Technical and Vocational Education and Training (TVET) Council

Occupational Standards of Competence

Photovoltaic Systems Maintenance

Level 3

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Qualification Overview

NVQB

in

Photovoltaic Systems Maintenance

Level 3

Qualification Overview

This qualification aims to assist employees in developing their knowledge and skills in inspecting, fault-finding, maintaining, servicing, and commissioning a range of photovoltaic systems (grid-tied, hybrid or off-grid) up to 40 kWh.

Employees at this level must understand the required skills and knowledge needed to implement preventative and corrective maintenance processes for photovoltaic energy production systems in a manner that:

- improves system performance (efficiency and energy delivery)
- extends system lifespans
- reduces system/component lifetime maintenance costs
- enhances safety and risk reduction
- adheres to financing, warranty and manufacturer requirements and guidelines.

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 is this qualification for?

The NVQB in Photovoltaic Systems Maintenance Level 3 is aimed at persons who provide preventative and corrective maintenance on photovoltaic electrical systems with a production capacity up to a maximum of 40 kWh.

Where could it be used?

This qualification can be used by training institutions, service providers, clientele and prospective/aspiring practitioners in the renewable energy sector to assess the competencies of persons tasked with scheduled or corrective maintenance of photovoltaic electrical systems.

Jobs within the occupational area

Relevant occupations include:

- Photovoltaic installation project supervisors
- Senior photovoltaic electrical installers
- Senior electrical technicians

This list is not exhaustive and only serves to illustrate the breadth of the qualification.

A011703 - APPROVED NATIONAL VOCATIONAL QUALIFICATION STRUCTURE

PHOTOVOLTAIC SYSTEMS MAINTENANCE LEVEL 3

To achieve a full award, candidates must complete all eleven (11) mandatory units.

Mandatory Units (All must be completed)	**CODES**
1. Create and maintain effective working relationships in the photovoltaic environment	**UA52403**
1.1 Gain the trust and support of colleagues and team members	
1.2 Gain the trust and support of relevant personnel	
2. Participate in workplace communication	**U53802**
2.1 Gather and convey workplace information	
2.2 Participate in workplace meetings and discussions	
2.3 Complete work-related documents	
3. Respond to emergencies in the photovoltaic environment	**UA52503**
3.1 Prepare for emergency situations	
3.2 Identify and evaluate the emergency	
3.3 Implement protection and control procedures	
3.4 Manage the emergency	
4. Maintain health and safety in the photovoltaic environment	**UA52603**
4.1 Maintain personal health and hygiene	
4.2 Maintain a safe work environment for clients, staff and visitors	
4.3 Maintain a secure work environment for clients, staff and visitors	
5. Identify and isolate multiple supply systems	**UA52703**
5.1 Prepare to isolate multiple supply systems	
5.2 Isolate multiple supply systems	
5.3 Re-instate multiple supply systems	
6. Implement a preventative maintenance programme for photovoltaic systems	**UA52803**
6.1 Prepare to conduct preventative maintenance programme processes	
6.2 Conduct preventative maintenance programme processes	
6.3 Complete preventative maintenance programme processes	

Mandatory Units (All must be completed)		CODES
7.	**Diagnose and rectify issues in photovoltaic systems**	**UA52903**
7.1	Prepare to work on photovoltaic systems	
7.2	Resolve issues in photovoltaic systems	
7.3	Complete work and required documentation	
8.	**Maintain and fault-find battery storage systems**	**UA53003**
8.1	Plan the maintenance of photovoltaic battery storage systems	
8.2	Manage photovoltaic battery storage systems	
8.3	Complete required documentation	
9.	**Provide quotations for photovoltaic systems maintenance and retrofit work**	**UA53103**
9.1	Establish the extent of maintenance and retrofit	
9.2	Prepare maintenance and retrofit work quotations	
9.3	Document and submit maintenance and retrofit work quotations	
10.	**Deliver reliable customer service**	**U12902**
10.1	Prepare to deal with your customers	
10.2	Give consistent service to customers	
10.2	Check customer service delivery	
11.	**Use and maintain tools and equipment for photovoltaic systems maintenance**	**UA53203**
11.1	Plan and prepare to use tools and equipment	
11.2	Select and use tools and equipment	
11.3	Conduct housekeeping activities	

UA52403 Create and maintain effective working relationships in the photovoltaic environment

Unit Descriptor:

This unit describes the competence required to create and maintain effective relationships. It describes the essential abilities of communicating effectively, managing time, problem solving, developing new skills to improve performance, operating within organisational procedures and meeting legal requirements.

