

Higher National Unit Specification

General information for centres

Unit title: Quantitative Building Studies: Building Services

Unit code: DW3K 34

Unit purpose: This Unit is designed to enable candidates of quantity surveying to gain skills in the measurement and description of work in building services trades using standard methods of measurement. It requires candidates to draft item descriptions and take off quantities for plumber work, electrical work, heating installations and ventilation installations.

On completion of the Unit candidates should be able to:

- 1 Prepare **quantified item descriptions** for internal and external **plumber work**.
- 2 Prepare **quantified item descriptions** for **electrical installations**.
- 3 Prepare **quantified item descriptions** for **heating and ventilation work**.

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: It would be an advantage for candidates to have a basic understanding and knowledge of building services technology. Such understanding and knowledge may be evidenced by possession of a unit or units in building services at NQ or HN level. The unit includes all the basic principles necessary to allow candidates possessing other qualifications or experience to succeed in this Unit.

It would also be of benefit for candidates to have experience in interpreting construction drawings. Prior experience in taking off quantities would be useful.

Experience in the interpretation of construction drawings may be evidenced by the possession of a unit or units in construction technology or construction drawing at NQ or HN level. Prior experience in taking off quantities might be evidenced by possession of any one unit from the suite of quantitative building studies units at HN level.

Core Skills: There are opportunities to develop the Core Skill(s) of Communication, Numeracy, 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. 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. It should be noted that the candidates must achieve all the minimum evidence 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 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 7.

Higher National Unit specification: statement of standards

Unit title: Quantitative Building Studies: Building Services

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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

Prepare **quantified item description** for internal and external **plumber work**.

Knowledge and/or skills

- ◆ Gutters and downpipes
- ◆ Soil and vent pipework and fittings; connection to underground drainage; work above roof level as required
- ◆ Waste pipework and fittings; connections to soil pipework
- ◆ Cold water installations and storage; connections to sanitary fittings and tanks etc
- ◆ Hot water installations and storage; connections to sanitary fittings and storage vessels etc
- ◆ Sanitary appliances and waste/overflow fittings

Evidence Requirements

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

- ◆ produce comprehensive lists of items
- ◆ draft comprehensive item descriptions
- ◆ express quantities in the correct unit of measurement
- ◆ take off quantities accurately
- ◆ produce accurate waste calculations
- ◆ correctly interpret services technology
- ◆ correctly analyse drawings

Evidence for the knowledge and /or skills in this Outcome will be provided on a sample basis. In any assessment of this Outcome a minimum of **four out of six** of the knowledge and/or skills items should be sampled. In order to ensure that candidates will not be able to foresee the installations on which they will be tested, a different sample of four out of six knowledge/skills items is required each time the Outcome is assessed. Candidates must provide a satisfactory response to all four items.

Higher National Unit specification: statement of standards

Unit title: Quantitative Building Studies: Building Services

Evidence should be generated through assessment undertaken in controlled, supervised conditions. Assessment, lasting two hours, should be conducted under open book conditions (with the current Standard Method of Measurement for Building Works provided) and as such candidates should be allowed to bring textbooks, handouts or notes to the assessment.

Assessment guidelines

Drawings and specification notes provided for assessment purposes should be based on a single building of straightforward construction and maximum two storeys height. Drawings must be provided as regards the plumber work installations. Specification notes must accompany the drawings. An isometric view of the plumber work installations must be provided if the drawings are otherwise unclear as regards the locations of appliances and the route of pipework.

The assessment of this Outcome should be separate from that for Outcomes 2 and 3, but it is recommended that a common set of drawings be used for all of the Outcomes.

Outcome 2

Prepare **quantified item descriptions** for **electrical installations**.

Knowledge and/or skills

- ◆ Switchgear and connections to incoming mains supply; earthing and bonding
- ◆ Lighting circuits and fittings
- ◆ Power circuits and fittings
- ◆ Electrical work in connection with heating and ventilation installations

Evidence Requirements

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

- ◆ produce comprehensive lists of items
- ◆ draft comprehensive item descriptions
- ◆ express quantities in the correct unit of measurement
- ◆ take off quantities accurately
- ◆ produce accurate waste calculations
- ◆ correctly interpret services technology
- ◆ correctly analyse drawings

Evidence for the knowledge and /or skills in this Outcome will be provided on a sample basis. In any assessment of this Outcome a minimum of **three out of four** of the knowledge/skills items should be sampled. In order to ensure that candidates will not be able to foresee the installations on which they will be tested, a different sample of three out of four knowledge/skills items is required each time the Outcome is assessed. Candidates must provide a satisfactory response to all three items assessed.

Evidence should be generated through assessment undertaken in controlled, supervised conditions. Assessment, lasting one hour, should be conducted under open book conditions (with the current Standard Method of Measurement for Building Works provided) and as such candidates should be allowed to bring textbooks, handouts or notes to the assessment.

