



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

**Unit title:** Domestic Rainwater Harvesting Systems

**Unit code:** FF2L 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 rainwater harvesting systems. The Unit will introduce candidates to the basic design principles, systems components and characteristics of domestic rainwater harvesting systems. The Unit will also introduce candidates to fundamental health and safety and installation requirements.

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

### **Outcomes**

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

### **Recommended entry**

Entry is at the discretion of the centre.

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

**Unit title:** Domestic Rainwater Harvesting 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 Rainwater Harvesting 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 domestic rainwater harvesting systems.

##### **Performance Criteria**

- (a) Describe correctly the main usage for rainwater systems in a household.
- (b) Describe correctly the role of a rainwater harvesting unit in a drainage system.
- (c) Describe correctly the suitability of a house selected to be used with a rainwater unit.
- (d) State accurately the main advantages of using a rainwater harvesting system.
- (e) Describe correctly the different types of rainwater harvesting systems on the market.

#### **Outcome 2**

Describe typical domestic rainwater harvesting 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 a rainwater harvesting system with particular regard to pipework installation and positioning of the tank.
- (b) Describe correctly the relevant issues concerning the protection from contamination in the rainwater unit.
- (c) Describe correctly the process of sizing a suitable rainwater unit.
- (d) Describe correctly by means of a basic sketch a direct and indirect rainwater system.
- (e) Describe correctly and produce a working schedule for a rainwater installation.

#### **Outcome 3**

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

##### **Performance Criteria**

- (a) State accurately the risks associated with installing and commissioning rainwater systems
- (b) State clearly how the Water Regulations and Building standards apply to domestic rainwater systems.
- (c) State correctly which appliances can receive water from the rainwater harvesting system
- (d) State clearly how to minimize risk for personnel when installing rainwater systems.
- (e) State accurately basic planning requirements and procedures in relation to the installation of a rainwater harvesting system.

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

**Unit title:** Domestic Rainwater Harvesting 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.

#### Outcome 1

- (a) The candidate must correctly describe the following main uses of a rainwater harvesting unit:
- ◆ WC flushing
  - ◆ watering the garden
  - ◆ car washing
- (b) The candidate must correctly describe the role of a rainwater harvesting unit in a drainage system. This description must include the operation of the main components, as follows:
- ◆ tank
  - ◆ filter
  - ◆ pump
  - ◆ pipework
- (c) The candidate must correctly describe the suitability of a house for a rainwater harvesting unit. This must include calculation of the optimum storage for a rainwater harvesting system in litres.
- (d) The candidate must state at least two of the following main advantages of using rainwater to help reduce demand on water usage:
- ◆ reduced strain on the water mains at peak times
  - ◆ reduces localised flooding
  - ◆ re-uses water
  - ◆ good for the environment
- (e) The candidate must correctly describe the different types of rainwater harvesting systems for under-ground and above-ground units as follows:
- ◆ polyethylene
  - ◆ glass reinforced polyester
  - ◆ concrete

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

**Unit title:** Domestic Rainwater Harvesting Systems

### Outcome 2

- (a) The candidate must correctly describe the main points of consideration when deciding on the suitability of a rainwater harvesting system for a house as follows:
- ◆ direct
  - ◆ indirect
- (b) The candidate must correctly describe issues concerning protection of the stored rainwater from possible contamination (bacteria in the storage water).
- (c) The candidate must correctly describe the process of sizing a rainwater harvesting unit. This description must include how to calculate the size of the rainwater harvesting (RWH) unit from the following different roof configurations:
- ◆ flat
  - ◆ tiled
  - ◆ slated
  - ◆ collection area of roof
- (d) The candidate must show by means of a basic sketch the specifications for both direct and indirect systems. The sketch must clearly show:
- ◆ pump control
  - ◆ solenoid
  - ◆ filter
  - ◆ float switch
- (e) The candidate must correctly describe and produce a working schedule for a rainwater harvesting system. The schedule must include the following main maintenance tasks:
- ◆ check the roof and gutters
  - ◆ check and clean filters
  - ◆ visually inspect the tank
  - ◆ check the pump and float filter

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

**Unit title:** Domestic Rainwater Harvesting Systems

### Outcome 3

- (a) The candidate must state at least two main risks associated with the installation and commissioning of domestic rainwater harvesting systems from the following:
- ◆ excavation work
  - ◆ debris that could damage the system
  - ◆ dimensional clearances from structure and services
- (b) The candidate must clearly state the Water Regulations, Building standards and Codes of Practice that apply to all domestic rainwater harvesting systems in respect of pipework:
- ◆ drainage
  - ◆ entrance to house
  - ◆ pipework materials
- (c) The candidate must correctly state which appliances can receive water from the rainwater harvesting system such as WC, washing machines and garden equipment.
- (d) The candidate must correctly state how to minimize five of the following main risks for personnel when installing domestic rainwater harvesting systems:
- ◆ contamination of water
  - ◆ electrical safety
  - ◆ frost temperature protection
  - ◆ excess temperature protection
  - ◆ working in confined spaces
  - ◆ installation of pipework and materials
- (e) The candidate must correctly state the basic planning requirements, procedures and relevant manufacturers' instructions including site survey, risk assessments and plan of work for a domestic rainwater harvesting system.

## National Unit specification: support notes

### Unit title: Domestic Rainwater Harvesting 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 main usage of the rainwater harvesting unit such as for WC flushing, watering the garden, car washing.
- (b) The candidate must be able to demonstrate that he/she understands the operation of the main components, of a rainwater harvesting unit including filter, tank, pump and additional pipe work.
- (c) The candidate must show that he/she understands and can calculate the optimum storage for a rainwater harvesting system, depending on the roof area from where the rain water will be collected.
- (d) The candidate must give at least two examples providing the advantages of using rainwater such as collection of rainwater helps provide reduction in the usage of the main water pipes;- reusing the water is good for the environment and can help with localised flooding.
- (e) The candidate must be able to show that he/she has knowledge of general installation, and the different types of rainwater harvesting systems on the market. For example; polyethylene, glass reinforced polyester and concrete.

#### Outcome 2

All the following should be covered:

- (a) The candidate must be able to demonstrate he/she understands the different configurations of rainwater harvesting system that can be installed in a property, such as a direct or indirect system.
- (b) The candidate will have to show that he/she understands issues concerning protection of the stored rainwater from possible contamination from bacteria.
- (c) The candidate must be able to show that he/she understands how to calculate the size of the rain water harvesting unit from different roof configurations, flat, tiled slated and the collection area of the roof.
- (d) The candidate must also show that he/she understands the specifications for different systems (direct or indirect), and understands the control systems. This can be achieved by identification of different controls such as filter, float switch, pump controls.
- (e) The candidate must show that he/she can produce a working schedule for an installation in a property, from the start to completion; this can be achieved by using manufacturer's instructions and checklists. The information must include; inspection of the tank and filters, checking the float filter and the pumping unit, checking the gutters and the roof, check all installation pipework for damage or leaks.

## National Unit specification: support notes (cont)

**Unit title:** Domestic Rainwater Harvesting Systems

### Outcome 3

Within the delivery of this unit current relevant regulations standards and codes of practice associated with respect to domestic rainwater harvesting 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 rainwater harvesting systems. Candidates must take measures to minimise risks. In particular, the following risks should be detailed: contamination of water, electrical safety, frost and excess temperature protection, working in confined spaces, 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 rainwater harvesting systems. This unit is not intended to endorse successful candidates as competent operatives of domestic rainwater harvesting systems.

### Opportunities for developing Core Skills

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

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 Rainwater Harvesting Systems

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

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 90 minutes in duration.

### **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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