



## Higher National Unit Specification

### General information

**Unit title:** Marine Vessels: Structures and Maintenance  
(SCQF level 8)

**Unit code:** HR1W 35

**Superclass:** XQ

**Publication date:** September 2017

**Source:** Scottish Qualifications Authority

**Version:** 2

### Unit purpose

This unit introduces learners to the legislative requirements regarding the construction of vessels, including the structural requirements for vessels with respect to the handling and carriage of cargo. It covers the ship construction features and systems that may be used to limit damage as well as the properties, construction and maintenance of materials. It also covers the methods of maintaining ship's equipment/fittings and preparing for statutory surveys. It is primarily aimed at learners who intend to seek sea-going employment as a Merchant Navy Deck Officer. However, it could also be studied by someone with an interest in the subject area.

### Outcomes

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

- 1 Analyse the structural requirements and features of a vessel.
- 2 Analyse maintenance requirements, methods and procedures.
- 3 Explain how to prepare for dry dock and for the survey of hull, fittings and equipment.

### Credit points and level

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

## Higher National Unit Specification: General information (cont)

**Unit title:** Marine Vessels: Structures and Maintenance  
(SCQF level 8)

### Recommended entry to the unit

Access to this unit is at the discretion of the centre. However, it would be beneficial if learners had achieved either a UK MCA 'Officer of the Watch' Certificate or equivalent, or the HNC Nautical Science, or the HN Unit *Naval Architecture: Ship Construction*.

### Core Skills

Achievement of this Unit gives automatic certification of the following Core Skills component:

Complete Core Skill	None
Core Skill component	Critical Thinking at SCQF level 6

There are also opportunities to develop aspects of Core Skills which are highlighted in the support notes of this unit specification.

### 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.

### 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 Vessels: Structures and Maintenance  
(SCQF level 8)

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

Analyse the structural requirements and features of a vessel.

#### Knowledge and/or skills

- ◆ Structural requirements for vessels with respect to:
  - (a) Assignment of loadlines
  - (b) Requirements and codes for the construction of specialised vessels
- ◆ Ship construction features and systems that may be used to limit damage
- ◆ Fire protection, fire detection and fire extinction on ships

### Outcome 2

Analyse maintenance requirements, methods and procedures.

#### Knowledge and/or skills

- ◆ Properties of materials
- ◆ Steelwork processes
- ◆ Corrosion and material failure
- ◆ Planned maintenance systems
- ◆ Safe use of maintenance equipment and material

### Outcome 3

Explain how to prepare for dry dock and for the survey of hull, fittings and equipment.

#### Knowledge and/or skills

- ◆ Ships plans
- ◆ Ship dry-docking requirements
- ◆ Survey requirements

## Higher National Unit Specification: Statement of standards (cont)

**Unit title:** Marine Vessels: Structures and Maintenance  
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### Evidence requirements for this unit

Learners will need to provide written and/or oral recorded evidence in supervised open-book conditions using centre provided, MCA approved data sheets or course work. Outcomes 1, 2 and 3 may be combined as a single assessment and should not exceed two hours.

#### Outcome 1

For Outcome 1 a minimum of two out of four knowledge and skills should be sampled. A different sample should be used on each assessment occasion.

Learners are required to provide written and/or oral evidence to demonstrate their knowledge and/or skills by showing that they can:

- ◆ Analyse and explain the factors affecting the assignment of a loadline to any vessel. This can be achieved by sampling two from the following:
  - (a) Conditions of assignment:
    - (i) definitions
    - (ii) principles
    - (iii) requirements
    - (iv) freeboard calculation process
- ◆ Analyse the structural requirements and interpret codes for the construction of specialised vessels as contained in the following:
  - (b) (i) International Code for the Construction and Equipment of ships carrying Dangerous Chemicals in Bulk.
  - (ii) International Code for the Construction and Equipment of ships carrying Liquefied Gases in Bulk.

For each of the above codes one of the following must be sampled:

- (i) definitions with regard to structural features of the type of vessel or
- (ii) the damage assumptions which they must be capable of surviving

A different sample must be used for each code.

- ◆ Identify and explain the construction features and systems used to limit damage to ships
- ◆ Analyse and explain legislation with regard to structural fire protection on board ships

#### Outcome 2

For Outcome 2 a minimum of two out of five knowledge and skills should be sampled. A different sample should be used on each assessment occasion.

## Higher National Unit Specification: Statement of standards (cont)

### Unit title: Marine Vessels: Structures and Maintenance (SCQF level 8)

Learners are required to provide written and/or oral recorded evidence to demonstrate their knowledge and/or skills by showing that they can:

- ◆ Analyse the properties of materials used in ship construction

This can be achieved by sampling three of the following:

Ship building materials:	stresses
	strains
	properties
	advantages and disadvantages
	production processes

- ◆ Analyse the steelwork processes used in ship construction

This can be achieved by sampling one from the following:

Processes:	principle of welding
	preparation for welding
	faults associated with welding

- ◆ Analyse the causes of corrosion and material failure

This can be achieved by sampling one from the following:

- (i) Non-destructive testing
- (ii) Causes of corrosion
- (iii) Prevention of corrosion
- (iv) Material failure due to creep
- (v) Material failure due to fatigue

- ◆ Explain the use of planned maintenance systems

This can be achieved by sampling one of the following:

Planned maintenance	(i)	rationale
	(ii)	preventative
	(iii)	predictive

- ◆ Safe use of maintenance equipment and materials

This can be achieved by sampling one from the following:

- (i) Preparations for painting
- (ii) Composition and properties of paints
- (iii) Paint systems and schedules
- (iv) Control of substances hazardous to health regulations

## Higher National Unit Specification: Statement of standards (cont)

**Unit title:** Marine Vessels: Structures and Maintenance  
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### Outcome 3

For Outcome 3 two out of three knowledge and skills should be sampled. A different sample should be used on each assessment occasion.

