

-SQA- SCOTTISH QUALIFICATIONS AUTHORITY

NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION

GENERAL INFORMATION

-Module Number-	4110113	-Session-1993-94
-Superclass-	XJ	
-Title-	ELECTRICAL FUNDAMENTALS	INSTALLATION: CIRCUIT

-DESCRIPTION-

GENERAL COMPETENCE FOR UNIT: Applying an understanding of wiring requirements for a consumer's electrical installation from the intake point to the final circuit to produce wiring arrangements for a range of domestic installation circuits.

OUTCOMES

1. outline control equipment requirements;
2. produce wiring arrangements for lighting circuits;
3. produce wiring arrangements for ring and radial socket outlet circuits;
4. produce wiring arrangements for domestic fixed appliance circuits.

CREDIT VALUE: 1 NC Credit

ACCESS STATEMENT: Successful completion of Standard Grade Science at 5 or above is the preferred entry level for this module.

It is expected that candidates will be able to identify colours to a standard which will enable them to carry out the work contained in this module.

For further information contact: Committee and Administration Unit, SQA, Hanover House, 24 Douglas Street, Glasgow G2 7NQ.

This specification is distributed free to all approved centres. Additional copies may be purchased from SQA (Sales and Despatch section) at a cost of £1.50 (minimum order £5).

NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION**STATEMENT OF STANDARDS****UNIT NUMBER:** 4110113**UNIT TITLE:** ELECTRICAL INSTALLATION: CIRCUIT
FUNDAMENTALS

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

OUTCOME**1. OUTLINE CONTROL EQUIPMENT REQUIREMENTS****PERFORMANCE CRITERIA**

- (a) Correct identification is made of:
 - (i) the items of equipment required for intake control;
 - (ii) the responsibilities associated with, and the parties responsible for, each item of control equipment identified;
 - (iii) the correct sequencing of the items of control equipment identified.
- (b) The outline identifies which items of consumer's equipment provide:
 - (i) isolation and switching;
 - (ii) protection against overcurrent;
 - (iii) protection against electric shock;
 - (iv) division of circuits.
- (c) Accurate reference is made to relevant British Standards.

RANGE STATEMENT

Responsible parties: consumer; supply authority.

Responsibilities: purchasing; provision; maintenance; notification of faults.

EVIDENCE REQUIREMENTS

Evidence of the candidate's knowledge and understanding of the appropriate arrangements for control equipment at a consumer's intake position and associated responsibilities.

Oral and/or written evidence should be used to ensure coverage of the full range.

Oral and/or written evidence should be obtained to show that the candidate fully understands the requirements of a single phase domestic or commercial consumer intake arrangement and this should be supported by additional forms of evidence as required.

OUTCOME

2. PRODUCE WIRING ARRANGEMENTS FOR LIGHTING CIRCUITS

PERFORMANCE CRITERIA

- (a) The wiring arrangements produced are appropriate in terms of the required functions and specification.
- (b) The wiring arrangements are accurate and conform to relevant British Standards.

RANGE STATEMENT

Types of lighting circuit: 1 way; 2 way; 2 way with intermediate switching. Loop-in and junction-box methods of wiring.

EVIDENCE REQUIREMENTS

Performance evidence of the candidate's ability to produce wiring arrangements for lighting circuits. This should include completion by the candidate of a wiring diagram which identifies all component parts of the circuit.

Oral and/or written evidence should be obtained to ensure coverage of the full range.

Oral and/or written evidence of knowledge and understanding of:

- (i) types of lighting circuit and their application;
- (ii) wiring methods, including joint box and loop-in;
- (iii) relevant British Standards.

OUTCOME

- 3. PRODUCE WIRING ARRANGEMENTS FOR RING AND RADIAL SOCKET OUTLET CIRCUITS**

PERFORMANCE CRITERIA

- (a) The wiring arrangements produced are appropriate in terms of the required functions and specification.
- (b) The wiring arrangements are accurate and conform to relevant British Standards.

RANGE STATEMENT

Types of circuit: standard circuit arrangements for ring final and radial circuits.

EVIDENCE REQUIREMENTS

Performance evidence of the candidate's ability to produce wiring arrangements for ring and radial socket outlet circuits. This should include completion by the candidate of a wiring diagram which identifies all component parts of the circuit.

Oral and/or written evidence should be obtained to ensure coverage of the full range.

Oral and/or written evidence of knowledge and understanding of:

- (i) types of ring and radial socket outlet circuit and their application;
- (ii) relevant British Standards.

OUTCOME

- 4. PRODUCE WIRING ARRANGEMENTS FOR DOMESTIC FIXED APPLIANCE CIRCUITS**

PERFORMANCE CRITERIA

- (a) The wiring arrangements produced are appropriate in terms of the required functions and specification.
- (b) The wiring arrangements are accurate and conform to relevant British Standards.

RANGE STATEMENT

Types of circuit: immersion heater; shower circuit; cooker.

EVIDENCE REQUIREMENTS

Performance evidence of the candidate's ability to produce wiring arrangements for domestic fixed appliance circuits. This should include completion by the candidate of a wiring diagram which identifies all component parts of the circuit.

Oral and/or written evidence should be obtained to ensure coverage of the full range.

Oral and/or written evidence of knowledge and understanding of:

- (i) types of domestic fixed appliance circuit and their application;
 - (ii) relevant British Standards.
-

ASSESSMENT RECORDS

In order to achieve this unit, candidates are required to present sufficient evidence that they have met all the performance criteria for each outcome within the range specified. Details of these requirements are given for each outcome. The assessment instruments used should follow the general guidance offered by the SQA assessment model and an integrative approach to assessment is encouraged. (See references at the end of support notes).

