

1. Module details

Module name

Electrical Wiring and Equipment 1

Suggested structured learning time

A learner possessing the prerequisite skills and knowledge should achieve the module purpose in 18 to 20 hours.

Module code

NE172.2

Discipline code

0703

2. Module purpose

This module provides an introduction to application of technical standards to cabling/wiring systems and further development of ‘trade skills’ relevant to a particular sector of the Electrotechnology Industry.

Learners will gain knowledge of common power, signal and communication cable types and develops basic skills in terminating cables and conductors and attaching plugs/connectors.

They will practice safe working methods and learn to select and apply a variety of fixing devices used in installing cables, cable enclosures and accessories, and electrical/electronic equipment wiring systems appropriate to an Electrotechnology Industry sector.

3. Learning pathway

Intended use in the structured learning program

This module is intended to supplement initial workplace exposure to installation work in the various sectors of the Electrotechnology Industry. In particular it applies the application of ‘trade skills’ and regulator requirements for installing wiring/cabling and equipment.

Therefore before undertaking this module a learner should have knowledge and skills in the safe use of common hand and power tools and a clear understanding of the work environment and need to work safely.

Recommended prerequisites

For the most effective learning this module should be undertaken only after modules in NBB002, NE175 and have been completed and in conjunction with module NUE044.

4. Relationship to competency standards

This module provides part of the underpinning knowledge and skills in the 'Evidence Guide' of specific units of competency in the National Electrotechnology Training Package and provides similar support, where mapped, to equivalent units in the National Metals and Engineering Competency Standards. For details refer to the module to unit maps, available from EEQSBA.

This module supports the development of essential capabilities required for electrical licensing.

5. Content

1. Electrical isolation for safety
 - identifying isolation device
 - isolating supply
 - testing
 - safety tagging and lock-off
2. Statutory requirements and standards
 - scope of work permitted by various licences
 - legislated requirements
 - purpose of technical standards
 - role of standards bodies
 - use of standards
3. Cables
 - types
 - power
 - signal
 - communication
 - terms
 - colour coding
 - structure
 - identification
 - cable applications

4. Cords/flexible cables, plugs/sockets and connectors
 - plugs/sockets
 - connectors
 - make-up cord and plug/connector
 - test procedures
 - connection failure
5. Wiring systems
 - wiring looms
 - enclosures and supports
 - selecting wiring systems
6. Terminating power, signal and communication cables
 - requirements
 - plugs/sockets and connectors types and applications
 - assembly/disassembly plugs/sockets and connectors
7. Accessories and fixings appropriate to industry sector
 - applications
 - fixing devices and methods

6. Assessment strategy

Assessment methods

Assessment should be progressive reflecting an holistic approach to ensure the module purpose is met. To assist in ensuring validity, reliability and fairness assessment instruments should include practical exercises, assignments and written tests consisting of a number of item types, such as multiple choice, short answer and problem solving.

Conditions of assessment

Normally learning and assessment will take place in a classroom / laboratory environment.

7. Learning outcome details

Learning outcome 1

Demonstrate knowledge of safe isolation, testing and tagging procedures.

Assessment criteria

- 1.1 Identify the fuse or circuit breaker controlling circuits supplying equipment to be worked on.
- 1.2 Isolate the circuit and equipment.

Learning outcome 2

- 1.3 Conduct testing to ensure correct isolation.
 - 1.4 Use safety tags, notices and lockable devices correctly.
- State the legislative requirements in relation to electrical safety and the associated standards.

Assessment criteria

- 2.1 State the scope of work covered by licensing in the electrotechnology industry.
- 2.2 State the legislative requirements for ensuring electrical/electronic equipment is safe to use.
- 2.3 Describe the purpose of technical standards and how they are developed.
- 2.4 Describe the role of Standards Australia, Standards New Zealand, the International Organisation for Standardisation (ISO) and the International Electrotechnical Commission (IEC)
- 2.5 Explain how technical standards are arranged and used in relation to electrical/electronic work.

