

SQA Advanced Unit Specification

General information for centres

Unit title: Construction Technology: Specialist Systems

Unit code: HR47 48

Unit purpose: This Unit seeks to provide the candidate with knowledge and understanding of common refurbishment technologies. This Unit covers the methods of underpinning buildings, façade retention and shoring, methods and materials for over cladding and over roofing buildings and offsite construction systems.

On completion of the Unit candidates should be able to:

- 1 Sketch and describe methods of underpinning buildings.
- 2 Sketch and describe methods of façade retention and shoring structures.
- 3 Compare and describe methods and materials used to over clad and over roof buildings.
- 4 Compare and describe the viability of offsite construction solutions.

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: It would be an advantage for candidates to have a basic knowledge and understanding of construction technology, although this is not essential because the unit covers all the basic principles.

Core Skills: There are opportunities to develop the Core Skills of Communication 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.

Assessment: All outcomes shall be assessed by a question paper details of which are given at the end of each outcome under the heading 'Assessment guidelines'.

In this Unit it is proposed that Outcome 3 and 4 be combined into a single question paper assessment.

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The assessment papers should be composed of a suitable balance of short answer, restricted response and structured questions. Assessment should be conducted under controlled, supervised conditions. It should be noted that candidates must achieve all the minimum evidence specified for each Outcome in order to pass the Unit.

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 the Unit and to indicate the national standard of achievement at SCQF level 8.

Unit specification: statement of standards

Unit title: Construction Technology: Specialist Systems

Unit code: HR47 48

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 this unit emphasis will be placed where appropriate on the application of Health and Safety and Sustainability. Safe working practices should be looked at in accordance with current safety codes of practice 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

Sketch and describe methods and procedures for underpinning buildings

Knowledge and/or skills

- ◆ Underpinning procedures
- ◆ Mass concrete underpinning
- ◆ Pier and beam underpinning
- ◆ Pile underpinning
- ◆ Pile and beam underpinning

Evidence Requirements

Evidence for the knowledge and /or skills in this Outcome will be provided on a sample basis. The evidence may be presented in responses to specific questions. Each candidate will need to demonstrate that she/he can answer correctly questions based on a sample of the items shown above. In any assessment of this Outcome **two out of five** 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 two out of the five knowledge and/or skills items is required each time the Outcome is assessed. Candidates must provide a satisfactory response to the two items being assessed.

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:

- ◆ sketch and describe the procedures and methods of underpinning buildings

Evidence should be generated through assessment undertaken in controlled, supervised conditions. Assessment should be conducted under closed book conditions and as such candidates should not be allowed to bring any textbooks, handouts or notes to the assessment.

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Assessment guidelines

Questions used to elicit candidate evidence should take the form of an appropriate balance of short answer, restricted response and structured questions.

The assessment of this Outcome should be a single assessment question paper. The assessment event should last one hour and be carried out under supervised controlled conditions.

Outcome 2

Sketch and describe methods of façade retention and shoring of structures

Knowledge and/or skills

- ◆ Initial investigation, method statements, risk assessments and safety issues
- ◆ Façade retention options
- ◆ Structural issues
- ◆ Fixing types
- ◆ Access issues

Evidence Requirements

Evidence for the knowledge and/or skills in this Outcome will be provided on a sample basis. The evidence may be presented in responses to specific questions. Each candidate will need to demonstrate that she/he can answer correctly questions based on a sample of the items shown above. In any assessment of this Outcome **three out of five** 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 three out of the five knowledge and/or skills items is required each time the Outcome is assessed. Candidates must provide a satisfactory response to all three items.

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

- ◆ sketch and describe the structural options for a façade retention system and shoring of a structure

Evidence should be generated through assessment undertaken in controlled, supervised conditions. Assessment should be conducted under closed book conditions and as such candidates should not be allowed to bring any textbooks, handouts or notes to the assessment.

Assessment guidelines

Questions used to elicit candidate evidence should take the form of an appropriate balance of short answer, restricted response and structured questions.

