

## 1. Module details

Module name

**Electrotechnology Systems, Materials and Accessories**

Module duration

It is expected that learners with the appropriate entry skills will successfully complete this module in **18 to 20 hours**.

Module code

NUE079

Discipline code

## 2. Module purpose

This module introduces learners to the various systems, cables, wiring, and accessories used in the Electrotechnology industry. Learners will learn to identify common power, signal, and communication cable types and gain awareness of technical standards and regulations that exist and, develop basic skills in terminating cables and conductors and attaching plugs/connectors in a controlled environment. Also, learners will, under direct supervision, 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 industry sector.

## 3. Prerequisites

Occupational Health and Safety (NBB02.2)

## 4. Relationship to competency standards

This module provides part of the underpinning knowledge and skills identified in the 'Evidence Guide' of specific units of competency in the National Electrotechnology Training Package Competency Standards; namely UTE NES 060A, 050A and 051A. Full competence is achieved through relevant off-job and on-job training as prescribed by the industry for the requisite qualification.

## 5. Content

### 1. Overview of Electrical Power System

- generation system – fossil fuel and renewable sources, co-generation and typical power station equipment
- transmission system – types and equipment
- distribution system – equipment
- grid system

### 2. Overview of Telecommunication System

- customer access network (CAN)
- customer premises equipment (CPE)

**3. Statutory requirements and standards**

- scope of work permitted by various licences
- legislated requirements
- purpose of technical standards
- role of standards bodies
- use of technical standards

**4. Cables**

- Types
  - \* Power
  - \* Signal
  - \* Communication
- Terms
- colour coding
- structure
- identification
- cable applications

**5. Wiring systems**

- types
- wiring looms
- enclosures and supports

**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**

- types of accessories and 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 controlled 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**

Learning and assessment will take place in an environment that is conducive to a learner's development with direct supervision and within a controlled situation, using approved equipment that is designed for instructional purposes.

## 7. Learning outcome details

### Learning outcome 1

**Identify the various components of the electrical power system used to produce and transport electrical power to the end user.**

#### Assessment criteria

- 1.1 List the main sources of energy used to produce electrical energy.
- 1.2 Identify the main components of a typical thermal power station and hydro power station
- 1.3 List the main components of the electrical transmission system
- 1.4 List the main components of the electrical distribution system.
- 1.5 State the purpose of the national grid system

### Learning outcome 2

**Identify the various components of the telecommunication system used to carry voice and data to the end user.**

#### Assessment criteria

- 2.1 Identify the main components of the customer access network – CAN (Telstra) to carry voice and data information.
- 2.2 Identify the main components of the customer premises network for domestic and commercial buildings – CPE (Telstra) to carry voice and data information.

### Learning outcome 3

**State the legislative requirements in relation to electrical and telecommunications safety and the associated standards.**

#### Assessment criteria

- 3.1 State the scope of work covered by licensing and registration in the Electrotechnology industry.
- 3.2 State the legislative requirements for ensuring electrical/electronic/telecommunications equipment is safe to use.
- 3.3 Describe the purpose of technical standards and how they are developed.

	3.4	Describe the role of Standards Australia, Standards New Zealand, the International Organisation for Standardisation (ISO) and the International Electrotechnical Commission (IEC)
	3.5	Explain how technical standards are arranged and used in relation to electrical/electronic work.
<b>Learning outcome 4</b>		<b>Describe the construction, specifications, colour coding and application of cords, power, signal and communication cables.</b>
<b>Assessment criteria</b>	4.1	List common power, signal and communication cables and state typical applications.
	4.2	Explain the terms conductor material, stranding, insulation type, voltage rating, temperature rating, colour coding, screening, sheathing, armour and serving.
	4.3	State the Australian and International colour standards for cable and cords.
	4.4	Describe the construction of common power, signal and communication cables.
	4.5	Identify cords and cables by conductor size, type and rating.
	4.6	Describe typical application for given cord and cable types.
<b>Learning outcome 5</b>		<b>Describe wiring/cabling systems and accessories suitable for a given application and given environment and state the importance of earthing and supplementary electrical protection.</b>
<b>Assessment criteria</b>	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).
<b>Learning outcome 6</b>		<b>Prepare and terminate power, signal and communication cables</b>
<b>Assessment criteria</b>	6.1	State the standards requirements for treatment of cable ends and 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.
<b>Learning outcome 7</b>		<b>Select and fix accessories, using appropriate fixing devices and methods for a given electrical/electronic installation</b>
<b>Assessment criteria</b>	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.
<b>8. Delivery of the module</b>		
<b>Delivery strategy</b>		Simulated structure including wall and ceiling framing, situations for concealed and surface wiring. Also, learner circuits should originate from a device or terminals with supply if required not exceeding the standard for extra low voltage and, which also complies with the relevant standards and reflect workplace practice. At all times the simulation must be conducted under controlled and direct supervision of the learner.
<b>Resource requirements</b>		Resources should be sufficient for learners to carry out practical exercises on an individual basis under controlled situations.
		Useful references include: <i>Standards Australia</i> , Relevant standards
		Trade publications

**Occupational health & safety requirements**

Pethebridge, K. and Neeson I., 1991-1992, *Australian Electrical Wiring, Vol. 1 and Vol. 2*, McGraw-Hill, Sydney.

A safe and healthy environment will be provided for learners and teachers as well as safety procedure with regard to learning / teaching activity.