Learning outcome 3

Describe the construction, specifications, colour coding and application of cords, power, signal and communication cables.

Assessment criteria

- 3.1 List common power, signal and communication cables and state typical applications.
- 3.2 Explain the terms conductor material, stranding, insulation type, voltage rating, temperature rating, colour coding, screening, sheathing, armour and serving.
- 3.3 State the Australian and International colour standards for cable and cords.
- 3.4 Describe the construction of common power, signal and communication cables.
- 3.5 Identify cords and cables by conductor size, type and rating.
- 3.6 Describe typical application for given cord and cable types.

Learning outcome 4

Demonstrate knowledge of connecting plugs and cords/cables to electrical/electronic equipment.

Assessment criteria

- 4.1 Identify plugs/sockets commonly used for a particular application.

Learning outcome 5

- 4.2 Make up typical plugs and cords/cables for connection to electrical/electronic equipment.
- 4.3 Follow written test procedures to test continuity, polarity and insulation resistance of plugs and cords/cables where appropriate.
- 4.4 State typical reasons for connector/termination failure.

Describe wiring/cabling systems and accessories suitable for a given application and given environment and state the importance of earthing and supplementary electrical protection.

Assessment criteria

- 5.1 State the reasons for the use of various wiring systems.
- 5.2 Identify common wiring enclosures, support systems and related accessories
- 5.3 State the factors to consider when selecting a wiring system for a particular application.
- 5.4 Identify the potential hazards when modifying or repairing a wiring system.
- 5.5 Construct a basic wiring system.
- 5.6 State the importance of, and basic reasons for, earthing electrical/electronic equipment.
- 5.7 Describe the purpose of double insulation and Residual Current Devices (RCDs).

Learning outcome 6

Prepare and terminate power, signal and communication cables

Assessment criteria

- 6.1 State the standards requirements for treatment of cable ends, joints in cables and terminating cables.
- 6.2 Terminate cables at pillar, tunnel, crimp and soldered type terminals and other connectors using methods appropriate to the particular application.
- 6.3 Demonstrate correct assembly and disassembly of plugs and sockets for particular applications.
- 6.4 List typical reasons for connector/termination failure and service common terminations and plug/socket combinations.

Learning outcome 7

Select and fix accessories, using appropriate fixing devices and methods for a given electrical/electronic installation

Assessment criteria	7.1 Describe briefly the typical application of a variety of commonly used accessories, and fixing devices. 7.2 Demonstrate the methods of safely fixing accessories for particular electrical/electronic installations to a range of timber, hollow walls, masonry, metallic and non-metallic structures and enclosures, and state any pertinent licensing requirements.
8. Delivery of the module	
Delivery strategy	Simulated structure including wall and ceiling framing, situations for concealed and surface wiring. Also, Learner circuits should originate from a device or terminals that comply with the relevant standards and reflect workplace practice.
Resource requirements	Resources should be sufficient for Learners to carry out practical exercises on an individual basis. Useful references include: Pethebridge, K., and Neeson, I., 2001, <i>Electrical Wiring Practice</i> , 6 th Ed. Vol. 1, McGraw Hill, Sydney Standards Australia, Standards New Zealand: AS/NZS 3000:2000 <i>Wiring rules</i> AS/NZS 4836 <i>Safe working practice on low-voltage electrical installations</i> WorkCover Codes of Practice Where this module is used in an approved Traineeship or Apprenticeship program learners should be advised to obtain, where available, respective EEQSBA ¹ User Guides (<i>these outline in detail what training and work performance the Learner is required to undertake for the program</i>)
Occupational health and safety requirements	A safe and healthy environment will be provided for learners and teachers. Safety procedures for the particular learning facilities shall be followed as part of the learning / teaching activity and assessment.

¹ EEQSBA – ElectroComms and EnergyUtilities Qualifications Standards Body of Australia Ltd