National Unit specification: general information

Unit title: Domestic Greywater Re-cycling Systems

Unit code: FF2M 12

Superclass: XH

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Version: 01

Summary

This Unit is designed to provide candidates with the necessary knowledge and understanding on the provision of domestic greywater re-cycling systems. The Unit will introduce candidates to the basic design principles, systems components and characteristics of domestic greywater re-cycling systems. The Unit will also introduce candidates to the issues relating to greywater, commissioning 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 greywater re-cycling systems. The Unit will allow for those currently employed in the building services industry to develop further knowledge specifically related to greywater.

Outcomes

1 Describe correctly domestic greywater re-cycling systems and components.
2 Describe correctly the issues relating to greywater re-cycling water quality.
3 State the relevant standards when installing and commissioning a domestic greywater re-cycling unit.

Recommended entry

Entry is at the discretion of the centre.

National Unit specification: General information (cont)

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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 Greywater Re-cycling 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 correctly domestic greywater re-cycling systems and components.

Performance Criteria

(a) Describe correctly why greywater systems are more suited to domestic dwellings rather than some commercial buildings.
(b) State correctly the average amount of greywater produced each day for a typical 4 bedroom home.
(c) Describe correctly the advantages of greywater recycling over that of other water harvesting systems.
(d) State the main advantages of membrane filtration systems.
(e) Show by means of a basic sketch the greywater harvesting system for a 2-4 bedroom house.
(f) Describe correctly the main components of a greywater unit.

Outcome 2

Describe correctly the issues relating to greywater re-cycling water quality.

Performance Criteria

(a) Describe correctly the time taken for anaerobic decomposition of greywater to cause problems in the water quality.
(b) Describe correctly the main aspects of water quality that need to be considered.
(c) Describe correctly the type of greywater system that meets the European Bathing Water Standards.
(d) Describe correctly the main risks associated with using greywater re-cycling systems.
(e) Describe correctly the safety considerations when using greywater in the garden.

Outcome 3

State the relevant standards when installing and commissioning a domestic greywater re-cycling unit.

Performance Criteria

(a) State correctly the reasons for and the importance of ventilation for greywater systems.
(b) State correctly the appliances that can discharge their waste water into the greywater unit.
(c) State correctly which appliances can receive water from the greywater system.

(d) State correctly the commissioning procedures for greywater systems including the British Standard.
(e) State correctly the maintenance requirements for greywater 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 under 'open-book' supervised and controlled conditions.

Outcome 1

(a) The candidate must correctly describe why greywater re-cycling systems are more suited to domestic rather than commercial buildings. This description must include reference to:

- amount of waste water in domestic homes
- amount of waste water in most commercial buildings
- manufacturer's instructions

(b) The candidate must correctly state the average amount of greywater produced each day for a typical 4 bedroom home.

(c) The candidate must correctly describe at least two advantages of greywater recycling over that of other water harvesting systems. This description must include:

- constant amount of water produced from greywater, so there is not as great a requirement on storage.

(d) The candidate must state at least two of the following main advantages of membrane filtration systems:

- water quality
- water uses (washing machines, WC and garden hoses)
- individual installations (some systems may be linked which may reduce the carbon load)

(e) The candidate must show by means of a basic sketch the greywater harvesting system for a 2-4 bedroom house. This sketch must be a lined diagram of the greywater system to the unit and appliances to receive the water and provide the water.

(f) The candidate must correctly describe the following main components of a greywater unit:

- pipework
- automatic mains back up
- overflow
- ventilation and pumps

Outcome 2

(a) The candidate must correctly describe the importance of anaerobic decomposition time of greywater and the problems this can cause in the water quality.

(b) The candidate must correctly describe at least the following three main aspects of water quality that need to be considered:

- microbiological
- chemical
- aesthetic

(c) The candidate must correctly describe the type of greywater system that meets the European Bathing Water Standards from the following:

- biological membrane filtration

(d) The candidate must correctly describe the main risks associated with using greywater re-cycling systems, as follows:

- pathogenic bacteria entering supply
- bacteria survival in supply
- risk at the end use.

