**Technical and Vocational Education and Training (TVET) Council**

# Occupational Standards of Competence

# Fibre Optic Installation

# Level 2

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## ACKNOWLEDGEMENTS

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### Members of the Fibre Optic Installation Working Group

| | |
|---|---|
| Mr. Rene Ramdin | Owner, Cascade Cable Runs |
| Mr. Grantley Robinson | System Database Administrator, Samuel Jackman Prescod Polytechnic (SJPP) |
| Mr. Akil Thompson | Technical and Vocational Education and Training (TVET) Council |

# Qualification Overview

# NVQB

# in

# Fibre Optic Installation

# Level 2

# Qualification Overview

This qualification is aimed at persons employed in employees in developing knowledge and skills in fibre optic cable installation and telecommunications networking.

Employees at this level must have an understanding of the required skills and knowledge to install optical fibre cables in accordance with given route plans, and to maintain the uptime and operational quality of fibre network infrastructure/equipment. The role also involves troubleshooting and effective fault management in cases of fault occurrence.

Like all NVQs this qualification is competence based. This means that it is linked to the candidate's ability to competently perform a range of tasks connected with their work. Candidates must plan a programme of development and assessment with their assessors and compile a portfolio of evidence to prove that they are competent in their work role.

**Who the qualification for?**

The NVQB in Fibre Installation Level 2 is aimed at technicians who place, secure and terminate optical fibre cable for new installations, upgrades to or maintenance of existing networks in domestic, commercial and industrial installations.

**Jobs within the industry**

Relevant occupations include:

- Fibre optic installer
- Fibre optic technician
- Fibre optic component and systems designer

## A070102 - APPROVED NATIONAL VOCATIONAL QUALIFICATION STRUCTURE

## FIBRE OPTIC INSTALLATION LEVEL 2

To achieve a full award, candidates must complete all six (6) mandatory units.

| **Mandatory Units (All must be completed)** | **CODES** |
|---|---|
| **1. Network, splice and test optical fibre cables** | **UA03002** |
| 1.1 Prepare for installation of optical fibre cables | |
| 1.2 Install, terminate and test optical fibre cable | |
| 1.3 Remove fibre hazards from work area | |
| 1.4 Complete documentation | |
| **2. Install and test optical fibre cables to client premises** | **UA03102** |
| 2.1 Prepare for installation of optical fibre cables | |
| 2.2 Install, terminate and test optical fibre cable | |
| 2.3 Remove fibre hazards from work area | |
| 2.4 Complete documentation | |
| **3. Set up and configure data communication equipment** | **UA03202** |
| 3.1 Prepare to set up and configure data communication systems | |
| 3.2 Set up, configure and maintain basic data communication equipment | |
| 3.3 Complete work and document activities | |
| **4. Deliver customer service in telecommunications installation** | **UA03302** |
| 4.1 Establish contact with customers | |
| 4.2 Identify customer needs | |
| 4.3 Deliver quality service to customers | |
| 4.4 Process customer feedback | |
| **5. Follow health and safety procedures** | **UA03402** |
| 5.1 Apply OHS regulatory requirements | |
| 5.2 Identify hazards and mitigate risk | |
| 5.3 Identify safety requirements for work with optical fibre equipment | |
| 5.4 Identify and respond to minor traffic management | |
| 5.5 Identify OHS incident response procedures | |
| 5.6 Identify OHS communication and reporting processes | |

## 6. Troubleshoot fibre communication system installations UA03502

6.1 Obtain background information
6.2 Prepare for troubleshooting work
6.3 Locate and diagnose faults
6.4 Organize fault rectification
6.5 Clean up worksite
6.6 Document fault details

## UA03002 Network, splice and test optical fibre cables

Unit Descriptor:

This unit deals with the knowledge, skills and attitudes required to install network cable, and splice and test optical fibre cable. This involves placing, securing and terminating optical fibre cables for upgrading or maintaining existing network infrastructure. Communications applications include digital and analogue, telephony, data, video, digital broadcasting, computer networks, local area networks (LAN), wide area networks (WAN) and multimedia.

| ELEMENT | PERFORMANCE CRITERIA |
|---|---|
| *To be competent you must achieve the following:* | |
| 1. Prepare for installation of optical fibre cables | 1.1 Arrange access to the site to conduct initial site survey and determine job needs in accordance with company procedures. |
| | 1.2 Prepare for work in accordance with **relevant legislative, industry and company requirements.** |
| | 1.3 Select appropriate **cable deployment methods**, bend ratios and access routes in accordance with company, local planning authority and client requirements. |
| | 1.4 Inform appropriate personnel of identified **hazards** on the worksite in accordance with company procedures. |
| | 1.5 Organize tools, equipment and materials to be used according to specifications. |
| 2. Install, terminate and test optical fibre cable | 2.1 Install cable using appropriate **installation methods** in accordance with **Occupational Health and Safety (OHS) and environmental requirements** and in compliance with manufacturer's specifications and industry standards. |
| | 2.2 Check cable route and bend ratios and verify that they meet manufacturer's specifications and industry standards. |

| | | |
|---|---|---|
| | | 2.3 Test the joint for transmission loss and strength and re-**terminate** the joint if the transmission loss exceeds manufacturer's specifications. |
| | | 2.4 Identify instances of cross fibre using power source and power meter tests and ensure their elimination in accordance with company procedures. |
| 3. | Remove fibre hazards from work area | 3.1 Clean work area thoroughly to minimize risk of injury from loose glass fibre in accordance with health and safety requirements. |
| | | 3.2 Dispose of debris and waste safely according to relevant environmental and company requirements. |
| 4. | Complete documentation | 4.1 Update plans and records with details of installation and test results in accordance with company requirements. |
| | | 4.2 Record cable identification, make and drum numbers for future fault localization in accordance with company requirements. |
| | | 4.3 Communicate installation status to Network Operating Centre (NOC) for cable integration in accordance with company requirements. |
| | | 4.4 Notify immediate supervisor of work completion and obtain sign off in accordance with company policies and procedures. |

