



National Unit Specification: general information

UNIT Installation of PVC Sheathed Wiring Systems (SCQF level 6)

CODE F5HX 12

SUMMARY

This Unit is intended for candidates with little or no prior knowledge of PVC sheathed wiring systems but who wish to gain some experience of these with a view to developing their skills in the installation of such systems.

The aim of this Unit is to develop the candidate's knowledge and understanding of PVC sheathed wiring systems and to develop their installation skills. The Unit will develop the candidate's understanding of the techniques of PVC sheathed wiring installations in relation to the requirements of the Wiring Regulations BS7671. It will also give candidates an understanding of circuit and wiring diagrams and develop their ability to wire circuits using multi-core PVC sheathed cables. Candidates will also be introduced to circuit testing and be provided with opportunities to carry out basic circuit testing procedures.

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

OUTCOMES

- 1 Interpret the requirements of the Wiring Regulations BS7671 for multi-core PVC sheathed wiring systems.
- 2 Interpret wiring requirements from circuit diagrams.
- 3 Demonstrate the skills and techniques used when installing multi-core PVC sheathed wiring systems.
- 4 Demonstrate the skills and techniques used when inspecting and testing multi-core PVC sheathed wiring systems.

Administrative Information

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National Unit Specification: general information (cont)

UNIT Installation of PVC Sheathed Wiring Systems (SCQF level 6)

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 — Credit Level
- ◆ Standard Grade Technological studies — Credit Level
- ◆ Standard Grade Physics — Credit Level
- ◆ NQ Unit *Installation of PVC Sheathed Wiring Systems* (SCQF level 5)

CREDIT VALUE

1 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

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

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

- ◆ Problem Solving (SCQF level 6)

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

National Unit Specification: statement of standards

UNIT Installation of PVC Sheathed Wiring Systems (SCQF level 6)

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

Interpret the requirements of the Wiring Regulations BS7671 for multi-core PVC sheathed wiring systems.

Performance Criteria

- (a) Identify correctly the BS7671 requirements for multi-core PVC sheathed cables and wiring.
- (b) Interpret correctly the BS7671 requirements for multi-core PVC sheathed cables and wiring.

OUTCOME 2

Interpret wiring requirements from circuit diagrams.

Performance Criteria

- (a) Identify correctly the circuit diagrams for, a two-way controlled lighting outlet point, a two-way and intermediate controlled lighting outlet point and a ring circuit of 13A socket-outlets including one fused spur.
- (b) Describe accurately the operation of the circuits for both a two-way controlled lighting outlet point and a two-way and intermediate controlled lighting outlet point.
- (c) Draw correctly from given circuit diagrams, the wiring diagrams of both a two-way and a two-way and intermediate switching arrangement, each controlling two lighting points.
- (d) Draw correctly from a given circuit diagram, the wiring diagram of a ring circuit of four 13A twin switched socket-outlets, one of which is supplied from a fused spur.
- (e) State correctly the cross sectional area and core colours of the multi-core cables for both the lighting and ring circuits, to comply with the requirements of BS7671.

OUTCOME 3

Demonstrate the skills and techniques used when installing, multi-core PVC sheathed wiring systems.

Performance Criteria

- (a) Install and terminate the wiring for a lighting circuit having two outlet points controlled by a two-way switching arrangement, using multi-core PVC sheathed cable, complying with the requirements of BS7671.
- (b) Install and terminate the wiring for a lighting circuit having two outlet points controlled by a two-way and intermediate switching arrangement, using multi-core PVC sheathed cable, complying with the requirements of BS7671.
- (c) Install and terminate the wiring for a ring circuit of four 13A twin switched socket-outlets including one supplied from a fused spur, using multi-core PVC sheathed cable, complying with the requirements of BS7671.

National Unit Specification: statement of standards (cont)

UNIT Installation of PVC Sheathed Wiring Systems (SCQF level 6)

OUTCOME 4

Demonstrate the skills and techniques used when inspecting and testing multi-core PVC sheathed wiring systems.

