



National Unit specification

General information

Unit title: Domestic Building Services (SCQF level 5)

Unit code: H660 45

Superclass: TH

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Unit purpose

This Unit is suitable for learners who are interested in a career within the construction industry. They will be introduced to the building utilities and services provided in domestic buildings. The services considered will be the provision of sewer and drainage, electricity and gas supplies, cold and hot water and space heating. Learners will be required to complete graphical layouts and specification notes for building services provision in domestic buildings. Learners will be introduced to building services drawings and the means to interpret them.

Outcomes

On successful completion of the Unit the learner will be able to:

- 1 Explain the basic concepts of Utility Services supplied to domestic buildings and their method of entry into the building.
- 2 Identify the materials used in the supply of utility services to domestic buildings.
- 3 Explain basic layouts of supply and distribution of services within domestic buildings.

Credit points and level

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

National Unit specification: General information (cont)

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Recommended entry to the Unit

While entry is at the discretion of the centre, learners will normally be expected to have attained the following:

- ◆ Standard Grades in Mathematics, English and Technical or Science subject at level 3 or above.
- ◆ Intermediate 2 or National 4/5 in appropriate English and Technical or Science subject/s.

Core Skills

There is no automatic certification of Core Skills or Core Skill components in this Unit. Opportunities for developing aspects of Core Skills are highlighted in *Guidance on Learning and Teaching Approaches*.

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.

The Assessment Support Pack (ASP) for this Unit provides assessment and marking guidelines that exemplify the national standard for achievement. It is a valid, reliable and practicable instrument of assessment. Centres wishing to develop their own assessments should refer to the ASP to ensure a comparable standard. A list of existing ASPs is available to download from SQA's website (<http://www.sqa.org.uk/sqa/46233.2769.html>).

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.

National Unit specification: Statement of standards

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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.

Outcome 1

Explain the basic concepts of Utility Services supplied to domestic buildings and their method of entry into the building.

Performance Criteria

- (a) Identify the range of utilities required for domestic properties.
- (b) Explain how these utilities are sourced and distributed to domestic properties.
- (c) Explain the correct method of entry into domestic buildings for the above utilities.

Outcome 2

Identify the materials used in the supply of utility services to domestic buildings.

Performance Criteria

- (a) Identify the materials used in the distribution of the utilities servicing domestic properties.
- (b) Explain the factors influencing the material selection and design of the utilities servicing domestic properties.
- (c) Identify new and sustainable technologies being used in the supply of utility services to domestic buildings.

Outcome 3

Explain basic layouts of supply and distribution of services within domestic buildings.

Performance Criteria

- (a) Explain the factors influencing the design, installation and layout of below and above ground drainage systems
- (b) Explain the factors influencing the design, installation and layout of cold and hot water supply systems.
- (c) Explain the factors influencing the design, installation and layout of heating systems
- (d) Explain the factors influencing the design, installation and layout of electrical systems.

National Unit specification: Statement of standards (cont)

Unit title: Domestic Building Services (SCQF level 5)

Evidence Requirements for this Unit

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

Written and/or recorded oral evidence is required to demonstrate that the learner has achieved this Unit to the standard specified in the Outcomes and Performance Criteria. The evidence for this Unit should be obtained under controlled, supervised conditions. The assessment will be closed-book. Learners will not be allowed access to course notes or reference to their own notes. Outcomes may be assessed on an individual or combined basis or a final end of Unit assessment. Total assessment time should not exceed more than 2 hours.

In this Unit an appropriate instrument of assessment would be a question paper based on case study material, consisting of a balance of short answer, restricted response and structured questions which would include annotated drawings.

Evidence will be gathered at appropriate points throughout the delivery of the Unit. Assessments must be manageable and practicable for centres and learners.

Centres should provide learners with a case study consisting of a typical domestic site showing relevant delineating boundaries and containing a domestic building from which to answer questions to demonstrate their knowledge of the standards specified in the Outcomes and Performance Criteria.

