

National Unit Specification: General Information

UNIT Electrical Installation Practice

NUMBER D922 11

COURSE

SUMMARY

Successful completion of this unit will demonstrate a knowledge of the materials used in the electrical supply in the construction industry. The unit has been developed so that candidates may acquire an appreciation of the practical skills required to install an electrical supply to a building, to maintain and inspect portable tools together with an appreciation of the general safety requirements when using electrical equipment.

OUTCOMES

- 1 Identify the main materials, and their basic properties, used in electrical installation practice.
- 2 Describe the main types of electrical connections used in electrical installation practice.
- 3 Carry out the installation of electric cables and equipment.
- 4 Describe the basic requirements for the inspection and maintenance of portable tools.
- 5 Describe the general requirements for safe working with electrical equipment.

RECOMMENDED ENTRY

Entry is at the discretion of the centre. There are no formal entry requirements.

CREDIT VALUE

1 Credit at Intermediate 2.

CORE SKILLS

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).

Administrative Information

Superclass: TH

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National unit specification: statement of standards

UNIT Electrical Installation Practice

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 the main materials, and their basic properties, used in electrical installation practice.

Performance Criteria

- a) Conducting materials used in electrical installation practice are stated correctly.
- b) Insulating materials used in electrical installation practice are stated correctly.
- c) The desirable properties of conducting and insulating materials used in electrical installation practice are listed correctly.
- d) Examples of the use of conducting and insulating materials are listed correctly.

Note on the range for the outcome

Conducting materials: copper; aluminium; steel.

Insulating materials: p.v.c.; bakelite; heat resistant sleeving.

Properties: ability or inability to conduct electricity; malleability.

Evidence Requirements

Written and/or oral evidence which satisfies all of the performance criteria and items in the range. This may be generated by a series of short answer or completion questions.

OUTCOME 2

Describe the main types of electrical connections used in electrical installation practice.

Performance Criteria

- a) The effect of unsatisfactory connection of conductors is described correctly.
- b) List the main types of electrical connectors used in electrical installation practice correctly.
- c) Perform electrical connections correctly.

Note on the range for the outcome

Types of connector: screws; soldered lug; crimped lug; bolted; clamped; push.

National unit specification: statement of standards (cont)

UNIT Electrical Installation Practice

Evidence Requirements

Written and/or oral evidence which satisfies performance criteria (a) and (b) and items in the range for pc (b). This may be generated by a series of short answer or completion questions. Evidence may be generated to satisfy performance criteria (c) by a practical exercise where the candidate completes one correct connection for three of the types listed in the range.

OUTCOME 3

Carry out the installation of electric cables and equipment.

Performance Criteria

- a) List the building materials, to which electric cables and equipment may be fixed correctly.
- b) Identify fixing devices, used to secure electric cables and equipment, correctly.
- c) List typical items of electrical equipment, that may be installed in buildings, correctly.
- d) Install a given electrical system correctly.

Note on range for the outcome

Building materials: brickwork; concrete; breeze block; plasterboard; wood; ceramic tiles.

Fixing devices: woodscrews; plugs; toggle fasteners; masonry pins and nails; adhesives.

Electrical equipment: pvc cable; trunking; plastic conduit; meters; consumer unit; switches; lighting pendants.

Evidence Requirements

Written and/or oral evidence which satisfies performance criteria (a), (b) and (c) and items in the range.

Evidence may be generated to satisfy performance criteria (d) by a practical exercise in which the candidate correctly installs a given system that contains a minimum of three items of electrical equipment using two fixing devices on two building materials taken from the range.

OUTCOME 4

Describe the basic requirements for the inspection and maintenance of portable tools.

Performance Criteria

- a) List the equipment associated with portable tools correctly.
- b) Describe the dangers arising from the misuse of portable tools correctly.
- c) Describe clearly a maintenance schedule and items to be checked for safety in portable tools.
- d) Carry out an inspection of a portable tool and its associated plug and socket correctly.

National unit specification: statement of standards (cont)

UNIT Electrical Installation Practice

Note on the range for the outcome

Equipment: plug; cable; transformer; tool.

Dangers: electric shock; fire; damage; personal injury.

Evidence Requirements

Written and/or oral evidence which satisfies performance criteria (a), (b) and (d) and items in the range. This may be generated by a series of short answer questions for performance criteria (a) and extended response questions for performance criteria (b) and (d).

Evidence may be generated for performance criteria (c) by a practical exercise in which the candidate inspects one portable tool and its associated plug and socket correctly.

OUTCOME 5

Describe the general requirements for safe working with electrical equipment.

Performance Criteria

- a) Describe the dangers associated with direct and indirect contact while working with electrical equipment clearly.
- b) Describe a permit to work system clearly.
- c) Describe the need for regulations for the use of electrical equipment clearly.

Note on the range for the outcome

Dangers: electric shock; electric burns; fire; damage to equipment.

