



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

**Unit title:** Domestic Woody Biomass Heating Systems

**Unit code:** FF2K 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 woody biomass heating systems. The Unit will introduce candidates to the basic design principles, systems components and characteristics of domestic woody biomass 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 woody biomass heating systems. The Unit will allow for those currently employed in the building services industry to develop further knowledge specifically related to domestic woody biomass heating systems.

### **Outcomes**

- 1 Describe the basic principles of domestic woody biomass heating systems installation.
- 2 Describe the typical domestic woody biomass heating system design and planning for new and existing installations.
- 3 State the relevant standards, Regulations and Codes of Practice used when installing and commissioning domestic woody biomass heating systems.

### **Recommended entry**

Entry is at the discretion of the centre.

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

**Unit title:** Domestic Woody Biomass 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 Woody Biomass 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 principles of domestic woody biomass heating systems installation.

##### **Performance Criteria**

- (a) Describe correctly the means of transferring heat through the domestic biomass boiler.
- (b) Describe correctly the major components in the installation of a domestic biomass heating system.
- (c) Describe correctly the suitability of a domestic biomass installation for a given house.
- (d) Describe correctly the importance of moisture in the fuel for a domestic biomass system.

#### **Outcome 2**

Describe the typical domestic woody biomass heating system design and planning for new and existing installations.

##### **Performance Criteria**

- (a) Describe correctly the main points to be taken into account when deciding if the home is suitable for a domestic biomass heating system.
- (b) Describe correctly the relevant issues when positioning and fixing a domestic biomass boiler and store.
- (c) Describe correctly the process of sizing suitable domestic biomass heating systems.
- (d) Show by means of a basic sketch the domestic biomass heating system installation for a basic 2-4 bedroom house.
- (e) Produce a work schedule for a domestic biomass heating system installation.

#### **Outcome 3**

State the relevant standards, Regulations and Codes of Practice used when installing and commissioning domestic woody biomass heating systems.

##### **Performance Criteria**

- (a) State correctly the risks associated with installing and commissioning a domestic biomass heating system.
- (b) State correctly how the Water Regulations and Building Standards apply to domestic biomass heating systems.
- (c) State correctly how to minimize risk for personnel when installing domestic biomass heating systems.
- (d) State correctly the basic need for earthing requirements for domestic biomass heating system installations.

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

**Unit title:** Domestic Woody Biomass Heating Systems

### 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.

The evidence may be produced on one or more than one assessment occasion.

#### Outcome 1

(a) The candidate must correctly describe the means of the heat transfer process from the following:

- ◆ burner
- ◆ heat exchanger
- ◆ heating system
- ◆ hot water store

for at least one of the following fuel types: fuel logs, chips and pellets.

(b) The candidate must correctly describe at least four of the following main components of a domestic biomass heating system:

- ◆ type of boiler
- ◆ buffer tank
- ◆ pumps flow and return pipe work
- ◆ motorised valves
- ◆ cylinder stats
- ◆ tanks
- ◆ heat
- ◆ leak radiator

for at least one of the following fuel types: fuel logs, chips and pellets.

(c) The candidate must state at least two advantages of using domestic biomass heating systems against that of a traditional heating system.

(d) The candidate must correctly describe the importance of moisture content in at least one of the following fuel types: fuel logs, chips or pellets.

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

**Unit title:** Domestic Woody Biomass Heating Systems

### Outcome 2

(a) The candidate must correctly state the following points regarding building efficiency and the effect this has on the selection of a domestic biomass heating system or traditional system:

- ◆ wall insulation
- ◆ window type
- ◆ roof insulation
- ◆ type, size and location of house
- ◆ space for boiler
- ◆ hot water storage
- ◆ wood store
- ◆ access for fuel

for at least one of the following fuel types: fuel logs, chips or pellets.

(b) The candidate must correctly describe the relevant issues when positioning and fixing a domestic biomass boiler and hot water storage both internally and externally using the manufacturer's instructions.

(c) The candidate must correctly describe the process of sizing domestic biomass heating systems to a given brief for at least one of the following fuel types: fuel logs, chips or pellets.

(d) The candidate must produce a basic sketch showing the lay-out of a domestic biomass heating system installation for a 2-4 bed house for at least one of the following fuel types: fuel logs, chips or pellets. This may be achieved by a lined diagram of the wood store, biomass boiler to the emitters, and hot water storage from a given brief.

(e) The candidate must produce a work schedule for a given house from the start of the installation to completion. The candidate must use the manufacturer's instructions in conjunction with a checklist.

