Australian Government

Department of Education, Employment and Workplace Relations

UEENEEF105A Install and modify optical fibre performance data communication cabling

Release: 1

UEENEEF105A Install and modify optical fibre performance data communication cabling

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers the installation and modification of high performance data communication optical fibre cabling in buildings and premises and intended for connection a telecommunications network. It encompasses working safely and to standards, installing multiple data lines and backbones using optical fibre cabling, terminating at distributors, splices and on socket outlets, testing and compliance checks and completing cabling documentation.

Application of the Unit

Application of the Unit **2)**

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit require a registration to practise in the workplace subject to requirements set out ACMA 'Open' Cabling Provider Rule. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.
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.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. circuits
UEENEEE105A	Fix and secure electrotechnology equipment

Prerequisite Unit(s) **4)**

UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEF102A	Install and maintain cabling for multiple access to telecommunication services

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

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to install or modify optical fibre cabling	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 are followed in preparation for the work.
		1.3	Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
		1.4	Installation or modification of wiring is prepared in consultation with others affected by the work and sequenced appropriately.
		1.5	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.
		1.6	Advice is sought from appropriate persons to ensure the work is coordinated effectively with others.
		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 operation and safety.
		1.9	Preparatory work is checked to ensure no damage has occurred and that it complies with requirements.
2	Install or modify optical fibre cables	2.1	OHS risk control measures and procedures for carrying out the work are followed.
		2.2	Optical fibres are tested for optical continuity.
		2.2	Cables are installed or modification to comply with manufacturer specifications, technical standards and job requirements with sufficient excess to affect terminations.
		2.4	Established methods for dealing with unexpected situations are discussed with appropriate person(s) and

ELEMENT	PERFORMANCE CRITERIA	
		documented.
	2.5	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6	Ongoing checks of the quality of installed wiring are undertaken in accordance with established procedures.
	2.7	Cable installation/modification is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices.
3 Terminate optical fibre cables.	3.1	OHS risk control measures and procedures for carrying out the work are followed.
	3.2	Cable termination work area is cleaned and safety measure implemented, particularly for terminating optical fibre cables.
	3.3	Cables are prepared for termination in accordance with manufacturer specifications and technical standards.
	3.4	Optical fibre connectors are fitted in accordance with manufacturer specifications and technical standards.
	3.5	Appropriate methods are used to splice optical fibre cables in strict accordance with OHS safety measures, manufacturer specifications and technical standards.
	3.6	Cable performance tests are conducted accurately and results documented.
	3.7	Causes of defects indicated by test results are identified and rectified.
	3.8	Unexpected situations are dealt with safely and with the approval of an authorised person.
	3.9	Ongoing checks of the quality of installed wiring are undertaken in accordance with established procedures.
	3.10	Cable terminations are carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices.

ELEMENT	PERFORMANCE CRITERIA
4 Document installation or modification, and verify data communication optical fibre cabling performance.	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 Final checks are made to that the installed cabling conforms to requirements.
	4.4 Documentation certifying system performance is issued to an appropriate person(s).

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 installing and modifying performance data communication optical fibre cabling.
All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies..

KS01-EF105A Optical fibre cable installation and modification practices

Evidence shall show an understanding of optical fibre communication cable installation and modification practices, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1. Telecommunications Standards and Regulations

- Telecommunications Wiring Rules AS/ACIF S009 or its replacement.
- Telecommunications Equipment Standards AS/ACIF S008 or its replacement.
- Cabling Provider Rules.

T2. Risk Management Principles with respect to:

- laser and similar products.
- optical fibre products.
- low voltage and extra low voltage circuits.
- working in hazardous areas.

T3. Optical Fibre Safety - Laser

- AS/NZS 2211.1 Safety of laser products
- AS/NZS 2211.2 Safety of optical fibre communications systems (OFCS)
- Nature of intense light outside of the visible light spectrum.
- Safety precautions to be employed when working with intense light sources.
- Laser classifications and their typical uses

T4. 4. Optical Fibre Safety - Hazards

- Chemicals used in the installation and termination process including Isopropyl Alcohol, Acetone, Kerosene, Mineral Turpentine and other solvents.
- Epoxy resins and other adhesives.
- Hot surface precautions.
- Disposal of hazardous materials including sharps (syringes glass shards and the like).
- Working in confined spaces and at height.

