

Higher National Unit Specification

General information for centres

Unit title: Building Services in Large Buildings

Unit code: DW4R 35

Unit purpose: This Unit is designed to provide the candidate with an understanding of common building services and their operation in commercial and industrial buildings.

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

- 1 Evaluate strategies for the provision of hot and cold water in large buildings.
- 2 Evaluate strategies for space heating and ventilation systems in commercial and industrial buildings.
- 3 Describe the methods by which electricity is supplied, and distributed within commercial and industrial buildings.
- 4 Identify automatic fire detection and control systems for commercial and industrial buildings.
- 5 Understand the operation of transportation systems in buildings.

Credit points and level: 1 HN 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 Access 1 to Doctorates.*

Recommended prior knowledge and skills: It is strongly recommended that students have a basic knowledge of domestic building services prior to undertaking this Unit. Such knowledge and understanding might be evidenced by the possession of appropriate Units at NC and HNC level.

Core Skills: There are opportunities to develop the Core Skill(s) of Communication, Problem Solving, in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Where Core Skills are both embedded and signposted, use the wording:

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: The assessment for all Outcomes may be undertaken separately or alternatively as two separate assessments comprising Outcomes 1 and 2 and Outcomes 3, 4 and 5.

General information for centres (cont)

Assessment should place emphasis upon description and sketching of the services layouts. Detailed design, such as, pipe, cable sizing, etc should not be part of the assessment scope.

Assessments should be conducted under supervised, controlled conditions. Individual Outcome assessments should not exceed 45minutes each. Assessment covering Outcomes 1 and 2 and 3, 4 and 5 should not exceed 90 minutes each. It should be noted that candidates must achieve all the minimum evidence specified for each outcome in order to pass the 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. Items being assessed should not be known to candidates in advance and different items should be sampled on each assessment occasion.

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

Higher National Unit specification: statement of standards

Unit title: Building Services in Large Buildings

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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 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 legislation promoting sustainability.

Outcome 1

Evaluate strategies for the provision of hot and cold water in large buildings.

Knowledge and/or skills

- ◆ Hot and cold water supply requirements
- ◆ Boosted cold water systems from storage cisterns
- ◆ Staged pumping cold water supply
- ◆ Staged pumping hot water from communal calorifiers

Evidence Requirements

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

- ◆ analyse and explain requirements for, and methods of providing, hot or cold water supplies in large buildings

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. In any assessment of this Outcome **three from four** knowledge and/or skills items should be sampled. Candidates must provide a satisfactory response to all three items.

Assessment guidelines

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

The assessment for this Outcome will be open book

Higher National Unit specification: statement of standards (cont)

Unit title: Building Services in Large Buildings

Outcome 2

Evaluate strategies for space heating and ventilation systems in commercial and industrial buildings.

Knowledge and/or skills

- ◆ Warm air systems
- ◆ Low, medium and high temperature hot water systems
- ◆ Control of legionella bacteria in water systems
- ◆ Mechanical extraction/inlet system

Evidence Requirements

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

- ◆ analyse and explain the requirements for, and provision of, air or water heating systems for large buildings

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. In any assessment of this Outcome **three from four** knowledge and/or skills items should be sampled. Candidates must provide a satisfactory response to all three items

Assessment guidelines

Questions used to elicit candidate evidence should be take the form of an appropriate balance of short answer, restricted response and structured questions. The assessment for this Outcome should be open book.

Outcome 3

Describe the methods by which electricity is supplied and distributed within commercial and industrial systems.

Knowledge and/or skills

- ◆ Star/delta arrangements
- ◆ Service head intake arrangements
- ◆ 3-phase supply to plant
- ◆ Rising main busbar for 400v and 230v supply

Evidence Requirements

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

- ◆ analyse and explain the requirements for, and provision of, electricity in large buildings

Higher National Unit specification: statement of standards (cont)

Unit title: Building Services in Large Buildings

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. In any assessment of this Outcome **three from four** knowledge and/or skills items should be sampled. Candidates must provide a satisfactory response to all three items.

Assessment guidelines

Questions used to elicit candidate evidence should be take the form of an appropriate balance of short answer, restricted response and structured questions. The assessment for this Outcome is open book.

Outcome 4

Identify automatic fire detection and control systems for commercial and industrial buildings.

Knowledge and/or skills

- ◆ Products of fire
- ◆ Fire detectors
- ◆ Automatic fire sprinklers systems
- ◆ Integration with passive protection
- ◆ Statutory control

Evidence Requirements

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

- ◆ analyse, describe and explain the requirements for, and provision of, fire detection and control systems for large buildings

Evidence for the knowledge and/or skills in this outcome will be provided on a sample basis. The evidence may be presented in response to specific questions. . In any assessment of this Outcome **three from five** knowledge and/or skills items should be sampled. Candidates must provide a satisfactory response to all three items.

Assessment guidelines

Questions used to elicit candidate evidence should be take the form of an appropriate balance of short answer, restricted response and structured questions. The assessment for this Outcome is open book.

Outcome 5

Understand the operation of transportation systems in buildings.