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

**Unit title:** Domestic Woody Biomass Heating Systems

### Outcome 3

- (a) The candidate must clearly state the risks associated with installing and commissioning domestic biomass heating systems. This must include:
- ◆ contamination of water
  - ◆ earthing
  - ◆ frost temperature protection
  - ◆ excess temperature protection
  - ◆ installation of boiler
  - ◆ heat stores
  - ◆ wood stores
  - ◆ pipe work support both structural and thermal
- (b) The candidate must clearly state how the Water Regulations and Building Standards apply to domestic biomass heating systems.
- (c) The candidate must clearly state how to minimize risk for personnel when installing domestic biomass heating systems.
- (d) The candidate must clearly state the basic need for earthing requirements for domestic biomass heating system installations.

## **National Unit specification: support notes**

### **Unit title: Domestic Woody Biomass 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**

The candidate must be able to demonstrate understanding of the heat transfer process from burner - heat exchanger - heating system and hot water store in conjunction with manufacturer's instruction and NOS. The use of a working model for this would be of help but not a requirement.

The candidate must be able to demonstrate that he/she understands the operation of the main components of a biomass heating system. This may be achieved by using manufacturers' instructions and NOS. The use of a working model for this would be of help but not a requirement.

The candidate must show that he/she understands the importance of the building efficiency and the effect it has on selection of biomass system or conventional system.

The candidate must give at least two answers proving the advantages over a traditional heating system.

The candidate must be able to show that he/she understands the importance of moisture content in the fuel logs, chips or pellets. This may be achieved by using moisture gauges on selected pieces of wood.

#### **Outcome 2**

The candidate must be able to show that he/she understands the size and location of the house may affect the suitability of a biomass boiler being installed, space for boiler, hot water storage, wood store and access for fuel. This may be achieved by using manufacturers' instructions and NOS.

The candidate must be able to show that he/she understands the standards for positioning a biomass boiler and hot water storage internally and externally using manufacturers' instructions or NOS.

The candidate must be able to show that he/she understands how to size biomass heating systems available: log, chip or pellet. This may be achieved by giving the candidate a given brief using manufacturers' instructions and NOS.

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

### **Unit title: Domestic Woody Biomass Heating Systems**

The candidate must be able to show that he/she understands the basic layout of a biomass heating system installation for a 2-4 bed house: log, chip or pellet. This may be achieved by a lined diagram of the wood store, biomass boiler to the emitters, and hot water storage. The candidate could be given a brief using manufacturer's instructions and NOS.

The candidate must show that he/she can produce a work schedule for the above house from start of the installation to completion. This may be achieved by using manufacturers' instructions and a checklist.

### **Outcome 3**

Within the delivery of this Unit current relevant regulations, standards and codes of practice with respect to domestic biomass 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 biomass systems. Candidates must take measures to minimise risks. In particular, the following risks should be detailed: contamination of water, earthing, frost and excess temperature protection, installation of boiler, heat stores, wood stores and associated pipe work support both structural and thermal.

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

It is recommended that the Outcomes are delivered in the sequence presented in the Unit specification. The Unit may be delivered by a combination of lectures, tutorial work and practical laboratory work. The Unit should be taught very much in a plumbing electrical/energy context and as such relevant plumbing electrical/energy examples should be used throughout Unit delivery.

While the majority of the Unit can be delivered in a classroom, centres should allow candidates to undertake practical experiments so that they have opportunities to relate theory learnt in the classroom to practice. For example, where biomass equipment exists candidates should be allowed to carry out simple performance tests on these systems.

The Internet contains a rich source of materials on Renewable Energy and biomass installations. Candidates should be aware of the different regulations, climates etc when using non UK based web sites.

The Unit should be fully supported with relevant learning materials (eg handouts in paper and electronic form, textbooks, on-line materials etc.)

Examples should be used throughout Unit delivery.



## National Unit specification: support notes (cont)

**Unit title:** Domestic Woody Biomass Heating Systems

### Opportunities for developing Core Skills

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

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 and 2 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 Outcome 2 while candidates complete design and installation calculations whilst working co-operatively with others.

### Guidance on approaches to assessment for this Unit

Centres are encouraged to use formative assessment extensively as it plays a particularly important role in allowing candidates to develop a sound knowledge and understanding of biomass technologies.

Summative assessment may take the following form:

#### Outcomes 1, 2 and 3

Assessment may comprise of a single assessment paper covering the outcome and performance criteria requirements. The assessment paper should be taken at a single assessment event lasting 1 hour and comprise of a suitable balance of; multiple choice, short answer, restricted response or structured questions.

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

**Unit title:** Domestic Woody Biomass 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

© Scottish Qualifications Authority [2011]

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. Please contact the Customer Contact Centre, telephone 0845 279 1000.