The assessment of this Outcome should be a single assessment question paper. The assessment event should last one and half hours and be carried out under supervised controlled conditions.

Outcome 3

Compare and describe methods and materials used to over clad and over roof buildings

Knowledge and/or skills

- ◆ Reasons for choosing over cladding and over roofing systems
- ◆ Performance requirements of over cladding systems
- ◆ Methods and materials used in over cladding and over roofing systems
- ◆ Component parts of over cladding systems
- ◆ Component parts of over roofing

Evidence Requirements

Evidence for the knowledge and/or skills in this Outcome will be provided on a sample basis. The evidence may be presented in responses to specific questions. Each candidate will need to demonstrate that she/he can answer correctly questions based on a sample of the items shown above. In any assessment of this Outcome **three out of five** 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 three out of the five knowledge and/or skills items is required each time the Outcome is assessed. Candidates must provide a satisfactory response to all three items.

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

- ◆ compare and describe the methods, materials and component parts of an over cladding and over roofing system

Evidence should be generated through assessment undertaken in controlled, supervised conditions. Assessment should be conducted under closed book conditions and as such candidates should not be allowed to bring any textbooks, handouts or notes to the assessment.

Assessment guidelines

The assessment for this Outcome should be combined with that for Outcome 4 to form a single assessment event lasting one and a half hours and carried out under supervised controlled conditions. Such a paper should be composed of an appropriate balance of short answer, restricted response and structured questions.

Outcome 4

Compare and describe the viability of a range of offsite construction solutions

Knowledge and/or skills

- ◆ History of prefabrication
- ◆ Definitions of off site construction.
- ◆ Forms of off site construction
- ◆ Sustainability

Evidence Requirements

Evidence for the knowledge and/or skills in this Outcome will be provided on a sample basis. The evidence may be presented in responses to specific questions. Each candidate will need to demonstrate that she/he can answer correctly questions based on a sample of the items shown above. In any assessment of this Outcome **two out of four** 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 two out of the four knowledge and/or skills items is required each time the Outcome is assessed. Candidates must provide a satisfactory response to the two items.

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

- ◆ compare and describe the viability of a range of offsite construction solutions

Evidence should be generated through assessment undertaken in controlled, supervised conditions. Assessment should be conducted under closed book conditions and as such candidates should not be allowed to bring any textbooks, handouts or notes to the assessment.

Assessment guidelines

The assessment for this Outcome should be combined with that for Outcome 3 to form a single assessment event lasting one and a half hours and carried out under supervised controlled conditions. Such a paper should be composed of an appropriate balance of short answer, restricted response and structured questions.

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Administrative Information

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|-----------------------------|---|
| Unit code: | HR47 48 |
| Unit title: | Construction Technology: Specialist Systems |
| Superclass category: | TE |
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Unit specification: support notes

Unit title: Construction Technology: Specialist Systems

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 Sketching and describing methods of underpinning buildings.
- 2 Sketching and describing methods of façade retention and shoring of structures.
- 3 Describing methods and materials used to over clad and over roof buildings.
- 4 Explaining the viability of the range of off site construction solutions.

This Unit has been developed as part of a group of construction technology units. This Unit at SCQF level 8 is included within many of the SQA Advanced Diploma Built Environment awards.

The group of units mentioned in the previous paragraph have been developed as an integrated suite of units to meet all the construction technology requirements of the SQA Advanced Certificate and SQA Advanced Diploma in Built Environment awards. However, this does not preclude the use of one or more of these units in other awards where award designers feel this to be appropriate. As well as providing a substantial course in construction technology principles these units also provide important underpinning knowledge, understanding and skills for other parts of the SQA Advanced Certificate and SQA Advanced Diploma in Built Environment awards

In designing this Unit, the unit writers have identified the range of topics they would expect to be covered by lecturers. The writers have also given recommendations 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 Construction Technology units and because the assessment exemplar pack for this Unit is based on the knowledge and/or skills and list of topics in each of the Outcomes.

