Higher National Unit specification

General information for centres

Unit title: Marine Engineering: Ship Construction

Unit code: F913 34

Unit purpose: This Unit is designed to enable candidates to develop a knowledge and understanding of ship construction.

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

1 Explain the construction of a ship.
2 Explain ship construction techniques.

Credit points and level: 1 HN credit 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 good communication skills. This may be demonstrated by the achievement of an SQA Communication unit at SCQF level 6 or possession of a NC Engineering group award at SCQF level 6.

Core Skills: There are opportunities to develop the Core Skill of *Communication* at SCQF level 6 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 is should be taught and assessed within the subject area of the Group Award to which it contributes.

Assessment: Assessment should be carried out in supervised conditions. Each outcome could be assessed separately in a paper which lasts no more than one hour.

Higher National Unit specification: statement of standards

Unit title: Marine Engineering: Ship Construction

Unit code: F913 34

Outcome 1

Explain the construction of a ship.

Knowledge and/or Skills

- General ship's terms.
- Midship sections of ship types.
- Framing systems.
- Constructional details.
- Rudder types and construction.
- Anchor and cable arrangement.

Evidence Requirements

Evidence for the knowledge and/or skills items in Outcome 1 should be provided on a sample basis. Each candidate will need to demonstrate that they can answer correctly questions based on a sample of the knowledge and skills items. In any assessment of this Outcome, **four out of six** knowledge and/or skills items should be sampled.

In order to ensure that candidates will not be able to foresee what items they will be questioned on, a different sample of four out of six knowledge and/or skills items are required each time the Unit is assessed. Candidates must provide a satisfactory response to all items.

Where sampling takes place, a candidate's response can be judged to be satisfactory where evidence provided is sufficient to meet the requirements for each item by showing that the candidate is able to:

- Identify and explain eight of the following general ship's terms including Forward Perpendicular, aft Perpendicular, Length between Perpendiculars, Length Overall, Midships, Sections, moulded and extreme breadth, depth and draught, Shear, Camber, Flare, rise of floor, bilge radius, parallel middle body, Deadweight, Lightweight, Displacement, Freeboard and Load Line marks.
- Identify, explain and sketch the midship section of one the following ship types:
  — Container Ship
  — Bulk Carrier
  — General Cargo
  — Crude Oil Tanker
  — LNG and LPG vessels
- Identify and explain Longitudinal, Transverse and Combined framing systems and the appropriate vessel types associated with each.
- Explain and sketch main constructional details of the shell, double bottoms, decks, hatches watertight bulkheads, watertight doors, fore-end structure and aft-end structure.
- Identify, explain and sketch different rudder types including balanced, semi-balanced and fully-balanced.
- Explain and sketch parts of the anchor and cable arrangement.

Evidence should be generated through a closed book assessment of one hour duration in supervised conditions.

Assessment Guidelines

Outcome 1 could comprise of four questions using restricted response questions.

Outcome 2

Explain ship construction techniques.

Knowledge and/or Skills

- Ship stresses
- Materials
- Sections
- Methods of welding
- Methods of cutting
- Fabrication methods
- Drainage and ventilation

Evidence Requirements

Evidence for the knowledge and/or skills items in Outcome 2 will be provided on a sample basis. Each candidate will need to demonstrate that they can correctly answer questions based on a sample of the knowledge and skills items listed. In any assessment of this Outcome, **four out of seven** knowledge and/or skills items should be sampled.

In order to ensure that candidates will not be able to foresee what items they will be questioned on, a different sample of four from seven knowledge and/or skills items are required each time the Unit is assessed. Candidates must provide a satisfactory response to all items.

Where sampling takes place, a candidate's response can be judged to be satisfactory where evidence provided is sufficient to meet the requirements for each item by showing that the candidate is able to:

- Identify and explain ship's stresses afloat and in dry-dock including longitudinal sheer force and bending moments, racking, water pressure and panting and pounding.
- Identify and explain two different materials used in Hull Construction including Mild Steel (grades A, B, D and E), Steels with improved characteristics for tensile strength, low temperature properties and corrosion, Aluminium Alloys and Composite Materials.
- Identify and sketch two different Rolled Steel Sections including Offset Bulb Bar, Angle Bar, Rectangular Hollow Section and Flat Bar.
- Explain and sketch three different welding processes including Manual Metal Arc, MIG/MAG, Submerged Arc and TIG welding.
- Explain and sketch different cutting processes including Oxy-Fuel and Plasma.
- Describe the fabrication methods used in Shipbuilding from the arrival of the steel plates and sections, through the cutting and forming processes, through the Sub-assembly, Unit-assembly, Block-assembly stages and to the final berth erection stage.
- Identify, explain and sketch different methods of drainage off decks and in spaces and ventilation of tanks including Automatic Float Valves and High Velocity Vent Valves.

