National Unit Specification: general information

UNIT Installation of Conduit Systems (SCQF level 5)

CODE F5FX 11

SUMMARY

This Unit is intended for candidates with little or no prior knowledge of electrical conduit systems but who wish to gain some experience in the fabrication and assembly of such systems with a view to developing their skills further in terms of a career choice.

The aim of this Unit is to introduce candidates to conduit systems as a means of providing a protective enclosure for electrical wiring. They will be able to identify types of steel and non-metallic conduit and their accessories and to develop the skills of fabrication and assembly of conduit systems.

Candidates will also be introduced to a simple lighting circuit having one-way control and will install this circuit in a safe manner using single-core PVC cables within a conduit enclosure.

This Unit may form part of a National Qualification Group Award or may be offered on a free-standing basis.

OUTCOMES

1 Identify conduit types and their accessories.
2 Demonstrate the techniques used in the fabrication and assembly of conduit systems.
3 Wire and operate a simple one-way lighting control circuit using single-core PVC cables enclosed in a conduit system.

Administrative Information

Superclass: XJ

Publication date: March 2009

Source: Scottish Qualifications Authority

Version: 01

National Unit Specification: general information (cont)

UNIT Installation of Conduit Systems (SCQF level 5)

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained one of the following or equivalent:

- Standard Grade Mathematics — General Level
- Standard Grade Technological Studies — General Level

CREDIT VALUE

1 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.*

CORE SKILLS

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

This Unit provides opportunities for candidates to develop aspects of the following Core Skills:

- Problem Solving (SCQF level 5)
- Numeracy (SCQF level 5)

These opportunities are highlighted in the Support Notes of this Unit Specification.

National Unit Specification: statement of standards

UNIT Installation of Conduit Systems (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

Identify conduit types and their accessories.

Performance Criteria

(a) Identify correctly non-metallic conduits of diameters 20mm and 25mm.
(b) Identify correctly steel conduits of diameters 20mm, 25mm and 32mm.
(c) Identify correctly accessories for non-metallic conduit systems.
(d) Identify correctly accessories for steel conduit systems.

OUTCOME 2

Demonstrate the techniques used in the fabrication and assembly of conduit systems.

Performance Criteria

(a) Measure conduit to given dimensions.
(b) Cut non-metallic and steel conduit to given dimensions.
(c) Correctly form 90^{o} bends in both non-metallic and steel conduit.
(d) Correctly form sets in both non-metallic and steel conduit.
(e) Correctly thread steel conduit.
(f) Correctly assemble a simple conduit system using both non-metallic and steel conduit.

OUTCOME 3

Wire and operate a simple one-way lighting control circuit using single-core PVC cables enclosed in a conduit system.

Performance Criteria

(a) Draw clearly and correctly the wiring diagram for a one-way lighting arrangement from a given circuit diagram.
(b) Wire correctly a one-way lighting arrangement in a conduit system, using single-core PVC cables.
(c) Terminate correctly electrical accessories to the wiring of a one-way lighting circuit.
(d) Operate a one-way lighting circuit in a safe and correct manner.

National Unit Specification: statement of standards (cont)

UNIT Installation of Conduit Systems (SCQF level 5)

EVIDENCE REQUIREMENTS FOR THIS UNIT

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

Performance evidence supplemented with an assessor observation checklist and 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 supervised, controlled conditions in a practical environment throughout the duration of the Unit.

An appropriate form of assessment could be a single, holistic practical assignment which incorporates all the Outcomes and Performance Criteria.

Candidates should be presented with an 'installation specification' showing a conduit system comprising of non-metallic and steel conduit each having one 90^{o} bend and one set, and accessories including conduit boxes, saddles, couplings, lockrings, serrated washers and bushes. A circuit diagram showing one light controlled by a one-way switch should also be included in the specification.

The wiring system should be connected to the energy supply through a consumer's Unit having appropriate circuit protection.

From this information the candidate should:

- identify TWO types and TWO sizes for both steel and non-metallic conduit
- identify SIX conduit accessories
- carry out the fabrication techniques of measuring, cutting, bending (90^{o}), setting and threading (steel) to given dimensions
- assemble the fabricated sections to form conduit assemblies in both non-metallic and steel conduit (both the non-metallic and steel assemblies may be integrated into one conduit system)
- draw an appropriate wiring diagram from the circuit diagram provided (one-way lighting control)
- carry out a wiring exercise to form the lighting circuit using single-core PVC cables in a conduit enclosure
- terminate the wiring into the appropriate accessories and have the tutor inspect and test the wiring and connect the supply voltage
- operate the control switch to ensure correct operation of the circuit

Assessors should use a checklist to record candidate's achievement as they demonstrate the skills set out in the Performance Criteria of each Outcome.