Knowledge and/or skills

- ◆ Hydraulic lifts
- ◆ Electric lifts
- ◆ Escalators/travelators

Higher National Unit specification: statement of standards (cont)

Unit title: Building Services in Large Buildings

Evidence Requirements

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

- ◆ analyse, describe and explain the requirements for, and the provision of, transportation systems in large buildings

Evidence for the knowledge and/or skills in this outcome will be provided on a sample basis. The evidence may be presented in response to specific questions. In any assessment of this Outcome **two from three** knowledge and/or skills items should be sampled. Candidates must provide a satisfactory response to all three items.

Assessment guidelines

Questions used to elicit candidate evidence should be take the form of an appropriate balance of short answer, restricted response and structured questions. The assessment for this Outcome is open book.

Administrative Information

Unit code:	DW4R 34
Unit title:	Building Services in Large Buildings
Superclass category:	TH
Date of publication:	June 2006
Version:	01
Source:	SQA

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Higher National Unit specification: support notes

Unit title: Building Services in Large Buildings

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 Evaluate strategies for the provision of hot and cold water in large buildings.
- 2 Evaluate strategies for space heating and ventilation systems in commercial and industrial buildings.
- 3 Describe the methods by which electricity is supplied, and distributed within commercial and industrial buildings.
- 4 Identify automatic fire detection and control systems for commercial and industrial buildings.
- 5 Understand the operation of transportation systems in buildings.

This Unit has been developed to further enhance the knowledge and skills gained by candidates in their studies of building services in low rise buildings. It is, part of a group of building services units. In addition to that mentioned above, there are also units entitled Building Services: Heating, Lighting and Acoustics and Building Services: Ventilation and Air Conditioning. This Unit at SCQF level 7 is mandatory within the new suite of HND Built Environment awards.

In designing this unit the writers have identified the range of topics expected to be covered by lecturers. The writers have also given recommendations on time allocated to each outcome. This will assist lecturers in planning lessons and preparing schedules of work. Whilst it is not mandatory for a centre to use this list of topics, it is strongly recommended that it does. This will provide consistency of delivery and student knowledge and understanding of building services.

The list of topics is given below. Delivering lecturers are advised to study this list of topics in conjunction with the assessment exemplar pack. This will provide a clear indication of the standard of achievement expected of the candidates undertaking this unit.

1 **Layout and provision of hot & cold water in high-rise and other large buildings. (9 Hours)**

Cold water supply:	demand requirements break cisterns header pipes pneumatic cylinders staged pumping
Hot water supply:	demand requirements communal hot water calorifiers bacteria control staged pumping recirculation and dead legs

Higher National Unit specification: support notes (cont)

Unit title: Building Services in Large Buildings

2 Typical space heating and ventilation systems in commercial and industrial buildings. (9 Hours)

Heating systems: warm air
LTHW/MTHW/HTHW
Controllability of systems
BMS/BEMS

Ventilation systems: natural ventilation problems in high-rise buildings full fresh air systems in commercial buildings use of fresh and recirculated air

3 Methods by which electricity is supplied and distributed within commercial and industrial buildings. (6 Hours)

Three phase supply: purpose of 3-phase supplies
star/delta transformer arrangement
service head arrangement
vertical distribution in high-rise buildings
horizontal distribution in high-rise buildings
distribution from service head to a 3-phase machine

4 Identify automatic fire detection and control systems for commercial and industrial buildings. (6 Hours)

Products of fire: smoke
toxic gases
heat
radiation

Choice of detectors: smoke: ionisation/optical
heat
radiation
VESDA

Classification of detectors: L1, L2, L3
P1, P2, P3
Manual

Operation of sprinkler system: water sources: tanks, reservoirs, rivers, lakes, canals
components of a dry system
components of a wet system

Statutory Control requirements: Fire Precautions Act, Fire in the Workplace Regulations

Higher National Unit specification: support notes (cont)

Unit title: Building Services in Large Buildings

5 **Understand the operation of transportation systems in buildings. (6 Hours)**

Electric lifts: demand requirements
principle of operation
components of the system
safety and statutory compliance

Hydraulic lifts: demand requirements
principle of operation
components of the system
safety and statutory compliance

**Escalators &
Travelators:** demand requirements
principle of operation
components of the system
safety and statutory compliance

Guidance on the delivery and assessment of this Unit

This Unit is designed to further develop knowledge and understanding of building services.

This Unit should also reinforce the importance of the building services interface with the construction of buildings, ie how services may be distributed throughout buildings without the need for retrospective work.

Details on approaches to assessment are provided 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 are read carefully prior to 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: Facilities Management: Operational and Support Services

Core Skill	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5
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

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.

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: Building Services in Large Buildings

On completion of this unit you should be able to:

- 1 Describe strategies for the provision of hot and cold water in large buildings.
- 2 Describe strategies for space heating and ventilation systems in commercial and industrial buildings.
- 3 Describe the methods by which electricity is supplied, and distributed within commercial and industrial buildings.
- 4 Identify automatic fire detection and control systems for commercial and industrial buildings.
- 5 Understand the operation of transportation systems in buildings.

Evidence that you can satisfy the knowledge and skill elements of this Unit will be obtained by assessment in controlled, supervised conditions to which you will not be allowed to bring textbooks, handouts or notes to the assessment.