



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **UEENEEF102A Install and maintain cabling for multiple access to telecommunication services**

Release: 1

## **UEENEEF102A Install and maintain cabling for multiple access to telecommunication services**

### **Modification History**

Not applicable.

### **Unit Descriptor**

#### **Unit Descriptor**

#### **1) Scope:**

##### **1.1) Descriptor**

This unit covers the installation and maintenance of telecommunications cabling in buildings and premises. It encompasses working safely and to Australian Communications and Media Authority's 'Open' Cabling Provider Rule, installing multiple telephone line, multi-pair cables, backbone cabling, terminating in socket outlets, termination modules and distributors, testing and compliance checks and completing cabling documentation.

### **Application of the Unit**

#### **Application of the Unit 2)**

This unit applies to customer cabling terminated on distributors and to the installation, maintenance and modification of indoor, external, underground cabling. Customer cabling, for the purpose of this standard, may be used to connect devices for a range of applications, including for example: telecommunications (phones and facsimile), data including video and multimedia, security and alarms, and fire protection.

### **Licensing/Regulatory Information**

#### **License to practice 3)**

This unit meets the minimum ACMA 'prescribed level of knowledge and skill that safeguards matters of health,

## License to practice

3)

safety, network integrity and addresses matters of interoperability where customer equipment and standard telephone service are involved'. Therefore, skills and knowledge described in this unit may only be practised under the requirements set out in ACMA 'Open' Cabling Provider Rule.

Practice of this competency standard unit is also subject to regulations directly related to occupational health and safe and contracts of training where they apply.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

## Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

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

UEENEEE1 01A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE1 02A Fabricate, assemble and dismantle utilities industry components

UEENEEE1 04A Solve problems in d.c. circuits

UEENEEE1 05A Fix and secure electrotechnology equipment

**Prerequisite Unit(s) 4)**

UEENEEE1 07A Use drawings, diagrams, schedules, standards, codes and specifications

For the full prerequisite chain details for this unit please refer to Table 2 in Volume 1, Part 2

**Literacy and numeracy skills 4.2)**

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 3      Writing 3      Numeracy 3

## **Employability Skills Information**

**Employability Skills 5)**

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.

## **Elements and Performance Criteria Pre-Content**

6) Elements describe the essential outcomes of a competency standard unit      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

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
1 Prepare to install and maintain cabling.	1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
	1.2 Health and safety risks are identified and established risk control measures and procedures are followed in preparation for the work.
	1.3 Remote power feeding is identified and established risk control measures prepared.
	1.4 The nature and location of the work is determined from documentation or in discussion with appropriate person(s) to establish the scope of work to be undertaken.
	1.5 Cable routes are planned within the constraints of the building structure, significant and regulations.
	1.6 Earthing requirements are determined with consideration of existing earthing arrangements, where applicable and of cable system earth upper and lower resistance limitations.
	1.7 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others.
	1.8 Sources of materials that may be required for the work are established in accordance with established routines and procedures.
	1.9 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Install and maintain cabling.	2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Installed support structure is checked to ensure cable will not be exposed to damage during installation and general operation.
	2.3 Catenary supports are secured to building structure and tensioned where necessary to ensure cable weight can be carried in operating conditions with interference and safety segregation maintained including adherence to

## ELEMENT

## PERFORMANCE CRITERIA

AS/ACIF S009.

- 2.4 Protective earthing of metal work is installed in accordance with requirements and to industry standards.
- 2.5 Cables/wires are handled in accordance with manufacturer's application specifications including tension and bending stress requirements.
- 2.6 Sufficient excess is allowed at cable ends to facilitate termination.
- 2.7 Telecommunication outlet ends of cable are uniquely labelled to match identifier at originating location.
- 2.8 Cable is placed and secured to maintain safety and interference segregation in accordance with legislative and industry standards.
- 2.9 Cable ties not tightened to the point of causing cable sheath damage or transmission impairment are trimmed flush to prevent risk of personal damage.
- 2.10 Cables installed as catenaries or supported by catenaries in external environment shall meet minimum above ground clearances and clearances from hazardous electrical services as per AS/ACIF S009.
- 2.11 Cables installed underground shall meet minimum depth of cover and segregation from hazardous electrical and other services as per AS/ACIF S009.
- 2.12 Over-voltage protection devices are fitted to all cable pairs, where required, to suppress voltage surges with the devices protectively earthed in accordance with AS/ACIF S009.
- 2.13 TRC/CES/Earth wire insulation is protected against damage and TRC/CES and protective earths segregated in accordance with relevant industry and legislative standards AS/ACIF S009.
- 2.14 Procedures for referring non-routine events to immediate supervisor for directions are followed.