Higher National Unit specification: statement of standards (cont)

Unit title: Marine Engineering: Ship Construction

Evidence should be generated through a closed book assessment of one hour duration in supervised conditions.

Assessment Guidelines

Outcome 2 could comprise of four questions using restricted response questions.

Administrative Information

Unit code: F913 34

Unit title: Marine Engineering: Ship Construction

Superclass category: XQ

Original date of publication: August 2010

Version: 01

History of changes:

Version	Description of change	Date

Source: SQA

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of Higher National qualifications.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. Please contact the Customer Contact Centre for further details, telephone 0845 279 1000.

Higher National Unit specification: support notes

Unit title: Marine Engineering: Ship Construction

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

This Unit has been written in order to allow candidates to develop knowledge, understanding and skills in the following areas:

1 Explain the Construction of a Ship.
2 Explain Ship Construction techniques.

In designing this Unit the Unit writers have identified the range of topics they would expect to be covered by lecturers. Recommendations are also given as to how much time should be spent on each Outcome. This has been done to help lecturers to decide what depth of treatment should be given to the topics attached to each of the Outcomes. Whilst it is not mandatory for a centre to use this list of topics it is strongly recommended that it does so to ensure continuity of teaching and learning across the Ship Construction Unit, the list of topics is given below. Lecturers are advised to study this list of topics in conjunction with the knowledge/skills section of this document so that they can get a clear indication of the standard of achievement expected of candidates in this Unit.

1 Ship construction. (20hrs)

- Understand general ship terminology.
- Identify, discuss and sketch ship design features.
- Distinguish between and draw different framing systems.
- Understand functions and constructional details of ships' structural components.
- Distinguish between rudder types and their construction.
- Understand the arrangement and operational method of anchor equipment.

2 Construction techniques. (20hrs)

- Identify cause and effect of shipboard stresses.
- Identify and explain materials used in ship hull construction.
- Identify and sketch rolled steel sections used in ship construction.
- Identify welding processes used in ship construction.
- Identify metal cutting processes used in ship construction.
- Understand fabrication methods used in ship construction.
- Understand reasons for ventilation and drainage of shipboard compartments.

Higher National Unit specification: support notes (cont)

Unit title: Marine Engineering: Ship Construction

Guidance on the delivery and assessment of this Unit

This unit could be delivered by a combination of class teaching, tutorial work and practical laboratory work where appropriate. The latter is seen as particularly important as it provides candidates with an opportunity to relate theoretical knowledge to a practical context. The unit has been designed to incorporate sufficient time to allow lecturers to teach the entire core Ship Construction principles.

Where this unit is incorporated into other group awards it is recommended that it be delivered in the context of the specific occupational area(s) that the award is designed to cover.

The unit has been written, in such a way, that there is sufficient time built in to allow candidates to practise what they have learnt through appropriate formative assessments.

Details on the approaches to assessment are given under Evidence Requirements and Assessment Guidelines of the Higher National Unit specification: statement of standards section. It is recommended that this section is read carefully before proceeding with assessment of candidates.

Opportunities for developing Core Skills

When candidates are completing this Unit there are opportunities through delivery and assessment to develop the component "Written Communication" of the core skill Communication at SCQF level 6. Candidates may complete well structured written communication on Ship Construction and may have the opportunity to complete the specific core skill elements "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 writing" and "Use spelling, punctuation, and sentence structures which are consistently accurate".

When candidates are completing the Outcomes there are opportunities to reinforce theories through laboratory work. Candidates may have the opportunity to develop the component "Written Communication (Reading)" of the core skill Communication at SCQF level 6. Candidates may complete a complex task in the laboratory and may have the opportunity to research technical articles using ICT. This work may allow candidates to develop the specific core skill element "Evaluate fully the effectiveness of a communication in meeting its purpose and the needs of its intended readership"

Candidates will be encouraged to engage in independent research during their study of this Unit. This may allow them to develop the components "Accessing Information" and "Providing/Creating Information" of the core skill Information and Communication Technology. This independent work may allow candidates to develop the specific skill elements "Use a range of ICT equipment, observing security procedures", "Evaluate information" and "Use a range of ICT equipment, observing security procedure and needs of other users".

Higher National Unit specification: support notes (cont)

Unit title: Marine Engineering: Ship Construction

Open learning

This unit is suitable for open learning; however assessment will need to take place by arrangement at an assessment centre under supervised 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: Ship Construction

This Unit has been designed to allow you to develop knowledge, skills and understanding in Ship Construction principles and concepts as used in Marine Engineering.

This Unit will also allow you the opportunity to develop the necessary knowledge and skills to explain Ship Construction as used in marine applications.

The formal assessment for this Unit could consist of two assessment papers lasting no more than one hour per paper. The assessment will be conducted under closed-book conditions in which you will not be allowed to take notes, textbooks etc into the assessment.

During your study of this Unit you will:

1 Explain the Construction of a Ship.
2 Explain Ship Construction techniques.