Performance Criteria

- (a) Carry out the inspection of the two-way and the two-way and intermediate controlled lighting circuits, and the socket-outlet ring circuits, using multi-core PVC sheathed cable, in accordance with the requirements of BS7671.
- (b) Carry out the appropriate testing of the two-way, and the two-way and intermediate controlled lighting circuits, and the socket-outlet ring circuit, using PVC sheathed multi-core cable, in accordance with the requirements of BS7671.
- (c) Carry out the functional testing of the two-way, and the two-way and intermediate controlled lighting circuits, and the socket-outlet ring, using multi-core PVC sheathed cable, correctly.

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.

Candidates should be permitted to use the Wiring Regulations BS7671 as a reference document throughout the assessment.

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 a 'specification' giving the installation requirements and circuit diagrams for a multi-core PVC sheathed wiring system to provide for the supply and control of electrical energy to:

- ◆ a lighting circuit having **two** outlet points controlled by a two-way switching arrangement
- ◆ a lighting circuit having **two** outlet points controlled by a two-way and intermediate switching arrangement
- ◆ a ring circuit of **four** 13A twin switched socket-outlets including one supplied from a fused spur

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

National Unit Specification: statement of standards (cont)

UNIT Installation of PVC Sheathed Wiring Systems (SCQF level 6)

From this information contained in the ‘specification’ the candidate should produce a wiring system in order to:

- ◆ identify correctly the circuit diagrams for, a two-way controlled lighting outlet point, a two-way and intermediate controlled lighting outlet point, and a ring circuit of 13A socket-outlets including one fused spur
- ◆ describe accurately the operation of the circuits for both a two-way controlled lighting outlet point and a two-way and intermediate controlled lighting outlet point
- ◆ draw correctly from given circuit diagrams, the wiring diagrams of both the two-way and the two-way and intermediate switching arrangements, each controlling two lighting points
- ◆ draw correctly from a given circuit diagram, the wiring diagram of a ring circuit of four 13A twin switched socket-outlets, one of which is supplied from a fused spur
- ◆ state correctly the cross sectional area and core colours of the multi-core cables for both the lighting and ring circuits, to comply with the requirements of BS7671
- ◆ install and terminate the wiring for a lighting circuit having two outlet points controlled by a two-way switching arrangement, using multi-core PVC sheathed cable, complying with the requirements of BS7671
- ◆ install and terminate the wiring for a lighting circuit having two outlet points controlled by a two-way and intermediate switching arrangement, using multi-core PVC sheathed cable, complying with the requirements of BS7671
- ◆ install and terminate the wiring for a ring circuit of four 13A twin switched socket-outlets including one supplied from a fused spur, using multi-core PVC sheathed cable, complying with the requirements of BS7671
- ◆ inspect the two-way controlled and the two-way and intermediate controlled lighting circuits, and the ring circuit of socket-outlets, in accordance with the requirements of BS7671
- ◆ carryout earth continuity, ring circuit continuity, insulation resistance and polarity tests as appropriate, on the two-way controlled and the two-way and intermediate controlled lighting circuits, and the ring circuit of socket-outlets, in accordance with the requirements of BS7671
- ◆ carryout the functional testing of the two-way controlled, and the two-way and intermediate controlled lighting circuits, and the ring circuit of socket-outlets to ensure they operate correctly

In addition to the production of the wiring systems as specified above, the candidates should also provide written and/or recorded oral evidence taken at a single assessment event lasting no more than 45 minutes, under controlled, supervised conditions which demonstrates an ability to:

- ◆ identify six BS7671 requirements for multi-core PVC sheathed cables and wiring
- ◆ interpret four BS7671 requirements for multi-core PVC sheathed cables and wiring

(Candidates should have access to the BS7671 Wiring Regulations publication during this assessment event).

