SQA Advanced Unit Specification

General information for centres

Unit title: Structural Masonry Design and Detailing

Unit code: HR65 48

Unit purpose: This Unit is designed to provide the candidate with the ability to apply limit state design philosophy to the checking of structural masonry elements in accordance with recognised Design Standards.

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

1 Select suitable structural Unit/mortar combinations for defined **unstiffened/stiffened single leaf and cavity masonry walls**.
2 Select suitable structural Unit/mortar combinations for defined **masonry columns and laterally loaded masonry wall panels**.
3 Check the suitability of defined **masonry walls subject to concentrated loads**.

Credit points and level: 1 SQA Credit at SCQF level 8: (8 SCQF credit points at SCQF level 8*)

**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 National 1 to Doctorates.*

Recommended prior knowledge and skills: Candidates must have an understanding and knowledge of the structural mechanics of statically determinate structures and distribution of structural loading. Such understanding and knowledge may be evidenced by the possession of an appropriate structural mechanics SQA Advanced Unit or equivalent. The Unit includes all the basic principles necessary to allow candidates possessing other qualifications or experience to succeed in this Unit.

Core Skills: There are opportunities to develop the Core Skills of Numeracy and IT 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: It is possible to assess candidates either on an individual Outcome basis, a combination of Outcomes or by a single holistic assessment combining all Outcomes. The assessment paper/s should be composed of an appropriate balance of short answer, restricted response and structured questions. Assessment should be conducted under supervised, controlled conditions. A single assessment covering all Outcomes should not exceed three hours in duration. It should be noted that candidates must achieve all the minimum Evidence requirements specified for each Outcome in order to pass this Unit.

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 Knowledge/Skill items should be sampled on each assessment occasion.

An exemplar instrument of assessment and marking guidelines has been produced to provide examples of the type of evidence required to demonstrate achievement of the aims of this Unit and to indicate the national standard of achievement at SCQF level 8.

SQA Advanced Unit specification: statement of standards

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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.

Throughout the Unit emphasis will be placed where appropriate on the application of Health & Safety and Sustainability. Safe working practises should be looked at in accordance with current safety codes of practise and regulations. Sustainability should include reference to criteria affecting sustainability, impact of not implementing sustainability on the environment and the legislation promoting sustainability.

Outcome 1

Select suitable structural Unit/mortar combinations for defined **unstiffened/stiffened single leaf and cavity masonry walls**

Outcome 2

Select suitable structural Unit/mortar combinations for defined **masonry columns and laterally loaded masonry wall panels**

Outcome 3

Check the suitability of defined **masonry walls subject to concentrated loads**

The following knowledge/skills, Evidence requirements and assessment guidelines apply to Outcomes 1, 2 and 3.

Knowledge and/or skills for the Unit

- Essential components of structural masonry
- Design load effects on statically determinate structures at the ultimate limit state due to given applied characteristic loads
- Structural unit/mortar combinations for masonry walls in accordance with recognised Design Standards
- Structural unit/mortar combinations for masonry columns in accordance with recognised Design Standards
- Design of laterally loaded wall panels
- Stability of masonry walls under concentrated loads

Evidence requirements for the Unit

Candidates will need to provide evidence to demonstrate their knowledge and/or skills by showing that they can:

- identify commonly used types of structural unit, bonding, wall ties and damp-proof courses
- select suitable structural unit/mortar combinations for masonry subject to concentric axial loading and axial loading with an eccentricity perpendicular to the plane of the wall in accordance with recognised Design Standards

Evidence should be generated through assessment undertaken in controlled, supervised conditions.

Assessment guidelines for the Unit

Evidence for the knowledge and/or skills for these Outcomes will be provided on a sample basis. In any assessment of these Outcome a minimum of **three out of six** knowledge and/or skills items should be sampled two of which must include a design check on a cavity wall and column. Candidates must provide a satisfactory response to all the Evidence requirements, this must be provided by manual calculations.

Assessment should be conducted under open-book conditions.

Questions used to elicit candidate evidence should take the form of clearly defined masonry elements using sketches where appropriate. The elements may be specified individually as separate questions or may form part of a larger structure comprising several types of element.

Administrative Information

Unit code: HR65 48

Unit title: Structural Masonry Design and Detailing

Superclass category: TM

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SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of SQA Advanced Qualifications.