(e) The candidate must describe correctly the safety considerations when using greywater in the garden. The greywater unit may only be used on the garden through a subsurface irrigation system.

National Unit specification: statement of standards (cont)

Unit title: Domestic Greywater Re-cycling Systems

Outcome 3

(a) The candidate must state the importance of ventilation for greywater systems in reducing smells from the system.

(b) The candidate must state the appliances that can discharge their waste water into the greywater unit as follows:

- showers
- baths
- wash hand basins

(c) The candidate must state which appliances can receive water from the greywater system as follows:

- WC
- washing machines
- garden depending on the filtration system.

(d) The candidate must state correctly the commissioning procedures for greywater systems including the British Standard required.

(e) The candidate must state correctly the maintenance requirements for greywater systems to minimise risk.

National Unit specification: support notes

Unit title: Domestic Greywater Re-cycling 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 following should be covered:

Knowledge of why greywater re-cycling systems are more suited to domestic rather than commercial buildings.

- Constant amount of water usage in most homes, however in some commercial buildings there is not the same useful amount of waste water. This may be achieved by using manufacturer's instructions.

- The average amount of greywater produced each day for a typical family home for four people.

- Main advantages of greywater recycling over that of other water harvesting systems. This may be achieved by comparing manufacturer's instructions on greywater units and rainwater units.

- State two main advantages of membrane filtration systems. This information will be found in British Standards or manufacturer's instructions.

- Basic sketch of a greywater harvesting system for a 2-4 bedroom house. This may be achieved by a lined diagram of the greywater system to the unit and appliances to receive the water and provide the water.

- The main components of a greywater unit such as overflow, ventilation, pumps, pipework, automatic mains back up. This information may be found in British Standards or manufacturer's instructions.

National Unit specification: support notes (cont)

Unit title: Domestic Greywater Re-cycling Systems

Outcome 2

- Time taken for anaerobic decomposition of greywater to cause problems in the water quality. This information may be found in British Standards or manufacturer's instructions.

- Three main aspects of water quality that need to be considered such as microbiological, chemical and aesthetic. This information may be found in British Standards or manufacturer's instructions.

- The type of greywater system that meets the European Bathing Water Standards such as biological membrane filtration.

- The main risks associated with using greywater re-cycling systems such as pathogenic bacteria entering supply, can the bacteria survive and can greywater cause a risk at the end use. This information may be found in British Standards or manufacturer's instructions.

- Safety considerations when using greywater in the garden.

Outcome 3

Within the delivery of this Unit current relevant regulations, standards and codes of practice associated with respect to domestic greywater 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 greywater installations. The candidate must take measures to minimise risks, commissioning procedures and maintenance. In particular, the following risks should be detailed:

- the appliances that can discharge their waste water into the greywater unit such as showers, baths, wash hand basins

- appliances can receive water from the greywater system such as WC flushing, subsurface irrigation of gardens and biological membrane filtration can be used for washing machines WC, and the garden

- the maintenance requirements for greywater systems

National Unit specification: support notes (cont)

Unit title: Domestic Greywater Re-cycling Systems

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 greywater 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 greywater 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 (e.g. handouts in paper and electronic form, textbooks, on-line materials etc.)

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 Outcome 1 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 Organisation 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 1 while candidates complete design and installation calculations whilst working co-operatively with others.

National Unit specification: support notes (cont)

Unit title: Domestic Greywater Re-cycling Systems

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 Greywater 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.

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 communications 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)*.

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.

An alternative is for candidates to achieve Outcomes and performance criteria through an integrated assignment. This will be continually be assessed in ‘open book’ conditions

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**.

History of changes to Unit

Version	Description of change	Date