

Higher National Unit Specification

General information for centres

Unit title: Construction Technology: Industrial/Commercial Superstructure

Unit code: DW55 34

Unit purpose: This Unit is designed to enable candidates to gain knowledge and understanding of superstructure construction of multi-storey and large area commercial and industrial buildings. The unit commences with structural frames and continues with external walls, cladding and the construction of ground floors, upper floors, stairs and roofs.

On completion of the Unit candidates should be able to:

- 1 Compare and describe the range of materials and construction forms available for the erection of a structural frame.
- 2 Sketch and describe methods and materials for forming external walls to framed buildings.
- 3 Sketch and describe ground floor, upper floor and stair construction in framed buildings.
- 4 Sketch and describe forms of roof construction and finishes.

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: This Unit is designed in such a way that it may be presented as a stand-alone unit. However, as the content of the Unit builds on the knowledge and understanding of foundations and substructure construction it is highly recommended that a construction technology (substructure) unit is completed prior to the commencement of this Unit.

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.

General information for centres (cont)

Assessment: It is possible to assess candidates either on an individual Outcome basis, combinations of Outcomes or by a single holistic assessment combining all Outcomes. It is recommended that 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'.

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 7.

Higher National Unit specification: statement of standards

Unit title: Construction Technology: Industrial/Commercial Superstructure

Unit code: DW55 34

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, 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

Compare and describe the range of materials and construction forms available for the erection of a structural frame

Knowledge and/or skills

- ◆ Function and selection criteria
- ◆ Forms and materials
- ◆ Skeleton and Portal frames
- ◆ Frame connection details
- ◆ Fire protection

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 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 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:

- ◆ compare and describe the function, range of materials and construction forms available for the erection of a structural frame

Higher National Unit specification: statement of standards (cont)

Unit title: Construction Technology: Industrial/Commercial Superstructure

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 1½ hours and be carried out under supervised controlled conditions.

Outcome 2

Sketch and describe methods and materials for forming external walls to framed buildings

Knowledge and/or skills

- ◆ Non-loadbearing brickwork/blockwork
- ◆ Infill panels
- ◆ Cladding systems
- ◆ Materials and jointing methods

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 all 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:

- ◆ sketch and describe methods and materials used for forming external walls to framed 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.

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.

Higher National Unit specification: statement of standards (cont)

Unit title: Construction Technology: Industrial/Commercial Superstructure

Outcome 3

Sketch and describe ground floor, upper floor and stair construction in framed buildings

Knowledge and/or skills

- ◆ Concrete ground floor construction
- ◆ Upper floor construction
- ◆ Stair construction
- ◆ Materials and finishes

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 all 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:

- ◆ sketch and describe floor and stair construction in framed buildings including materials and finishes

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 hour and be carried out under supervised controlled conditions.

Outcome 4

Sketch and describe forms of roof construction and finishes

Knowledge and/or skills

- ◆ Forms of pitched roof construction
- ◆ Forms of flat roof construction
- ◆ Materials and finishes

Higher National Unit specification: statement of standards (cont)

Unit title: Construction Technology: Industrial/Commercial Superstructure

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 three** 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 three 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:

- ◆ sketch and describe forms of roof construction including materials and finishes

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

This assessment paper should be taken at a single assessment event lasting 1½ 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.

Administrative Information

Unit code: DW55 34

Unit title: Construction Technology: Industrial/Commercial Superstructure

Superclass category: TE

Date of publication: June 2006

Version: 02

History of changes:

Version	Description of change	Date
02	Outcome 5 removed. Minor changes to Outcomes 1 – 4.	19/10/10

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Higher National Unit specification: support notes

Unit title: Construction Technology: Industrial/Commercial Superstructure

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 Comparing and describing the range of materials and construction forms available for the erection of a structural frame.
- 2 Sketching and describing methods and materials for forming external walls to framed buildings.
- 3 Sketching and describing ground, upper floor and stair construction in framed buildings.
- 4 Sketching and describing forms of roof construction and finishes.

This Unit has been developed as part of a group of construction technology units. There are three other units in the group entitled Construction Technology: Substructure, Construction Technology: Domestic Construction, and Construction Technology: Specialist Systems. This Unit at SCQF level 7 is a mandatory unit within the HNC and HND Built Environment award with the exception of the HNC Construction

The three units mentioned in the previous paragraph have been developed as an integrated suite of units to meet all the construction technology requirements of the HNC and HND 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 HNC and HND 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.