Higher National Unit specification: statement of standards (cont)

Unit title: Quantitative Building Studies: Building Services

Assessment guidelines

Drawings and specification notes provided for assessment purposes should be based on a single building of straightforward construction and maximum two storeys height. Drawings must be provided as regards the electrical work installations. Specification notes and distribution sheets must accompany the drawings.

The assessment of this Outcome should be separate from that for Outcomes 1 and 3, but it is recommended that a common set of drawings be used for all of the Outcomes.

Outcome 3

Prepare **quantified item descriptions** for **heating and ventilation work**.

Knowledge and/or skills

- ◆ Gas-fired wet central heating system
- ◆ Mechanical extract system and associated ductwork

Evidence Requirements

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

- ◆ produce comprehensive lists of items
- ◆ draft comprehensive item description
- ◆ express quantities in the correct unit of measurement
- ◆ take off quantities accurately
- ◆ produce accurate waste calculations
- ◆ correctly interpret services technology
- ◆ correctly analyse drawings

In any assessment of this Outcome all knowledge and skills will be assessed. In order to ensure that candidates will not be able to foresee the assessment instruments on which they will be tested, a different drawing is required each time the Outcome is assessed or re-assessed. Candidates must ultimately provide a satisfactory response to both of the installations assessed.

Evidence should be generated through assessment undertaken in controlled, supervised conditions. Assessment, lasting one hour, should be conducted under open book conditions (with the current Standard Method of Measurement of Building Work provided) and as such candidates should be allowed to bring textbooks, handouts or notes to the assessment.

Higher National Unit specification: statement of standards (cont)

Unit title: Quantitative Building Studies: Building Services

Assessment guidelines

Drawings and specification notes provided for assessment purposes should be based on a single building of straightforward construction and maximum two storeys height. Drawings must be provided as regards the heating and ventilation installations. Specification notes must accompany the drawings. An isometric view of the different installations must be provided if the drawings are otherwise unclear as regards the locations of appliances, heat emitters and the route of pipework and ducts etc. Separate drawings of the heating installation and the ventilation installations are required if a composite drawing renders the details of either installation unclear.

The assessment of this Outcome should be separate from that for Outcomes 1 and 2, but it is recommended that a common set of drawings be used for all of the Outcomes.

Administrative Information

Unit code:	DW3K 34
Unit title:	Quantitative Building Studies: Building Services
Superclass category:	TC
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Higher National Unit specification: support notes

Unit title: Quantitative Building Studies: Building Services

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: -

The measurement and description of:

- ◆ internal and external plumber work;
- ◆ electrical installations
- ◆ heating and ventilation work

Recommended time allocations to each outcome are given as guidance towards the depth of treatment which might be applied to each topic.

1 Prepare quantified item descriptions for internal and external plumber work for a domestic building (12 hours)

Gutters and downpipes; roof plumber work:

- ◆ gutters and fittings (in different materials); gutter brackets and fixing to eaves
- ◆ downpipes and fittings (in different materials); brackets and fixing to external walls
- ◆ testing installations

Note: The assessment of the measurement of roof plumber work is dealt with in the Unit 'Quantitative Building Studies: Floors and Roofs'. Nevertheless, candidates studying this unit on 'Building Services' may benefit by learning more about roof plumber work. The options to deal with roof metalwork as 'supply and fix' or 'supply only' along with 'take delivery of and fix' should be explained to candidates.

Soil and vent pipework and fittings:

- ◆ horizontal and vertical soil pipework and fittings
- ◆ connections to sanitary fittings
- ◆ connections to underground drainage
- ◆ work in roofspace as applicable including connections to roof vents
- ◆ pipework and fittings above roof level as applicable
- ◆ testing installations

Waste pipework and fittings:

- ◆ horizontal and vertical waste pipework and fittings
- ◆ connections to sanitary fittings
- ◆ connections to soil pipework including adaptors
- ◆ testing installations

Higher National Unit specification: support notes (cont)

Unit title: Quantitative Building Studies: Building Services

Cold water installations:

- ◆ horizontal and vertical cold water pipework and fittings
- ◆ pipework ancillaries
- ◆ connections to sanitary fittings, tanks and cylinders
- ◆ tails for kitchen appliances including valves
- ◆ cold water storage
- ◆ thermal insulation
- ◆ testing installations

Hot water installations:

- ◆ horizontal and vertical hot water pipework and fittings
- ◆ pipework ancillaries
- ◆ connections to sanitary fittings, tanks and cylinders
- ◆ tails for kitchen appliances including valves
- ◆ hot water storage
- ◆ boilers
- ◆ thermal insulation
- ◆ testing and commissioning installations

Sanitary appliances:

- ◆ sanitary appliances
- ◆ wastes and overflow assemblies
- ◆ connections to backgrounds and surfaces

Note: Candidates should be made aware of the builders' work that may be required in connection with plumber work installations: holes, raggles, backplates etc. These items are particularly significant when dealing with work to an existing building as opposed to a new build. Whilst the assessment for this Unit is purely in connection with new build, candidates may benefit, if time permits, by looking at what might be required in the way of builders' work in refurbishment and alterations work projects.

