



Australian Government

ICTCBL2065B Splice and terminate optical fibre cable for carriers and service providers

Release 1

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Modification History

Release	Comments
Release 2	This version first released with <i>ICT10 Integrated Telecommunications Training Package Version 3.0</i>. Addition to application. Minor changes to knowledge requirements and range statement to reflect changed terminology. Outcomes deemed equivalent.
Release 1	This version first released with <i>ICT10 Integrated Telecommunications Training Package Version 1.0</i>.

Unit Descriptor

This unit describes the performance outcomes, skills and knowledge required to splice and terminate optical fibre cable within an optical telecommunications transmission environment.

This work is essential in provisioning of National Broadband Network (NBN) infrastructure for high speed and high bandwidth transmissions.

Assessment by a TITAB-registered assessor is recommended.

All customer cabling work in the telecommunications, fire, security and data industries must be performed by a registered cabler. All cablers are required to register with an Australian Communications and Media Authority (ACMA)-accredited registrar.

Application of the Unit

Technical staff who splice and terminate optical fibre cable for telecommunications projects apply the skills and knowledge in this unit.

They may carry out new installations, upgrade an optical backbone or access network provisioning for greater bandwidth and capacity required by emerging technology convergence for Next Generation Networks (NGN).

This unit may be applied to commercial or industrial fibre to the premises (FTTP) installations.

This unit does not include consideration of mechanical splicing. For mechanical splicing, refer to ICTCBL3010B Install and terminate optical fibre cable on customer premises.

Licensing/Regulatory Information

Refer to Unit Descriptor.

Pre-Requisites

Nil

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements	Performance Criteria
<i>Elements describe the essential outcomes of a unit of competency.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.</i>

Elements and Performance Criteria

1. Prepare for splicing	1.1 Select safety equipment to protect self and public according to enterprise guidelines and occupational health and safety (OHS) practices 1.2 Confirm layout of job using installation according to physical conditions at site and requirements of relevant legislation, codes, regulations and standards 1.3 Inform appropriate personnel of identified hazards on work site 1.4 Locate other services from relevant authorities according to enterprise guidelines and safe practices 1.5 Test for dangerous gases and place guards around open manholes following OHS and environmental requirements 1.6 Obtain approval for alterations to the design according to enterprise guidelines
2. Check existing optical fibre cable	2.1 Verify that cable was installed according to the installation plan and visually inspect cable for signs of sheath damage 2.2 Maintain minimum bend ratios according to manufacturer specifications to prevent cable damage and signal degradation 2.3 Secure cable according to safe industry practice to avoid cable and sheath damage
3. Splice optical fibre cable	3.1 Verify fibre is not live using appropriate equipment to maintain safe work practices, and ensure correct fibre has been identified 3.2 Prepare cable end to expose optical fibres according to splicing method and manufacturer specifications 3.3 Prepare and splice fibres using safe industry practice according to enterprise specifications 3.4 Test splice joint to manufacturer and design requirements
4. Terminate optical fibre cable	4.1 Select connector unit to suit terminating frame according to design specifications 4.2 Terminate the cable using type of termination specified in the plan and according to manufacturer specifications 4.3 Test termination for transmission loss and strength and re-terminate if transmission loss exceeds the manufacturer specifications 4.4 Install protection devices on connectors and fibres to protect from exposure and contaminants

	4.5 Label and lay up cables in enclosure according to manufacturer's instructions and enterprise guidelines
5. Finish job and report	5.1 Remove waste and reinstate site according to enterprise guidelines 5.2 Prepare reports, including test results and alterations to plans, according to enterprise policy 5.3 Notify client of work completion and obtain sign-off

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required skills

- communication skills to:
 - liaise with internal and external personnel on technical and operational matters
 - relate to work associates, supervisors, team members and clients
- literacy skills to interpret technical documentation, such as equipment manuals, specifications and requirements for optical fibre cable installation
- numeracy skills to take and analyse measurements
- planning and organising skills to organise and maintain equipment
- problem-solving skills to solve equipment and logistics problems
- safety awareness skills to:
 - apply precautions and required action to minimise, control or eliminate hazards that may exist during work activities
 - apply work site OHS
 - select and use required personal protective equipment conforming to industry and OHS standards
 - work safely with optical fibre and lasers
 - work systematically with required attention to detail without injury to self or others, or damage to goods or equipment
- technical skills to:
 - install customer access network (CAN) cable
 - operate test equipment to perform measurements on optical fibre
 - perform fault clearance
 - use diagnostic equipment
 - use optical fibre jointing techniques
 - use specialised tools and test equipment
 - use hand and power tools
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Required knowledge