ELEMENT	PERFORMANCE CRITERIA
Candidates must be able to:	
1. Gain the trust and support of colleagues and team members	1.1 Communicate with colleagues and team members at appropriate times about proposed activities in a manner which encourages open and frank discussion.
	1.2 Inform colleagues and team members sufficiently about organisational plans and activities.
	1.3 Confirm that commitments made to colleagues and team members are realistic and honoured.
	1.4 Treat colleagues and team members in a manner that shows respect for individuals and the need for confidentiality.
	1.5 Support colleagues and team members to achieve work objectives.
	1.6 Discuss evaluations of output and behaviour with colleagues and team members in accordance with organisational requirements.
	1.7 Deal with unexpected situations in an effective manner and inform the appropriate persons where necessary.

		1.8 Carry out work in an organised and efficient manner in accordance with organisational procedures.
2.	Gain the trust and support of relevant personnel	2.1 Confirm that relevant personnel receive timely and accurate reports on activities, issues, progress, results and achievement.
		2.2 Confirm that relevant personnel receives clear, accurate and timely information about emerging threats and opportunities.
		2.3 Consult relevant personnel at appropriate times about organisational policies and ways of working.
		2.4 Confirm that proposals for action are realistic, clear and presented at an appropriate time.
		2.5 Make constructive efforts to resolve disagreements with relevant personnel.
		2.6 Deal with unexpected situations and inform the appropriate persons where necessary in accordance with organisational requirements.
		2.7 Carry out work in an organised and efficient manner in accordance with organisational procedures.

RANGE STATEMENT

All range statements must be assessed:

1. **Colleagues** may include but not are limited to:

    - Persons working at a lower level
    - Persons working at a higher level
    - Persons working at the same level

2. **Team members** may include but are not limited to:

    - Persons with whom the individual works to fulfil administrative responsibilities
    - Persons with whom the individual works to fulfil functional responsibilities

3. **Relevant personnel** may include but is not limited to:

    - Immediate supervisors
    - Managers
    - The organisation or authority to which the person reports (e.g. Inspectors)

4. **Proposals** may include but are not limited to:

    - Oral
    - Written

5. **Disagreements** may include but are not limited to:

    - Actual
    - Potential

UNDERPINNING KNOWLEDGE AND SKILLS

Candidates must know and understand:

1. Why gaining the trust and support of colleagues and team members are important for effective performance.
2. How to encourage good working relationships and a feeling that colleagues and team members are respected.
3. Why gaining the trust and support of relevant personnel is important to effective performance.
4. What types of emerging threats and opportunities the manager needs to be informed about and the degree of urgency attached to these.
5. Why commitments to colleagues need to be realistic and why they should be honoured.
6. What types of support colleagues and team members may require to achieve their objectives and how to respond effectively to these needs.
7. How to select appropriate times, methods and styles of consultation according to a range of issues and contexts.
8. What range of issues about which colleagues and team members need to be informed.
9. What range of communication methods is available and how to select methods appropriate to a range of issues and contexts.
10. What types of information concerning colleagues and team members need to be treated confidentially and what procedures need to be followed to achieve this.
11. How to provide feedback in a way which will lead to a constructive outcome.
12. What types of disagreements may occur with relevant personnel and what are the methods of handling these in an appropriate manner.
13. Why relevant personnel need to be kept informed of activities, progress, results and achievements.
14. How to develop and present proposals in a way which is realistic, clear and likely to positively influence the decision-making of relevant personnel.
15. What types of organisational policies and ways of working the manager needs to be informed about and what the appropriate methods of doing so are.

