



Unit title	Safe Operation of Merchant Vessel Machinery Systems
SQA code	HC3A 04
SCQF level	6
SCQF credit points	8

History of changes

Publication date: March 2016

Version: 01

Version number	Date	Description	Authorised by

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Title	Safe Operation of Merchant Vessel Machinery Systems	
Level	6	
Credit value	8	
Learning Outcomes	Assessment Criteria	
The learner will:	The learner can:	
1 Know the requirements of the Code of Safe Working Practices for work on machinery systems.	1.1	Describe the Personal Protective Equipment required for work on machinery systems.
	1.2	Identify the meaning of common shipboard safety signs and the precautions required by them.
	1.3	Describe the basic precautions to be taken for safe movement around the ship, including passage through watertight doors.
	1.4	Describe the basic precautions to be taken for work in enclosed spaces when working under supervision.
	1.5	Describe the precautions to be taken before using lifting equipment.
	1.6	Identify the basic requirements of a 'permit to work' and instances when it would be used.
	1.7	Describe the precautions to be taken when using hand tools.
	1.8	Describe the precautions to be taken when using portable power tools.
	1.9	Describe the dangers of hazardous substances including oils, asbestos, chemical agents, and pesticides.
	1.10	Identify the symbols and associated dangers of common hazardous chemicals from Materials Safety Data Sheets.
	1.11	Identify the procedures to be followed for the disposal of bilge water.

Learning Outcomes	Assessment Criteria
The learner will:	The learner can:
<p>2 Know the function and basic operating principles of the main items of plant within machinery spaces.</p>	<p>2.1 Describe the Two Stroke and Four stroke cycles for compression ignition engines.</p> <p>2.2 Identify the main component parts of an engine, including cylinder head, liner, piston, connecting rod, piston rod, piston rings, stuffing box, bottom/top/main bearings, crankshaft, camshaft, fuel pump, fuel injector.</p> <p>2.3 Identify the components of the engine air induction and exhaust system including. scavenge air and exhaust receivers, turbochargers, and auxiliary blowers</p> <p>2.4 Identify main engine types and layouts including slow speed, medium speed, high speed, single and multi-engine arrangements, basic layout of steam propulsion plant, thrust blocks and gear boxes.</p> <p>2.5 Identify the main components and function of ancillary systems required to operate a diesel engine:</p> <ul style="list-style-type: none"> ◆ Fuel oil system ◆ Starting air system ◆ Lubricating oil system ◆ Fresh water cooling system ◆ Sea water cooling system <p>2.6 Identify the main constructional features of a boiler including furnace, gas paths and water paths.</p> <p>2.7 Identify the main boiler mountings and state their purpose to include steam and feed valves, boiler water level indicators, safety valves, blow-down valves and flame detector</p> <p>2.8 Explain why purging of the furnace must take place before firing a boiler.</p> <p>2.9 Explain why boiler water level must be maintained within the sight glass.</p>

Learning Outcomes	Assessment Criteria
The learner will:	The learner can:
	<p>2.10 Explain why boiler feed water must be treated to prevent scale formation and corrosion within the boiler.</p> <p>2.11 Identify the common symbols used on engine room pipeline diagrams including screw lift valves, non-return valves, pumps, quick closing valves, heaters, and coolers.</p> <p>2.12 Identify the main components and purpose of:</p> <ul style="list-style-type: none"> ◆ Sewage Systems ◆ Steering gear ◆ Fresh water production systems ◆ Bilge Systems ◆ Ballast Systems ◆ Fixed ER Fire-Fighting Systems

Additional information about the Unit
Unit purpose and aim(s)
<p>To enable persons to work safely in the engine rooms of typical merchant vessels at the support level.</p> <p>To introduce engine-room mechanical systems to new entrants to the marine industry.</p>
Details of the relationship between the Unit and relevant national occupational standards (if appropriate)
<p>MNTB/SFIA Marine NOS</p> <p>NOS A11 (part), A31 (part), C02 (part), C31 (part). The other parts of these standards will be met by shipboard training which will also consolidate the knowledge gained in this Unit.</p>
Details of the relationship between the Unit and other standards or curricula (if appropriate)
<p>MNTB/SFIA Underpinning Knowledge Library Documents</p>
Assessment requirements specified by a sector or regulatory body (if appropriate)
<p>Unit to be assessed in accordance with the Maritime Skills Alliance Assessment Strategy.</p>

Assessment (evidence) Requirements

The following evidence is required to demonstrate that learners have the appropriate level of knowledge to underpin proficiency for the Safe Operation of Merchant Vessel Machinery Systems.

All Learning Outcomes and Assessment Criteria must be achieved.

Written and/or recorded oral evidence produced either on or off-the-job is required for all of the Learning Outcomes (1 and 2).

Guidance on Instruments of Assessment

Performance evidence can be generated using an approved Maritime Skills Alliance (MSA) approved Training Record Book (TRB) and/or practical exercises.

Short answer written questions and/or oral interview could be used for the other Learning Outcomes and Assessment Criteria.

Assessment will be by a combination of the following methods — assignment, knowledge based testing, project work: presentation, practical demonstration, other, as agreed by the external verifier.