



## **National Unit specification: general information**

**Unit title:** Domestic Underfloor Heating Systems

**Unit code:** FF2G 12

**Superclass:** XH

**Publication date:** February 2011

**Source:** Scottish Qualifications Authority

**Version:** 01

### **Summary**

This Unit is designed to provide candidates with the necessary knowledge and understanding of the provision of domestic underfloor heating systems. The Unit will introduce candidates to the basic design principles, systems components and characteristics of domestic underfloor heating systems. The Unit will also introduce candidates to fundamental health and safety and installation requirements.

The Unit is suitable for candidates who are undertaking this study for the first time or wish to obtain a basic knowledge of domestic underfloor heating systems. The Unit will allow for those currently employed in the building services industry to develop further knowledge specifically related to domestic underfloor heating systems.

### **Outcomes**

- 1 Describe the basic design principles of a domestic underfloor heating system.
- 2 Describe typical domestic underfloor heating systems, their components, characteristics and issues of installation.
- 3 State the relevant Standards, Regulations and Codes of Practice used when installing and commissioning domestic underfloor heating systems.

### **Recommended entry**

Entry is at the discretion of the centre.

## **National Unit specification: General information (cont)**

**Unit title:** Domestic Underfloor Heating Systems

### **Credit points and level**

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

*\*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.*

### **Core Skills**

Opportunities to develop aspects of Core Skills are highlighted in the support notes of this Unit specification.

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

## **National Unit specification: statement of standards**

### **Unit title: Domestic Underfloor Heating Systems**

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**

Describe the basic design principles of a domestic underfloor heating system.

##### **Performance Criteria**

- (a) Describe correctly the principles of a warm water underfloor heating system.
- (b) Describe correctly the operation of an underfloor heating system and its components.
- (c) Describe correctly the suitability of a house selected to be used with an underfloor heating system.
- (d) State the main advantages of using underfloor heating against that of a traditional system.
- (e) Describe correctly the different types of underfloor heating systems on the market.

#### **Outcome 2**

Describe typical domestic underfloor heating systems, their components, characteristics and issues of installation.

##### **Performance Criteria**

- (a) Describe correctly the main points to take into account when deciding if the house is suitable for an underfloor heating system.
- (b) Describe correctly the underfloor systems and finishings associated with underfloor heating systems.
- (c) Describe correctly the process of sizing suitable underfloor systems.
- (d) Show by means of a basic sketch the specifications for different heat sources for an underfloor heating system.
- (e) Produce a working schedule for an underfloor heating installation.

## National Unit specification: statement of standards (cont)

**Unit title:** Domestic Underfloor Heating Systems

### Outcome 3

State the relevant Standards, Regulations and Codes of Practice used when installing and commissioning domestic underfloor heating systems.

#### Performance Criteria

- (a) State correctly the risks associated with installing and commissioning domestic underfloor heating systems
- (b) State correctly how the Water Regulations and Building standards apply to domestic underfloor heating systems.
- (c) State correctly the basic need for earthing requirements for underfloor heating systems
- (d) State clearly how to minimize risk for personnel when installing underfloor heating systems.
- (e) State correctly basic planning requirements and procedures in relation to the installation of an underfloor heating system.

#### Evidence Requirements for this Unit

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

Written and/or recorded oral evidence should be produced to demonstrate that the candidate has achieved all the Outcomes and Performance Criteria. The evidence should be produced in the form of 'open-book' supervised and controlled conditions.

### Outcome 1

- (a) The candidate must correctly describe the heat transfer process through the heated floor surface in respect of the following floor construction types:
  - ◆ solid/screed
  - ◆ timber
  - ◆ floating floors
- (b) The candidate must correctly describe the operation of the main components of an underfloor heating system. This description must include:
  - ◆ manifold
  - ◆ thermostat
  - ◆ zone control

## National Unit specification: statement of standards (cont)

### Unit title: Domestic Underfloor Heating Systems

- (c) The candidate must correctly describe the importance of the floor coverings and the effects it can have on the underfloor heating system. This description must include:
- ◆ laminate
  - ◆ ceramic tiles
  - ◆ carpet
- (d) The candidate must state at least two of the following advantages of an underfloor heating system over a traditional heating system:
- ◆ energy efficient
  - ◆ uniform heat
  - ◆ low maintenance
  - ◆ greater level of comfort
- (e) The candidate must correctly describe at least two different types of systems on the market from the following:
- ◆ suspended floor
  - ◆ float floor
  - ◆ solid floor

### Outcome 2

- (a) The candidate must correctly describe the importance of the efficiency of the house when installing underfloor heating systems. This description must include the following types of heat loss:
- ◆ conduction
  - ◆ convection
  - ◆ radiant
- (b) The candidate must correctly describe the following underfloor systems and associated finishings:
- ◆ single zone
  - ◆ extended system
  - ◆ full house system
- (c) The candidate must correctly describe the process for sizing underfloor heating systems. This description must include:
- ◆ pipework lay outs
  - ◆ identifying pipe work configurations
  - ◆ spiral pattern
  - ◆ meander pattern
  - ◆ bifilar pattern

## National Unit specification: statement of standards (cont)

### Unit title: Domestic Underfloor Heating Systems

(d) The candidate must show by means of a basic sketch the specifications for the following different heat sources:

- ◆ solar
- ◆ boiler
- ◆ ground source
- ◆ air source

The sketch must identify the following controls:

- ◆ manifold
- ◆ mixing valve
- ◆ zone control
- ◆ room thermostats

(e) The candidate must produce a working schedule for an underfloor heating system installation using the manufacturer's instructions in conjunction with a checklist.