Accurate records should be made of assessment instruments used showing how evidence is generated for each outcome and giving marking schemes and/or checklists, etc. Records of candidates' achievements should be kept. These records will be available for external verification.

SPECIAL NEEDS

In certain cases, modified outcomes and range statements can be proposed for certification. See references at end of Support Notes.

© Copyright SQA 1993

Please note that this publication may be reproduced in whole or in part for educational purposes provided that:

- (i) no profit is derived from the reproduction;
- (ii) if reproduced in part, the source is acknowledged.

NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION**SUPPORT NOTES**

UNIT NUMBER: 4110113

UNIT TITLE: ELECTRICAL INSTALLATION: CIRCUIT FUNDAMENTALS

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

NOTIONAL DESIGN LENGTH: SQA allocates a notional design length to a unit on the basis of time estimated for achievement of the stated standards by a candidate whose starting point is as described in the access statement. The notional design length for this unit is 40 hours. The use of notional design length for programme design and timetabling is advisory only.

PURPOSE This module is designed to develop a technical knowledge of consumer's electrical arrangements and lighting and power circuits in domestic and small commercial/industrial premises. It is intended for this module to be taught in conjunction with other related modules as part of a course of study which should include complementary industrial experience. It is aimed at those following a career in electrical installation work.

SQA publishes summaries of NC units for easy reference, publicity purposes, centre handbooks, etc. The summary statement for this unit is as follows:

This module will help you to acquire a knowledge of types of electrical installation circuit required for domestic use. On completion of the module you will be able to produce wiring arrangements for different types of circuit and will have a good working knowledge of relevant British Standards.

CONTENT/CONTEXT The candidate successfully completing this module will require underpinning knowledge relating to sequencing of equipment and division of responsibilities for installation and maintenance, different types of circuit wiring installation and British Standards.

The following information concerns the knowledge required for specific outcomes.

Corresponding to Outcomes 1-4:

1. Appreciation of national generation/transmission/distribution systems.

Standard voltages present in the National Grid. Input and output arrangements from a local substation transformer producing a 3-phase 4-wire output.

Single-phase and 3-phase 4-wire arrangements of supply authorities and consumer's equipment: types of service cable, cut-out, energy meter, main switch/fuse, distribution boards, consumer units, circuit breaker boards.

Introduction to earthing systems: TN-S, TN-C-S, TT TNC and IT systems.

Relate content to requirements of current British Standards.

2. Need for 1-way, 2-way and 2-way with intermediate switching arrangements.

Recognised names of conductors and colour coding. Connection of single pole control devices and common accessories.

Interpretation of circuit diagrams to produce wiring arrangements involving joint-box method and loop-in method.

Typical cable sizes and overcurrent device rating for lighting circuits.

Relate content to the requirements of current British Standards.

3. Standard circuit arrangements for ring and radial socket outlet circuits to British Standards. Understanding of 'Diversity' and relevance of floor area.

Use of fused and non-fused spurs. Connection of permanently connected equipment.

4. Wiring arrangements for domestic immersion heater circuits, shower unit circuits and cooker circuits. Isolation and switching requirements.

Typical loadings of equipment and related overcurrent device and cable sizes. Application of diversity in relation to cookers.

Related content to the requirements of current British Standards.

APPROACHES TO GENERATING EVIDENCE This module could be taught in conjunction with the following related modules and could involve both tutorial-based and workshop activities.

4110060	Materials and Jointing Methods (Electrical) (x 0.5)
84013	PVC Sheathed Wiring
94105	Selecting a Cable Size (x 0.5)
4110130	Work Safety
84109	Conduit Systems
94111	Mineral Insulated Cable (x 0.5)
84112	Cable Tray Systems
4110180	Electrical Installation: Inspection and Testing
4110312	Electrical Installation: Layout and Fixings (x 0.5)
94110	Cable Trunking Systems
4110120	Protection and Earthing

Teaching will be mainly instructional but a candidate centred approach should be adopted wherever possible.

Every opportunity should be taken to provide practical examples and exercises to clarify basic concepts.

For Outcome 2, the candidate should be encouraged to develop skills using both the joint-box and loop-in methods.

The learning approaches could also include films, videos, slides, practical exercises, and guidance notes to relevant British Standards.

Employer and supervisors should be encouraged to reinforce the knowledge gained with appropriate practical experience and to assist in evidence gathering wherever practicable.

The safety aspects of practical installation should be stressed and illustrated in practical demonstrations.

ASSESSMENT PROCEDURES The use of diagrams, by the candidate, to assist in giving clear evidence of understanding circuit wiring arrangements, would, be advantageous. Oral or written questioning will also be required and the use of structured questions based on diagrams would provide an effective methods of assessment for all the outcomes in this module.

Candidates' answers, whether written or oral, should be adequately recorded and made available for the purposes of verification.

Candidates should have access to the current edition of the IEE Wiring Regulations and Guidance notes when undergoing assessment on these outcomes.

RECOGNITION Many SQA NC units are recognised for entry/recruitment purposes. For up-to-date information see the SQA guide 'Recognised and Recommended Groupings'.

REFERENCES

1. Guidelines for Module Writers.
2. SQA's National Standards for Assessment and Verification.
3. For a fuller discussion on assessment issues, please refer to SQA's Guide to Assessment.
4. Procedures for special needs statements are set out in SQA's guide 'Students with Special Needs'.

© Copyright SQA 1993

Please note that this publication may be reproduced in whole or in part for educational purposes provided that:

- (i) no profit is derived from the reproduction;
- (ii) if reproduced in part, the source is acknowledged.