National Unit specification: general information

Unit title: Construction Technology and Design (SCQF level 5)

Unit code: F1AK 11

Superclass: TD

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Version: 02

Summary

This Unit will be suitable for candidates who have limited or no experience of the Building Services Engineering Industry or Construction Technology and Design.

This Unit aims to introduce the candidate to the design, planning and production phases of construction projects such as low-rise domestic and commercial buildings. The Unit is intended to increase candidate confidence in the use of a wide range of appropriate design and construction terminology and to develop his or her ability to communicate effectively with other members of the construction team. It further develops the candidate's knowledge and understanding of the primary services and utilities that are incorporated within a construction project.

Outcomes

1 Identify the various stages of the construction design process.
2 Explain the various stages of a construction project planning process.
3 Interpret written and graphical communication materials in relation to a given design brief.
4 Describe traditional and modern methods of construction in the context of low-rise domestic and commercial buildings.
5 Describe the provision of primary services and utilities in a construction project.

Recommended entry

Entry is at the discretion of the centre.

General information (cont)

Unit title: Construction Technology and Design (SCQF level 5)

Credit points and level

1 National Unit credit at SCQF level 5: (6 SCQF credit points at SCQF level 5*)

**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.*

6 credit points, indicates a notional Unit design length of 40 hours of contact and 20 hours of self-directed learning.

Core Skills

There is no automatic certification of Core Skills or Core Skill components in this Unit.

The Unit provides opportunities for candidates to develop components of the following Core Skills:

- Numeracy (SCQF level 5)
- Problem Solving (SCQF level 5)

These opportunities are highlighted in the support notes of this Unit specification.

National Unit specification: statement of standards

Unit title: Construction Technology and Design (SCQF level 5)

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. The Appendix forms a part of this statement of standards.

Outcome 1

Identify the various stages of the construction design process.

Performance Criteria

(a) Identify the main stages in a construction design process.
(b) Identify relevant frameworks for design process.
(c) Identify the key financial, legal and environmental constraints in a design process.
(d) Identify the key members of a design team in a construction design process.

Outcome 2

Explain the various stages of a construction project planning process.

Performance Criteria

(a) Explain a Royal Institution of British Architects (RIBA) Plan of Work.
(b) Explain the main factors contributing to construction project planning decisions.
(c) Explain the main outcomes from the construction project planning process.
(d) Explain the key legislative factors effecting the construction project planning process.

Outcome 3

Interpret written and graphical communication materials in relation to a given design brief.

Performance Criteria

(a) Interpret accurately an initial design brief.
(b) Interpret accurately sketch designs and drawings from a given design brief.
(c) Interpret accurately a specification from a given design brief.

Outcome 4

Describe traditional and modern methods of construction in the context of low-rise domestic and commercial buildings.

Performance Criteria

(a) Describe typical traditional methods of construction.
(b) Describe a range of modern methods of construction.

National Unit specification: statement of standards (cont)

Unit title: Construction Technology and Design (SCQF level 5)

Outcome 5

Describe the provision of primary services and utilities in a construction project.

Performance Criteria

(a) Describe the main primary services and utilities in a construction project.
(b) Describe the incorporation of the main primary services and utilities into a building.
(c) Identify the main legal requirements in terms of health and safety during the provision of primary services and utilities in a construction project.

Evidence Requirements for this Unit

The Appendix to this Unit details the mandatory content for each Outcome.

Evidence is required to demonstrate that candidates have achieved all Outcomes and Performance Criteria.

For Outcomes 1, 2, 3, 4 and 5 written and/or oral evidence must be produced in open-book conditions. In this Unit an appropriate Instrument of Assessment could be a question paper consisting of a balance of multiple-choice, short answer, restricted response and structured questions based on case study material. Candidates must not bring notes, textbooks or handouts to the assessment.

Candidates may be assessed on an Outcome by Outcome basis, combinations of Outcomes or by a single, holistic assessment covering Outcomes 1, 2, 3, 4 and 5.

Assessments must be manageable and practicable for centres and candidates and a single assessment covering all Outcomes should not exceed 2 hours in duration.

The Assessment Support Pack for this Unit provides appropriate sample assessment materials. Where centres wish to develop their own assessment materials they should refer to the Assessment Support Pack to ensure a comparable standard.

National Unit specification: support notes

Unit title: Construction Technology and Design (SCQF level 5)

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

The Appendix to this Unit details the mandatory content for each Outcome.

This Unit is a mandatory Unit within the National Certificate in Building Services Engineering (SCQF level 6).

This Unit aims to introduce candidates to the design, planning and production phases of construction projects such as low-rise domestic and commercial buildings. The Unit is intended to increase candidate confidence in the use of a wide range of appropriate design and construction terminology and will help develop his or her ability to communicate effectively with other members of the construction team.

Health and Safety and Sustainability are integral and key to the Building Services Engineering industry therefore throughout the Unit emphasis will be placed where appropriate on the application of Health and 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.

Guidance on learning and teaching approaches for this Unit

Emphasis in the delivery of the Unit should be on familiarisation with terminology and basic concepts.

The use of case study material is particularly recommended for both the learning and assessment components of this Unit. The study material should provide candidates with an initial design brief, for a low-rise domestic or commercial building, allowing candidates to identify appropriate stages in the design process together with legal, financial and environmental constraints. The building should be within an environment with which candidates are familiar and for which they can identify an appropriate planning process and likely issues which might arise.

Suggested teaching and learning methods for this Unit could include: the use of visual aids, ICT, group lectures and discussion, practical demonstrations, question and answer sessions, directed study, industrial/site visits.