## ELEMENT

## PERFORMANCE CRITERIA

- |   |      |   |
|---|------|---|
|   | 2.15 | Cabling is installed efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or services.                           |
|   | 2.16 | Routine quality checks are carried out to ensure cabling complies with requirements.  |
| 3. Terminate and test cables and earth wires. | 3.1  | Established OHS risk control measures and procedures for carrying out the work are followed.  |
|   | 3.2  | Cable sheath removed to allow for correct termination length and without damage to underlying conductors and their insulation.                                    |
|   | 3.3  | Terminating modules are installed in accordance to manufacturer specifications and cable pairs neatly and sequentially fanned for termination.                    |
|   | 3.4  | Conductors are terminated in accordance with recommended colour code sequence using appropriate termination tools in the manufacturer's specified manner.         |
|   | 3.5  | Cable shield (if applicable) is earthed to manufacturer specifications and relevant industry codes of practice including AS/ACIF S009.                            |
|   | 3.6  | Visual inspection is undertaken to confirm termination colour code sequence has been followed prior to end-to-end testing of wire and pair termination integrity. |
|   | 3.7  | Cable pairs are tested and clearly labelled to provide an accurate identification in accordance with requirements.  |
|   | 3.8  | TRC/CES/Earth wires are terminated with connectors recommended by manufacturers in accordance with relevant industry codes of practice including AS/ACIF S009.    |
|   | 3.9  | TRC/CES /Earth wire continuity is maintained through out and interface requirements with electrical systems are observed.   |
|   | 3.10 | TRC/CES /Earthing installation is tested for continuity, insulation resistance and conductive resistance as per relevant industry standards including             |

**ELEMENT**

**PERFORMANCE CRITERIA**

AS/ACIF S009.

- |   |   |  |   |
|---|---|--|---|
|   | 3.11  | Earthing system is labelled in accordance with requirements.   |   |
|   | 3.12  | Compatibility of alterations with existing systems is confirmed and new work tested both in isolation and when integrated with existing systems. |   |
|   | 3.13  | Procedures for referring non-routine events to immediate supervisor for directions are followed.   |   |
|   | 3.14  | Cabling is terminated efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or services.         |   |
|   | 3.15  | Routine quality checks are carried out and a defect rectified to ensure cabling complies with requirements.                                      |   |
| 4 | Complete cabling work, records and reporting. | 4.1  | OHS work completion risk control measures and procedures are followed.  |
|   |   | 4.2  | Work site is cleaned and made safe in accordance with established procedures.   |
|   |   | 4.3  | Record sheets and plans of cable location, type and infrastructure are accurately created or updated and stored in accordance with customer requirements.                                   |
|   |   | 4.4  | Cable pair record books are created or updated to provide an accurate record of pair locations, inter-connections and usage in accordance with industry codes of practice and AS/ACIF S009. |
|   |   | 4.5  | Cabling completion advice is documented and reported in accordance with requirements.   |



## Required Skills and Knowledge

### REQUIRED SKILLS AND KNOWLEDGE

8) 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 laying and connecting cables for multiple access to telecommunication services. All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

#### **KS01-EF102A Telecommunications telephony and switching**

Evidence shall show an understanding of telecommunications telephony and switching, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1. Principles and characteristics of sound encompassing:

- Sound characteristics
- Sound waves
- Distortion
- Attenuation
- Resonant frequency
- Sound pressure levels

T2. Transmission of sound encompassing:

- Compression
- Rarefaction
- Sound transmission
- Wavelength
- Inverse square rule (attenuation)
- Basic telephone construction

T3. Telephone transmitters encompassing:

- Telephone transmitter functions
- Telephone transmitter types
- Capacitive transmitters
- Moving coil transmitters

T4. Telephone receivers encompassing:

- Telephone receiver functions
- Telephone receiver types

T5. Telephone circuits encompassing:

- Components
- Operation of basic telephone
- Operation of basic facsimile machine
- Cables used, colour and termination types

## **REQUIRED SKILLS AND KNOWLEDGE**

T6. Overview of earthing and protection encompassing:

- Function of earthing
- Earthing requirements

T7. Customer switching systems (CSS), interfaces and devices encompassing:

- System Distribution Frames (SDF)
- Power fail and line interface requirements (e.g. Indial, ISDN, Rotary Groups, Extension, Tie-line circuits and the like)

T8. Installation of CSS encompassing:

- Documentation
- CPR rules
- CSS interfaces
- CPR rules for SDFs

T9. Installation and termination requirements overview encompassing:

- ACMA regulations and requirements
- Technical standards
- Programming of CSS
- Metering and Public/Pay Phones

