

**-SQA-SCOTTISH QUALIFICATIONS AUTHORITY**

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**NATIONAL CERTIFICATE MODULE DESCRIPTOR**

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**-Module Number- 0094105 -Session- 1989-90**  
**-Superclass- XJ**

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**-Title- SELECTING A CABLE SIZE (x<sup>1</sup>/<sub>2</sub>)**

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**-DESCRIPTION-**

Purpose This module is designed to develop the necessary knowledge and understanding of the factors to be considered when selecting a cable size. It is intended that this module is taught in conjunction with other related modules and forms part of a course of study which should include complementary industrial experience. It is aimed at those following a career in electrical installation work.

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Preferred Entry Level 74016 Single and Three Phase Circuits  
64107 Protection and Earthing

Learning Outcomes The student should:

1. select appropriate types of cable for given conditions of installation;
2. calculate the effective current carrying capacity of cables using correction factors;
3. calculate the cable voltage drop in consumer circuits;
4. determine the minimum size of cable required for given situations.

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Content/ Context Corresponding to Learning Outcomes 1-4:

1. Types of cable incorporating copper and aluminium conductors - Appendix 9 - current IEE Wiring Regulations. Schedule of methods of installation of cables - Table 9A. Heat dissipation; type of insulation. Classification of external influences. Environmental conditions of cables and conductors. Relevant IEE Wiring Regulations.

2. Definition of "effective current-carrying capacity" of a cable - Appendix 9; Item 3. Symbols used in the Regulations - Item 4. Significance of correction factors with reference to "tabulated current-carrying capacity" of a cable. Correction factors for ambient temperature, grouping, thermal insulation and type of overcurrent protective device. Consideration of operating temperature of conductor.
3. Determined by conductor material, cross-sectional area, length of circuit conductors and design current of the circuit. Power loss and reduction in performance of equipment. Calculation of cable voltage drop and check procedures comply with current IEE Wiring Regulations. Use of Tables of Voltage Drop.
4. Calculation of design current of circuit. Selection of the type and nominal rating of protective device. Consideration of the co-ordination requirements between conductors and protective devices. Determination and application of correction factors to nominal rating or setting of protective device. Selection of cable size from Tables of current-carrying capacities and voltage drops. Consideration of cumulative effects resulting from cable correction factors, voltage drop, shock protection (comparison of actual earth loop impedance against permitted maximum) and thermal constraints (by selection from Table 54F and by calculation from Regulation 543-2). Reselection of suitable cable size, when required, to comply with current IEE Wiring Regulations.

Suggested  
Learning and  
Teaching  
Approaches

This module could be taught in conjunction with the following related modules and could involve both classroom and workshop activities.

64102 Materials and Jointing Methods (Electrical) (x 1/2)  
 84103 PVC Sheathed Wiring  
 64108 Work Safety (x1/2)  
 84109 Conduit Systems  
 94111 Mineral Insulated Cable (x 1/2)  
 84112 Cable Tray Systems  
 64113 Electrical Installation Inspection and Testing (x 1/2)  
 64121 Electrical Layout and Fixings (x 1/2)  
 94110 Cable Trunking Systems

Learning Outcomes 1 to 4 will be achieved mainly by discussion, example and student tutorial. The student must be continually referred to appropriate IEE Regulations to gain expertise in the recognition and selection of specific tables.

Learning Outcome 4 develops from Learning Outcomes 1 and 3 but the integration and extension could be taken a step at a time, with repeated examples, by the teacher and the student.

The choice of single phase systems only or single and three phase systems is at the discretion of the teacher depending on which is most appropriate for the student group.

Assessment  
Procedures

Acceptable performance in the module will be satisfactory achievement of all the performance criteria specified for each Learning Outcome.

Students should have access to the current edition of the IEE Wiring Regulations when carrying out the assessment of the Learning Outcomes.

The following abbreviations are used below:

LO Learning Outcome  
IA Instrument of Assessment  
PC Performance Criteria

LO1

SELECT APPROPRIATE TYPES OF CABLE FOR GIVEN CONDITIONS OF INSTALLATION

PC The student:

- (a) identifies the external influences which affect the choice of wiring systems;
- (b) determines the appropriate method of installation as contained in the current IEE Wiring Regulations;
- (c) selects appropriate types of cable for given situations.

IA Structured Question

The student will be presented with an exercise consisting of one structured question to test the application of knowledge required to select a cable as affected by given external influences.

The question will be subdivided into 3 parts as follows:

- (a) external influences
- (b) method of installation
- (c) types of cable

Satisfactory achievement of the Learning Outcome will be based on all performance criteria being met. This will be demonstrated by the student producing a correct response for each of (a), (b) and (c).

LO2

**CALCULATE THE EFFECTIVE CURRENT CARRYING CAPACITY OF CABLE USING CORRECTION FACTORS**

PC The student:

(a) identifies the appropriate correction factors applicable to:

- (i) ambient temperature
- (ii) grouping of cables or circuits
- (iii) thermal insulation
- (iv) types of overcurrent protective device;

(b) determines the effective current carrying capacity using correction factors.

IA Objective Items

The student will be presented with an exercise consisting of objective items to test the interpretation of circuit conditions and application of correction factors to determine the effective current carrying capacity for cables under given conditions.

The exercise will consist of 6 questions based on the following conditions:

- (i) ambient temperature
- (ii) grouping of cable or circuit
- (iii) thermal insulation
- (iv) types of overcurrent protective device

The questions will be allocated as follows:

- (a) 4 questions each considering only one of the listed conditions to identify the applicable correction factor.
- (b) 2 questions each considering 2 or more of the listed conditions to determine the correction factors and effective current carrying capacity of a cable under given conditions.

Objective items could be either multiple choice or short answer questions.

Satisfactory achievement of the Learning Outcome will be based on all performance criteria being met. This will be demonstrated by the student producing 3 correct responses for (a) and 2 correct responses for (b).



## IA Assignment

The student will be set an assignment to test the application of knowledge required to determine the minimum size of cable for a given situation.

The student, following the correct procedures, should calculate the minimum cable size required for 1 specific task relating to a type of wiring system. The student should be provided with the necessary formulae to determine:

- (i) design current of circuit
- (ii) nominal current rating and type of protective device
- (iii) minimum tabulated current-carrying capacity of cable
- (iv) suitable cable size allowing for correction factors
- (v) suitable cable size allowing for circuit constraints

Satisfactory achievement of the Learning Outcome will be based on all performance criteria being met. This will be demonstrated by the student, following the correct procedures, selecting a minimum cable size for the wiring system which complies with the current IEE Wiring Regulations.