



Higher National Unit specification

General information

Unit title: Marine Engineering: Ship Construction and Survey
(SCQF level 8)

Unit code: HJ4G 35

Superclass: XQ

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Unit purpose

This Unit is designed to enable learners to further develop their knowledge and understanding of Ship Construction. The Unit will allow learners to apply the knowledge and understanding of Ship Construction within the field of Marine Engineering. It is targeted at Merchant Navy Engineer Officer Cadet trainees and those who wish to achieve STCW Engineer certification at Management level.

Outcomes

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

- 1 Analyse flood protection and seaworthiness for different vessel types.
- 2 Analyse ship's structure with reference to fire protection, vibration and noise for different Merchant Navy vessels.
- 3 Evaluate load line and dry-docking surveys for Merchant Navy vessels.

Credit points and level

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

Recommended entry to the Unit

Entry is at the discretion of the centre however, it is recommended that learners will have completed the Unit *Marine Engineering: Stability and Structure for Merchant Ships* before commencing this Unit.

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Core Skills

There are opportunities to develop the Core Skills of *Communication*, *Problem Solving* and *Working with Others* 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 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.

Higher National Unit specification: Statement of standards

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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 flood protection and seaworthiness for different vessel types.

Knowledge and/or Skills

- ◆ Freeboards for different vessel types
- ◆ Subdivisions and damage stability elements for different vessel types
- ◆ Structural watertight components and the open deck drainage arrangements for different vessel types
- ◆ Testing for water tightness of doors, hatches and bulkheads
- ◆ Drainage system for different ship's spaces and vessels:
- ◆ Methods of roll stabilisation

Outcome 2

Analyse ship's structure with reference to fire protection, vibration and noise for different Merchant Navy vessels.

Knowledge and/or Skills

- ◆ Structural fire protection arrangements
- ◆ Construction requirements of fire class bulkheads
- ◆ Sources of vibration within a vessel
- ◆ Effects of vibration
- ◆ Methods of vibration reduction
- ◆ Source of noise and its transmission throughout a vessel
- ◆ Reduction of noise transmission

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Outcome 3

Evaluate load line and dry-docking surveys for Merchant Navy vessels.

Knowledge and/or Skills

- ◆ Assignment of freeboard (load line survey)
- ◆ Factors required to maintain conditions of assignment
- ◆ Information required for tonnage measurement and the tonnage certificate
- ◆ Load line survey and analyse and compare dry-docking surveys
- ◆ The procedure for survey by a Classification Society and Dry-docking

Evidence Requirements for this Unit

Assessment should be carried out in supervised conditions. Each Outcome may be assessed separately or as one single paper lasting no more than 2 hours. Assessment should be conducted under closed-book conditions and as such learners should not be allowed to bring any textbooks, handouts or notes to the assessment. Learners will be permitted to use scientific calculators during the assessment.

Outcome 1

Written and or/oral evidence for the Knowledge and/or Skills items in Outcome 1 should be provided on a sample basis. In any assessment of this Outcome, three out of eight. Knowledge and/or Skills items should be sampled.

In order to ensure that learners will not be able to foresee what items they will be assessed on, a different sample of three out of six Knowledge and/or Skills items are required each time the Unit is assessed.

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

- ◆ compare freeboards for different vessel types.
- ◆ describe subdivisions and damage stability elements for different vessel types.
- ◆ explain the structural watertight components and the open deck drainage arrangements for different vessel types.
- ◆ describe testing for water tightness of doors, hatches and bulkheads.
- ◆ explain drainage system for different ship's spaces (accommodation, tween decks, chain locker, fore peak, holds, insulated spaces) and vessels:
 - explain drainage system for ro-ro vehicle deck
 - explain drainage system for tanker deck
- ◆ compare methods of roll stabilisation: bilge keels, tank stabilisers, fin stabilisers, wash bulkheads, subdivisions.

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Outcome 2

Written and/or oral evidence for the Knowledge and/or Skills items in Outcome 2 should be provided on a sample basis. In any assessment of this Outcome, **four out of seven** Knowledge and/or Skills items should be sampled.

In order to ensure that learners will not be able to foresee what items they will be assessed on, a different sample of four out of seven Knowledge and/or Skills items are required each time the Unit is assessed.

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

- ◆ describe fire division classification by reference to their fire resistance and the structural arrangements for fire protection in passenger ships, dry cargo ships and oil tankers.
- ◆ explain construction requirements of fire class bulkheads and outline the requirements for openings in A-class divisions and the protection of stairways, lift shafts and ventilation trunks.
- ◆ identify and discuss possible causes of vibration, correctly using the terms frequency, amplitude, resonance, mode, node and anti-node:
 - Action of the sea
 - Out of balance forces in machinery
 - Force on the propeller
 - Propeller-hull interaction
 - Deck machinery
- ◆ discuss how vibration can cause structural failure, failure of equipment and crew/passenger discomfort, making reference to a vessel's natural frequency.
- ◆ describe methods of vibration reduction regarding stern design, propeller design, machinery seating and ships load condition.
- ◆ explain the source of noise and its transmission throughout a vessel.
- ◆ appraise methods of noise reduction by structural and machinery arrangement.

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Outcome 3

Written and/or evidence for the Knowledge and/or Skills items in Outcome 3 should be provided on a sample basis. In any assessment of this Outcome, **two out of four** Knowledge and/or Skills items should be sampled.