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
- Written evidence
- Witness testimony
- Professional discussion

Questioning techniques should not require language, literacy or numeracy skills beyond those required in this unit of competency.

(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 organisational 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 organisational procedures, product 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.

U53802 Participate in workplace communication

Unit Descriptor: This unit describes the knowledge, skills and attitudes required to gather, interpret and convey information in response to organisational requirements.

ELEMENT	PERFORMANCE CRITERIA
Candidates must be able to:	
1. Gather and convey workplace information	1.1 Access relevant and up-to-date information from appropriate sources.
	1.2 Use effective communication strategies to gather and convey information.
	1.3 Use appropriate medium to transfer information and ideas.
	1.4 Identify and follow lines of communication with management and colleagues.
	1.5 Define procedures for the location and storage of information.
	1.6 Record information according to organisational procedures.
2. Participate in workplace meetings and discussions	2.1 Make useful contributions in meetings and discussions.
	2.2 Express opinions in a clear, courteous and respectful manner.
	2.3 Confirm that discussions are appropriate to the purpose and proposed outcome of the meeting.
	2.4 Interpret and implement meeting outcomes.
3. Complete work-related documents	3.1 Select correct documentation and complete according to organisational requirements.
	3.2 Identify and correct errors on forms and documents.

RANGE STATEMENT

All range statements must be assessed:

1. **Appropriate sources** may include but are not limited to:

- Team members
- Suppliers
- Trade personnel
- Public sector (government)
- Industry

2. **Communication strategies** may include but are not limited to:

- Questioning
- Listening
- Speaking
- Writing
- Non-verbal communication

3. **Medium** may include but is not limited to:

- Memorandum
- Circular
- Notice
- Information discussion
- Follow-up or verbal instruction
- Face to face communication

4. **Storage** may include but is not limited to:

- Manual filing system
- Electronic filing system

UNDERPINNING KNOWLEDGE AND SKILLS

Candidates must know and understand:

1. What are the organisational policies and procedures that relate to the communication of information.
2. How to locate, interpret and provide information in response to organisational requirements or customer requests.
3. What are appropriate sources of information.
4. What is effective communication.
5. What are the different modes of communication and how to use them.
6. What are the different communication strategies and how to use them.
7. How to communicate effectively with management, colleagues and clients to provide information and feedback.
8. How to participate in organisational meetings and discussions.
9. How to identify the purpose and proposed outcomes of a meeting and make positive contributions to achieve them.
10. How to express opinions in a clear and courteous manner.
11. How to use basic information & communication technology (ICT) resources.
12. What is the range of work-related documentation and how this should be completed.

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
- Written evidence
- Witness testimony
- Professional discussion

Questioning techniques should not require language, literacy or numeracy skills beyond those required in this unit of competency.

(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 organisational 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 organisational procedures, product 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.

UA52503 Respond to emergencies in the photovoltaic environment

Unit Descriptor:

This unit deals with the knowledge, skills and attitudes required to respond to organisational emergencies such as electrical faults, fire and other dangerous situations and render first aid in the photovoltaic work environment according to local, regional and international standards.

ELEMENT	PERFORMANCE CRITERIA
Candidates must be able to:	
1. Prepare for emergency situations	1.1 Identify potential organisational emergency situations and develop appropriate responses to emergencies, in accordance with industry best practices and established organisational policies.
	1.2 Identify relevant emergency resources and their location in the work area.
	1.3 Conduct regular checks of the organisation to minimise potential hazards and report any issues in accordance with organisational procedures.
	1.4 Select, use and maintain personal protective equipment, safety equipment and other aids as required for emergencies and store after use in accordance with organisational policies and procedures.
	1.5 Identify and report problems with the functioning of emergency resources in accordance with organisational policies and procedures.
2. Identify and evaluate the emergency	2.1 Classify and assess the potential emergency and evaluate the risks and effectiveness of initial response actions.
	2.2 Evaluate the emergency with relevant personnel in accordance with organisational policies and procedures.