## RANGE STATEMENT

*All range statements must be assessed:*

1. **Relevant legislation, codes, regulations and standards:**

    - Occupational Health and Safety
    - Regulated or industry codes of practice
    - Cabling security codes

2. **Cable deployment method:**

    - Aerial cable deployment (e.g. utility poles)
    - Subterranean cable deployment (e.g. trenching)

3. **Hazards:**

    - Earth potential rise (EPR):
    - Optical cable:
        - bare fibres
        - hazardous laser light
    - Remote power feeding
    - Radio frequency (RF) emission

4. **Installation methods:**

    - Direct cable
    - Cable pre-installed in duct
    - Blown cable/fibre
    - Pullable cable
    - Pushable cable

**5. OHS and environmental requirements**

- Identifying other services
- Decommissioning and isolating worksite and lines prior to commencement
- Safety equipment
- Special access requirements
- Environmental considerations

**6. Type of termination:**

- Direct
- Splicing (Fusion & Mechanical)

## UNDERPINNING KNOWLEDGE AND SKILLS

*You need to know and understand:*

1. How to liaise with internal and external personnel on technical and operational matters.
2. How to relate to work associates, supervisors, team members and clients.
3. What are the main differences between the fibre architectures (Passive Optical Networking (PON) and Point to Point (P2P).
4. What are the appropriate protective casings for buried cable deployments.
5. What are the maximum installation distances and reliability of the following fibre installation methods: direct cable, cable pre-installed in duct, blown cable/fibre, pullable cable and pushable cable.
6. How to interpret technical documentation, such as equipment manuals, specifications and requirements for optical fibre cable installation.
7. How to take and analyse measurements.
8. How to organise and maintain equipment.
9. How to solve equipment and logistics problems.
10. What are the precautions and required actions to minimise, control or eliminate hazards that may exist during work activities.
11. How to select and use required personal protective equipment which conforms to industry and OHS standards.
12. How to employ task management skills to work systematically with required attention to detail and adherence to all safety requirements.
13. How to perform fault clearance.
14. How to use diagnostic equipment.
15. How to use hand and power tools.
16. What are the features and requirements of test equipment for optical fibre cabling.
17. What kind of information is required to operate equipment according to a test specification.
18. What are the manufacturer's requirements for safe operation of optical fibre equipment.
19. What safety precautions must be employed when working with laser-based systems.
20. What are the specific OHS requirements relating to the activity and site conditions.
21. What are the relevant test methods and performance requirements.
22. What are the appropriate techniques for the various types of termination (including direct termination, fusion splicing and mechanical splicing).
23. What are the typical issues and challenges that occur on site.

# EVIDENCE GUIDE

*For assessment purposes:*

**(1) Critical Aspects of Evidence**

Candidates must prove that they can carry out **all** the elements, meeting **all** of the performance criteria, range and underpinning knowledge **on more than one occasion.** This evidence must come from a real working environment.

**(2) Methods of Assessment**

Assessors should gather a range of evidence that is valid, sufficient, current and authentic.

Evidence may be collected in a variety of ways including:

- Observation
- Written/oral questioning
- Witness testimony
- Personal statement
- Written evidence (projects or assignments)
- Case study and scenario analysis
- Role play/simulation

**(3) Context of Assessment**

This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, that is, the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by a candidate working alone or as part of a team. The assessment environment should not disadvantage the candidate.

The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, products and manufacturing specifications, codes, standards, manuals and reference materials.

Simulation **must not be used,** except in exceptional circumstances where natural work evidence is unlikely to occur.

# UA03102 Install and test optical fibre cables to client premises

Unit Descriptor:

This unit deals with the knowledge, skills and attitudes required to install and test optical fibre cables on customer premises for communications applications. This involves placing, securing and terminating optical fibre cables for new installations or for upgrading or maintaining existing networks. Communications applications include digital and analogue, telephony, data, video, digital broadcasting, computer networks, local area networks, wide area networks and multimedia.

| ELEMENT | PERFORMANCE CRITERIA |
|---|---|
| *To be competent you must achieve the following:* | |
| 1. Prepare for installation of optical fibre cables | 1.1 Prepare for work in accordance with **relevant legislative, industry and company requirements.** |
| | 1.2 Arrange access to the site in accordance with company procedures. |
| | 1.3 Select the appropriate **cable deployment methods**, bend ratios and access routes in accordance with company, local planning authority and client requirements. |
| | 1.4 Inform appropriate personnel of identified **hazards** on the worksite in accordance with company procedures. |
| | 1.5 Organize tools, equipment and materials to be used according to specifications. |
| | 1.6 Select appropriate **optical fibre cable type** and length for installation environment and customer requirements. |
| 2. Install, terminate and test optical fibre cable | 2.1 Test cable at the distribution point in accordance with company procedures. |
| | 2.2 Install cable using appropriate **installation methods** in accordance with **Occupational Health and Safety (OHS) and environmental requirements** and in compliance with manufacturer's specifications and industry standards. |