- causes of signal strength loss in optical fibre
- colour coding of fibres
- detailed knowledge of AS/NZS 2211:2006 Safety of laser products (parts 1 and 2)
- features and operating requirements of test equipment for optical fibre cable
- industry and organisational policy and procedures when splicing optical fibre cable
- information required to operate equipment according to a test specification
- manufacturer requirements for safe operation of optical fibre equipment
- safety precautions when working with laser-based systems
- specific OHS requirements relating to the activity and site conditions
- techniques for types of termination, including:
 - direct termination
 - fusion splicing

- test methods and performance requirements
- types of optical cable and termination
- workplace and industry environment

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the ability to: - splice, terminate and test optical fibre cable applying safety precautions when working with laser-based systems - splice at least 12 fibres and house them in splicing cassettes and trays within industry recognised enclosures according to manufacturer's instructions - install a mechanical connector and a fusion, spliced pigtail type connector - complete relevant documentation to manufacturer and design requirements - provide report documenting installation and test results to client - comply with all related OHS requirements and work practices.
Context of and specific resources for assessment	Assessment must ensure: - sites where splicing and termination of optical fibre cable may be conducted - use of optical fibre testing equipment currently used in industry - relevant regulatory and equipment documentation that impacts on optical fibre cable installation activities.
Method of assessment	A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit: - review of a hands-on project completed by the candidate - review of an oral and written report, including installation and test results - direct observation of the candidate carrying out splicing of optical fibre within an optical communication system.
Guidance information	Holistic assessment with other units relevant to the industry

for assessment	sector, workplace and job role is recommended, for example: • ICTCBL3010B Install and terminate optical fibre cable on customer premises. Aboriginal people and other people from a non-English speaking background may have second language issues. Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess required knowledge. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. Where applicable, physical resources should include equipment modified for people with special needs.
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Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

<i>OHS practices</i> may relate to:	- determining that optical fibre cable is not live according to guidelines and standards - handling optical fibre cable in a safe manner to avoid risk of injury - labelling fibre cable and laser devices - locating and identifying adjoining services according to enterprise guidelines and OHS practices - observing AS/NZS 2211:2006 Safety of laser products (parts 1 and 2) - testing for presence of dangerous gases according to enterprise guidelines.
<i>Physical conditions</i> may relate to:	- above ground - in cabinet - in joint enclosure.
<i>Relevant legislation, codes, regulations and standards</i> may include:	- Australian Communications Industry Forum (ACIF) standards and codes - AS Communications Cabling Manual (CCM) Volume 1 - AS/NZS 2211:2006 Safety of laser products (parts 1 and 2) - AS/NZS 3000:2007 - AS/NZS 3080:2003 - AS/NZS 3084:2003 - AS/NZS 3085.1:2004 - AS/NZS ISO/IEC 14763.3:2007 - AS/NZS ISO/IEC 15018:2005 - AS/NZS ISO/IEC 24702:2007 - cabling security codes and regulations - OHS Acts and relevant codes and standards - regulated or industry codes of practice, including ACMA technical standards - technical standards AS/ACIF S008:2006 and AS/ACIF S009:2006.
<i>Hazards</i> may include:	- earth potential rise (EPR) - optical cable: - bare fibres

	• hazardous laser light • remote power feeding.
Relevant authorities may include:	• cable location services (Dial Before You Dig) • environment protection • local government • private owners • utility providers, such as: • electricity • fire services • gas • water • other telecommunications providers.
Dangerous gases may include:	• asphyxiating gas • carbon dioxide • carbon monoxide • combustible • natural gas • noxious gas.
Guards may include:	• barricades • plates • temporary fencing.
OHS and environmental requirements may relate to:	• identifying other services, including power and gas • need to decommission and isolate work site and lines before beginning work • personal protective clothing: • earmuffs • gloves: • leather • plastic • rubber • head protection • kneepads • masks • protective suits • safety boots • safety glasses • safe work practices, such as the safe use and handling of: • asbestos • chemicals • materials

	• tools and equipment • work platforms • safety equipment: • flashing lights • gas and other hazard detection equipment • safety barriers • trench guards • warning signs and tapes • witches hats • suitable light and ventilation • special access requirements • environmental considerations: • clean-up protection • stormwater protection • waste management.
Cable may include:	• air blown • armoured • external • internal • loose tube • tight buffered.
Appropriate equipment may include:	• hand-held optical power meter • OFI-fibre to the x (FTTx) active optical network terminal (ONT) detector • passive optical network (PON) meter • optical time domain reflectometer (OTDR).
Optical fibres may include:	• multi-mode • polymer • single mode.
Splice fibres may relate to:	• fusion splice • preparing connection ends to a smooth flat surface to ensure no optical path redirection from joint • removing all coatings from exposed optical fibre and removing all possible contaminants.
Type of termination may include:	• direct termination • fusion splicing.

Unit Sector(s)

Telecommunications - Cabling