		2.3	Establish emergency needs and priority, including any assistance that may be required in accordance with organisational policies and procedures.
		2.4	Evaluate the potential for further development of the emergency and assess any hazards or risks to staff, clients or animals in accordance with organisational policies and procedures.
		2.5	Adhere to high standards of hygiene to reduce the risk of biological hazards, where necessary, in accordance with industry best practices.
3.	Implement protection and control procedures	3.1	Check and confirm that relevant safety procedures are implemented, including lockout or tagout in accordance with industry best practices.
		3.2	Minimise the risk of electrical faults in the organisation in accordance with established industry guidelines.
		3.3	Select appropriate fire extinguisher and equipment for type of fire and notify the relevant authorities in accordance with organisational policies and procedures.
		3.4	Evacuate premises to designated assembly points in accordance with organisational emergency procedures.
4.	Manage the emergency	4.1	Confine emergency to the immediate area using available resources within current skill limits.
		4.2	Conduct emergency procedures and operate equipment using safe practices in accordance with organisational policies and procedures.
		4.3	Coordinate the use of equipment with other emergency actions in accordance with organisational policies and procedures.

4.4 Implement strategies for group control, including removal of staff, clients and animals from danger and monitor ongoing conditions in accordance with organisational policies and procedures.

4.5 Acquire and document information required to notify and assist emergency services where appropriate.

4.6 Evacuate casualties in accordance with established emergency procedures.

4.7 Isolate hazards where possible in a manner that minimises the risk to self and casualty's health.

4.8 Assess vital signs and reassure casualty in a calm and caring manner using available resources.

4.9 Provide first aid within limits of authority and competence and seek first aid assistance and advice from others where required.

4.10 Implement organisational procedures and policies in the event of a near miss, major injury or death.

RANGE STATEMENT

All range statements must be assessed:

1. **Emergency situations** may include but are not limited to:

    - Medical emergencies
    - Fire
    - Leakage or spillage of hazardous substances
    - Electrical faults
    - Natural disaster (e.g. flood, earthquake)

2. **Response to emergency situations** may include but are not limited to:

    - Use of alarms or warnings
    - Assisting injured persons
    - Contacting emergency services
    - Evacuation
    - Erection of emergency or warning signage

3. **Emergency resources** may include but are not limited to:

    - Extinguishers
    - Alarms
    - First aid kit
    - Lockout and tagout equipment

4. **Hazards** may include but are not limited to:

    - Physical (e.g. electrical shock, burns, falls etc.)
    - Biological (e.g. infection risk, disease vectors, etc.)
    - Chemical (e.g. battery electrolytes, fumes, etc.)
    - Ergonomic (e.g. repetitive tasks, lifting heavy objects etc.)

5. **Personal protective equipment (PPE)** may include but not limited to:

    - Electrically insulated boots
    - Hardhat
    - Electrically insulated gloves
    - Reflective/high visibility vest
    - Safety harness
    - Respirators
    - Arc resistant face shields
    - Goggles/eye protection

6. **Electrical faults** may include but are not limited to:

    - Loose connections
    - Short circuits
    - Overloads
    - Improper grounding
    - Damaged insulation

UNDERPINNING KNOWLEDGE AND SKILLS

Candidates must know and understand:

1. How to correctly evaluate an emergency.
2. How to avoid and control the escalation of an emergency.
3. How to follow a plan of action.
4. How to deal with contingency situations.
5. How to operate emergency equipment in accordance with manufacturer's specifications.
6. How to use appropriate fire protection and control techniques relevant to the organisation and industry.
7. How to apply basic first aid to individuals across a range of incident situations applicable to the job role, organisation or sector.
8. How to use industry standard terminology.
9. How to apply work health and safety in the context of own work.
10. What the relevant safe working practices.
11. How to perform lockout or tagout measures and why they are important.
12. What are the relevant emergency contacts.
13. What are the organisational emergency plans and evacuation procedures.
14. What are the relevant work health and safety legislative requirements and Codes of Practice.
15. What are the ways to minimise or eliminate the risks of loose connections, short circuits, overloads, incorrect grounding, damaged insulation.
16. What are the relevant legal responsibilities and duty of care.
17. What are the organisational and legal policies and procedures in the event of an accident or incident.
18. What are the local call out procedures to access emergency services personnel.
19. How to prepare and improvise first aid materials and procedures.
20. What are the legal responsibilities and duty of care for persons and animals as appropriate to industry and emergency.
21. What are the hazard identification and risk assessment techniques and tools relevant to the organisation and industry.
22. What are the procedures to minimise infection in the work environment.