| | | |
|---|---|---|
| | | 2.3 Check cable route and bend ratios and verify that they meet manufacturer's specifications and industry standards. |
| | | 2.4 Run cable using appropriate **connectors** in compliance with manufacturer's specifications and industry standards. |
| | | 2.5 Fit **termination** point, test cable using power meter in compliance with manufacturer's specifications and industry standards. |
| | | 2.6 Connect fibre cable from **termination** point to internal fibre in compliance with manufacturer's specifications and industry standards. |
| | | 2.7 Fit faceplate and test power levels where applicable in compliance with manufacturer's specifications and industry standards. |
| 3. | Remove fibre hazards from work area | 3.1 Clean work area thoroughly to minimize the risk of injury from loose glass fibre in accordance with health and safety requirements. |
| | | 3.2 Dispose of debris and waste safely according to relevant environmental and company requirements. |
| | | 3.3 Restore worksite to the customer's satisfaction in accordance with company policies. |
| 4. | Complete documentation | 4.1 Update plans and records with details of installation and test results in accordance with company requirements. |
| | | 4.2 Log all readings of test results in accordance with company requirements. |
| | | 4.3 Communicate installation status to Network Operating Centre (NOC) for cable integration in accordance with company requirements where applicable. |
| | | 4.4 Notify client of work completion and obtain sign off in accordance with company policies and procedures. |

## RANGE STATEMENT

*All range statements must be assessed:*

1. **Relevant legislation, codes, regulations and standards:**

    - Occupational Health and Safety
    - Regulated or industry codes of practice
    - Cabling security codes

2. **Cable deployment method:**

    - Aerial cable deployment (e.g. utility poles)
    - Subterranean cable deployment (e.g. trenching)

3. **Hazards:**

    - Earth potential rise (EPR):
    - Optical cable:
        - bare fibres
        - hazardous laser light
    - Remote power feeding
    - Radio frequency (RF) emission

4. **Optical fibre cable type:**

    - Multi-mode
    - Single mode
    - Photonic

5. **Connectors:**

    - Fusion
    - Glued

6. **Installation methods:**

    - Direct cable
    - Cable pre-installed in duct
    - Blown cable/fibre
    - Pullable cable
    - Pushable cable

**7. OHS and environmental requirements:**

- Identifying other services
- Decommissioning and isolating worksite and lines prior to commencement
- Safety equipment
- Special access requirements
- Environmental considerations

**8. Type of termination:**

- Direct
- Splicing (Fusion & Mechanical

## UNDERPINNING KNOWLEDGE AND SKILLS

*You need to know and understand:*

1. How to liaise with internal and external personnel on technical and operational matters.
2. How to relate to work associates, supervisors, team members and clients.
3. What are the appropriate protective casings for buried cable deployments.
4. What are the maximum installation distances and reliability of the following fibre installation methods: direct cable, cable pre-installed in duct, blown cable/fibre, pullable cable and pushable cable.
5. How to interpret technical documentation, such as equipment manuals, specifications and requirements for optical fibre cable installation.
6. How to take and analyze measurements.
7. How to organize and maintain equipment.
8. How to solve equipment and logistics problems.
9. What are the precautions and required actions to minimize, control or eliminate hazards that may exist during work activities.
10. How to select and use required personal protective equipment which conforms to industry and OHS standards.
11. How to employ task management skills to work systematically with required attention to detail and adherence to all safety requirements.
12. How to perform fault clearance.
13. How to use diagnostic equipment.
14. How to use hand and power tools.
15. What are the features and requirements of test equipment for optical fibre cabling.
16. What kind of information is required to operate equipment according to a test specification.
17. What are the manufacturer's requirements for safe operation of optical fibre equipment.
18. What safety precautions must be employed when working with laser-based systems.
19. What are the specific OHS requirements relating to the activity and site conditions.
20. What are the relevant test methods and performance requirements.
21. What are the appropriate techniques for the various types of termination (including direct termination, fusion splicing and mechanical splicing).
22. What are the typical issues and challenges that occur on site.
23. What are the main differences between the fibre architectures (Passive Optical Networking (PON) and Point to Point (P2P).

# EVIDENCE GUIDE

*For assessment purposes:*

**(1) Critical Aspects of Evidence**

Candidates must prove that they can carry out **all** the elements, meeting **all** of the performance criteria, range and underpinning knowledge **on more than one occasion.** This evidence must come from a real working environment.

**(2) Methods of Assessment**

Assessors should gather a range of evidence that is valid, sufficient, current and authentic.

Evidence may be collected in a variety of ways including:

- Observation
- Written/oral questioning
- Witness testimony
- Personal statement
- Written evidence (projects or assignments)
- Case study and scenario analysis
- Role play/simulation

**(3) Context of Assessment**

This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, that is, the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by a candidate working alone or as part of a team. The assessment environment should not disadvantage the candidate.

The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, products and manufacturing specifications, codes, standards, manuals and reference materials.

Simulation **must not be used,** except in exceptional circumstances where natural work evidence is unlikely to occur.

# UA03202 Set up and configure data communication equipment

Unit Descriptor:

This unit deals with the knowledge, skills and attitudes required to set up, configure and maintain domestic and commercial data communications systems which provide high speed internet, voice over internet protocol (VoIP), IPTV and internet TV services. It encompasses using safe working practices, installing data communications hardware, installing and configuring data communications software and documenting set-up parameters.