Evidence Requirements

Written and/or oral evidence which satisfies all of the performance criteria and items in the range.

This may be generated by a series of extended response questions.

National unit specification: support notes

UNIT Electrical Installation Practice

This part of the unit specification is offered as guidance. None of the sections of the support notes is mandatory.

GUIDANCE ON CONTENT AND CONTEXT

This unit is concerned with electrical installation practice applied to the construction industry and is designed to give the candidate some knowledge of the materials and equipment used in the electrical supply to buildings. An appreciation of some of the hand skills necessary for electrical installations will be developed together with an awareness of the maintenance and safe use of electrical equipment.

Corresponding to outcomes 1-5:

- 1 This outcome should provide the candidate with a basic knowledge of the materials used in electrical installation practice together with their basic properties. Examples of conductors would be cables, switch terminals, fuses, steel trunking, steel conduit, saddles, screws etc.

Examples of insulators would be conductor insulation, PVC sleeving joint boxes, plastic switch plates, cable clips etc.
- 2 This outcome covers the main types of electrical connectors and introduces practical exercises in their use.
- 3 Practical work on an installation is provided in this outcome covering a range of equipment and materials.
- 4 An introduction to inspection and maintenance of portable tools is provided in this outcome. The candidate should be able to outline a maintenance schedule which includes daily checks before and after use, and quarterly examination by an authorised person. He/she should also be able to list the items to be checked such as damage to flex, broken plug, damage to the transformer cracked /broken casing on portable tool, incorrectly fitted guard etc.
- 5 This outcome should provide the candidate with the basic knowledge with regard to safe working with electrical equipment.

National unit specification: support notes (cont)

UNIT Electrical Installation Practice

GUIDANCE ON TEACHING AND LEARNING APPROACHES

A general introduction on electrical conduction should be used to introduce the candidate to the flow of electrons in conductors and their relationship to current flow to explain the conduction properties of electrical conductors and insulators. The use of Ohms law could be used at this stage with simple calculations to get over the idea of low electrical resistance and high electrical resistance materials. The electrical properties of conductors and insulators have thus been introduced. This can be followed by some discussion on the need for flexibility of conductors in cables, etc. The need for 'earth' conductors in the form of steel structures could be treated at this stage. It is not intended to use calculations except to illustrate properties of materials. Ohms law has already been used but the resistivity expression could also be introduced at some stage for illustration of the difference in conductors.

Examples of the listed types of electrical connectors could be made available and the candidate given the opportunity to use each to connect or terminate different types of conductors/cables. It is important to get over the effect of unsatisfactory connections prior to the installation of a system which could follow the study of electrical connectors.

It would be in the candidate's interest to get some practice at mounting electrical equipment, including cables, onto all the surfaces listed by all the fixing methods listed prior to attempting the assessment on the installation of an electrical system.

When considering the inspection of portable tools it would make a useful exercise if faulted equipment was used as an aid to learning, prior to looking at the maintenance of the same equipment, to ensure that faults occur as infrequently as possible.

The teaching of safety, particularly the use of protective equipment (safety helmet, boots, etc.), must permeate throughout the teaching of the whole unit especially when using workshop premises for practical work but wider implications of safety must be introduced that include such items as the need for and the general requirements of the Health and Safety at Work Act and the IEE regulations.

GUIDANCE ON APPROACHES TO ASSESSMENT

Outcome 1

Keep it simple. Four short answer questions only are needed for assessment, two starting 'State the.....' and two starting 'List the.....' are sufficient and can be given at any time following the introduction.

National unit specification: support notes (cont)

UNIT Electrical Installation Practice

Outcome 2

The assessment here is in two parts, part I contains two short answer questions, 'State the.....' and 'List the.....' covering pcs (a) and (b). Part II is a practical exercise that could follow when the candidate has successfully practised on all connectors listed using suitable conductor materials. Three are chosen to make up the assessment with a checklist to keep as evidence of achievement.

Outcome 3

The assessment is again in two parts, part I covers pcs (a), (b) and (c) and should consist of two short answer questions starting 'List the.....' and one identification exercise where fixing devises are matched to names either by mounted fixing devises or drawings. Part II is a practical exercise comprising the installation of three items of plant using two fixing devises on at least two surfaces from the range, keep it simple and use material to hand.

Outcome 4

This assessment is in two parts, part I consisting of one short answer question, 'List the.....' for pc (a) and two extended response questions covering pcs (b) and (c), eg. 'Describe.....' Part II would be the practical exercise of carrying out an inspection of a faulted portable tool and its associated equipment, the use of a check list to keep as evidence of achievement would be necessary.

Outcome 5

The use of three extended response questions covering all the performance criteria would make up a satisfactory assessment.

All the assessments, with the exception of the practical exercises, should be carried out as individual efforts within a classroom situation and under supervision. The practical exercises should be carried out in a suitable workshop that simulates, as near as possible, an industrial site.

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 alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment and Certification Arrangements* (SQA, 1998).