



Higher National Unit specification

General information for centres

Unit title: Marine Engineering: Propulsion

Unit code: F912 34

Unit purpose: The Unit is designed to develop studies in marine propulsion plant and examine its ancillary equipment. It will also permit the candidate to diagnose the operational problems associated with plant types and ensure its effective maintenance. This Unit is designed to provide the underpinning knowledge to enable candidates to acquire the standards of competency for officers in charge of an engineering watch under the STCW 95 Convention.

On completion of the Unit the candidate should be able to:

- 1 Explain marine propulsion plant and ancillary equipment.
- 2 Explain the operational procedures, operational problems and maintenance of marine propulsion plant.

Credit points and level: 1 HN credit(s) at SCQF level 7: (8 SCQF credit points at SCQF level 7*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

Recommended prior knowledge and skills: Candidates should have completed the NQ Unit Marine Engineering Practice: An Introduction at SCQF level 5. Candidates could also have had some relevant industrial experience within a marine environment.

Core Skills: There are opportunities to develop the Core Skills of Communication, Information and Communication Technology and Problem Solving in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Context for delivery: If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

Assessment: The assessment for Outcomes 1 could be a single question paper of 6 questions which will be answered under supervised closed-book conditions in one hour.

Outcome 2 can be a question paper of three questions to be answered under supervised closed-book conditions in 30 minutes. Alternatively the candidate can show competency by simulating the start-up/shut down procedures of a propulsion plant, to be followed by diagnosing a normal operating problem within 30 minutes and then produce a report of the maintenance procedures to be followed to resolve the problem.

Higher National Unit specification: statement of standards

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Assessment should be conducted under supervised and controlled conditions.

The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Explain marine propulsion plant and ancillary equipment.

Knowledge and/or Skills

- ◆ Types of marine propulsion plant
- ◆ Layout of marine propulsion plant
- ◆ Operating principles of marine propulsion plant
- ◆ Construction of marine propulsion plant
- ◆ Ancillary Systems
- ◆ Boiler feed water densities

Evidence Requirements

Candidates will need to provide evidence to demonstrate knowledge and/or skills for a type of marine propulsion plant (Marine Diesel Engines, Marine Boilers, Marine Steam Turbines, Marine Gas Turbines and Diesel-Electrical Drives).

Candidates should with reference to a type of propulsion plant:

- ◆ Draw the layout of one propulsion plant
- ◆ Explain the operating principles of one propulsion plant
- ◆ Explain with the aid of a sketch the construction of one propulsion plant
- ◆ Explain 2 ancillary systems from:
 - Lubricating oil systems
 - Cooling water systems
 - Starting and control systems
 - Fuel systems

Candidates should be asked on each assessment occasion to:

- ◆ Explain boiler feed water systems and densities for steam plant.

Evidence should be generated under controlled conditions.

Assessment Guidelines

Evidence could be assessed using an assessment instrument composed of six structured questions. This assessment may last for one hour.

Higher National Unit specification: statement of standards (cont)

Unit title: Marine Engineering: Propulsion

Outcome 2

Explain the operational procedures, operational problems and maintenance of marine propulsion plant.

Knowledge and/or Skills

- ◆ Types of marine propulsion plant
- ◆ Starting plant
- ◆ Stopping plant
- ◆ Fault recognition
- ◆ Maintenance procedures

Evidence Requirements

Candidates will need to provide evidence to demonstrate their knowledge and/or skills for a type of marine propulsion plant (Marine Diesel Engines, Marine Boilers, Marine Steam Turbines, Marine Gas Turbines and Diesel-Electrical Drives).

Candidates should for one type of marine propulsion plant:

- ◆ Explain the sequence of starting plant including freedom of movement, and control of fuel, temperature, and speed.
- ◆ Explain the sequence of stopping plant including slow cool down.
- ◆ Explain a fault associated with one type of marine plant.
- ◆ Explain 2 maintenance procedures associated with marine propulsion plant

Evidence should be generated under controlled conditions.

Assessment Guidelines

The assessment could be a single question paper consisting of three structured questions.

Alternatively, candidates can use a simulator to demonstrate their knowledge of the start up and shutdown procedures. The candidate could diagnose a fault and explain the maintenance procedure to resolve the problem. This report should be generated under the conditions outlined within the Evidence Requirements.

The assessment of this Outcome may last for one hour.

Administrative Information

Unit code: F912 34

Unit title: Marine Engineering: Propulsion

Superclass category: XQ

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History of changes:

Version	Description of change	Date

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Higher National Unit specification: support notes

Unit title: Marine Engineering: Propulsion

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

The content of this Unit is designed to give the candidate the knowledge of the various types of propulsion plant they may come across whilst at sea.