| ELEMENT | PERFORMANCE CRITERIA |
|---|---|
| *To be competent you must achieve the following:* | |
| 1. Prepare to set up and configure data communication systems | 1.1 Obtain and clarify work health and safety (WHS) requirements, risk control measures and procedures for a given work area from **appropriate persons**. |
| | 1.2 Determine requirements for the set-up and configuration of data communication systems from job specifications and through consultation with **appropriate persons**. |
| | 1.3 Consult **appropriate persons** to ensure work is coordinated effectively with others involved on the work site. |
| | 1.4 Procure required hardware and software for the work in accordance with company procedures and check them against job requirements. |
| | 1.5 Check preparatory work for compliance with job requirements and to ensure no damage has occurred. |
| 2. Set up, configure and maintain basic data communication equipment | 2.1 Determine the layout of data communications hardware, cabling and outlets from job specifications or in consultation with **appropriate persons**. |
| | 2.2 Install **hardware** in accordance with data communication equipment requirements and company procedures. |

| | | |
|---|---|---|
| | | 2.3 Install and **configure** data communications software in accordance with network requirements and company procedures. |
| | | 2.4 Test data communications operations and identify and correct anomalies in accordance with company procedures. |
| | | 2.5 Respond to data communications failures and faults in accordance with company procedures. |
| | | 2.6 Rectify identified causes of reported problems and test data communications link in accordance with industry and company procedures. |
| | | 2.7 Deal with unexpected situations safely with the approval of an authorized person. |
| | | 2.8 Set-up equipment **configurations** and perform maintenance activities efficiently, without waste of materials or damage to apparatus and the surrounding environment or services, using sustainable energy practices. |
| 3. | Complete work and document activities. | 3.1 Complete post-work activities in accordance with OHS risk control work completion measures and company procedures. |
| | | 3.2 Clean the work site and make safe in accordance with company procedures. |
| | | 3.3 Maintain data communications configuration and maintenance records in accordance with company procedures. |
| | | 3.4 Prepare service report and deliver to the **appropriate persons** in accordance with company procedures. |

## RANGE STATEMENT

*All range statements must be assessed:*

1. **Appropriate persons:**

    - Supervisor
    - Customer
    - Network Operating Centre (NOC) Operator

2. **Hardware:**

    - Cables and connectors
    - Optical Network Terminal (ONT)
    - Set Top Box (Fibre TV)
    - Phones
    - Switches

3. **Configurations:**

    - data communications protocols
    - user options and permissions
    - software
    - security

## UNDERPINNING KNOWLEDGE AND SKILLS

*You need to know and understand:*

1. What are the company procedures, protocols, and legal and regulatory responsibilities pertaining to setting up and configuring fibre based data communication systems.
2. How to recognize and interpret complex technical specifications and related information.
3. How to employ clear, specific and industry-related terminology to produce plans and update workplace documentation.
4. How to articulate information concisely and clearly to provide customers and personnel with guidance and advice.
5. How to confirm understanding using listening and questioning techniques.
6. What are the safe working practices relevant to setting up and configuring data communication systems.
7. What are the fundamentals of data communication and the process of data transmission encompassing the following: codes, asynchronous and synchronous transmission, bits per second, baud rate, DCEs, DTEs, error control, parity and CRC.
8. What are the characteristics and limitations of various types of transmission media.
9. What are the characteristics, strengths and limitations of the following protocols: teletype, X modem, half-duplex and full duplex.
10. What are the characteristics and limitations of various types of modems, modulation techniques and interface and signalling standards.
11. What are the characteristics, strengths and limitations of the various fibre optic systems.
12. What are the fundamentals of light and how it travels in a fibre.
13. What are the characteristics, strengths and limitations of the following fibre compositions: multimode and single mode propagation.
14. What are the characteristics, strengths and limitations of various light sources and detectors.
15. How to configure television sets.
16. What are LANS protocols.

# EVIDENCE GUIDE

*For assessment purposes:*

**(1) Critical Aspects of Evidence**

Candidates must prove that they can carry out **all** the elements, meeting **all** of the performance criteria, range and underpinning knowledge **on more than one occasion.** This evidence must come from a real working environment.

**(2) Methods of Assessment**

Assessors should gather a range of evidence that is valid, sufficient, current and authentic.

Evidence may be collected in a variety of ways including:

- Observation
- Written/oral questioning
- Witness testimony
- Personal statement
- Written evidence (projects or assignments)
- Case study and scenario analysis
- Role play/simulation

**(3) Context of Assessment**

This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, that is, the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by a candidate working alone or as part of a team. The assessment environment should not disadvantage the candidate.

The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, products and manufacturing specifications, codes, standards, manuals and reference materials.

Simulation **may be used**.

# UA03302 Deliver customer service in telecommunications installation

Unit Descriptor:

This unit deals with the knowledge, skills and attitudes required to satisfy or surpass customer needs and expectations in the delivery of services and any client interactions while adhering to company policies and procedures. It includes creating a relationship with customers, identifying their needs, delivering services or products and processing customer feedback.

| ELEMENT | PERFORMANCE CRITERIA |
|---|---|
| *To be competent you must achieve the following:* | |
| 1. Establish contact with customers | 1.1 Arrange time for site access and service delivery with client in advance in accordance with company policy. |
| | 1.2 Acknowledge and greet **customers** in a professional and courteous manner according to company requirements. |
| | 1.3 Demonstrate knowledge of **personal presentation** in accordance with company requirements. |
| | 1.4 Communicate using appropriate **interpersonal skills** to facilitate accurate and relevant exchange of information. |
| | 1.5 Maintain sensitivity to **customer's** specific needs and cultural, family and individual differences. |
| | 1.6 Establish rapport and relationships with customers and demonstrate a genuine interest in **customer** needs and requirements. |
| 2. Identify customer needs | 2.1 Use appropriate questioning and active listening skills to determine **customer** needs. |
| | 2.2 Assess **customer** needs for urgency to identify priorities for service delivery. |
| | 2.3 Provide customers with information about available options for meeting their needs and assist them to identify preferred options. |

