



**Australian Government**

# **UEENEEG103A Install low voltage wiring and accessories**

**Release: 3**

## **UEENEEG103A Install low voltage wiring and accessories**

### **Modification History**

Not Applicable

### **Unit Descriptor**

#### **Unit Descriptor**

1)

#### **1.1) Descriptor**

This unit covers the installation in building and premises of wiring enclosures, cable support systems, cables and accessories and designed to operate at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompasses working safely and to installation standards, routing cables to specified locations, terminating cables and connecting wiring at accessories and completing the necessary installation documentation.

### **Application of the Unit**

Not Applicable

## Licensing/Regulatory Information

### 1.2) License to practice

**During Training:** Competency development activities are subject to regulations directly related to licensing, occupational health and safety and where applicable contracts of training such as apprenticeships.

**In the workplace:** The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

## Pre-Requisites

**Prerequisite Unit(s)**      2)

### 2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE10 1A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE10 2A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE10 4A	Solve problems in d.c circuits
UEENEEE10 5A	Fix and secure electrotechnology equipment
UEENEEE10 7A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE13 7A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG00	Solve problems in single and three phase

<b>Prerequisite Unit(s)</b>	<b>2)</b>
	6A low voltage machines
	UEENEEG03 Solve problems in single and three phase 3A electrical apparatus and circuits
	UEENEEG06 Arrange circuits, control and protection 3A for general electrical installations
	UEENEEG10 Solve problems in electromagnetic 1A devices and related circuits
	UEENEEG10 Solve problems in low voltage a.c. circuit 2A
	UEENEEG10 Terminate cables, cords and accessories 6A for low voltage circuits
	UEENEEG10 Select wiring systems and cables for low 7A voltage general electrical installations
	UEENEEG10 Trouble-shoot and repair faults in low 8A voltage electrical apparatus and circuits
	UEENEEG10 Develop and connect electrical control 9A circuits

## Employability Skills Information

### Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

### Application of the Unit 4

#### 4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical license.

#### 4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

## Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency      Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

## Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to install wiring and accessories.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
	1.4 Installation of wiring is prepared in consultation with other affected by the work and sequenced appropriately.
	1.5 The nature and location of the work is determined from documentation or other appropriate person to establish the scope of work to be undertaken.
	1.6 Cable routes are planned within the constraints of the building structure, significant and requirements.
	1.7 Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements.
	1.8 Tools, equipment and testing devices needed to for the installation work are obtained in accordance with established procedures and checked for correct

ELEMENT	PERFORMANCE CRITERIA
	operation and safety.
2 Install wiring and accessories.	<p data-bbox="550 360 1369 439">1.9 Preparatory work is checked to ensure no damage has occurred and complies with requirements.</p> <p data-bbox="550 472 1369 539">2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p data-bbox="550 573 1369 719">2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.</p> <p data-bbox="550 752 1369 864">2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p data-bbox="550 898 1369 1043">2.4 Wiring and accessories are installed to comply with technical standards and job specifications and requirements with sufficient excess to affect terminations.</p> <p data-bbox="550 1077 1369 1144">2.5 Accessories are installed straight and square in the required locations and within acceptable tolerances.</p> <p data-bbox="550 1178 1369 1290">2.6 Cables and conductors are terminated at accessories in accordance with manufacture's specifications and regulatory requirements.</p> <p data-bbox="550 1323 1369 1435">2.7 Ongoing compliance and safety inspection of installed wiring systems and testing of installed circuits is undertaken.</p> <p data-bbox="550 1469 1369 1536">2.8 Defects revealed through on-going compliance and safety inspection and tests are rectified.</p> <p data-bbox="550 1570 1369 1715">2.9 Cable installation and termination is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices.</p> <p data-bbox="550 1749 1369 1816">2.10 Unexpected situations are dealt with safely and with the approval of an authorised person.</p>
3 Completion and report installation activities.	<p data-bbox="550 1850 1369 1928">3.1 OHS work completion risk control measures and procedures are followed.</p> <p data-bbox="550 1962 1369 1989">3.2 Work site is cleaned and made safe in accordance</p>

**ELEMENT****PERFORMANCE CRITERIA**

with established procedures.

- 3.3 'As-installed' cables/wiring and accessories is documented and an appropriate person or persons notified in accordance with established procedures.

## Required Skills and Knowledge

### REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing wiring and accessories for low voltage circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry standards, technologies and practices.

#### KS01-EG103A

#### Installation of wiring systems

Evidence shall show an understanding of the installation of wiring systems that comply with standards to an extent indicated by the following aspects:

T1 Standards, codes and requirements applicable to the installation of wiring systems encompassing:

- Cables and methods of mechanical protection and support
- Protection against and from other services.
- Prohibited cable locations
- Building codes affecting the installation of cables in buildings, structures and premises (limitation on penetration of structural elements, maintenance of fire protection integrity, and wiring above suspected ceilings)
- Issues affecting electrical installations in heritage buildings and premises (limitation on penetration of structural and finished elements, accessing cable routes, types and colour of exposed accessories).