The list of topics is given below. Lecturers are advised to study this list of topics in conjunction with the assessment exemplar pack so that they can get a clear indication of the standard of achievement expected of candidates in this Unit.

1 Sketch and describe methods of underpinning buildings. (9 hours)

- ◆ Overview of why buildings crack
- ◆ Procedures — Site investigation
- ◆ Methods of underpinning:
 - mass concrete underpinning
 - pier and beam underpinning
 - pile underpinning
 - pile and beam underpinning
- ◆ Good practices in underpinning

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2 Sketch and describe methods of façade retention and shoring structures. (9 hours)

- ◆ Initial investigations required
- ◆ Façade retention options:
 - raking shores
 - horizontal bracing
 - internal cross bracing
 - facades strutted across the building
 - internal façade systems using new steel frame
 - proprietary systems
- ◆ Structural principles
- ◆ Fixing details
- ◆ Access issues:
 - access for construction work
 - plant and materials access provision
 - public highways or footpaths encroachment

3 Compare and describe methods and materials used to over clad and over roof buildings. (9 hours)

- ◆ Reasons for choosing over cladding:
 - inadequate weather tightness of the external envelope
 - deterioration of external finishes
 - improving the thermal insulation
 - improving appearance
 - reducing noise levels
- ◆ Performance requirements of over cladding systems
- ◆ Methods and materials used in over cladding and over roofing
- ◆ The component parts of systems
- ◆ Structural forms of over roofing:
 - trussed roofs
 - structural frames

4 Compare and describe the viability of the range of off site construction solutions. (9 hours)

- ◆ History of prefabrication:
 - Charles Eames
 - system build — Boot, Orlit, Dorran
 - post war temporary ‘prefab’
 - recent case studies
 - fabrication pioneers
 - post-war prefabricated building
 - system building methods

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- ◆ Definitions and forms:
 - Semi Volumetric
 - Volumetric
 - Pods
 - Sips
 - Kits
 - Flat pack
 - Tilt-up and others

- ◆ Implications for design and site planning:
 - extended briefing and design stage
 - built in redundancy
 - reduced on site construction
 - reduced snags and life cycle problems
 - less waste and environmental impact

Unit Assessment (4 hours total)

This takes the form of three different assessment papers, one covering the content of Outcome 1 and lasting one hour duration, one covering the content of Outcome 2 and lasting one and a half hours duration and finally a combined assessment paper covering the content of Outcomes 3 and 4 and lasting one and half hours duration.

Guidance on the delivery and assessment of this Unit

It is recommended that this Unit is delivered towards the start of the SQA Advanced Certificate and SQA Advanced Diploma in Built Environment, as it provides core knowledge of construction technology.

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.

Details on approaches to assessment are given under Evidence Requirements and Assessment guidelines under each Outcome in the SQA Advanced Unit specification: statement of standards section. It is recommended that these sections be read carefully before proceeding with assessment of candidates.

Opportunities for developing Core Skills

The following grid provides a general guide to opportunities for the development of Core Skills in this Unit. Opportunities for the development of Core Skills at the output level are more fully identified in the Core Skills Signposting Guide.

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

Open learning

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. Arrangement would be required to be put in place to ensure that the assessment, which is required to be at a single event, was conducted under controlled, supervised conditions.

For information on normal open learning arrangements, please refer to the SQA guide *Assessment and Quality Assurance of Open and Distance Learning* (SQA 2000).

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.

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General information for candidates

Unit title: Construction Technology: Specialist Systems

This Unit has been designed to allow you to develop knowledge, understanding and skills in common refurbishment technologies. This unit covers the methods of underpinning buildings, façade retention and shoring, methods and materials for over cladding and over roofing buildings and offsite construction systems.

The formal assessment for this Unit will consist of a series of single assessment question papers. Each assessment will be conducted under closed book conditions in which you will not be allowed to take notes, textbooks etc. into the assessment.