



## National Unit Specification: general information

**UNIT** Installation of Cable Tray and MI Systems (SCQF level 5)

**CODE** F5FV 11

### SUMMARY

This Unit is intended for candidates with little or no prior knowledge of cable tray and mineral insulated (MI) cable systems but who wish to gain some experience in the fabrication and assembly of tray systems and the installation of mineral insulated cables with a view to developing their skills.

The aim of this Unit is to introduce candidates to cable tray systems as a means of providing a route for electrical wiring and to provide candidates with opportunities to learn the skills and practice, using the specialist tools required, for the installation of MI wiring systems. They will be able to identify types of cable tray and sizes of MI cable and to develop the skills of fabrication and assembly of wiring systems using cable tray and MI cable.

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 MI cables mounted on cable tray.

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

### OUTCOMES

- 1 Demonstrate the techniques used in the fabrication and assembly of cable tray systems.
- 2 Demonstrate the techniques used in the installation of mineral insulated cable.
- 3 Install and operate a simple one-way lighting control circuit using mineral insulated cables mounted on cable tray system.

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#### Administrative Information

**Superclass:** XJ

**Publication date:** March 2009

**Source:** Scottish Qualifications Authority

**Version:** 01

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## **National Unit Specification: general information (cont)**

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### **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
- ◆ Standard Grade Science — 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 Skill:

- ◆ Problem Solving (SCQF level 5)

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

## **National Unit Specification: statement of standards**

### **UNIT        Installation of Cable Tray and MI 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**

Demonstrate the techniques used in the fabrication and assembly of cable tray systems.

##### **Performance Criteria**

- (a) Identify correctly various types of cable tray.
- (b) Measure cable tray to given dimensions.
- (c) Cut cable tray to given dimensions.
- (d) Form a 90° flat bend and a 90° internal radius bend in cable tray to given dimensions.
- (e) Join sections of cable tray to given dimensions using tray couplers.
- (f) Assemble and mount a cable tray system, to given dimensions on a rigid surface.

#### **OUTCOME 2**

Demonstrate the techniques used in the installation of mineral insulated cable.

##### **Performance Criteria**

- (a) Identify correctly mineral insulated cables of various sizes and numbers of core.
- (b) Measure MI cable to given dimensions.
- (c) Cut MI cable to given dimensions.
- (d) Form a 90° bend in MI cable to given dimensions.
- (e) Complete correctly the sealing of an end of MI cable using a pot and gland assembly.
- (f) Test correctly the sealed ends of MI cable to verify its integrity.

#### **OUTCOME 3**

Install and operate a simple one-way lighting control circuit using mineral insulated cables mounted on a cable tray 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, using MI cables mounted on a cable tray system.
- (c) Terminate accurately 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 Cable Tray and MI 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 a 'specification' giving the installation requirements and circuit diagrams for a mineral insulated wiring system mounted on a cable tray system.

The wiring must provide for the supply and control of electrical energy to one lighting outlet point controlled by a one-way switch.

The cable tray system should be mounted on preformed brackets and contain:

- ◆ one 90° flat bend
- ◆ one 90° internal radius bend

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 of cable tray and THREE sizes of mineral insulated cable
- ◆ carry out the fabrication techniques of measuring, cutting, bending (90°) and joining cable tray to given dimensions
- ◆ assemble the fabricated sections, using tray couplers, to form a cable tray assembly having one 90° flat bend and one 90° internal radius bend
- ◆ mount the assembled tray system to a rigid surface using pre-formed brackets
- ◆ carry out the techniques of measuring, cutting, bending (90°) and sealing the ends of mineral insulated cable, including testing the sealed cable to ensure its integrity
- ◆ 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 MI cables and mount the wiring on the cable tray system
- ◆ terminate the wiring into the appropriate accessories and have the lecturer test the wiring and connect the supply voltage
- ◆ operate the control switch to ensure correct operation of the circuit

## **National Unit Specification: support notes**

### **UNIT        Installation of Cable Tray and MI 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.

#### **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 cable tray systems as a means of providing a route for electrical wiring and to provide opportunities for them to learn the skills and practice using the specialist tools required for the installation of MI wiring systems.

The Unit will enable candidates to identify types and sizes of cable tray and MI cables and their accessories and provide opportunities to develop the skills of fabrication and assembly of tray systems and the special techniques and skills associated with MI cable.

It will also introduce candidates to a simple lighting circuit having one-way control which they will install in a safe manner using MI cables mounted on a cable tray system.

The tutor **MUST** ensure that the candidate works safely at all times and that the wiring arrangement has been 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 cable tray and MI wiring and systems.

Candidates should be provided with opportunities to become familiar with ‘specifications’ for basic cable tray and MI systems 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 cable tray and MI wiring 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 using MI wiring systems.

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

## National Unit Specification: support notes (cont)

### UNIT Installation of Cable Tray and MI Systems (SCQF level 5)

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

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

Aspects of the Core Skill of *Problem Solving*, will be naturally developed in this Unit, which requires the application of knowledge to a practical task. Candidates plan and organise the wiring and operation of a simple one-way lighting control circuit taking safety issues and regulations into account. Identifying and using appropriate techniques and tools involves on going critical thinking. Discussion of procedures during formative work will be particularly useful to reinforce the ability of candidates to review and evaluate their approaches to practical activities.

### 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 Cable Tray and MI Systems (SCQF level 5)**

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

- ◆ fabrication and assembly of cable tray systems
- ◆ installation techniques of MI cables
- ◆ installation and operation of a simple lighting circuit

These three elements should be integrated into one practical exercise with the achievements 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](http://www.sqa.org.uk/assessmentarrangements)