Evidence Requirements for this Unit

Written and Graphical evidence is required to demonstrate that the learner has achieved this Unit to the standard specified in the Outcomes and Performance Criteria. The evidence for this Unit should be obtained under controlled, supervised conditions. The assessment will be closed-book and should last no more than 2 hours.

Evidence will be gathered through a closed-book assessment on completion of delivery of the Unit. Assessment must be manageable and practicable for centres and should last no longer than 2 hours duration.

In this Unit an appropriate instrument of assessment would be a question paper based on case study material, consisting of a balance of short answer, restricted response and structured questions which could include annotated drawings.

Evidence will be gathered at appropriate points throughout the delivery of the Unit.

Assessments must be manageable and practicable for centres and learners.

Centres should provide learners with a case study of a typical domestic building plot and low rise building on which to answer questions to demonstrate their knowledge of the standards specified. This should be based on a sample of the topics covered in the delivery of the Outcomes and Performance Criteria outlined.

National Unit specification: Statement of standards (cont)

Unit title: Domestic Building Services (SCQF level 5)

Although delivery of the Unit will cover all of the points below for each Outcome, assessment of these Outcomes must cover the following:

Outcome 1

A minimum of two from section (a), four from section (b) and two from section (c)

Learner must provide evidence of correct identification of the following utilities by way of written text and/or annotated graphical layout:

- (a) Drainage Sewers (Foul Water Sewer) & (Surface Water Sewer)
 - Water
 - Electricity
 - Gas
 - Communications

- (b) Foul water sewer
 - Surface water sewer
 - Wells deep and shallow
 - Springs
 - Reservoirs
 - Dams
 - Treatment plants
 - Gas fields storage and distribution
 - Cable, fibre optic

- (c) Installation depths of services
 - Protection of services on entry
 - Lintels
 - Sleeving
 - Dpm

Outcome 2

A minimum of two from section (a), four from section (b) and two from section (c).

Learners must provide evidence of correct identification of the materials used in the following in the following installations by way of written text:

- (a) Sewage Treatment Plant,
 - Water Supply sources
 - Electrical Supply
 - Gas Supply
 - Communications Media

- (b) Material type
 - Strength
 - Corrosion resistance
 - Pressure requirements
 - Jointing methods

National Unit specification: Statement of standards (cont)

Unit title: Domestic Building Services (SCQF level 5)

- (c) Sewage Disposal
 - Water treatment
 - Solar
 - Wind
 - Ground Source heat

Outcome 3

A minimum of four from section (a), two from section (b) and one from section (c) two from section (d).

Learners must provide evidence by producing a descriptive text and graphical layout explanation of the following:

- (a) Trench excavation
 - Simple and Economic Design
 - Flow Capacity requirements
 - Gradient
 - Regulations
 - Single stack system
 - Syphonic Action
- (b) Direct Cold
 - Indirect Cold
 - Direct Hot
 - Indirect Hot
 - Regulations
- (c) Two pipe small bore system
 - Two pipe micro bore system
 - Identification of major components in above systems
- (d) Main cable intake into property
 - Consumer Unit
 - Circuit protection

Evidence is required to demonstrate that the learner understands the appropriate utility services for serviced plots normally associated with domestic buildings and the materials used in their distribution. These should include those such as, water, drainage, gas, electricity and communications.

A demonstrated knowledge and understanding of basic materials and layouts of drainage systems from the below ground drainage connection to the above ground single stack will be required combined with that of, basic gravity cold and hot water systems.

An understanding of a basic heating system layout suitable for a domestic building and a basic electrical supply and distribution system must complete the Outcomes. This can be achieved through a series of questions and the completion of annotated graphical layouts which illustrate the technology and component location within the systems.