23. What are the organisational procedures and legislative requirements for dealing with major injury or death.

24. How to prepare for, evaluate and act appropriately in an emergency.

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

Simulation **may be used.**

UA52603 Maintain health and safety in the photovoltaic environment

Unit Descriptor:

This unit describes the competence required to contribute to maintaining a safe and secure working environment. It addresses the essential abilities of communicating effectively, working in a safe and hygienic manner, problem solving, keeping records, operating within organisational procedures and meeting legal requirements.

ELEMENT	PERFORMANCE CRITERIA
Candidates must be able to:	
1. Implement health and hygiene regulations	1.1 Wear clean, smart and appropriate clothing in accordance with job role.
	1.2 Wear hair neat and tidy in accordance with organisational requirements.
	1.3 Limit the wearing of jewellery, in line with organisational safety requirements.
	1.4 Confirm that cuts, grazes and wounds are treated by the appropriate person.
	1.5 Report illness and infections to the appropriate person in accordance with organisational procedures.
	1.6 Conduct work in accordance with hygiene practices that must be adhered to within the working environment.
	1.7 Perform work in an efficient and organised manner in accordance with appropriate organisational procedures and legislative requirements**.**
2. Confirm a safe work environment for clients, staff and visitors	2.1 Identify and rectify hazards and potential hazards to the safety of clients, staff and visitors.
	2.2 Make customers, staff and visitors aware of hazards and potential hazards in accordance with organisational procedures.

		2.3 Take cautionary measures, including the erection of signage, to warn clients, staff and visitors of hazards and potential hazards.
		2.4 Report accidents, damage and non-rectifiable hazards to the appropriate person in accordance with organisational procedures.
		2.5 Deal with unexpected situations and inform the appropriate persons where necessary.
		2.6 Conduct work in an organised and efficient manner in accordance with safety and health regulations and organisational procedures.
3.	Confirm a secure work environment for clients, staff and visitors	3.1 Identify potential security risks and report to the appropriate person in accordance with organisational health and safety requirements.
		3.2 Secure staff areas against unauthorised access in accordance with organisational health and safety requirements.
		3.3 Report establishment, staff or client lost property to the appropriate person.
		3.4 Question individuals with unauthorised access to staff areas politely or, where necessary, report them to the appropriate person in accordance with organisational policies and procedures.
		3.5 Deal with unexpected situations and inform the appropriate persons where necessary.
		3.6 Perform work in an organised and efficient manner in accordance with safety and health regulations and organisational procedures.

RANGE STATEMENT

All range statements must be assessed:

1. **Hazards and potential hazards** may include but are not limited to:

    - Physical
    - Chemical
    - Biological
    - Ergonomic

2. **Security risks** may include but are not limited to:

    - Unauthorised open access points
    - Missing keys
    - Trespassers

3. **Staff areas** may include but are not limited to:

    - Equipment room (e.g., office or worksite, etc.)
    - Storage areas (e.g., warehouse, storeroom, etc.)