Higher National Unit specification: support notes (cont)

Unit title: Construction Technology: Industrial/Commercial Superstructure

1 Compare and describe the range of materials and construction forms available for the erection of a structural frame. (12 hours)

Skeleton frames

Functions and selection criteria

Forms and materials

***In-situ* reinforced concrete:**

- ◆ Principles of reinforced concrete
- ◆ Formwork materials and functional requirements
- ◆ Types of formwork for columns, beams and slabs
- ◆ Formwork safety
- ◆ Reinforcing steels — bars and fabric
- ◆ Reinforcing drawings, bending schedules and referencing
- ◆ Fixing bars and cover

Precast concrete:

- ◆ Methods of connection: Column to Foundation, Column to Column and Column to Beam
- ◆ Assembly techniques

Steel:

- ◆ Standard steel sections and grades of steel
- ◆ Welding and bolting
- ◆ Methods of connection: Column to base plate, Column to Column and Column to Beam
- ◆ Assembly techniques
- ◆ Wind bracing

Portal frames

Functions and selection criteria

Forms and materials

Steel:

- ◆ Methods of connection: Column to base plate, Column to rafter, use of web stiffeners and cleats
- ◆ Assembly techniques
- ◆ Wind bracing

Precast concrete:

- ◆ Methods of connection at joints/junction

Timber:

- ◆ Methods of connection at joints/junction

Fire protection:

- ◆ Solid, board, applied

Higher National Unit specification: support notes (cont)

Unit title: Construction Technology: Industrial/Commercial Superstructure

2 Sketch and describe methods and materials for forming external walls to framed buildings. (9 hours)

- ◆ Functions of external walls and claddings
- ◆ Selection criteria
- ◆ Options available:
 - non-loadbearing brickwork/blockwork
 - infill walling/panels
 - non-loadbearing cladding
 - large heavy units (precast concrete panels)
 - curtain walling
 - rainscreen cladding
 - structural glazing
- ◆ Materials for cladding
- ◆ Joints

3 Sketch and describe ground, upper floor and stair construction in framed buildings. (8 hours)

Functional requirements

Concrete ground floors:

- ◆ Design, construction and finish of long strip and large area floors

Upper floor construction:

- ◆ Precast prestressed concrete units
- ◆ Concrete and steel composite floors
- ◆ In-situ concrete floors: flat slab, beam and slab, ribbed and waffle
- ◆ Openings in floors

Stairs:

- ◆ Steel, precast and *in-situ* concrete

Finishes:

- ◆ Raised access floors and suspended ceiling systems

Higher National Unit specification: support notes (cont)

Unit title: Construction Technology: Industrial/Commercial Superstructure

4 Sketch and describe forms of roof construction. (6 hours)

Functions and selection criteria

Pitched roof forms

Flat roof forms

- ◆ Castellated and cellular beams
- ◆ Lattice girders
- ◆ Lattice trusses
- ◆ Space frames

Unit Assessment (5 hours total)

This takes the form of four different assessment papers, one covering the content of Outcome 1 and lasting 1½ hours duration, one covering the content of Outcome 2 and lasting one hour duration and one covering Outcome 3 and lasting one hour duration and finally an assessment paper covering the content of Outcome 4 and lasting 1½ hours duration.

Guidance on the delivery and assessment of this Unit

As this Unit provides core construction technology which underpins much of the studies done in other areas of HNC and HND Built environment awards it is recommended that the Unit be delivered towards the start of these awards.

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 Higher National 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.

Higher National Unit specification: support notes (cont)

Unit title: Construction Technology: Industrial/Commercial Superstructure

Core Skill	Outcome 1	Outcome 2	Outcome 3	Outcome 4
1 Communication				
Reading				
Writing	✓	✓	✓	✓
Oral				
2 Numeracy				
Using Number				
Using Graphical Information				
3 IT				
Using Information Technology				
4 Problem Solving				
Critical Thinking	✓			
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).

Candidates with additional support needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Alternative Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs*, which is available on the SQA website www.sqa.org.uk.

General information for candidates

Unit title: Construction Technology: Industrial/Commercial Superstructure

This Unit has been designed to allow you to develop knowledge, understanding and skills in superstructure construction of multi-storey and large area commercial and industrial buildings. The Unit commences with the building frames and continues with external walls, cladding and the construction of ground floors, upper floors, stairs and roofs.

The formal assessment for this Unit will consist of four different assessment papers, one covering the content of Outcome 1 and lasting 1½ hours duration, one covering the content of Outcome 2 and lasting ONE hour duration and one covering Outcome 3 and lasting one hour duration and finally an assessment paper covering the content of Outcome 4 and lasting 1½ hours duration.