National Unit Support Notes

Unit title: Domestic Building Services (SCQF level 5)

Unit Support Notes are offered as guidance and 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 developed as a mandatory Unit in the National Certificate Built Environment at SCQF level 6 and an optional Unit in the National Certificate Civil Engineering at SCQF level 6 and can also be delivered as a free-standing Unit.

The purpose of this Unit is to develop an understanding of the provision of utility services including entry methods, layout, materials and components used in domestic buildings. It is aimed at learners with no previous knowledge of building services engineering.

There are various ways in which the requirements placed on building services systems within domestic buildings may be met. Basic systems may be suited to an application depending on the particular circumstances involved. The learner should be able to justify the selection of a particular system for a given building and, after this selection, be able to sketch illustrated layouts and produce annotated notes for the system.

Outcome 1 (8 hours) provides learners with an introduction to the identification of individual utility services. The learner should also have the ability to identify sources and distribution of these services. They will finally have an understanding of associated regulatory entry methods into a site and domestic building.

Outcome 2 (8 hours) provides the learner with an understanding of the materials and distribution of utility services. The learners should be introduced to the factors influencing the selection and choice of materials and distribution methods.

Outcome 3 (24 hours) introduces the learners to the basic design, layout and major components of below ground and above ground drainage system, cold and hot water supply and distribution, basic space heating and basic electrical supply and distribution within a domestic building. The aim is for them to be able to understand and produce basic layouts for all of the previous systems.

National Unit Support Notes (cont)

Unit title: Domestic Building Services (SCQF level 5)

Below and above ground drainage should introduce the learner to basic layout of, below ground, the separate or combined system and for above ground, the single stack system. These should all be referred as per the current Building Services Design criteria. The learners should be introduced to the factors, which may influence the choice of system.

The learners should be introduced to the factors, which influence the choice of system for cold and hot water systems and should enable the learner to understand and produce basic layouts for gravity storage and supply to cold and hot water domestic outlets. It should provide the learners with an understanding of basic safe and hygienic water supplies including the use Byelaw kits 30, 60.

The content of this section should be restricted to gas-fired wet central heating and electric storage heating. The learners should be introduced to a typical basic wet central heating system such as the two pipe, Low Temperature Hot Water (LTHW) small or micro bore systems, the room sealed boiler, and radiators as heat emitters. Electric heating should enable the learner to understand basic electric storage heating layout and components control. The layout from main intake cable to consumer Unit through to distribution of basic lighting and power circuits, as well as protective devices should be covered.

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.

This Unit will provide the necessary underpinning knowledge for the learner to develop sufficient skills to allow them to progress to HN level 7 and 8 or SVQ level 3 studies in construction related awards or alternatively into employment in a construction related career.

This Unit has been developed as part of a group of building services Units. There are two other Units in the group entitled *Building Services: An Introduction* and *Building Services in Large Buildings*. This Unit at SCQF level 5 is a mandatory Unit within the new NC Built Environment award and an option in the NC Civil Engineering Award.

The two Units mentioned in the previous paragraph have been developed as an integrated suite of Units to meet all the building services requirements of the new 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 insight into building services principles these Units also provide important underpinning knowledge, understanding and skills for other parts of the HNC and HND Built Environment awards. The underpinning knowledge gained through successful completion of this Unit would also integrate well with transferring the theoretical elements and skills into both SVQ and employment practical skills development.

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 Building Services Units and because the assessment support pack (ASP) for this Unit is based on the Knowledge and/or Skills and list of topics in each of the Outcomes.

National Unit Support Notes (cont)

Unit title: Domestic Building Services (SCQF level 5)

Guidance on approaches to delivery of this Unit

For most learners, this Unit will serve as an introduction to building services. It is therefore intended to give learners a general appreciation of the principles and layouts of services installations for enhancement of further study.

This Unit offers considerable scope for the use of case studies, project work and practical investigations, as well as visits to services installations and the use of visiting speakers.

