

National Unit Specification: general information

UNIT	Application of Electrical Installation Hand-tools and Accessories
CODE	DH58 10
COURSE	Scottish Progression Award in Engineering

SUMMARY

This unit identifies basic hand-tools and accessories used in the Electrical Installation industry and provides candidates with the opportunity to apply these in a correct and safe manner.

OUTCOMES

1. Identify a range of basic hand-tools and their uses in the electrical installation industry.
2. Identify a range of accessories and their applications in electrical installations.
3. Apply safe working practices in the use of tools and accessories.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates are expected to have previous experience in the use of hand tools.

CREDIT VALUE

0.5 credits at Intermediate 1 (3 SCQF credit points at SCQF level 4*)

**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.*

Administrative Information

Superclass:	XJ
Publication date:	September 2004
Source:	Scottish Qualifications Authority
Version:	01

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National Unit Specification: general information (cont)

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CORE SKILLS

There is no automatic certification of core skills or core skill components in this unit.

Information on the automatic certification of any core skills in this unit is published in *Automatic Certification of Core Skills in National Qualifications* (SQA, 1999).

National Unit Specification: statement of standards

UNIT Application of Electrical Installation Hand-tools and Accessories

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 the Scottish Qualifications Authority.

OUTCOME 1

Identify a range of basic hand-tools and their uses in the electrical installation industry

Performance Criteria

- a) The identification of cable stripping and cutting tools is appropriate to the application.
- b) The identification of type and size of screwdriver is appropriate to the application.
- c) The identification of gripping tool is appropriate to the application.
- d) The identification of hacksaw type is appropriate to the application.
- e) The identification of type and size of hammer is appropriate to the application.

Evidence Requirements

The candidate should provide performance evidence to satisfy PCs (a)-(e) of this outcome. The candidate should identify hand tools from a given selection and describe the correct use of each.

OUTCOME 2

Identify a range of accessories and their applications in electrical installations

Performance Criteria

- a) The identification of supply connection accessories is appropriate to the application.
- b) The identification of cartridge fuse rating is appropriate to the application.
- c) The identification of type and rating of control accessories is appropriate to the application.
- d) The identification of load connection accessories is appropriate to the application.
- e) The identification of types and rating of flexible cord is appropriate to the application.

Evidence Requirements

The candidate should provide performance evidence to satisfy PCs (a)-(e) of this outcome. The candidate should identify accessories from a given selection and describe the correct application of each.

OUTCOME 3

Apply safe working practices in the use of tools and accessories

Performance Criteria

- a) The selection of a load connection accessory, control accessory, supply connection accessory and flexible cord is appropriate for a given application.
- b) The selection of tools to terminate the cord cores in the load connection, control and load connection accessories is appropriate.
- c) The preparation of flexible cord cores for termination is in compliance with safe working practices.
- d) The termination of flexible cord to the load connection, control and supply connection accessories is in compliance with safe working practices.

National Unit Specification: statement of standards (cont)

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Evidence Requirements

The candidate should provide performance evidence to satisfy PCs (a)-(d) of this outcome. The candidate should correctly select appropriate accessories from a given selection and the tools required to terminate the cord cores into the terminals of these accessories. The candidate should demonstrate safe working practices when terminating the cord cores, and the terminations should be mechanically and electrically sound.

National Unit Specification: support notes

UNIT Application of Electrical Installation Hand-tools and Accessories

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 20 hours.

These support notes provide the guidance required for candidates to achieve the knowledge and skills to identify the basic hand-tools and accessories used in the electrical installation industry and to demonstrate safe working practices in the use of these tools in an electrical installation application.

The unit would normally be taken by candidates who have no experience in the identification and use of hand-tools and electrical installation accessories. It may be used as a base unit for candidates wishing to progress to other electrical installation units.

GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

Outcome 1:

(a) The identification of cable stripping and cutting tools is appropriate to the application.

Tools to include:

- Proprietary types of cable insulation strippers up to 4mm²
- Cable side cutters.
- Cable-cutting pliers.

Stripping and cutting tools appropriate to flexible cords and fixed-wiring cables in the range 1mm² to 4mm².

(Note: The electrician's knife may be included as a stripping tool however 'Stanley knives' should NOT be used.)

The application of stripping and cutting tools should relate to the type and size of the cord/cable on which they are used.

(b) The identification of type and size of screwdriver is appropriate to the application.

Screwdriver types and size to include:

- Terminal
- Medium
- Large
- Phillips (Crosshead)

Applications to include the termination of cord/cable cores in accessories, the fixing of accessories to boxes and the fixing of cables and wiring systems to building structures etc.

National Unit Specification: support notes (cont)

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(c) The identification of gripping tool is appropriate to the application

Gripping tools to include:

- Pliers (including long-nosed)
- 'Footprints'
- Spanners
- Adjustable grips
- Bush spanners

Applications to include the handling of cords/cables and wiring systems

(d) The identification of hacksaw type is appropriate to the application

Hacksaws to include:

- Regular
- Junior

Applications to include the cutting of cables and wiring systems

(e) The identification of type and size of hammer is appropriate to the application

Types and size of hammer to include:

- Pin
- Claw

Applications to relate to the fixings of cables and wiring systems

Outcome 2:

(a) The identification of supply connection accessories is appropriate to the application.

Supply connection accessories to include:

- 13A domestic plug-top
- 16A industrial plug-top
- kettle connector
- ceiling rose

Applications to relate to the load rating and environmental conditions

(b) The identification of cartridge fuse rating is appropriate to the application.

