inspection procedures and techniques of propeller drive components</li></ul>

<b>UNIT TITLE</b>	Inspect and service jet drive propulsion system				
<b>DESCRIPTOR</b>	This unit identifies the competence required to carry out the inspection and service of jet drive propulsion systems and/or associated components				
<b>CODE</b>	TRNo3S2U07V1	<b>LEVEL</b>	2	<b>CREDIT</b>	4

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
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 are 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, equipments 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

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"><li>• Equipment/Material safety requirements</li><li>• Operating principles of jet drive propulsion systems</li><li>• Service procedures</li></ul>	<ul style="list-style-type: none"><li>• Apply personal safety requirements</li><li>• Access, interpret &amp; apply technical information</li><li>• Use relevant tools &amp; equipment</li><li>• Test propulsion unit for normal operation</li><li>• Service jet drive propulsion systems</li></ul>

<b>UNIT TITLE</b>	Inspect and service electrical systems/components				
<b>DESCRIPTOR</b>	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.				
<b>CODE</b>	TRNo3S2Uo8V1	<b>LEVEL</b>	2	<b>CREDIT</b>	4

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
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 equipments.

## 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

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"><li>• Interpretation technical materials, graphic symbols and diagrams</li><li>• Operation of marine systems and components relevant to application</li><li>• Procedures for the repair and testing of marine electrical systems/components</li></ul>	<ul style="list-style-type: none"><li>• Safely and correctly use tools and equipment</li><li>• Test and identify faults in marine electrical systems/components</li><li>• Perform electrical connections; crimping and soldering</li><li>• Repair marine electrical systems</li><li>• Select and use appropriate materials for repair of marine electrical systems/components</li></ul>

<b>UNIT TITLE</b>	Operate and maintain engine water pump				
<b>DESCRIPTOR</b>	This unit involves the skills and knowledge required to operate and carry out basic routine maintenance of small engine water pumps on maritime vessels.				
<b>CODE</b>	TRNo3S2U09V1	<b>LEVEL</b>	2	<b>CREDIT</b>	4

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

## 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

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"><li>• Types and functions of small engine water pumps</li><li>• Construction details of engine water pumps</li><li>• Functions of pump parts</li><li>• Operational procedures of pumps</li></ul>	<ul style="list-style-type: none"><li>• Identify parts of the pump</li><li>• Start and run pumps safely</li><li>• Inspect and maintain pumps</li><li>• Undertake pump repair</li></ul>

<b>UNIT TITLE</b>	Operate and service diesel/petrol electric generator				
<b>DESCRIPTOR</b>	This unit involves the skills and knowledge required to operate and carry out basic routine maintenance of small diesel/petrol electric generator.				
<b>CODE</b>	TRNo3S2U10V1	<b>LEVEL</b>	2	<b>CREDIT</b>	4

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

## 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

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"><li>• Types and functions of small diesel/petrol electric generator</li><li>• Construction details of diesel/petrol electric generator</li><li>• Functions of diesel/petrol electric generator parts</li></ul>	<ul style="list-style-type: none"><li>• Identify parts of the diesel/petrol electric generator</li><li>• Start and run diesel/petrol electric generator safely</li><li>• Inspect and maintain diesel/petrol electric generator</li></ul>