The Unit also allows for individual learner research guided by the delivering lecturer on all areas of the topic. Illustration by means of photographs, slides and videos should be considered and examination of existing installations and interpretation of existing and proposed site and utility provision drawings should be arranged where possible. Use should be made of Building Research Establishment digests, information papers, and good practice guides; defect action sheets and BRECSU good practice case studies.

Centre should provide learners with a case study consisting of a typical domestic site showing relevant delineating boundaries and containing a domestic building from which to answer questions to demonstrate their knowledge of the standards specified in the Outcomes and Performance Criteria.

Guidance on approaches to assessment of this Unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

Suggested types of assessment may be as follows;

All Outcomes 1, 2, and 3 may be assessed on an individual basis: closed-book.

Alternatively;

All Outcomes 1, 2, and 3 may be assessed as a Case Study final end of Unit assessment: closed-book.

Outcome 1

- (a) Identify the range of utilities required for domestic properties through short answer and or restricted response questions/list.
- (b) Explain how these utilities are sourced and distributed to domestic properties through brief descriptive text and graphical layouts
- (c) Identify by use annotated sketches and explain the correct method of entry into domestic buildings for the above utilities

All three PCs 25 minutes duration.

National Unit Support Notes (cont)

Unit title: Domestic Building Services (SCQF level 5)

Outcome 2

- (a) Identify the materials used in the distribution of the utilities servicing domestic properties through short answer or restricted response questions/list.
- (b) Explain the factors influencing the material selection and design of the utilities servicing domestic properties through brief descriptive text.
- (c) Identify and explain new and sustainable technologies being used in the supply of utility services to domestic buildings through short answer or restricted response questions/list.

All three PCs 25 minutes duration.

Outcome 3

- (a) Explain the factors influencing the design, installation and layout of below and above ground drainage systems through brief description and or annotated graphical sketch of layout.
- (b) Explain the factors influencing the design, installation and layout of Cold and Hot water supply systems through brief description and or annotated graphical sketch of layout.
- (c) Explain the factors influencing the design, installation and layout of heating systems through brief description and or annotated graphical sketch of layout.
- (d) Explain the factors influencing the design, installation and layout of Electrical systems through brief description and or annotated graphical sketch of layout.

All three PCs 70 minutes duration.

The Assessment Support Pack (ASP) for this Unit provides sample assessment material. Centres wishing to develop their own assessments should refer to the ASP to ensure a comparable standard.

Opportunities for 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 social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at www.sqa.org.uk/e-assessment.

National Unit Support Notes (cont)

Unit title: Domestic Building Services (SCQF level 5)

Opportunities for developing Core and other essential skills

In this Unit learners will be:

- ◆ completing sketches
- ◆ completing written responses
- ◆ research

These offer opportunities to develop aspects of the Core Skills of:

- ◆ *Problem Solving*
- ◆ *Communications*
- ◆ *ICT*

Problem Solving, Communication and *ICT* are a fundamental part of the construction process. By learning the principles in this Unit, learners will be able to transfer these skills to obtain a deeper understanding of these principles as they progress to further studies or employment. The examples used in this Unit are an everyday part of the construction process and learners should be familiar with these principles to ensure seamless progression to HNC/HND level studies and then to articulate to University or pursue a career in the construction industry. Learners will be also be able through other embedded Core Skills such as, good punctual timekeeping, effective planning of resources and time and working on their own initiative to solve many of these course subject related problems. Learners will also work towards being, a valuable member of the construction process as part of a team, which will then allow them to complete the Core Skills suite with the inclusion of the *Working with Others* element while developing their employability, enterprise, citizenship and sustainable development.

Core Skill	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5
Problem Solving	✓	✓	✓		
Communication	✓	✓	✓		
ICT	✓	✓	✓		

Learners will be able to improve and demonstrate their core and essential skills development through working with others in problem solving exercises while demonstrating effective communications in both written and verbal contexts through collaboration with other learners. This will be enhanced with embedded good timekeeping skills and deadline meeting goals achievement all improving employability and citizenship.