| | | |
|---|---|---|
| | | 2.4 Identify personal limitations in addressing **customer** needs and seek assistance from designated persons where required. |
| 3. | Deliver quality service to customers | 3.1 Provide prompt **customer** service to meet identified needs according to company requirements. |
| | | 3.2 Provide information regarding problems and delays and follow up within appropriate timeframes as necessary. |
| | | 3.3 Communicate with **customers** in a clear, concise and courteous manner. |
| | | 3.4 Identify opportunities to enhance the quality of service and products and take action to improve service whenever possible. |
| | | 3.5 Restore worksite to **client** satisfaction after completing work. |
| 4. | Process customer feedback | 4.1 Promptly acknowledge and sensitively handle **customer** feedback according to company requirements. |
| | | 4.2 Record feedback and communication between **customers** and the organisation accurately according to company standards, policies, procedures and requirements. |
| | | 4.3 Identify unmet **customer** needs and discuss the suitability of other products and services. |

# RANGE STATEMENT

*All range statements must be assessed:*

1. **Client/Customers:**

    - Users
    - Purchasers or beneficiaries of service, product or process
    - Internal or external clients
    - Colleagues
    - Visitors

2. **Personal presentation:**

    - Personal appearance
    - Correct posture
    - Use of appropriate language and tone
    - Demeanour
    - Personality

3. **Interpersonal skills:**

    - Using appropriate body language
    - Summarizing and paraphrasing to check understanding of customer's message
    - Providing an opportunity for the customer to confirm his/her request
    - Seeking feedback from the customer to confirm understanding of needs
    - Questioning to clarify and confirm the customer's needs
    - Listening actively to what the customer is communicating

## UNDERPINNING KNOWLEDGE AND SKILLS

*You need to know and understand:*

1. What are the company's business structure, products and services.
2. What are the strategies for delivering excellent customer service.
3. What are the company's policies and procedures for delivering customer service including handling customer complaints.
4. What are the various customer feedback mechanisms.
5. What are the company culture and values with regard to customer service.
6. What are the company business goals and standards.
7. What are the company operations and processes.
8. What are the relevant legislative requirements.
9. How to access and use workplace information.
10. How to utilize communication skills to identify customer needs.
11. How to employ problem solving skills to deal with customer enquiries or complaints.
12. How to relate to people from a range of social, cultural and ethnic backgrounds and physical and mental abilities.
13. How to articulate company products and services.
14. How to employ questioning and active listening skills to clarify information.
15. How to apply customer service skills to satisfy customer requirements and achieve customer satisfaction.

# EVIDENCE GUIDE

*For assessment purposes:*

**(1) Critical Aspects of Evidence**

Candidates must prove that they can carry out **all** the elements, meeting **all** of the performance criteria, range and underpinning knowledge **on more than one occasion.** This evidence must come from a real working environment.

**(2) Methods of Assessment**

Assessors should gather a range of evidence that is valid, sufficient, current and authentic.

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- Role play/simulation

**(3) Context of Assessment**

This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, that is, the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by a candidate working alone or as part of a team. The assessment environment should not disadvantage the candidate.

The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, products and manufacturing specifications, codes, standards, manuals and reference materials.

Simulation **must not be used,** except in exceptional circumstances where natural work evidence is unlikely to occur.

# UA03402 Follow health and safety procedures

Unit Descriptor: This unit deals with the knowledge, skills and attitudes required to carry out telecommunications workplace tasks in accordance with relevant Occupational Health & Safety (OHS) legislative requirements and the basic principles of risk management.

| ELEMENT | PERFORMANCE CRITERIA |
|---|---|
| *To be competent you must achieve the following* | *:* |
| 1. Apply OHS regulatory requirements | 1.1 Identify OHS legislative requirements relevant to own work, role and responsibilities and comply with **safe work practices.** |
| | 1.2 Identify and apply **duty of care requirements**. |
| 2. Identify hazards and mitigate risk | 2.1 Identify and report common construction hazards in the work area to **designated personnel** according to company procedures. |
| | 2.2 Identify and follow OHS requirements, workplace procedures and work instructions to control **hazards and risks**. |
| | 2.3 Comply with **safe work practices** and principles of risk management. |
| | 2.4 Implement **duty of care requirements**. |
| | 2.5 Complete job safety analysis (JSA) sheet or safe work method statement (SWMS) according to work requirements, including hazard identification and risk assessment. |
| | 2.6 Use and complete checks to **personal protective equipment** according to company requirements. |
| | 2.7 Assess and test for harmful gases associated with the workplace in accordance with company and industry and Occupational Safety and Health requirements. |

| | | |
|---|---|---|
| | | 2.8 Identify and report electrical hazards in the work area to **designated personnel** according to company procedures. |
| 3. | Identify safety requirements for work with optical fibre equipment | 3.1 Identify and apply **safe work practices** when handling optical fibre, lasers and optical connectors in accordance with company procedures. |
| | | 3.2 Identify and follow **safe work practices** when handling and disposing of chemical waste. |
| | | 3.3 Identify and follow **safe work practices** when handling and disposing fibre scraps. |
| 4. | Identify and respond to minor traffic management | 4.1 Assess traffic safety requirements in the general location with respect to regulatory and company requirements. |
| | | 4.2 Identify a safe work zone around vehicle and work space using traffic cones and signs according to company and regulatory requirements. |
| | | 4.3 Identify and respond to changed traffic conditions in accordance with company policy. |
| 5. | Identify OHS incident response procedures | 5.1 Identify and adhere to site and company procedures for responding to **incidents** and emergencies. |
| | | 5.2 Identify and follow procedures for accessing first aid. |
| | | 5.3 Identify and demonstrate requirements for selecting and using relevant **personal protective equipment.** |
| 6. | Identify OHS communication and reporting processes | 6.1 Identify and follow OHS communication processes, information and documentation. |
| | | 6.2 Identify the role of designated WHS personnel and safety signs and symbols. |

6.3 Identify and apply procedures and confirm the relevant authorities for reporting **hazards**, **incidents** and injuries.