2 Prepare quantified item descriptions for electrical installations for a domestic building (12 hours)

Switchgear and connections to incoming mains supply:

- ◆ switchgear and distribution boards and associated wiring
- ◆ earthing

Introductory items:

- ◆ distribution sheets

Lighting circuits and fittings:

- ◆ cables and conduit/ducting
- ◆ lighting points
- ◆ lighting circuits
- ◆ light fittings and lamps
- ◆ accessories

Higher National Unit specification: support notes (cont)

Unit title: Quantitative Building Studies: Building Services

Power circuits and fittings:

- ◆ cables and conduit/ducting
- ◆ power points
- ◆ power circuits
- ◆ fittings and accessories

Electrical work in connection with heating and ventilation installations:

- ◆ electrical work in connection with heating installation
- ◆ electrical work in connection with mechanical extract installation

Others:

- ◆ earthing and bonding
- ◆ testing, commissioning, identification and sundries

3 Prepare quantified item descriptions for heating and ventilation work for a domestic building (13 hours)

Introductory items:

- ◆ specifications
- ◆ interpretation of drawings
- ◆ schematic diagrams and isometric drawings

Gas-fired wet central heating:

- ◆ boilers and pumps
- ◆ boiler flues and chimneys
- ◆ expansion tanks and expansion vessels
- ◆ hot water storage cylinders
- ◆ distribution pipework and fittings
- ◆ pipework ancillaries
- ◆ thermal insulation
- ◆ radiators
- ◆ controls, valves

Electrical work in connection with heating and ventilation installations:

- ◆ electrical work in connection with heating installation
- ◆ electrical work in connection with mechanical extract installation

Others:

- ◆ earthing and bonding
- ◆ testing, commissioning, identification and sundries

Higher National Unit specification: support notes (cont)

Unit title: Quantitative Building Studies: Building Services

4 Unit Assessment (4 hours)

Assessment shall be carried out on an Outcome-by-Outcome basis:

- ◆ Outcome 1 shall be two hours
- ◆ Outcome 2 shall be one hour
- ◆ Outcome 3 shall be one hour

All assessments shall be open book with SMM7 (or latest subsequent edition) provided.

Candidates are therefore permitted to refer to notes and textbooks during assessments.

Guidance on the delivery and assessment of this Unit

This Unit is a specialist quantitative building studies unit that is recommended as a second year Unit in the HND Quantity Surveying programme. As it is a specialist Unit, it is recommended that the Unit be delivered towards the end of the programme and after candidates have acquired competence in at least one other unit on quantitative building studies as well as a knowledge of building services technology.

If the Unit is to be delivered as a stand-alone unit, candidates without prior knowledge of building services technology or experience in interpreting building services drawings should be helped to gain an overview of such technology and drawings. An effective way of doing so may be by examining first-hand the various services installations inherent in buildings. A tour of the premises in which the Unit is being delivered may be helpful, as might the candidate examining the services installations in his or her own house. Examining working drawings of building services installations of domestic and non-domestic building projects may also be a useful learning experience.

Candidates may benefit from examining examples of professionally produced bills of quantities from actual projects. This may help them realise that basically, preparing bills of quantities is all about describing and measuring building works. Candidates should also learn to appreciate that the use of a standard method of measurement is beneficial and brings about a method and rigour to work in drafting bills of quantities.

It is recommended that evidence for learning outcomes is achieved through well-planned coursework assignments and projects. Assessment may be formative and summative and both may feature as part of the process. Although assessments must be focused on the individual achievement of each candidate, group work may contribute to the assessment. Integrative assignments and case studies will help to link this unit with other related units.

The volume of evidence required for each assessment should take into account the overall number of assessments being contemplated within this unit and the design of the overall teaching programme.

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

Where available, evidence from the workplace can also be incorporated to enhance the learning outcomes, provided that this evidence is appropriate and authenticated as the candidate's own work.

Higher National Unit specification: support notes (cont)

Unit title: Quantitative Building Studies: Building Services

Opportunities for developing Core Skills

This Unit provides opportunities for the development of Core Skills in Communication, Numeracy and Problem Solving. Opportunities for the development of Core Skills at the output level are more fully identified in the Core Skills Signposting Guide.

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 the assessments, which are normally required to be at three separate events, were conducted under controlled, supervised conditions.

Evidence obtained via open learning and distance learning may be supplemented by oral questioning where required.

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: Quantitative Building Studies: Building Services

On completion of the Unit you should be able to:

- 1 Prepare **quantified item descriptions** for internal and external **plumber work**.
- 2 Prepare **quantified item descriptions** for **electrical installations**.
- 3 Prepare **quantified item descriptions** for **heating and ventilation work**.

Evidence that you can satisfy the knowledge and skill elements of this unit will be obtained by assessment in controlled, supervised conditions. Assessment should be conducted under open book conditions with current Standard Method of Measurement of Building Works provided.