Australian Government

# ICTCBL3240B Install ribbon fibre cable in the FTTX distribution network

**Release 1**

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

# ICTCBL3240B Install ribbon fibre cable in the FTTX distribution network

## Modification History

| Release | Comments |
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| Release 2 | This version first released with *ICT10 Integrated Telecommunications Training Package Version 3.0*.<br><br>References to other units updated.<br><br>Outcomes deemed equivalent. |
| Release 1 | This version first released with *ICT10 Integrated Telecommunications Training Package Version 1.0*. |

## Unit Descriptor

This unit describes the performance outcomes, skills and knowledge required to install ribbon cable in the fibre access node (FAN) site and also distribution, local and access underground enclosure joints. Cables range from 12 fibre to 576 fibre cables.

For splicing and terminating of optical fibre, the following unit of competency should be completed based on the needs of the work environment: ICTCBL2065B Splice and terminate optical fibre cable for carriers and service providers.

For more comprehensive safe work practices on optical installations, particularly on live fibre, the following unit of competency should be completed based on the needs of the work environment: ICTBWN3100B Work safely with live fibre to test and commission a fibre to the x installation.

Network owner specifications will apply to this work and should be checked and confirmed before undertaking work on National Broadband Network (NBN) sites.

## Application of the Unit

The unit applies to optical fibre cable installers and splicers deploying broadband access networks using optical technologies. They combine technical skills with specific work health and safety skills to work safely on ribbon fibre.

This unit is written in the context of the technology used for the NBN and may be adapted to suit other situations using ribbon fibre cable.

## Licensing/Regulatory Information

Refer to Unit Descriptor.

## Pre-Requisites

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

## Employability Skills Information

This unit contains employability skills.

## Elements and Performance Criteria Pre-Content

| **Element** | **Performance Criteria** |
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| *Elements describe the essential outcomes of a unit of competency.* | *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.* |

# Elements and Performance Criteria

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| 1. Prepare for installation of ribbon fibre | 1.1 Select safety equipment to protect self, co-workers and public in line with ***work health and safety (WHS) and environmental requirements*** |
| | 1.2 Identify and obtain tools and ***appropriate equipment*** required for the installation |
| | 1.3 Check ***physical conditions*** relevant to the installation and confirm layout of equipment to be installed |
| | 1.4 Inform appropriate personnel of identified ***hazards*** on work site |
| | 1.5 Locate other services from ***relevant authorities*** |
| | 1.6 Secure the work site with tests for ***dangerous gases*** and ***guards*** around open manholes |
| | 1.7 Obtain approval for alterations to the design within organisational guidelines |
| 2. Check and secure existing optical fibre cable | 2.1 Following ***WHS practices***, verify that cable was installed according to the installation plan and inspect cable for signs of sheath damage |
| | 2.2 Maintain minimum bend ratios of cable according to manufacturer specifications while manoeuvring into position |
| | 2.3 Secure cable according to safe industry practice, avoiding damage to cable and sheath |
| 3. Install ribbon fibres into high density drawers and/or pivot sub-racks in internal cabinets | 3.1 Introduce cable into ***cabinet*** rack though appropriate route |
| | 3.2 Remove cable sheath and lay up ribbon loose tubes into sub-racks without damage to fibre |
| | 3.3 Remove loose tubes, clean ribbon fibres and prepare for splicing using organisational techniques |
| | 3.4 ***Splice ribbon fibres*** and secure into splice holders |
| | 3.5 Confirm that fibres are accurately spliced according to organisational specifications |
| 4. Install and splice ribbon cable in underground enclosures | 4.1 Select appropriate ***enclosure*** for function and cable type |
| | 4.2 Prepare cables for mid-span and butt splicing following vendor guidelines |
| | 4.3 Feed cable accurately into enclosure according to network owner guidelines |
| | 4.4 Lay up ribbon fibre in enclosure splice tray to allow accurate and efficient splicing |

