



## Higher National unit specification

### General information

**Unit title:** Marine Engineering: Propulsion (SCQF level 7)

**Unit code:** HJ46 34

**Superclass:** XS

**Publication date:** March 2017

**Source:** Scottish Qualifications Authority

**Version:** 01

### Unit purpose

The unit is designed to develop studies in marine propulsion plant and examine its ancillary equipment. It will also permit the learner 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 learners to acquire the standards of competency for officers in charge of an engineering watch under the Standards of training, certification and current watchkeeping for seafarers (STCW) as amended 2010.

### Outcomes

On successful completion of the unit the learner will be able to:

- 1 Explain the layout, Construction and operation marine propulsion plant and ancillary systems as found on Modern Merchant Ships.
- 2 Explain the operational procedures, operational problems and maintenance of marine propulsion plant.as found on Modern Merchant Ships.

### Credit points and level

1 Higher National unit credit at SCQF level 7: (8 SCQF credit points at SCQF level 7)

### Recommended entry to the unit

Entry to the unit is at the discretion of the centre. Learners should have completed the NQ unit *Marine Engineering Practice: An Introduction* F9K6-12 at SCQF level 5. However learners could also have had some relevant industrial experience within a marine environment.

## Higher National unit specification: General information (cont)

**Unit title:** Marine Engineering: Propulsion (SCQF level 7)

### Core Skills

There are opportunities to develop the Core Skills of *Communication, Information and Communication Technology (ICT)* 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.

The Assessment Support Pack (ASP) for this unit provides assessment and marking guidelines that exemplify the national standard for achievement. It is a valid, reliable and practicable assessment. Centres wishing to develop their own assessments should refer to the ASP to ensure a comparable standard. A list of existing ASPs is available to download from SQA's website (<http://www.sqa.org.uk/sqa/46233.2769.html>).

### Equality and inclusion

This unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website [www.sqa.org.uk/assessmentarrangements](http://www.sqa.org.uk/assessmentarrangements).

## Higher National unit specification: Statement of standards

**Unit title:** Marine Engineering: Propulsion (SCQF level 7)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

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. Learners 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 the layout, Construction and operation marine propulsion plant and ancillary systems as found on Modern Merchant Ships.

#### 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
- ◆ Systems that marine propulsion plant require in order to operate

### Outcome 2

Explain the operational procedures, operational problems and maintenance of marine propulsion plant.as found on Modern Merchant Ships.

#### Knowledge and/or Skills

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

#### Evidence Requirements for this unit

Written and/or oral evidence for Outcomes 1 and 2 could be combined to one assessment which will be assessed under closed-book supervised conditions and should be two hours duration.

Outcomes 1 and 2 could also be assessed separately each consisting of a single assessment, each lasting one hour which will be assessed under closed-book supervised conditions.

## Higher National unit specification: Statement of standards (cont)

**Unit title:** Marine Engineering: Propulsion (SCQF level 7)

### Outcome 1

Learners will need to provide evidence to demonstrate Knowledge and/or Skills for one type of marine propulsion plant.

- 1 Marine Diesel Engines; low speed and medium speed
- 2 Marine Steam Propulsion Plant
- 3 Diesel-Electrical Drives

Learners will need to provide evidence to demonstrate Knowledge and/or Skills for one type of marine propulsion plant from the above list. A different type of marine propulsion plant should be assessed if a re assessment is used.

Learners 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 a major item in one propulsion plant
- ◆ Explain two systems required from:
  - Lubricating oil systems
  - Cooling water systems
  - Starting and control systems
  - Fuel systems

### Outcome 2

Learners will need to provide evidence to demonstrate Knowledge and/or Skills for one type of marine propulsion plant. A different type of marine propulsion plant should be assessed if a re assessment is used.

- 1 Marine Diesel Engines; low speed and medium speed
- 2 Marine Steam Propulsion Plant
- 3 Diesel-Electrical Drives

Learners should with reference to one type of propulsion plant from the above list:

- ◆ Explain the sequence of starting the plant including time to bring the plant to operating temperature, 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 two maintenance procedures associated with marine propulsion plant.



## **Higher National unit Support Notes**

**Unit title:** Marine Engineering: Propulsion (SCQF level 7)

Unit Support Notes are offered as guidance and 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 learner 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 systems 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 learners 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 approaches to delivery of this unit**

This unit should be delivered by a combination of whole class teaching and visits to college workshops where appropriate. Simulators can also be used to help reinforce knowledge gained in the classroom. Formative assessment and exercises in a simulator can also be used to help learners practise what they have learnt.

### **Guidance on approaches to assessment of this unit**

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

Written and/or oral evidence for Outcomes 1 and 2 could be combined to one assessment which will be assessed under closed-book supervised conditions and should be two hours duration

## Higher National unit Support Notes (cont)

### Unit title: Marine Engineering: Propulsion (SCQF level 7)

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 learner demonstrates his/her ability to safely start and/or shutdown different types of propulsion plant. The learner should 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.

When practical evidence is used it should be recorded on a check list.

Assessment should be conducted under supervised and controlled conditions.

### Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at [www.sqa.org.uk/e-assessment](http://www.sqa.org.uk/e-assessment).

### Opportunities for developing Core and other essential skills

In completing the class work of Outcomes 1 and 2 learners have the opportunity to develop the component 'Written Communication (Reading)' of the Core Skill *Communication* at level 6. Learners 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 learner may have to complete is 'Identify and summarise all significant information, ideas and supporting details in complex written communication'.

In completing Outcome 2 learners have the opportunity to develop the components 'Accessing Information' of the Core Skill *Information Communication Technology* at level 6. Learners 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 learner may have to complete are 'Carry out complex searches for information' and 'Evaluate reliability of information using given criteria'.

## Higher National unit Support Notes (cont)

**Unit title:** Marine Engineering: Propulsion (SCQF level 7)

In completing Outcome 2 learners have the opportunity to develop the component 'Reviewing and Evaluating' of the Core Skill *Problem Solving* at level 6. Learners will have the opportunity to solve problems with marine propulsion systems, using simulation, diagnose them and develop a strategy to solve them. The specific Core Skills that the learner 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 learners have the opportunity to develop the component 'Written Communication (Writing)' of the Core Skill *Communication* at level 6. Learners will have the opportunity to solve problems with marine propulsion systems, 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 learner 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'.

## History of changes to unit

| Version | Description of change | Date |
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## General information for learners

### Unit title: Marine Engineering: Propulsion (SCQF level 7)

This section will help you decide whether this is the unit for you by explaining what the unit is about, what you should know or be able to do before you start, what you will need to do during the unit and opportunities for further learning and employment.

On completion of this unit you will have acquired knowledge of the most common 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.

Written and/or oral evidence for Outcomes 1 and 2 could be combined to one assessment which will be assessed under closed-book supervised conditions and should be two hours duration

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 the layout, Construction and operation marine propulsion plant and ancillary systems as found on Modern Merchant Ships.
- 2 Explain the operational procedures, operational problems and maintenance of marine propulsion plant.as found on Modern Merchant Ships.