### Outcome 3

(a) The candidate must correctly state at least two main risks associated with the installation and commissioning of domestic underfloor heating systems for both concrete and timber flooring. Risks for concrete must include:

- ◆ curing time for slab
- ◆ notching the joists
- ◆ installation beneath the floor
- ◆ floor surface
- ◆ floor tog rating

Risks for timber must include:

- ◆ notching the joists
- ◆ installation beneath the floor
- ◆ floor surface
- ◆ floor tog rating

(b) The candidate must correctly state which Water Regulations, Building standards and Codes of Practice apply to all domestic underfloor heating systems in respect of two pipework materials.

(c) The candidate must correctly state the size and positioning of the earthing requirements for underfloor heating systems.

## National Unit specification: statement of standards (cont)

**Unit title:** Domestic Underfloor Heating Systems

(d) The candidate must correctly state how to minimize four main risks for personnel when installing underfloor heating systems for both concrete and timber flooring. Risks for concrete must include:

- ◆ curing time for slab notching the joists
- ◆ installation beneath the floor
- ◆ floor surface
- ◆ floor tog rating

Risks for timber must include:

- ◆ notching for joists
- ◆ installation beneath the floor
- ◆ floor surface
- ◆ floor tog rating

(e) The candidate must correctly state the basic planning requirements, procedures and relevant manufacturer's instructions including site survey, risk assessments and plan of work for both concrete and timber flooring.

## National Unit specification: support notes

### Unit title: Domestic Underfloor Heating Systems

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

#### Outcome 1

All the following should be covered:

- (a) The candidate must be able to demonstrate that he/she understands the heat transfer process, and understands the different floor construction to be used with underfloor heating such as; floating floors, timber flooring, solid or screed flooring.
- (b) The candidate must be able to demonstrate that he/she understands the operation of the main components, of an underfloor heating system. Example; pipework, manifold, zone valves, thermostats.
- (c) The candidate must show that he/she understands the importance of the floor coverings and the effects it has on the underfloor heating system. Examples; carpet, laminate, tiles.
- (d) The candidate must give at least two examples providing the advantages over a traditional heating system. This can include; energy efficiency, low maintenance, uniform heat throughout the property.
- (e) The candidate must be able to show that he/she has knowledge of general installation, and the different types of systems on the market (floating floor, solid floor or suspended floor installation).

#### Outcome 2

All the following should be covered:

- (a) The candidate must be able to demonstrate that he/she understands the importance of the efficiency of the house when installing underfloor heating systems, looking at heat loss.
- (b) The candidate will have to show that he/she understands different underfloor systems, such as single zone, extended system and full house system.
- (c) The candidate must be able to show that he/she understands pipe work lay outs, and identify pipe work configurations such as spiral pattern or meander patten depending on the manufacturer.
- (d) The candidate must also show that he/she understands the specifications for different heat sources, and understands the control systems. This can be achieved by identification of different controls. Examples; zone controls, room stats, mixing valves.
- (e) The candidate must correctly show that he/she can produce a working schedule for an underfloor heating system installation. This can be achieved by using manufacturer's instructions in conjunction with a checklist.



## National Unit specification: support notes (cont)

**Unit title:** Domestic Underfloor Heating Systems

### Outcome 3

Within the delivery of this unit current relevant regulations, standards and codes of practice associated with respect to domestic underfloor heating systems should be integrated in the teaching and learning process.

Candidates must be able to identify and describe the risks associated with installing and using domestic underfloor heating systems. Candidates must take measures to minimise risks. In particular, the following risks should be detailed: contamination of water, frost and excess temperature protection, installation of pipe work and materials to meet building standards and regulations.

### Guidance on learning and teaching approaches for this Unit

This unit is to be delivered using a variety of learning and teaching approaches such as structured lessons with formative and summative assessments; in addition to practical demonstration of components and characteristics of domestic underfloor heating systems. This unit is not intended to endorse successful candidates as competent operatives of domestic underfloor heating systems.

The evidence may be produced on one or more than one assessment occasion. A suitable instrument of assessment covering all outcomes could be by short answer, restricted response and structured questions, lasting no more than ninety minutes in duration.

### Opportunities for developing Core Skills

There may be opportunities for the candidate to develop aspects of the Core Skills of Communication, Working with Others, Numeracy and Problem Solving at SCQF level 5. Elements of *Numeracy* at SCQF level 5 may be developed in Outcomes 1 and 2 where various aspects of theory require numerical skills particularly carrying out calculations associated with planning.

The Core Skill *ICT* at SCQF level 5 may be developed in Outcomes 1, 2 and 3 where candidates may use research from the internet.

The Critical Thinking component of *Problem Solving* at SCQF level 5 may be developed in Outcome 1 while candidates are interpreting drawings and practically planning artefacts. The Planning and Organising component of *Problem Solving* at SCQF level 5 may be developed as candidates undertake theory and practical activities if the centre has working models. Also in Outcomes 1, 2 and 3 when candidates are developing electrical and plumbing skills.

Elements of *Working with Others* Core Skill at SCQF level 4 may be developed in Outcomes 1 and 2 while candidates complete design and installation calculations whilst working co-operatively with others.

## **National Unit specification: support notes (cont)**

**Unit title:** Domestic Underfloor Heating Systems

### **Guidance on approaches to assessment for this Unit**

This unit is to be delivered using a variety of learning and teaching approaches such as structured lessons with formative and summative assessments; in addition to practical demonstration of components and characteristics of domestic underfloor heating systems. This unit is not intended to endorse successful candidates as competent operatives of domestic underfloor heating systems.

### **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)*.

### **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](http://www.sqa.org.uk/assessmentarrangements)

## History of changes to Unit

Version	Description of change	Date

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