FURTHER INFORMATION: Call SQA's Customer Contact Centre on 44 (0) 141 500 5030 or 0345 279 1000. Alternatively, complete our Centre Feedback Form.

SQA Advanced Unit specification: support notes

Unit title: Structural Masonry Design and Detailing

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 provides the candidate with the ability to check the suitability of given structural masonry elements in statically determinate structures, in accordance with recognised Design Standards.

The delivery of this Unit should emphasise the relevance of the syllabus content to overall structural design and to other Units in the program; particularly those relating to the structural design of reinforced concrete, structural steelwork and timber.

Recommended time allocations to each Outcome are given as guidance towards the depth of treatment which might be applied to each topic. This guidance has been used in the design of the assessment exemplar material provided with the Unit.

1 Unstiffened/stiffened masonry walls (20 hours)

Unstiffened/stiffened single leaf masonry walls: consideration of appropriate partial safety factors for ultimate limit state conditions, analysis to determine design load effects, narrow brick walls, small plan areas, type of structural unit, quality control, effective height/length/thickness, eccentricity at right angles to a wall, capacity reduction factor, and vertical resistance/m length.

Unstiffened/stiffened cavity masonry walls: as for single-leaf masonry walls and in addition; width of cavity, and type/density/ positioning of ties,

2 Masonry columns and wall panels (14 hours)

Masonry columns: consideration of appropriate partial safety factors for ultimate limit state conditions, analysis to determine design load effects, small plan areas, type of structural unit, quality control, effective height, width/thickness, eccentricity about the minor and major axes, capacity reduction factor, and vertical resistance, columns formed by adjacent opening in walls,

Laterally loaded masonry wall panels: consideration of appropriate partial safety factors for ultimate limit state conditions, analysis to determine design load effects, support conditions, limiting dimensions, bending moment coefficients, enhanced flexural strength parallel to the beds due to applied vertical load,

3 Masonry walls subject to concentrated loads (6 hours)

Masonry walls subject to concentrated loads: consideration of appropriate partial safety factors for serviceability and ultimate limit state conditions, analysis to determine design load effects, type, location and enhanced strength of bearing, (excluding spreader beams at the end of a wall and spanning in its plane).

Guidance on the delivery and assessment of this Unit

The material in this Unit should be delivered in a manner which encourages students to develop a working knowledge and familiarity of recognised Design Standards and the style in which they are written. The teaching should be based, wherever possible, on real design office situations incorporating commercially available, practical design aids such as computer software, design charts and design tables where appropriate in addition to the direct use of recognised Design Standards.

Candidates should be encouraged to prepare calculations on formal 'design calculation sheets' in a manner similar to that found in practice. In addition they can also develop 'flow charts' to aid their understanding of design/checking procedures and which can be utilised in future summative assessments.

Candidate will usually work individually however, they should also be encouraged to work in small groups developing solutions to specific design problems; presenting and explaining the solutions to the remainder of their peer group.

It is recommended that knowledge/skills be developed by working through structured questions issued by the tutor or initiated by the candidates themselves. Where possible some of the questions should be based on real-life structures which can be viewed locally and discussed prior to analysis and design by the candidates.

In designing the assessment instrument opportunities should be taken to generate appropriate evidence to contribute to the assessment of Core Skills.

Opportunities for developing Core Skills

Opportunities for the development of Core Skills at the output level are more fully identified in the Core Skills Sign Posting Guide. The grid below is indicative of the opportunities for Core Skills development within this Unit.

Core Skill	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5
1 Communication					
Reading					
Writing					
Oral					
2 Numeracy					
Using Number	3	3	3		
Using Graphical Information	3	3	3		
3 IT					
Using Information Technology	3	3	3		
4 Problem Solving					
Critical Thinking					
Planning and Organising					
Reviewing and Evaluating					
5 Working with Others					

Open learning

Given that appropriate materials exist this Unit could be delivered by distance learning, which may incorporate some degree of on-line support. However, with regard to assessment, planning would be required by the centre concerned to ensure the sufficiency and authenticity of candidate evidence. Arrangements would be required to be put in place to ensure that assessment/s were conducted under controlled, supervised conditions.

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.

General information for candidates

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- check the suitability of defined **masonry walls subject to concentrated loads**

Evidence that candidates can satisfy the knowledge and skill elements of this Unit will be obtained by assessment in controlled, supervised conditions.