UNDERPINNING KNOWLEDGE AND SKILLS

Candidates must know and understand:

1. Why it is important to comply with health and safety legislation.
2. Where and from whom information on current health and safety legislation can be obtained.
3. What general hygienic practices must be adhered to in own work environment.
4. Why the correct clothing, footwear and headgear should be worn at all times.
5. Why and to whom illness and infections should be reported.
6. Why it is important to maintain good personal hygiene.
7. Where alarms are located and how to activate them.
8. Why a fire should never be approached unless it is safe to do so.
9. What emergency services are available in the event of an accident and why it is important to contact them.
10. What action should be taken to ensure the safety of the injured and the uninjured.
11. What are the organisational procedures for reporting an accident.
12. What cautionary measures can be taken to warn customers, staff and visitors of potential hazards.
13. What are the potential hazards within the working environment.
14. Why it is important to use correct lifting techniques.
15. What are the employee's responsibilities in relation to health and safety regulations.
16. Which keys, property and areas should be secured from unauthorised access at all times.
17. Why it is essential to be aware of potential security risks.
18. Why procedures relating to lost property must be adhered to.
19. Why only disclosable information should be given to clients.
20. Why it is important to report all unusual/non-routine incidents to the appropriate person.

EVIDENCE GUIDE

For assessment purposes:

(1) Critical Aspects of Evidence

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

Evidence must be provided of dealing with **at least one (1) security risk** and working in **both types of staff areas.**

(2) Method 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
- Professional discussion
- Photographs of yourself at work
- Correspondence written by the candidate drawing attention to health and safety issues
- Witness testimony
- Simulations

Questioning techniques should not require language, literacy or numeracy skills beyond those required in this unit of competency.

(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 organisational 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 organisational procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Simulation **may** be used**.**

UA52703 Identify and isolate multiple supply systems

Unit Descriptor:

This unit deals with the knowledge, skills and attitudes required to identify and isolate multiple electrical energy supply systems. Candidates are expected to identify the location of multiple supply systems on premises with or without grid supply, perform shutdown and isolation procedures and return supply systems to normal operations.

ELEMENT	PERFORMANCE CRITERIA
Candidates must be able to:	
1. Prepare to isolate multiple supply systems	1.1 Plan work activities in accordance with relevant organisational policies and procedures.
	1.2 Obtain the scope of work documentation and outline the implications of isolation.
	1.3 Access and interpret relevant site-specific information in accordance with organisational requirements.
	1.4 Identify and assess worksite hazards in accordance with organisational procedures.
	1.5 Select and apply appropriate risk controls for identified hazards prior to starting work in accordance with organisational policies and procedures.
	1.6 Identify and select required tools and equipment, and personal protective equipment (PPE) and check for correct operation and safety before use in accordance with organisational requirements and manufacturer's instructions.
	1.7 Notify relevant persons on site of supply systems shutdown and isolation in accordance with organisational requirements.

2.	Isolate multiple supply systems	2.1 Complete supply systems shut-down procedures in accordance with site-specific information and organisational requirements.
		2.2 Test and confirm that supply system components and circuits are de-energised and follow lock-out procedures in accordance with industry best practices.
3.	Re-instate multiple supply systems	3.1 Complete supply systems start-up procedures in accordance with site-specific information and organisational requirements.
		3.2 Check and confirm that supply systems are re-energised and tested for correct operation in accordance with organisational procedures and requirements.
		3.3 Respond to incidents or unplanned events in accordance with organisational requirements.
		3.4 Notify relevant persons on site of the re-instatement of supply systems in accordance with organisational requirements.

RANGE STATEMENT

All range statements must be assessed:

1. **Organisational policies and procedures** may include but are not limited to:

    - Health and safety legislation
    - Industry standards
    - Codes of practice
    - Compliance codes (e.g. Authority Having Jurisdiction (AHJ))

2. **Site-specific information** may include but is not limited to:

    - Manuals
    - Drawings
    - Operational information
    - Labels
    - Shutdown and start up procedures

3. **Hazards** may include but are not limited to:

    - Physical (e.g. electrical shock, burns, falls, etc.)
    - Biological (e.g. infection risk, disease vectors, etc.)
    - Chemical (e.g. battery electrolytes, fumes, etc.)
    - Ergonomic (e.g. repetitive tasks, lifting heavy objects, etc.)
    - Environmental (e.g. adverse weather conditions, inadequate task lighting)

4. **Tools and equipment** may include but are not limited to:

