National Unit specification: general information

Unit title: Building Services Engineering: Basic Refrigeration and Air Conditioning Operations (SCQF level 5)

Unit code: FT81 11

Superclass: TH

Publication date: April 2016

Source: Scottish Qualifications Authority

Version: 03

Summary

This is a mandatory unit of the d Building Services Engineering National Progression Award and is suitable for candidates with little or no previous engineering, technical or employment experience. Candidates will recognise and use a range of basic tools associated with the refrigeration and air conditioning (RAC) industry and will then go on to develop an understanding, through practical application, of how to use those tools in practical settings. Candidates will also be encouraged to develop an appreciation of their responsibilities in the workplace.

Outcomes

1 Recognise and safely use basic tools and materials associated with the RAC industry.
2 Demonstrate basic RAC operations.

Recommended entry

Entry is at the discretion of the centre.

Credit points and level

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

**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.*

General information (cont)

Unit title: Building Services Engineering: Basic Refrigeration and Air Conditioning Operations (SCQF level 5)

Core Skills

Achievement of this Unit gives automatic certification of the following Core Skills component:

- Critical Thinking at SCQF level 4

There are also opportunities to develop aspects of Core Skills which are highlighted in the Support Notes of this Unit specification.

National Unit specification: statement of standards

Unit title: Building Services Engineering: Basic Refrigeration and Air Conditioning Operations (SCQF level 5)

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

Recognise and safely use basic tools and materials associated with the RAC Industry.

Performance Criteria

(a) Recognise and use basic tools associated with the RAC industry.
(b) Recognise and use basic materials and components associated with the RAC Industry.
(c) Work safely and in accordance with all relevant legislation and procedures.

Outcome 2

Demonstrate basic RAC operations.

Performance Criteria

(a) Identify all relevant requirements for RAC operations.
(b) Carry out safe basic RAC operations.
(c) Work safely and in accordance with all relevant legislation and procedures.

National Unit specification: statement of standards (cont)

Unit title: Building Services Engineering: Basic Refrigeration and Air Conditioning Operations (SCQF level 5)

Evidence Requirements for this Unit

Evidence is required to demonstrate that the candidate has achieved all Outcomes and Performance Criteria.

The performance and written or oral evidence should be produced by one or more than one assessment for all Outcomes undertaken in supervised and controlled conditions.

In terms of the specific outcomes of this Unit:

Outcome 1

Candidates must be able to recognise, use and maintain all of the basic tools below in accordance with relevant legislation and procedures:

- adjustable spanner
- brazing equipment
- de-burr tool
- flaring/swaging tools
- junior hack saw
- level
- pipe cutters (for use on refrigeration copper tube)
- screwdriver (crosshead and flat)
- tape measure

Candidates must be able to recognise and use all the basic materials and components below in accordance with relevant legislation and procedures:

- a thermal expansion valve, condensing and evaporating units — from a typical domestic fridge
- cleaning materials, flux and solder/brazing rods
- cleaning materials, flux and solder/brazing rods
- clips
- copper pipes
- fittings, elbows, tees, and unions, jointing methods, brazed and flared
- fixing devices, ie screws
- type of copper used for refrigeration systems

Candidates must work safely and demonstrate that they know all of the following: how to identify and report any potential workshop hazards; how to reduce risks for workshop activities; the correct use of personal protective equipment for basic RAC practical applications; the dangers and risks associated with RAC operations; the relevant health and safety practices throughout the task.

National Unit specification: statement of standards (cont)

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Outcome 2

Candidates must be able to identify all requirements for RAC installation operations including all of the following: interpret typical drawings and specifications related to basic practical applications; measure accurately and record the requirements for the installation

Candidates must complete a prefabricated RAC installation of a fan coil unit by insertion of a pipe work section which will evidence all of the following skills: cut pipework to given sizes; bending techniques to form 90° bends and offsets; fabricate small copper tube frame using flared and brazed joint techniques; safely pressure test completed pipe frame; fixing copper pipework; jointing copper pipe using brazed and flared joints

Candidates must work safely and demonstrate that they know all of the following: how to identify and report any potential workshop hazards; how to reduce risks for workshop activities; the correct use of personal protective equipment for basic RAC practical applications; the dangers and risks associated with RAC operations; the relevant health and safety practices throughout the task.

Candidates must leave the work area in a safe condition after completion of the task and do all of the following: ensure the area is left clean and tidy; dispose of any waste materials; return excess materials; return tools and equipment.

Candidates must complete a reflective account of work undertaken similar to a professional log or report.

National Unit specification: support notes

Unit title: Building Services Engineering: Basic Refrigeration and Air Conditioning Operations (SCQF level 5)

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

The content and context of this Unit is at a basic, introductory but industrially meaningful level. The main purpose of the Unit is to make candidates aware of, and prepare for employment within, the RAC industry. There is a strong emphasis on safety throughout the Unit.

Outcome 1 ensures that the candidate develops an understanding of the range of hand tools, materials and components likely to be required when undertaking, or preparing to undertake, basic RAC operations.

Outcome 2 ensures that the candidate develops an understanding (at the appropriate level) of the practical aspects of RAC activity and recognises the responsibility to self and others during and on completion.

Guidance on learning and teaching approaches for this Unit

Candidates should be given opportunities to work towards Outcomes in an integrated way whenever possible.

Practical activities should be teacher/lecturer-led in that all equipment, techniques and processes should be explained, demonstrated and thoroughly understood before (candidate) commencement. Demonstrations should be clear, logically sequenced and reflect current safe working practices to ensure candidate understanding.

An integrated approach to learning and teaching across the outcomes in this Unit, and relevant others, is suggested

Opportunities for developing Core Skills

Throughout this Unit there may be opportunities for candidates to develop Core Skills in:

- Communication
- Numeracy
- Problem Solving
- Working with Others

National Unit specification: support notes (cont)

Unit title: Building Services Engineering: Basic Refrigeration and Air Conditioning Operations (SCQF level 5)

Guidance on approaches to assessment for this Unit

An integrated approach to assessment across the outcomes in this Unit is suggested. If this is being delivered as part of the National Progression Award the use of holistic assessment with other applicable Units is suggested. In addition, the project-based approach may be used to gather evidence of candidate achievement.

Candidates will carry out practical exercises according to a given brief. In doing this, they will gather their findings in a folio which will be used as the basis for a discussion between the assessor and the candidate.

The practical exercises will include:

- cut pipework to given sizes; bending techniques to form 90° bends and offsets
- fabricate small copper tube frame using flared and brazed joint techniques
- safely pressure test completed pipe frame
- fixing copper pipework
- jointing copper pipe using brazed and flared joints

The assessment evidence will be the completed signed assessor checklist which will detail the essential steps in the process as expressed in the Performance Criteria.

An assessor checklist identifying the critical aspects of the candidate performance should be completed and retained for each candidate.

Relevant written and oral evidence should also be capture and retained.

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 that 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**

History of changes to Unit

Version	Description of change	Date
03	Outcome 2 amended to include the production of a reflective account.	26/04/2016
02	Core Skills Component Critical Thinking at SCQF level 4 embedded.	29/09/2011