In order to ensure that learners will not be able to foresee what items they will be assessed on, a different sample of two out of four Knowledge and/or Skills items are required each time the Unit is assessed. Learners must provide a satisfactory response to all Outcomes.

Assessment should be conducted under closed-book conditions and as such learners should not be allowed to bring any textbooks, handouts or notes to the assessment. Learners will be permitted to use scientific calculators during the assessment.

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

- ◆ Explain the criteria used for assignment of freeboard:
 - adequate ship strength
 - adequate reserve buoyancy
 - prevention of entry of water into hull
 - safe height of working platform and protection of crew
 - deck wetness in relation to bow height
 - stability and compartmentation
- ◆ Evaluate the main factors required to maintain conditions of assignment:
 - hatchways
 - machinery space openings
 - openings in freeboard and superstructure decks
 - vents, air pipes, cargo doors and other openings in hull below the freeboard deck
 - side scuttles, freeing ports
 - guard rails, gangways
- ◆ Compile the information required for tonnage measurement. Explain the function of the tonnage certificate.
- ◆ Describe and compare dry-docking surveys by a Classification Society. Research statutory certification of ships requirements for different class vessels and summarize assignment of class. Describe and compare regulations for assignment, maintenance, suspension and withdrawal of class for different vessels.



Higher National Unit Support Notes

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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

This Unit is primarily aimed at learners who intend to seek sea going employment as a Merchant Navy Engineering Officer and the Unit will meet the Merchant and Coastguard Agency (MCA) requirements up to Class 1 Certificate of Competency.

This Unit has been written in order to allow learners to develop knowledge and understanding of the construction of ships in the following areas:

- 1 Analyse flood protection and seaworthiness for different vessel types.
- 2 Analyse ship's structure with reference to fire protection, vibration and noise for different Merchant Navy vessels.
- 3 Evaluate load line and dry-docking surveys for Merchant Navy vessels.

In designing this Unit, the Unit writer has identified the range of topics expected to be covered by lecturers. In delivering the Unit material used should relate to real life examples, using marine terminology, as found aboard modern ships. As new technology is incorporated in ships the Unit delivery should be updated to reflect modern design and usage.

Guidance on approaches to delivery of this Unit

This Unit should be delivered by a combination of whole class teaching, tutorial work and practical examples where possible such as ship visits. The latter is seen as particularly important as it provides learners with an opportunity to relate theoretical knowledge to a practical context.

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 such that there is sufficient time built in to allow learners to practise what they have learnt through appropriate formative assessments.

Higher National Unit Support Notes (cont)

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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.

Assessment should be carried out in supervised conditions. Each Outcome may be assessed separately or as one single paper lasting no more than 2 hours.

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.

Assessment should be conducted under closed-book conditions and as such learners should not be allowed to bring any textbooks, handouts or notes to the assessment. Learners will be permitted to use scientific calculators during the assessment.

If a learner requires to be re-assessed, a different selection of questions must be used from all sections. A significant proportion of the questions used in the re-assessment must be different from those used in the original test.

Assessment Guidelines

Outcome 1

The assessment of this Outcome could be combined together with that for Outcomes 2 and 3 to form a single assessment paper, details of which are given under the Evidence Requirements for Outcome 3.

Outcome 2

The assessment of this Outcome could be combined together with that for Outcomes 1 and 3 to form a single assessment paper, details of which are given under the Evidence Requirements for Outcome 3.

Higher National Unit Support Notes (cont)

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Outcome 3

The assessment of this Outcome could be combined together with that for Outcomes 1 and 2 to form a single assessment paper.

Questions used to elicit learner evidence should take the form of an appropriate balance of short answer, restricted response and structured questions. Assessment should be conducted under closed-book conditions and as such learners should not be allowed to bring any textbooks, handouts or notes to the assessment. Learners will be permitted to use scientific calculators during the assessment.

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.

Opportunities for developing Core and other essential skills

The presentation of problems in assessments which learners require to interpret and work through will develop the Critical Thinking component of *Problem Solving*, at SCQF level 6. This will allow learners to develop the specific Core Skill elements 'Assess the relevance of these factors to the situation or issue' and 'Develop and justify an approach to deal with the situation or issue'.

In the answering of assessment work learners may have the opportunity to develop Written Communication of the Core Skill *Communication* at SCQF level 6. The specific Core Skill elements that the learner may have to complete are 'Use conventions which are effective in achieving the purpose of the piece and adapted as necessary for the target audience'.

History of changes to Unit

Version	Description of change	Date

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General information for learners

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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 has been designed to allow you to further develop knowledge, skills and understanding in Ship construction and survey.

This Unit will also provide you with an opportunity to study the practical design considerations of several important aspects of ship construction and the requirements for the Load line survey.

The formal assessment for this Unit will consist of a single assessment paper lasting no more than two hours. The assessment will be conducted under closed-book conditions in which you will not be allowed to take notes, textbooks, etc into the assessment. You will sit this assessment paper at the end of the Unit.

This Unit will consist of three Outcomes that you will study:

- 1 Analyse flood protection and seaworthiness for different vessel types
- 2 Analyse ship's structure with reference to fire protection, vibration and noise for different Merchant Navy vessels..
- 3 Evaluate load line and dry-docking surveys for Merchant Navy vessels.

There are opportunities for you to develop Core Skills of *Communication* and *Problem Solving* at SCQF level 6 within the assessment and teaching approaches used in this Unit.