Learners are required to provide written and/or oral recorded evidence to demonstrate their knowledge and/or skills by showing that they can:

- ◆ Identify and describe ships' plans from a sample of one from the following:
  - (i) Shell expansion plan
  - (ii) General arrangement plan
  - (iii) Fire arrangement plan
  - (iv) Capacity plan
  - (v) Rigging plan
  - (vi) Piping arrangement plan
  - (vii) Plug plan
  - (viii) Dry dock plan
  
- ◆ Outline the procedures involved in dry-docking a vessel for a sample of one from the following:
  - (i) Reasons
  - (ii) Documentation
  - (iii) Specification
  - (iv) Preparation
  - (v) Required facilities
  - (vi) Shipboard management
  
- ◆ Analyse the preparations required for surveys of hull and fittings for in and out of water surveys for a sample of one from the following surveys:
  - (i) Loadline
  - (ii) Hull and machinery
  - (iii) Lifting appliances
  - (iv) Safety construction
  - (v) Safety equipment



## Higher National Unit support notes

**Unit title:** Marine Vessels: Structures and Maintenance  
(SCQF level 8)

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 forms part of the underpinning knowledge for a UK MCA Chief Mate Certificate of Competency and accordingly reflects the content of International Maritime Organisation's Standards of Training Certification and Watchkeeping (STCW).

The knowledge and skills contained within the unit cover all the requirements as laid down by Standards for Training and Certification of Watchkeepers (STCW 95) at Management level aboard ship.

The following notes give additional information on the knowledge and skills for each of the three outcomes.

#### Outcome 1

Learners will understand the considerations and requirements of the ship's assigned freeboard and the procedure for calculating the assigned freeboard.

The learner will also understand the structural considerations and factors that are incorporated into the ship to withstand and limit damage.

#### Outcome 2

Learners will understand the properties of materials and the processes used in shipbuilding. They will be able to ensure the correct and safe methods of maintaining the ship's structure are applied. The learner will appreciate the importance of an effective planned maintenance system on board the ship to maintain the ship's structure and to comply with legislation pertaining to the ship's structure.

#### Outcome 3

The learner will understand the use and contents of ships' plans and their function pertaining to readiness for drydocking. The learner will understand other considerations regarding the preparation for a drydocking and the considerations whilst in drydock.

The learner will also consider the preparations regarding required surveys on board ship.

## Higher National Unit support notes (cont)

**Unit title:** Marine Vessels: Structures and Maintenance  
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### Guidance on approaches to delivery of this unit

Learners will benefit most if this unit is delivered in conjunction with the HN units *Ship Stability: Theory and Practical Application* and *Management of Vessel Operations*. They should also be able to draw on the knowledge gained from the qualifications or units recommended as prior knowledge as well as experience gained from service at sea.

### 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.

All outcomes will be assessed by means of an open-book assessment not exceeding two hours under supervised conditions.

Assessment will be on a sample basis with Outcomes 1 to 3 being assessed by means of a mixture of structured and short answer questions in an open-book assessment under supervised conditions or course work. Course work should not exceed two thousand words.

### 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

This unit has the Critical Thinking component of Problem Solving embedded in it. This means that when learners achieve the unit, their Core Skills profile will also be updated to show they have achieved Critical Thinking at SCQF level 6.

This unit also provides the learner with opportunities to develop Core Skills in Oral and Written communication.



## History of changes to unit

Version	Description of change	Date
2	Core Skill component Critical Thinking at SCQF level 6 embedded.	19/09/17

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## General information for learners

### Unit title: Marine Vessels: Structures and Maintenance (SCQF level 8)

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.

This unit is about the structural requirements for vessels with respect to the handling and carriage of cargo. It covers the ship construction features and systems that may be used to limit damage and the properties, construction and maintenance of materials. It also covers the methods of maintaining ship's equipment/fittings and preparing for statutory surveys.

On completion of this unit you should be able to:

- 1 Analyse the structural requirements and features of a vessel.
- 2 Analyse maintenance requirements, methods and procedures.
- 3 Explain how to prepare for dry dock and for the survey of hull, fittings and equipment.

This unit has the Critical Thinking component of Problem Solving embedded in it. This means that when you achieve the unit, your Core Skills profile will also be updated to show you have achieved Critical Thinking at SCQF level 6.

There are also opportunities to develop the Core Skill of *Communication* and *Numeracy* using verbal, non-verbal communications and numbers at SCQF level 6. This can be achieved by demonstrating your ability to create sensible arguments and conclusions using non-verbal communication skills and understand numerical calculations involving assignment of freeboard. Learners will require a good knowledge of English language.

You will develop the elements from the Core Skill *Communication* by actively participating in classroom discussions.

Assessment will be on a sample basis with Outcomes 1 to 3 being assessed by means of written questions or course work under open-book supervised conditions. Outcomes 1–3 may be combined for assessment purposes which should last no longer than two hours.