## RANGE STATEMENT

*All range statements must be assessed:*

1. **Safe work practices:**

- Access to site amenities
- Dealing with hazardous chemicals i.e. avoiding contact, removal of fibre particles and solvents, removal on completion of work
- Emergency response procedures
- Ensuring manufacturer's warnings and instruction labels in relation to the laser product are not damaged or obscured during installation
- Correct method of using equipment including personal protective equipment
- Housekeeping i.e. ensuring a clean, tidy and safe work area, storing and removing debris, using wet cleaning process, disposing of solvent residue according to environmental policies and procedures
- Adherence to policies and procedures for safety and welfare of personnel
- Operating in well ventilated spaces

2. **Duty of care requirements:**

- Legal responsibilities, duties and rights of duty holders and workplace parties as specified in WHS acts, regulations and codes of practice
- Own duties to comply with safe work practices for activities that require licences or certificates of competency
- Specific and general duties and responsibilities of particular individuals on site

3. **Hazards and risks:**

- Physical (confined spaces, excavations, including trenches; falling objects, unplanned collapse, working at heights, manual handling, traffic and mobile plant)
- Environmental (noise, temperature)
- Chemical (hazardous chemicals and dangerous goods e.g. solvents, epoxy resins, flammable fluids and solvents, fibre offcut)
- Health (handling optic fibres and lasers, sustained injury from repetitive tasks, ultraviolet (UV) radiation)
- Electricity
- Activating equipment without notifying other staff who may be working remotely on the network

4. **Designated personnel:**

- Managers
- OHS personnel
- Inspectors
- Team leaders

**5. Personal protective equipment:**

- Breathing apparatus (respirators, dust masks)
- Safety footwear (boots, shoes)
- Gloves
- Overalls, coveralls, protective jackets, high visibility retro-reflective vests
- Arm guards
- Eye protection (goggles, glasses)
- Helmets, hard hats
- Face masks
- Hearing protection
- Radiation detectors

**6. Incidents:**

- Accidents i.e. collapse of structure, building or excavation, failure of load bearing equipment
- Physical injury i.e. falls
- Dangerous occurrence i.e. electric shock, electric short circuit, explosion, gas escape, fire
- Malfunction of equipment i.e. breathing apparatus
- Emergency i.e. accident, fire,

## UNDERPINNING KNOWLEDGE AND SKILLS

*You need to know and understand:*

1. What are the relevant OHS legislations, regulations, industry standards, codes of practice and guidance notes relevant to own workplace, role and responsibilities.
2. How to apply required precautions and actions to minimize, control or eliminate hazards associated with work activities.
3. How to select and use required personal protective equipment that conforms to industry and WHS standards.
4. How to work systematically with attention to detail without injury to self and others, and damage to goods or equipment.
5. What are the common construction hazards.
6. What are the correct procedures for dealing with the following:
    - disposal and handling of hazardous and dangerous substances
    - noise pollution
    - safe disposal of fibre offcuts
    - storm water and materials spillage
    - waste disposal
7. What are the potential hazards relating to the handling of optical fibre and laser light sources in the workplace.
8. What are the various ways to avoid the following injuries:
    - damage to retina from lasers
    - damage to lungs from inhalation of fibre offcuts and particles
    - needle stick injury from fibres and offcuts
9. How to identify and interpret laser warning signs and labels relating to optical fibre components and equipment.
10. What are the safety requirements for handling and working with:
    - devices
    - laser light sources
    - optical fibre connectors
    - optical fibres
    - patch cords
11. What constitutes appropriate traffic control for a single vehicle.
12. What are the risks associated with confined spaces and appropriate responses.

# EVIDENCE GUIDE

*For assessment purposes:*

**(1) Critical Aspects of Evidence**

Candidates must prove that they can carry out **all** the elements, meeting **all** of the performance criteria, range and underpinning knowledge **on more than one occasion.** This evidence must come from a real working environment.

**(2) Methods of Assessment**

Assessors should gather a range of evidence that is valid, sufficient, current and authentic.

Evidence may be collected in a variety of ways including:

- Observation
- Written/oral questioning
- Witness testimony
- Personal statement
- Written evidence (projects or assignments)
- Case study and scenario analysis
- Role play/simulation

**(3) Context of Assessment**

This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, that is, the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by a candidate working alone or as part of a team. The assessment environment should not disadvantage the candidate.

The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, products and manufacturing specifications, codes, standards, manuals and reference materials.