T10. Hazards encompassing:

- Electronic components and circuits
- Printed circuit boards
- Physical
- Static discharge
- Chemical

### **KS02-EF102A**

### **Telecommunications Open CPR regulations**

Evidence shall show an understanding of telecommunications Open CPR regulations, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1 Cabling provider rules encompassing:

- Cabling registrars, auditors and inspectors
- Mandatory and voluntary requirements for cabling work
- Registration

T2 General installation requirements encompassing:

- Cabling provider rules requirements
- Earth potential rise
- Catenary cabling systems
- Optical fibre and coaxial cabling systems
- Conduits

## **REQUIRED SKILLS AND KNOWLEDGE**

- Surge suppression devices
- T3 Cable distribution devices encompassing:
  - Cable distribution devices
  - Clearances
  - General requirement
- T4 Indoor cabling encompassing:
  - General requirements for indoor cabling
  - Required minimum clearances
  - Damp situations
  - Cables in lift and hoist shafts
- T5 Underground cabling encompassing:
  - Requirements for underground cabling
  - Protection of underground cabling
  - Segregation from other services
- T6 Aerial cabling encompassing:
  - Requirements for aerial cabling
  - Minimum clearances
  - Segregation requirements
- T7 Earthing encompassing:
  - Earthing systems
  - Earthing of equipment
  - Equipotential bonding
- T8 Miscellaneous regulations encompassing:
  - Cabling in heritage buildings
  - Cabling in public places
  - Cabling in hazardous areas

### **KS03-EF102A**

### **Telecommunications installation practices**

Evidence shall show an understanding of telecommunications installation and maintenance practices, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1 Telecommunication cable types encompassing:

- Construction
- Characteristics
- Applications

T2 Cable identification encompassing:

- Plans and drawing
- Labelling
- Documentation

T3 Building structures, materials and sequencing encompassing:

## **REQUIRED SKILLS AND KNOWLEDGE**

- Building types
- Timber frame
- Brick veneer
- Double brick
- Metal frame
- Parts of a building
- Sequence of construction
- Stages of construction where electrical work is completed
- Environmental and heritage awareness purpose and regulations

### **T4 Cable installation encompassing:**

- Hazards
- Cable damage prevention
- Cable dispensers
- Cable enclosures
- Types
- Fixing
- Regulations
- Distribution boxes and back mounts
- Systems

### **T5 Termination Boundaries and devices encompassing:**

- Electrical connections
- Hazards
- Regulations

### **T6 Cable preparation and terminations and hauling mechanisms encompassing:**

- Indoor Methods
- Outdoor Methods

### **T7 Earthing concepts encompassing:**

- MEN System
- Communication Earthing System
- Telecommunication Reference Conductor
- Earthing Cable Shield
- Testing
- Earth Barriers
- Purpose of earth testing instruments
- Earth Potential Rise
- Earthing test procedures
- Interpretation of results

### **T8 Surge suppression and system encompassing:**

## REQUIRED SKILLS AND KNOWLEDGE

- Purpose
- Types
- Operation
- Installation Techniques
- Earthing requirements

T9 Cable shielding and interference encompassing:

- EMI/RFI Principles
- Sources
- Reduction Techniques
- Earthing Cable Shields

T10 Telecommunication earthing systems encompassing:

- Hazards
- Solutions
- Installation
- Termination
- Line taps
- Testing

## Evidence Guide

### EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the 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-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 everyday 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 be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. 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:
  - Lay and connect cables for multiple access to telecommunication services as described in 8) and including:

- A Terminating systems at both distributor and outlet locations and at least one 50 pair copper cable, with accurate completion of installation records, drawing alterations and compliance forms
- B Placing of cables on support structures and building faces for both internal and external locations
- C Securing cables correctly for above locations
- D Avoiding cable damage such as crushing, burning, kinking, sheath twist, cutting and nicking, bending radius
- E Reading and interpreting drawings related to cable layouts, outlet location, cable coding system and identifiers, distributor locations
- F Conducting and interpreting cable test results
- G Correctly interpreting and applying standards and regulations
- H Completing the required documentation
- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**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 used in 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 laying and connecting cables for multiple access to telecommunication services.

**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 competency standard 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 relationship with other units** 9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:



UEENEEE10 Fix and secure electrotechnology equipment  
5A

UEENEEE10 Use drawings, diagrams, schedules, standards,  
7A codes and specifications

## Range Statement

### RANGE STATEMENT

**10)** 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 cable laying and connecting applicable to larger commercial and industry installations involving many lines, multi-pair cables, backbone cabling, multi-story buildings and more complicated termination modules and distributors.

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

Competency Field **11)**

Data and Voice Communications