National Unit Specification: support notes

UNIT Installation of PVC Sheathed Wiring Systems (SCQF level 6)

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

This is an optional Unit within the National Qualification Group Award in Electrical Engineering at SCQF level 6 but may also be offered on a free-standing basis.

The aim of this Unit is to develop candidate's knowledge and understanding of multi-core PVC sheathed wiring systems and to develop their installation skills.

The Unit will enable candidates to develop their understanding of the techniques of multi-core PVC sheathed wiring systems in relation to the requirements of the Wiring Regulations BS7671. It will also give candidates an understanding of circuit and wiring diagrams and develop their ability to wire circuits using multi-core PVC sheathed cables. Candidates will also be introduced to circuit inspection and testing and be provided with opportunities to carry out basic circuit testing procedures.

The tutor **MUST** ensure that the candidate works safely at all times and that the wiring arrangements have been tested and are correct, prior to the circuits being energised.

This Unit has links with the technology Units in the National Qualification Group Award in Electrical Engineering 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 PVC sheathed installations, wiring techniques, inspection and testing procedures.

Opportunities should be provided to allow candidates to develop their practical skills in the measuring, cutting, bending, stripping, terminating and installing PVC sheathed wiring systems.

This practical approach should be continued to allow candidates to develop their interpretation of wiring and circuit diagrams and their ability to work between these. Basic installation inspection and testing procedures should also be carried out by candidates undertaking this Unit.

The requirements of the relevant Wiring Regulations BS7671 should be taught in conjunction with the development of the candidate's skills and understanding of PVC wiring systems.

Candidates should be able to identify the hand tools used in the construction of multi-core PVC wiring systems and be taught their correct use. They should also be familiar with test instruments and their use.

National Unit Specification: support notes (cont)

UNIT Installation of PVC Sheathed Wiring Systems (SCQF level 6)

It is important that this Unit is delivered in a practical manner which develops the candidate's skills and understanding of wiring systems, circuit and wiring diagrams and inspection and testing procedures along with the appropriate requirements of BS7671.

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 the Health and Safety workshop procedures of the centre should be continually emphasized and implemented.

Tutors MUST also satisfy themselves that ALL circuit wiring produced by candidates has been inspected and tested in accordance with the requirements of BS7671 and that NO circuit is connected to the supply voltage until these requirements have been fully met.

It is recommended that the supply voltage used to energise candidate circuits is of a suitable safe value.

OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

All aspects of the Core Skill of *Problem Solving* will be developed and enhanced as candidates apply their knowledge and understanding to a complex practical task. Safety requirements must be adhered to as work is planned, organised and completed efficiently using appropriate tools and techniques. Circuit and wiring diagrams are interpreted to wire circuits using multi-core PVC sheathed cables. Inspection and circuit testing can provide opportunities for review and evaluation of the process with assessor feedback.

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)*.

National Unit Specification: support notes

UNIT Installation of PVC Sheathed Wiring Systems (SCQF level 6)

The assessment of this Unit could take the form of a 'Practical Assignment' which extends over the duration of the Unit.

This assignment could contain the four elements specified in the Unit Outcomes ie:

- ◆ interpreting the requirements of the Wiring Regulations BS7671 for multi-core PVC sheathed cables and wiring
- ◆ interpreting wiring requirements from circuit diagrams
- ◆ installing, multi-core PVC sheathed wiring systems
- ◆ inspecting and testing multi-core PVC sheathed wiring systems

These four elements could be integrated into one practical assignment and written and/or recorded oral evidence, with the achievements of each element being clearly recorded for each candidate.

The practical assignment could be conducted in a workshop environment under supervised and controlled conditions.

The written and/or recorded oral evidence could be gathered by means of a short-answer and/or multi-choice question paper conducted under controlled, supervised conditions.

Candidates should be allowed access to the Wiring Regulations BS7671 for reference purposes.

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.

CANDIDATES WITH DISABILITIES AND/OR ADDITIONAL SUPPORT NEEDS

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* (www.sqa.org.uk).