T2 Use of other installation standards called up by the Wiring Rules for special situations encompassing:

- standards that apply to Electromedical treatment areas.
- additional requirements for construction and demolition sites.
- Relocatable installations and their site supply
- additional requirements for caravan park.
- additional requirements for marinas and pleasure craft at low voltage.
- additional requirements for shows and carnivals.

T3 Hazardous areas encompassing:

- Conditions that apply in an areas that require them to be classified as a 'Hazardous area'.
- Responsibility for classifying a hazardous area
- Awareness of standards called up by the Wiring Rules for selection of equipment and installations in Hazardous areas. (AS/NZS 3000 requirements for hazardous areas).

T4 Requirement for the installation of cables and accessories in damp situations and



## REQUIRED SKILLS AND KNOWLEDGE

ELV installations encompassing:

- restricted zones around baths, showers, fixed water containers, pools, sauna heaters and fountains/water features for given installations.
- selecting equipment suitable for installation in given damp situations.
- voltage range that defines extra-low voltage.
- 'Separated extra-low voltage (SELV) system' and a 'Protected extra-low voltage (PELV) system'.
- AS/NZS 3000 requirements for selecting extra-low voltage systems and devices for a range of installations and conditions.

T5 Aerial cabling encompassing:

- Describe the types of aerial cabling.
- State the AS/NZS 3000 and local supply authority requirements for aerial cabling.
- Termination of aerial cables in accordance with AS/NZS 3000 and local requirements.
- installation of consumers mains for connection via overhead consumers terminals in accordance with AS/NZS 3000 and local requirements.
- Testing of installed cables compliance with Australian Standards

T6 Underground cabling encompassing:

- Describe permissible underground cabling systems.
- Identify other underground services.
- State the AS/NZS 3000 and local supply authority requirements for underground cabling.
- List the advantages and disadvantages of underground wiring systems
- selection of underground consumers mains in accordance with AS/NZS 3000 and local requirements

T7 Techniques for installing cables and wiring systems encompassing:

- Typical cable routes through buildings, structures and premises.
- Application of wiring accessories
- Drawing-in, placing and fixing of cables
- Cable and conductor terminations
- Maintaining fire rating integrity.
- Inspecting and testing installed and terminated cables to ensure they comply with continuity and insulation resistance and are safe to connect to the supply.

## Evidence Guide

### EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with

## EVIDENCE GUIDE

the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to demonstrate competency in this unit

#### 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall

## EVIDENCE GUIDE

be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Install wiring and accessories for low voltage circuits as described as described in 8) and including:
    - A Reading and interpreting drawings related to cable layouts, cable schedules and apparatus locations.
    - B Planning cable routes and obtaining installation materials.
    - C Sequencing the installation effectively with other affected by the work.
    - D Routing, placing and securing cables in compliance with requirements.
    - E Placing and securing accessories accurately.
    - F Maintaining fire integrity.
    - G Terminating cable and conductors to comply with requirements.

## EVIDENCE GUIDE

- H Undertaking on-going compliance and safety inspection and testing of installed circuits.
- I Rectifying any defects revealed through on-going inspection and testing
- J Correctly documenting 'as-installed' cables/wiring and accessories.
- K Dealing with unplanned events

### Context of and specific resources for assessment

#### 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to installing wiring and accessories for low voltage circuits.

### Method of assessment

#### 9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

### Concurrent assessment and

#### 9.5)

For optimisation of training and assessment effort, competency

**EVIDENCE GUIDE**

**relationship with other units**      development in this unit may be arranged concurrently with unit:

UEENEEG104A      Install appliances, switchgear and associated accessories for low voltage electrical installations

## Range Statement

### RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to at least three different types of cable enclosure/support systems in combination with four different cable types and circuits for five different purposes as listed below.

#### Wiring systems enclosures and supports:

- Metallic conduit
- Non-metallic conduit
- Trunking
- Duct
- Cable tray/ladder
- Catenary
- Posts/poles/struts

#### Cable types:

- Thermoplastic insulated cable (TPI)
- Flat thermoplastic sheathed (TPS)
- Circular thermoplastic sheathed (TPS)
- Steel wire armoured (SWA)
- Fire rated cable ( HT or HF or MIMS)
- Flexible cables
- Aerial cable

#### Circuit purpose:

- Consumers mains
- Submains
- Alternative supply
- Lighting;
- Socket outlets
- Single phase fixed appliance
- Single phase motor
- Three phase motor
- Control

**RANGE STATEMENT**

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

**Unit Sector(s)**

Not Applicable

**Competency Field****2.2) Literacy and numeracy skills**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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**2.2) Literacy and numeracy skills**

**Competency Field**            5)

Electrical