    - Hand tools (for cutting, tightening, impact, digging, clamping, etc.)
    - Power tools (e.g. drills, saws, screwdrivers, etc.)
    - Measuring tools (e.g. rules, tapes, scales, levels, squares, gauges, etc.)
    - Circuit testing devices (e.g. voltmeter, multimeter, ohmmeter, ammeter, megger testers, etc.)
    - Diagnostic equipment (e.g. thermal imaging, hydrometer, torque tester, etc.)
    - Isolation devices (e.g., tags and locks)
    - Balance of system (BOS) components (e.g. wires, conduit, fastening devices, fittings, etc.)

5. **Supply system components** may include but are not limited to:

    - Inverters or inverter energy systems
    - Battery or energy storage systems
    - Charge controllers
    - Overcurrent protection devices and disconnects

6. **Personal protective equipment (PPE)** may include but is not limited to:

    - Electrically insulated gloves
    - Full body harnesses
    - Electrically insulated boots
    - Hard hats
    - Goggles/eye protection
    - Arc resistant face shield
    - Safety harness
    - High visibility/reflective jackets

UNDERPINNING KNOWLEDGE AND SKILLS

Candidates must know and understand:

1. What are the relevant regulations, standards, codes of practice and legislative and organisational requirements.
2. What are the relevant hazard and risk assessment and control requirements.
3. What are the potential injuries that can be caused by multiple supply systems.
4. Why it is important to notify relevant persons of shutdown and start-up supply systems.
5. Why it is important to identify hazards, assess risks and identify, apply and monitor control measures and how to do so.
6. Why it is important to assess a worksite and locate overcurrent protection devices and disconnects and how to do so.
7. How to locate and interpret site-specific information.
8. Why it is important to locate inverter energy systems (IES) and supply systems and how to do so.
9. How to apply awareness of potential unidentified and supply system.
10. Why it is important to locate and interpret site-specific information and how to do so.
11. Why it is important to identify and locate isolation devices and supply systems conductors and how to do so
12. Why it is important to use tools and equipment safely especially when testing equipment and how to do so
13. How to perform electrical isolation.
14. How to use anti-islanding to perform electrical isolation.
15. What are unidentified supply systems and how to use the.
16. Why it is important to ensure the safe isolation of an electrical supply and how to do so.
17. How to use isolation devices used in IES
18. What is tagging and lockout and how are they used.
19. What are central protection systems and how to use them.
20. How to shut down and isolate supply systems
21. What is a renewable energy inverter energy system, what are its various characteristics, operations and safety functions.
22. What is a grid connected inverter energy system with standalone functionality, what are its various characteristics, operations and safety functions.
23. Wha is a stand-alone IES, what are its various characteristics, operations and safety functions.

24. What are the different types of labelling for multiple supply systems and where they can be located.
25. How to isolate multiple supply systems in accordance with organisational and regulatory requirements, including, applying safe isolation practices, identifying correct isolation devices, identifying live conductors, correctly using testing equipment, confirming systems are isolated, tagging-out all supplies
26. How to interpret operational information, manuals, operational information, drawings, labelling.
27. What are the shutdown procedures and start up procedures and notifications of inconsistencies in shutdown and start up procedures
28. How to return supply systems to normal operation for renewable energy IES, grid connected IES with stand-alone functionality and stand-alone IES.
29. How to work safely with electricity.
30. What are the various hazards associated with working with direct current (DC) and alternating current (AC) electricity.
31. What are the effects of electric shock on the human body.
32. How to identify live supply systems conductors.
33. What precautions must be taken to minimise the chance of electric shock.
34. What are the emergency procedures for incidents involving electricity.
35. What are the common causes of electrical accidents.
36. How to test re-energised supply systems for correct operation and electrical safety.
37. How to confirm that documented shutdown and start up procedures are correct.
38. How to appropriately notify appropriate persons of any inconsistencies in shutdown or start up procedures.
39. How to deal with an unplanned event.

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 work 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

(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 organisational 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 candidates must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant organisational 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.