Formative work for the Unit could specifically include group discussion. Such an approach could be particularly beneficial to candidates with no industrial experience.

National Unit specification: support notes (cont)

Unit title: Construction Technology and Design (SCQF level 5)

Guidance on approaches to assessment for this Unit

To be read in conjunction with the **Evidence Requirements**.

Candidates may be assessed on an Outcome by Outcome basis, combinations of Outcomes or by a single, holistic assessment. In this Unit an appropriate Instrument of Assessment could be a question paper consisting of a balance of short answer, multiple-choice, restricted response and structured questions based on case study material.

Outcomes 1, 2, 3, 4 and 5 might be assessed using a single case study.

Preparation for assessment should include formative work with opportunities for constructive feedback. Well planned assignments and project work will also be useful preparation.

Where the Unit is taken as part of the National Certificate in Building Services Engineering, there may be opportunities to integrate the assessments for this Unit with other appropriate Units. For example:

- *Air Conditioning and Ventilation Technology* (SCQF level 6)
- *Refrigeration Technology* (SCQF level 6)
- *Heating and Plumbing Technology* (SCQF level 6)
- *Building Services Engineering Technology* (SCQF level 5)

Planning should allow time for re-assessment. Given that assessment for this Unit must be conducted in controlled conditions, centres should ensure that a different assessment is given for re-assessment purposes and that similar controlled conditions apply.

Opportunities for the use of 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 e-checklists. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003), SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

Opportunities for developing Core Skills

Accuracy in interpreting complex numerical and graphic information and the ability to calculate, apply and present complex data underpins the competencies developed in the Unit. Candidates could be provided with formative opportunities to enhance skills in the interpretation of numerical, statistical and graphic data in practical contexts. Calculations and effective presentation of data could be supported and enhanced by the use of appropriate technology and relevant software could be useful as candidates learn to apply numerical and graphical information in building services contexts. The emphasis of formative work should be on Numeracy as a tool to be used and applied efficiently and critically in building services and construction design solutions.

National Unit specification: support notes (cont)

Unit title: Construction Technology and Design (SCQF level 5)

Elements of the Core Skill of Problem Solving, that is, planning and organising, critical thinking, and reviewing and evaluating, will be developed and enhanced in the Unit, which requires an examination of the application of theoretical knowledge to a practical task. Identifying and examining the relevance of all factors in various stages of the planning and construction process while considering fully available resources and services will involve a high level of critical thinking. Group discussion of issues may be useful although candidates should be independently able to identify effective design solutions which allow review and modification. Individual discussions with the assessor to reinforce analytical evaluation of proposed solutions could enhance problem solving skills.

Open learning

Where appropriate materials and facilities are available, this Unit could be delivered by distance learning which might include some degree of online support. Centres must ensure that for all modes of delivery the same assessment conditions, standards and quality assurance procedures apply to all candidates.

Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**.

Appendix

National Unit specification: statement of standards

Unit title: Construction Technology and Design (SCQF level 5)

Appendix — Content and Context for this Unit

This Appendix is within the statement of standards, ie the mandatory requirements of the Unit.

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

1 Identify the various stages of the construction design process (5 hours).

Stages
- Need for and benefits of a structured framework for design (eg Royal Institute of British Architects Plan of Work)
- Characteristics of individual stages
- Factors that affect each stage
- Ways in which various stages interconnect — implications of financial, legal and environmental constraints for design team, including health, safety and welfare, CDM (Construction Design and Management) Regulations

Design team
- Members of design team including client, architect, architectural technologist, landscape architect, structural engineer, services engineer
- Roles and responsibilities
- Interactions between team members

2 Explain the various stages of a construction project planning process (5 hours).

RIBA Plan of Work
- Four major categories
- Implications of each category
- Scope of work involved

Decision-making process
- Factors that contribute to making decisions
- Influence of such decisions on final project outcomes

Outcomes
- Workload
- Roles and responsibilities in design office and on site
- Benefits to client

Legal aspects
- Legal position of each member of the design team
- Rights of client, damages, negligence, health, safety and welfare, environment
- CDM
- Scottish construction law

National Unit specification: statement of standards (cont)

Unit title: Construction Technology and Design (SCQF level 5)

3 Interpret written and graphical communication materials in relation to a given design brief (6 hours).

Brief
- Initial brief, after consideration of client's requirements, to aid production of design

Sketch designs
- Multiple options in sketch form to satisfy given brief and comply with financial, legal and environmental constraints

Drawings
- All drawings and documentation needed to make a formal planning application, processes and procedures to be followed to obtain planning consent

Specifications
- Sample model specifications to meet requirements of client, building control, etc

4 Describe traditional and modern methods of construction in the context of low-rise domestic and commercial buildings (12 hours).

Systems
- Traditional and modern methods of construction, influence on present-day designs
- Applications of modern methods to satisfy traditional requirements and vice versa
- Limitations of each system on the other
- Identification of multiple construction options to satisfy requirements of a given design
- Variety of construction options available to satisfy the primary and secondary requirements of a design, health, safety and environmental constraints on selection of the above

Use of
- Correct construction and architectural terminology to describe both traditional and modern building projects

5 Describe the provision of primary services and utilities in a construction project (12 hours).

Incorporating services
- Need to incorporate services at the design stage of a project
- Use of standard notation for services in the drawn form to British standard specification 1192
- Methods used to incorporate services

Main features and operating principles
- Main features, basic operating principles, materials, major components of services
- Merits and demerits of each in terms of installation and maintenance costs
- Limitations imposed by construction and legal requirements in terms of health and safety

History of changes to Unit

Version	Description of change	Date
02	Update from ‘closed-book’ assessment to ‘open-book’ assessment.	14/07/2011