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| | 4.5 Cross-reference fibre numbering to match fibres accurately<br>4.6 Strip ribbon fibres to specifications<br>4.7 Splice ribbon fibres accurately<br>4.8 Apply heat-shrink sleeves to ensure protection of spliced ribbon fibres<br>4.9 Secure spliced ribbon fibres in splice holders |
| 5. Close and seal enclosure | 5.1 Check cable and ribbon fibre placement in splice trays conform to vendor and network owner specifications and adjust if necessary<br>5.2 Close and secure splice trays and fit enclosure cap<br>5.3 Heat shrink seals around cable entry ports when using heat shrinking techniques, according to vendor and network owner guidelines<br>5.4 Close and tighten seals around ribbon fibre cables when using mechanical sealing techniques according to vendor and network owner guidelines<br>5.5 Check for signs of effective seal and re-seal if necessary |
| 6. Complete site reinstatement, reporting and sign-off requirements | 6.1 Place sealed enclosure in pit and secure to vendor and network owner specifications<br>6.2 Identify signs of damage or potential damage to pit and cable and take steps to mitigate<br>6.3 Reinstate site to network owner specifications<br>6.4 Prepare and finalise reports, including test results and alterations to plans, according to network owner requirements<br>6.5 Advise 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:
  - ask effective questions and clarify requirements
  - listen to, and liaise with, relevant personnel on technical and operational matters
  - identify, raise and report WHS matters, discussing and relaying WHS information to others
  - communicate job-related hazards and risk-management approaches to colleagues
- literacy skills to:
  - interpret technical documentation and standards, and safety signs and symbols
  - use technical language in written tasks, such as reports or recommendations, to optimise cable installation
- numeracy skills to interpret technical data, such as specifications for cable installation
- problem-solving skills to detect and rectify cable installation failures
- research skills to access technical information and sources to understand and report on installation issues
- safety awareness skills to:
  - apply precautions and required action to minimise, control or eliminate hazards associated with work activities
  - select and use required personal protective equipment that conforms to industry and WHS standards
  - work systematically with required attention to detail without injury to self or others, or damage to goods or equipment
  - select and use appropriate methods for cable installation
- technical skills to:
  - install customer access network (CAN) cable
  - use correct installation practices
  - use diagnostic equipment
  - use optical fibre jointing techniques
  - use specialised tools and equipment
  - use hand and power tools
  - work with ribbon fibre cables to:
    - lay up ribbon fibre cables in pits and cabinets to network owner specifications
    - strip protective coating on small and large (576 fibre) cables
    - clean gel coats from fibre casings
    - install ribbon fibre into enclosures according to network owner specifications
    - seal enclosures with heat seals and mechanical seals
    - perform ribbon fibre splicing.
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### Required knowledge

- applicable network owner standards, specifications and procedures for cable installation
- cable installation knowledge, including:
  - causes of signal strength loss in optical fibre
  - colour coding and numerical coding of fibres
  - detailed knowledge of AS/NZS 2211:2006 Safety of laser products (Parts 1 and 2)
  - industry and organisational policies and procedures when splicing optical fibre cable
  - manufacturer requirements for safe operation of optical fibre equipment
- common construction site hazards
- health, safety and environmental control processes, including WHS and environmental responsibilities and duty of care
- optical fibres and equipment:
  - hazards relating to handling of optical fibre and laser light source in the workplace
  - injuries:
    - damage to retina from lasers
    - damage to lungs from inhalation of fibre offcuts and particles
    - needle stick injury from fibres and offcuts
  - laser warning signs and labels relating to optical fibre components and equipment
  - safety requirements when handling and working with:
    - devices
    - laser light sources
    - optical fibre connectors
    - optical fibres
    - patch cords
- traffic control for a single vehicle
- ribbon fibre knowledge, including:
  - bend ratios for ribbon fibre
  - procedures for handling and placing ribbon fibre in enclosures
  - procedures for physical handling of ribbon fibre cables
  - structure of ribbon fibre cables
  - splicing techniques for ribbon fibre
  - types and functions of ribbon fibre enclosures
- risks associated with confined spaces and appropriate responses.