T5. Optical Theory

- Electromagnetic Spectrum and the place of visible light, infrared and ultra violet bands.
- Frequency of oscillation and the relationship to wavelength of light.

REQUIRED SKILLS AND KNOWLEDGE

- Propagation speed and the refractive index.
- Reflection of light and refraction of light.

T6. Optical Fibre Principles of Operation

- Multi Mode Optical Fibres (MMOF)
- Single Mode Optical Fibres (SMOF)
- Advantages and applications
- Refractive index and how it can be employed in optical fibres.
- Transmission path for laser energy within the optical fibre.
- Optical fibre performance and the mechanisms that may result in losses.
- Requirements of optical fibre cables as specified in current Standards

T7. Installation of Cables

- Requirements of the standard AS/ACIF S009 or its replacement.
- AS/NZS 3080 or its replacement.
- Installation requirements of cables by the manufacturer.
- Building Codes of Australia.
- Construction of domestic, commercial and industrial buildings.
- Purpose and procedures for pre-testing optical fibre cable prior to installation
- Bending radii and hauling requirements.
- Cable supporting structures, cable trays and catenaries
- Types of securing devices and anchors.
- Safety precautions

T8. Terminating Fibre Cables

- Precautions required for the use of solvents and cleaning agents.
- Safe handling and disposal of waste materials at the conclusion of termination.
- Safe handling of fibre cables that may carry laser light energy.
- Manual means of striping and cleaning optical fibre cables.
- Optical devices to safely examine optical fibre cables.
- Mechanical means to terminate or splice optical fibre cables
- Termination devices and methods
- Preparation and splicing techniques.
- Devices used to protect terminations and splices against mechanical damage.
- Colour individual fibre cables and tubes to ensure end to end integrity.

T9. Testing optical fibre cables.

- AS/NZS 3080 Telecommunications Installations
- Concept of measurements in decibels.
- Loss measurements methods at different wavelengths of light
- Setting up required equipment for accurate testing and the calibration of that equipment.

REQUIRED SKILLS AND KNOWLEDGE

- Precautions employed to ensure accurate measurements.
- Operating principles and applications of an Optical Time Domain Reflectometer (OTDR).
- Operating principles and applications of an visible light source and an optical light loss test set
- Extraction and recording of test reports.
- Analyse and interpretation of test reports and corrective action.

T10. Building Construction and the building codes.

- Building Codes of Australia
- Construction of domestic, commercial and industrial buildings

T11. Supporting structures and fixings

- Types of cable supporting structures, cable trays and catenaries
- Types of securing devices for anchoring cable trays and catenaries.

T12. Administration and management (records)

- Completion Compliance Certificate (TCA1)
- Contractual obligations for the provision of test results and reports to customers.
- Requirements to keep and make available copies of test results of individual fibres.
- Requirements to record cable pathways and locations of coiled extra cable length for expansion or re-termination.
- Requirements of labelling Frames, Cabinets and outlets.
- Requirements of record keeping for cross connects and patches.
- How to plan records indicating history of faults or deficiencies attributed to the fibre cable to plan replacement or maintenance.

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, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Install and modify performance data communication optical fibre cabling as described in 8) and including:

A Reading and interpreting drawings related to cable layouts, cable schedules and apparatus locations.

B Routing, placing and securing cables to comply with requirements

C Maintaining fire integrity

D	Preparing and terminating each type of cable to comply with requirements.
E	Conducting cable performance test accurately
F	Identifying and rectifying anomalies
G	Completing the necessary documentation accurately.
H	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.

Note:
Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

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 installing and modifying performance data communication optical fibre cabling

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:

UEENEEF109A	Install and connect data and voice communication equipment

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 installing or modifying two types of performance optical fibre cables each on at least two occasions.
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