Outcome 1 examines the construction of the different types of propulsion plant and the principles of operation. Outcome 1 also looks at the various types of auxiliary machinery that are required for the operation of the propulsion plant. The layout of this machinery and its interconnection with the propulsion plant will be explained.

Outcome 2 examines the procedures employed in the starting and shutdown of the various types of propulsion plant. The candidates will also be tutored in the diagnosis of common operational faults and machinery failures and the procedures to be adopted in order to rectify the problem.

Guidance on the delivery and assessment of this Unit

Outcome 1 could consist of a single paper of six structured questions which will be assessed under closed-book supervised conditions of one hour duration. The questions will cover one type of propulsion plant and will cover the construction, operation and system layout of the plant.

The question paper for Outcome 2 could consist of three questions which will be assessed under closed-book supervised conditions of one hour duration. The questions must cover one type of propulsion plant and include procedures for start-up, shutdown and maintenance. Alternatively simulation can be used where the candidate demonstrates his/her ability to safely start and/or shutdown different types of propulsion plant. The candidate can be given a randomly chosen fault which they must diagnose within 30 minutes and write a report which could be under supervised conditions as to the procedures to be used in the rectification of the fault.

Opportunities for developing Core Skills

In completing the class work of Outcomes 1 and 2 candidates have the opportunity to develop the component 'Written Communication (reading)' of the Core Skill *Communication* at level 6. Candidates will have the opportunity to analyse and evaluate complex information from a variety of marine propulsion literature from manufacturers. The specific Core Skill element that the candidate may have to complete is 'Identify and summarise all significant information, ideas and supporting details in complex written communication'.

In completing Outcome 2 candidates have the opportunity to develop the components 'Accessing Information' of the Core Skill *Information Communication Technology* at level 6. Candidates will have the opportunity to simulate problems with marine propulsion units, identify key information, diagnose the problem(s) and develop and evaluate a strategy to solve them. The specific Core Skill elements that the candidate may have to complete are 'Carry out complex searches for information' and 'Evaluate reliability of information using given criteria'.

Higher National Unit specification: support notes (cont)

Unit title: Marine Engineering: Propulsion

In completing Outcome 2 candidates have the opportunity to develop the component ‘Reviewing and Evaluating’ of the Core Skill *Problem Solving* at level 6. Candidates will have the opportunity to solve problems with marine propulsion units, using simulation, diagnose them and develop a strategy to solve them. The specific Core Skills that the candidate may have to complete are ‘Evaluate the effectiveness of the strategy’ and ‘Identify and gather appropriate evidence’.

In completing the class work of Outcome 2 candidates have the opportunity to develop the component ‘Written Communication (writing)’ of the Core Skill *Communication* at level 6. Candidates will have the opportunity to solve problems with marine propulsion units, identify key information, diagnose the problem(s) and develop and evaluate a strategy to solve them. This information will be presented in a report. The specific Core Skill elements that the candidate may have to complete are ‘Present all essential ideas/information and supporting detail in a logical and effective order’, ‘Use a structure which takes account of purpose and audience and links major and minor points in ways which assist the clarity and impact of the writing’ and ‘Use spelling, punctuation and sentence structures which are consistently accurate’.

Open learning

This Unit could be delivered by distance learning. However it would require planning by the centre to ensure the sufficiency and authenticity of candidate evidence. Arrangements would have to be made to ensure that assessment for the Outcomes are under controlled conditions

Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website

www.sqa.org.uk/assessmentarrangements

General information for candidates

Unit title: Marine Engineering: Propulsion

On completion of this Unit you will have acquired knowledge of the different types of propulsion plant and their systems to be found on ships at sea.

You will have appreciation of the myriad of different arrangements of the systems that are required to support propulsion plant. You will learn the main features of these systems.

You will gain knowledge of the typical procedures required to start the different types of propulsion plant and also how to shut them down. You will study the different common operational faults and mechanical failures that can occur with the different types of plant, and how to rectify them.

Outcome 1 could consist of a single assessment consisting of six questions covering the construction, operation and systems pertaining to the different types of plant. The assessment may be of one hour duration and will be sat under supervised closed-book conditions.

Outcome 2 can be assessed by a paper consisting of three questions covering the starting, shutdown and maintenance procedures of the different types of propulsion plant. The assessment could be of one hour duration under supervised closed-book conditions. Alternatively you may demonstrate your ability to start and shutdown a propulsion plant safely by simulation, as well as identify an operational problem caused by a common fault or mechanical failure within 30 minutes and detail the procedures that would be employed to rectify the problem.

There are two Outcomes of study in this Unit:

- 1 Explain marine propulsion plant and ancillary equipment.
- 2 Explain the operational procedures, operational problems and maintenance of marine propulsion plant.