Simulation **may be used.**

# UA03502 Troubleshoot fibre communication system installations

Unit Descriptor:

This unit deals with the knowledge, skills and attitudes required to methodically diagnose complex faults, and organize the repair or replacement of defective parts for customer premises equipment (CPE). It also involves identifying faults in upstream or downstream services that may require the involvement of others.

| ELEMENT | PERFORMANCE CRITERIA |
|---|---|
| *To be competent you must achieve the following:* | |
| 1. Obtain background information | 1.1 Contact client to identify the type of **fault** and occurrence in accordance with company policies. |
| | 1.2 Analyze the **fault** history if required to establish **fault** patterns, including questioning personnel involved in previous **fault** repair. |
| | 1.3 Develop strategies for identification and repair of **faults** using advice from other engineering and technical personnel. |
| | 1.4 Inform customer of issues and possible solutions in accordance with company policy. |
| 2 Prepare for troubleshooting work | 2.1 Contact client to arrange site access in accordance with company policy. |
| | 2.2 Obtain tools and **test equipment** relevant to the identified system type and **fault**. |
| | 2.3 Set up **equipment** according to manufacturer's specifications and safe work practices and reconfigure as required. |
| 3. Locate and diagnose faults | 3.1 Isolate the **fault** progressively using a **fault** identification approach to remove likely variables from the assessment. |
| | 3.2 Identify the **fault** in the shortest time possible or escalate to appropriate level. |

| | | |
|---|---|---|
| | | 3.3 Seek back-up support from the product manufacturer when required. |
| 4. | Organize fault rectification | 4.1 Determine options to rectify the **fault**, including downtime and present to customer for decision. |
| | | 4.2 Rectify the **fault** totally, partially or provide a temporary solution in accordance with company procedures. |
| | | 4.3 Upgrade, replace or repair defective parts or equipment according to service agreement. |
| | | 4.4 Reprogram **equipment** as required in accordance with company procedures. |
| | | 4.5 Perform repair work in accordance with Occupational Health & Safety requirements and company procedures. |
| | | 4.6 Dismantle and remove temporary service safely and efficiently, where appropriate. |
| | | 4.7 Perform routine checks to identify the likelihood of further or likely problems. |
| | | 4.8 Rectify additional identified problems or bring to the attention of the customer for decision on further action. |
| 5 | Clean up worksite | 5.1 Remove and dispose of waste and debris from worksite according to environmental and company requirements. |
| | | 5.2 Confirm that changes made to the work area during **fault** repair are restored to client's satisfaction. |
| 6. | Document fault details | 6.1 Record details of the **fault** and the actions taken to find and repair it, and store details for future reference in accordance with company procedures. |
| | | 6.2 Advise the product manufacturer of the **fault** and repair details if applicable. |

6.3 Recommend changes to the product or product model design where appropriate.

6.4 Complete records, and explain and justify **faults** and corrective action taken.

## RANGE STATEMENT

*All range statements must be assessed:*

1. **Faults:**

- Broken fibres
- Insufficient/excessive transmitting power
- Excessive signal loss due to:
  - a cable span that is too long
  - a contaminated connector
  - faulty /too many splices or connectors
  - faculty connection of fibre to the patch panel or in the splice tray
  - Micro bends (kinks)
- Damaged/defective equipment (router, modem etc.)

2. **Test equipment:**

- Fibre optic microscope
- Optical time domain reflectometer
- Clip On Identifier
- Visible fault locater
- Optical Loss Test Set (OLTS)
- Attenuator

3. **Equipment:**

- Optical Network Terminal (ONT)
- Routers
- Set Top Box
- VoIP Handset
- Switches

## UNDERPINNING KNOWLEDGE AND SKILLS

*You need to know and understand:*

1. What are the key principles and concepts underpinning the design and operation of digital systems and tools and how to apply them where required.

2. What are the main types of faults that occur in fibre-based telecommunication system installations.

3. How to obtain fault histories and use them to inform troubleshooting efforts.

4. What are the legal and regulatory responsibilities and company polices and protocols relevant to own work.

5. How to select and use appropriate conventions and protocols when communicating with customers and personnel in a range of work contexts.

6. How to liaise and negotiate with clients, repairers and technical staff using appropriate strategies to extract main ideas and information regarding technical and operation matters.

7. How to employ listening and questioning techniques to confirm understanding.

8. What are the main types of testing equipment used in troubleshooting fibre-based telecommunication installations.

9. How to implement actions according to a predetermined plan and make adjustments where necessary.

10. How to employ a combination of formal, logical planning processes and an increasingly intuitive understanding of context to identify and rectify technical faults.

11. How to rectify the main types of faults in fibre-based telecommunication system installation.

12. What is the potential impact of service agreements on replacing/repairing defective parts/equipment.

13. What are the environmental requirements for cleaning up and restoring worksites after rectifying installation faults.

14. How to prepare clear and concise written reports and workplace documentation, incorporating technical language to communicate complex information effectively.

15. How to use test equipment to identify faults.

# EVIDENCE GUIDE

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The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, products and manufacturing specifications, codes, standards, manuals and reference materials.

Simulation **must not be used,** except in exceptional circumstances where natural work evidence is unlikely to occur.

# Level 2 Glossary of Terms

**Assessment methods**

The methods which can be used to determine competence in performance and underpinning knowledge.

**Assessors**

The Assessor's role is to determine whether evidence presented by a candidate for assessment within the programme, meets the required standard of competence in the relevant unit or element. The Assessor needs to be competent to assess to national standards in the area under assessment.

**Approved Centre**

Organization/Centre approved by the TVET Council to offer full National Vocational Qualifications.

**Case Studies**

In situations where it is difficult for workplace assessment to take place, case studies can offer the candidate an opportunity to demonstrate potential competence.

A case study is a description of an actual or imaginary situation presented in some detail. The way the case study is presented will vary depending upon the qualification, but the most usual methods are written, taped or filmed.

The main advantage of a case study is the amount of evidence of underpinning knowledge it can generate and the specific nature of the evidence produced.

**Competence**

In the context of vocational qualifications, competence means: the ability to carry out prescribed activities to nationally pre-determined standards in an occupation. The definition embraces cognitive, practical and behavioural skills, underpinning knowledge and understanding and the ability to react appropriately in contingency situations.

**Element**

An element is a description of an activity which a person should be able to do. It is a description of an action, behaviour or outcome which a person should be able to demonstrate.