# 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.*

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| **Overview of assessment** | |
| **Critical aspects for assessment and evidence required to demonstrate competency in this unit** | Evidence of the ability to:<br>• prepare cable for mid-span splicing – strip and coil<br>• prepare cable for butt end splicing – strip and coil<br>• install cable into:<br>  • three types of enclosures<br>  • two types of FAN cabinet racks and sub-racks<br>• splice ribbon fibre according to specifications<br>• observe all network owner requirements and product practices to ensure optimal performance of cable systems<br>• adapt techniques to a range of technical and environmental conditions. |
| **Context of and specific resources for assessment** | Assessment must ensure access to:<br>• optic fibre cabling and equipment<br>• a range of cabinet types and other housings requiring cable-handling techniques<br>• personal protective equipment<br>• first aid and fire safety equipment. |
| **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:<br>• direct observation of the candidate installing cable into:<br>  • enclosures<br>  • cabinets<br>• direct observation of the candidate following network owner and product-specific instructions<br>• oral questioning to assess knowledge of installation principles and practices. |
| **Guidance information for assessment** | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

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| | Access must be provided to appropriate learning and assessment support when required.<br><br>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.<br><br>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.<br><br>Where applicable, physical resources should include equipment modified for people with special needs. |

# 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.*

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| ***WHS and environmental requirements*** may relate to: | • environmental considerations:<br>  • clean-up protection<br>  • stormwater protection<br>  • waste management<br>• identifying other services, including power and gas<br>• need to decommission and isolate work site and lines before beginning work<br>• personal protective clothing and equipment<br>• safe work practices, such as the safe use and handling of:<br>  • asbestos<br>  • chemicals<br>  • materials<br>  • tools and equipment<br>  • work platforms<br>• safety equipment:<br>  • flashing lights<br>  • gas and other hazard detection equipment<br>  • safety barriers<br>  • traffic cones<br>  • trench guards<br>  • warning signs and tapes<br>• special access requirements<br>• suitable light and ventilation. |
| ***Appropriate equipment*** may include: | • hand-held optical power meter<br>• OFI-FTTx network terminal detector<br>• optical time domain reflectometer (OTDR)<br>• passive optical network (PON) meter. |
| ***Physical conditions*** relate to: | • access to the site<br>• equipment at the site<br>• other construction activities at or adjacent to the site<br>• road and other traffic conditions<br>• weather. |

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| ***Hazards*** may include: | • earth potential rise (EPR)<br>• optical cable:<br>  • bare fibres<br>  • hazardous laser light<br>• remote power feeding. |
| ***Relevant authorities*** may include: | • cable location services (Dial Before You Dig)<br>• environment protection<br>• local government<br>• private owners<br>• utility providers, such as:<br>  • electricity<br>  • fire services<br>  • gas<br>  • other telecommunications providers<br>  • water. |
| ***Dangerous gases*** may include: | • asphyxiating gas<br>• carbon dioxide<br>• carbon monoxide<br>• combustible gas<br>• natural gas<br>• noxious gas. |
| ***Guards*** may include: | • barricades<br>• plates<br>• temporary fencing. |
| ***WHS practices*** may relate to: | • determining that optical fibre cable is not live according to guidelines and standards<br>• handling optical fibre cable in a safe manner to avoid risk of injury<br>• labelling fibre cable and laser devices<br>• locating and identifying adjoining services according to organisational guidelines and WHS practices<br>• observing AS/NZS 2211:2006 Safety of laser products (Parts 1 and 2)<br>• testing for presence of dangerous gases according to organisational guidelines. |
| ***Cabinets*** may include: | • FAN distribution cabinets<br>• fibre distribution hub (FDH) cabinets<br>• distribution cabinets. |
| ***Splice ribbon fibres*** may relate to: | • ribbon fusion splice techniques<br>• preparing connection ends to a smooth flat surface to ensure no optical path redirection from joint |

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| | • removing all coatings from exposed optical fibre and removing all possible contaminants. |
| ***Enclosures*** may include: | • access joint location (AJL)<br>• distribution joints<br>• local joint location (LJL). |

## Unit Sector(s)

Telecommunications - Cabling