National Unit Specification: support notes

UNIT Installation of Conduit Systems (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. This Unit can also be delivered on a free-standing basis.

GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

This is an optional Unit within the National Certificate in Electrical Engineering at SCQF level 5. This Unit can also be delivered on a free-standing basis.

The aim of this Unit is to introduce candidates to conduit systems as a means of providing a protective enclosure for electrical wiring and to provide opportunities for them to develop their skills in the fabrication and assembly of a simple conduit system.

The Unit will enable candidates to identify types of steel and non-metallic conduit and their accessories and to develop the skills of fabrication and assembly of conduit systems.

It will also introduce candidates to a simple lighting circuit having one-way control which they will install in a safe manner using single-core PVC cables within a conduit enclosure.

The tutor MUST ensure that the candidate works safely at all times and that the wiring arrangement has been inspected and tested and is correct, prior to energising the circuit.

This Unit has links with the technology Units in the National Certificate in Electrical Engineering at SCQF level 5 and may be delivered as part of the suite of ‘Wiring System’ Units.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

This Unit should be delivered in a practical environment and should encourage candidates to become familiar with the terminology of the conduit installations and systems.

Candidates should be provided with opportunities to become familiar with ‘specifications’ for basic conduit installations and the transfer of this information into practical systems.

Opportunities should be provided to allow candidates to develop their practical skills in measuring, cutting and forming conduit systems to given dimensions and to the assembly of a simple system.

This practical approach should be continued to allow candidates to develop their skills in reading and interpreting circuit diagrams and how these are translated into wiring arrangements which are capable of being installed in conduit systems.

Candidates should be able to identify the hand tools used in the construction of conduit and wiring systems and be taught the correct use of hand tools in this context.

It is important that all THREE Outcomes of this Unit are delivered in a practical manner which develops the candidate’s fabrication and assembly skills and an understanding of circuit and wiring diagrams.

National Unit Specification: support notes (cont)

UNIT Installation of Conduit Systems (SCQF level 5)

The Outcomes should be delivered in the sequence given in the 'statement of standards'. The practical aspects of these Outcomes should be demonstrated to candidates with the reasons for particular techniques being fully explained. Candidates should then be given opportunities to practice these techniques.

Tutors MUST always ensure that candidates work in a safe manner and, to this end, the Health and Safety workshop procedures of the centre should be continually emphasized and implemented.

Tutors MUST also ensure that they have inspected and tested ALL circuit wiring produced by candidates in accordance with the requirements of BS7671 and that circuits are connected to the supply voltage only after these conditions have been satisfied.

It is recommended that the supply voltage used to energise candidate circuits is of a suitable safe value and that the connection of this voltage is carried out by the tutor.

OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

Elements of the Core Skill of *Problem Solving* will be developed and enhanced as candidates undertake practical work. Candidates interpret an installation specification and consider various factors before assembling fabricated sections to form a conduit system. They must plan, select appropriate tools, organising and completing wiring work efficiently and safely. Discussion with the assessor could support evaluation of proposed approaches and review of achievements.

As they demonstrate effective working practice candidates perform a series of measurements to given dimensions and interpret and produce wiring diagrams. Numeracy skills will be naturally enhanced, with the focus on practical application of number and graphics. Formative activities could be designed to develop accuracy and confidence in electrical engineering contexts.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

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 assessment of this Unit should take the form of a 'Practical Exercise' which extends over the duration of the Unit.

National Unit Specification: support notes (cont)

UNIT Installation of Conduit Systems (SCQF level 5)

This exercise could contain the three elements specified in the Unit Outcomes ie:

- identification of conduit types and accessories
- fabrication and assembly of conduit systems
- wiring and operation of a simple lighting circuit

These three elements should be integrated into one practical exercise with the achievement of each element being clearly recorded for each candidate.

The practical exercise should be conducted in a workshop environment under supervised and controlled conditions.

The Health and Safety of candidates must be paramount at all times and the tutor must be responsible for ensuring that all wiring carried out for assessment purposes is of a sufficiently high standard that it meets all the necessary BS7671 requirements prior to connection of the supply voltage.

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**