**Explanation of NVQ Levels**

NVQs cover five (5) levels of competence, from entry level staff at Level 1 through to senior management at Level 5.

# Level 2 Glossary of Terms

**Level 1 - Entry Level**

Recognizes competence in a range of varied work activities performed in a variety of contexts. Most work activities are simple and routine. Collaboration with others through work groups or teams may often be a requirement. Substantial supervision is required especially during the early months evolving into more autonomy with time.

**Level 2 - Skilled Occupations**

Recognizes competence in a broad range of diverse work activities performed in a variety of contexts. Some of these may be complex and non-routine and involve some responsibility and autonomy. Collaboration with others through work groups or teams and guidance of others may be required.

**Level 3 - Technician and Supervisory Occupations**

Recognizes competence in a broad range of complex, technical or professional work activities performed in a wide variety of contexts, with a substantial degree of personal responsibility and autonomy. Responsibility for the work of others and the allocation of resources are often a requirement. The individual is capable of self-directed application, exhibits problem solving, planning, designing and supervisory capabilities.

**Level 4 - Technical Specialist and Middle Management Occupations**

Recognizes competence involving the application of a range of fundamental principles and complex techniques across a wide and unpredictable variety of contexts. Requires very substantial personal autonomy and often significant responsibility for the work of others, the allocation of resources, as well as personal accountability for analysis, diagnosis, design, planning, execution and evaluation.

**Level 5 - Chartered, Professional and Senior Management Occupations**

Recognizes the ability to exercise personal professional responsibility for the design, development or improvement of a product, process, system or service. Recognizes technical and management competencies at the highest level and includes those who have occupied positions of the highest responsibility and made outstanding contributions to the promotion and practice of their occupation.

## External Verifier

The External Verifier is trained and appointed by the TVET Council and is competent to approve and ensure an approved Centre's quality of provision.

## Internal Verifier

The Internal Verifier acts in a supporting role for Assessors to ensure consistent quality of assessment and competence. He or she needs to be competent to assess to national standards in the area under assessment.

# Level 2 Glossary of Terms

## NVQ

National Vocational Qualifications (NVQs) are work-based qualifications that assess an individual's competence in a work situation and certify that the individual can perform the work role to the standards expected in employment.

NVQs are based on national occupational standards of competence drawn up by standards-setting bodies known as Industry Lead Bodies. The standards describe the level and breadth of performance that is expected of persons working in the industry or sector which the NVQ covers.

## NVQ Coordinator

Within each approved Centre offering NVQs, there is a centre contact who has overall responsibility for the operation and administration of the NVQ system.

## Observation

Observation of the candidate carrying out his/her job in the workplace is the assessment method recommended in the vast majority of units and elements. Observation of staff carrying out their duties is something that most supervisors and managers do every day.

## Performance criteria

Performance criteria indicate what is required for the successful achievement of an element. They are descriptions of what is expected in competent performance.

## Product of Work

This could be items produced during the normal course of work which can be used for evidence purposes such as reports, menus, promotional literature, training plans, etc.

## Questioning

Questioning is one of the most appropriate ways to collect evidence to assess a candidate's underpinning knowledge and understanding.

Questioning can also be used to assess a candidate in those areas of work listed in the range which cannot be assessed by observation. Guidance on when this assessment method can be used is given in the assessment guidance of each individual element.

# Level 2 Glossary of Terms

As an assessment method, questioning ensures the Assessor has all of the evidence about a candidate's performance. It also allows the Assessor to clarify situations.

## Range statements

The range puts the element of competence into context. A range statement is a description of the range of situations to which an element and its performance criteria are intended to apply.

Range statements are prescriptive therefore each category must be assessed.

## Role-plays

Role-plays are simulations where the candidate is asked to act out a situation in the way he/she considers "real" people would behave. By using role-play situations to assess a candidate the Assessor is able to collect evidence and make a judgment about how the candidate is most likely to perform. This may be necessary if the range specified includes a situation in which the candidate is unlikely to find himself/herself in the normal course of their work, or where the candidate needs to develop competence, before being judged, for example, in a disciplinary situation.

## Simulations

Where possible, assessment should always be carried out by observing **natural performance** in the workplace. **Simulated performance,** however, can be used where specified to collect evidence about an aspect of the candidate's work which occurs infrequently or is potentially hazardous; for example, dealing with fires.

By designing the simulated situation, briefing the candidate and observing his/her performance, the Assessor will be able to elicit evidence which will help her judge how a candidate is **most likely** to perform in real life.

## Supplementary evidence

Supplementary evidence can be used to confirm and support performance evidence. Types of supplementary evidence include witness testimonies, reports, journals or diaries, records of activities, personal statements, simulation (see note in glossary).

## Underpinning knowledge

Underpinning knowledge indicates what knowledge is <u>essential</u> for a person to possess in order to successfully achieve an element and prove total competence.

# Level 2 Glossary of Terms

## Units

A unit of competence describes one or more activities which form a significant part of an individual's work. Units are accredited separately but in combination can make up a vocational qualification. There are two categories of units:

**Mandatory units** - are core to a qualification and must to be completed.

**Optional units** - candidates must choose the required number of individual units, specified in the qualification structure, to achieve the qualification.

## Work-based projects

Work-based projects are a useful way for you to collect evidence to support any decision you make about a candidate's performance. They are particularly appropriate in determining the level of a candidate's underpinning knowledge and understanding where it may be insufficient to rely only on questioning and observation.

A project often involves the identification of a solution to a specific problem identified by you and/or the candidate (such as looking at ways to redress a recent drop in sales), or may be a structured programme of work built around a central situation or idea (such as the introduction of a new job rostering process).