History of changes to Unit

Version	Description of change	Date

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General information for learners

Unit title: Domestic Building Services (SCQF level 5)

This section will help you decide whether this is the Unit for you by explaining what the Unit is about, what you should know or be able to do before you start, what you will need to do during the Unit and opportunities for further learning and employment.

The construction industry uses many different types of utility services to produce the end result which may be a house, a shopping centre, offices, a bridge, roads, etc. These are used for many different purposes to allow the occupants or users of the domestic building to carry out their varied activities in safe hygienic and comfortable conditions.

These utility services require very good inter discipline and provider communications and co-ordination to be effectively sourced and installed. They also cover many different materials and diagrammatic layouts to be formed during the planning and installation phases.

You should be able to understand these basic concepts and this Unit will give you the skills and knowledge that are required to develop your learning and education for further studies in the construction industry in general and in particular in your advancement in building services through to the HN and Degree levels of study.

The construction industry uses many different types of utility services external to a buildings boundary and connected to its internal systems for the provision of safe and hygienic occupation and use. This is to produce the end result that may be a domestic house. This Unit will provide the learner with a knowledge and understanding of what these services are, Below and Above Ground Drainage, Cold and Hot Water, Electricity, Gas and Communications. Where these services originate and how they are transferred from source to and through the boundary of a domestic property.

You should on successful completion of this Unit be able to understand and identify the range of utilities required for domestic properties and demonstrate this knowledge through correctly answering short answer and or restricted response questions/list. Explain how these utilities are sourced and distributed to domestic properties through brief descriptive text and graphical layouts and identify them by use of annotated sketches while providing an explanation of the correct method of entry into domestic buildings for the above utilities.

You will be able to Identify the materials used in the distribution of the utilities servicing domestic properties and will through short answer or restricted response questions/list show an understanding of these.

You will also be able to explain the factors influencing the material selection and design of the utilities servicing domestic properties; this will be achieved through brief descriptive text. Identifying and explaining new and sustainable technologies being used in the supply of utility services to domestic buildings will be embedded throughout and short answer or restricted response questions/list will provide evidence of the learners understanding.

You will be able to explain the factors influencing the design, installation and layout of below and above ground drainage systems through brief description and or annotated graphical sketch of layout and this will provide them with an integral insight and understanding of how the individual systems connect and operate to provide safe hygienic sanitary conditions within a domestic building.

General information for learners (cont)

Unit title: Domestic Building Services (SCQF level 5)

You will be able to explain the factors influencing the design, installation and layout of Cold and Hot water supply systems through brief description and or annotated graphical sketch of layout and this will provide them with an integral insight and understanding of how the individual systems perform individually and interconnect to supply the domestic property with basic, safe and hygienic water supplies.

You will be able to explain the factors influencing the design, installation and layout of basic heating systems through brief description and or annotated graphical sketch of layout. This will provide the learner with an integral insight and understanding of the pre design requirements of thermal comfort and how this is related and transferred into the basic individual systems, how they connect and operate to provide thermal comfort to the property and its occupants.

You will be able to explain the factors influencing the design, installation and layout of basic distribution, intake, and power and lighting electrical systems within a domestic building through brief description and or annotated graphical sketch of layout. This will provide them with an understanding of the basic concepts of the provision.

The assessment for this Unit will be in the form of one closed-book assessment based on the above information consisting of a series of questions lasting no longer than 2 hours. A case study will be supplied and the pass mark will be 60%

This SCQF level 5 Unit will give you the skills and knowledge that are required to develop your learning and education for further studies academically, by providing the underpinning knowledge to progress to HNC/HND SCQF level 7/8 where the two Units Building Services: An Introduction and Building Services in Large Buildings exist. This would then also provide relevant content should the learner then decide they wish to articulate to any relevant Built Environment Degree course at SCQF level 9/10 or decide to enter directly into the Construction Industry.

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