Cartridge fuses limited to those used with 13A Plugs. Ratings to include 3A and 13A only
Identification of the fuse by its body colour and printed rating.

Applications related to the rating of the load device and the cord/cable being protected.

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(c) The identification of types and rating of control accessories is appropriate to the application.

Types and rating of control accessories to include:

- Push-button bell switch
- 5A flexible cord switch
- 5A one-way switch
- 5A two-way switch
- 15A double-pole switch

Applications to include:

- cord-switching of a table lamp
- 1-way switching of a lighting circuit
- 2-way switching of a lighting circuit
- isolation of power point

(d) The identification of load connection accessories is appropriate to the application.

Load connection accessories to include:

- 3kW electric kettle connector
- bayonet-cap lamp holder [brass]
- bayonet-cap lamp holder [moulded (non-metallic)]
- low-voltage bell unit

Ratings of the load connection accessories should be related to their supply-connection and control accessories.

(e) The identification of types and rating of flexible cord is appropriate to the application.

Flexible cord types to include:

- 3-core pvc/pvc
- 3-core pvc/braid
- 3-core butyl
- 2-core pvc/pvc

Types and ratings of cords should be related to the load device they are supplying and to the environmental conditions in which they are to operate.

Outcome 3:

(a) The selection of a load connection accessory, control accessory, supply connection accessory and flexible cord is appropriate for a given application.

Candidates should select an appropriate load connection accessory and chose the most appropriate flexible cord in terms of its current rating and the environmental conditions in which it is to operate. An appropriate control accessory and supply connection accessory (including the cartridge fuse where

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appropriate) will also be selected in terms of the rating of the load and the cord supplying it. The accessories should be selected from the range given in Outcome 2.

(b) The selection of tools to terminate the cord cores in the load connection, control and load connection accessories is appropriate.

Candidates should select appropriate tools to prepare and terminate the cord selected in (a) to the load connection, control and supply connection accessories also selected in (a).

(c) The preparation of flexible cord cores for termination is in compliance with safe working practices.

The preparation of cord cores for termination should be carried out in compliance with safe working practices including:

- The removal of the outer sheath without the risk of cuts to the candidate
- The removal of the core insulation without the risk of cuts to the candidate.
- The twisting together of conductor strands without the risk of these breaking the skin.
- The proper use of pliers to bend the bare conductor without risk to the candidate.

(d) The termination of flexible cord to the load connection, control and supply connection accessories is in compliance with safe working practices.

The prepared cord cores should be terminated in the accessory terminations in compliance with safe working practices including:

- Using the correct size of screwdriver for the termination.
- Ensuring the prepared cord end is inserted firmly in the termination.
- The correct screwdriver technique with the correct pressure to ensure the cord end is securely terminated.
- Terminating the cord in such a manner as to avoid risk to the candidate should the screwdriver slip.

The cord terminations should be checked for mechanical and electrical soundness and the work should be electrically correct and in compliance with good electrical practices.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

This unit should be delivered in a wholly practical manner, ideally in a workshop environment.

The tools and accessories to be identified and used should be actual items rather than diagrams or illustrations.

Candidates should be encouraged to handle and examine the tools and accessories throughout delivery of this unit so that they become familiar with these items, their use, capabilities and limitations.

National Unit Specification: support notes (cont)

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The safe and correct use of tools in preparing cords for termination should first be demonstrated prior to providing the candidates with opportunities to carry out the required cord termination exercises.

Candidates should be taught to appreciate the limitations in the use of tools and the correct applications of these. They should also be taught an appreciation of the relationship between the rating of load devices and the cord/cable and accessories being used to supply and control these loads.

The importance of safe working practices should be emphasised at all times.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2 should use worksheets to record the candidate's responses to the assessment exercises.

An observation checklist should be used to record the candidate's responses to the assessment exercise of Outcome 3

Where possible, the assessment of Outcomes 1, 2 and 3 should be integrated into one project type assessment.

APPROACHES TO GENERATING EVIDENCE

Outcome 1

The candidate will be presented with a range of tools to perform the functions of:

- cord/cable stripping and cutting
- driving screws
- gripping cords/cables and wiring systems
- sawing cables and wiring systems
- hammering for the fixing of cables and wiring systems

From the range of tools presented, the candidate will select the most appropriate for given applications and describe the correct use of the tool.

Outcome 2

The candidate will be presented with a range of electrical accessories to include:

- plug and socket connectors
- lamp holders [brass and moulded (non-metallic)]
- ceiling roses
- cartridge fuses for use in 13 A plugs
- switches
- flexible cords

From the range presented, the candidate will identify the accessories and describe their applications.

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Outcome 3

The candidate will be presented with 3 practical exercises to connect a load connection accessory to control and supply connection accessories (as appropriate) by means of a flexible cord.

- Exercise 1: to connect a brass bayonet-cap lamp holder (table lamp) to a flexible cord switch and a 13A plug-top.
- Exercise 2: to connect a moulded (non-metallic) bayonet-cap lamp holder to a ceiling rose
- Exercise 3: to connect a kettle connector to a 13 A plug-top.

For each exercise, the candidate will:

- select an appropriate accessory and flexible cord
- select tools appropriate for the exercise
- prepare the cord cores for termination in compliance with safe working practices.
- terminate the cord cores to the accessories using safe working practices.
- ensure that all terminations are and mechanically and electrically sound.

Note: Since this Unit relates only to the identification and use of tools and accessories, there is no requirement for the completed exercise to be energised, however the cores should be terminated in the correct terminals

SPECIAL NEEDS

This Unit Specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, September 2003).