UA52803 Implement a preventative maintenance programme for photovoltaic systems

Unit Descriptor:

This unit deals with the knowledge, skills and attitudes required to implement the quality assurance and risk management processes for the preventative maintenance of photovoltaic systems.
It includes working safely to technical, quality and risk management standards, work specifications and maintenance schedules, sampling inspections, evaluating components and completing the necessary maintenance documentation.

ELEMENT	PERFORMANCE CRITERIA
Candidates must be able to:	
1. Prepare to conduct preventative maintenance programme processes	1.1 Access, interpret and apply relevant site-specific information in accordance with organisational safety procedures.
	1.2 Identify hazards, assess risks, and implement risk control measures according to work, health and safety (WHS) requirements.
	1.3 Confirm maintenance schedules and compliance requirements with relevant persons and sequence work in accordance with organisational procedures.
	1.4 Consult relevant persons to ensure that work is coordinated with others present at the work site.
	1.5 Select photovoltaic systems and components to be maintained in accordance with maintenance schedules and/or system specifications.
	1.6 Obtain required resources to conduct maintenance tasks in accordance with organisational procedures and maintenance requirements.
2. Conduct preventative maintenance programme processes	2.1 Check and confirm that risk control measures have been implemented in accordance with organisational safety requirements.

		2.2 Check and isolate circuits, as required, in accordance with organisational safety requirements and procedures.
		2.3 Inspect and test live photovoltaic systems and components for compliance with industry standards in accordance with organisational safety requirements and procedures.
		2.4 Document non-compliant photovoltaic systems and components and arrange for rectification in accordance with organisational procedures.
		2.5 Select the required tools and equipment for scheduled maintenance tasks and check them for serviceability in accordance with organisational safety requirements.
		2.6 Perform scheduled maintenance processes in a manner that minimises waste and damage to photovoltaic systems and components and the surrounding environment in accordance with organisational procedures.
3.	Complete preventative maintenance processes	3.1 Restore the work area and dispose of waste in accordance with environmental and organisational safety policies and procedures.
		3.2 Inspect completed maintenance processes and confirm compliance with industry standards in accordance with organisational procedures.
		3.3 Document completed maintenance processes and notify relevant persons in accordance with organisational procedures.

RANGE STATEMENT

All range statements must be assessed:

1. **Site-specific information** may include but is not limited to:

   - Manuals/specification sheets
   - Drawings
   - Operational information
   - Labels
   - Safety checklists
   - Shutdown and start up procedures

2. **Hazards** may include but are not limited to:

   - Physical (e.g. electrical shock, burns, falls, etc.)
   - Biological (e.g. infection risk, disease vectors, etc.)
   - Chemical (e.g. battery electrolytes, fumes, etc.)
   - Ergonomic (e.g. repetitive tasks, lifting heavy objects, etc.)
   - Environmental (e.g. adverse weather conditions, inadequate task lighting)

3. **Risk control measures** may include but are not limited to:

   - Use of personal protective equipment (PPE)
   - Erection of signage
   - Electrical isolation (e.g. tagout and lockout)
   - Use of height access equipment

4. **Relevant persons** may include but are not limited to:

   - Clients
   - Supervisors/management
   - Authorities having jurisdiction (AHJ)
   - Manufacturer representatives

5. **Photovoltaic systems and components** may include but are not limited to:

   - Modules
   - Mounting system (e.g. racking, rails, ground mounts, etc.)
   - Overcurrent protection devices and disconnects
   - Inverters
   - Cables and wiring
   - Battery banks
   - Charge controllers
   - Networking devices (e.g. routers, hubs, etc.)

6. **Resources** may include but are not limited to:

   - Tools and diagnostic equipment
   - Personal protective equipment (PPE)
   - Personnel
   - Documentation (e.g. checklists, specifications)

7. **Tools and equipment** may include but are not limited to:

    - Hand tools (for cutting, tightening, impact, digging, clamping, etc.)
    - Power tools (e.g. drills, saws, screwdrivers, etc.)
    - Measuring tools (e.g. rules, tapes, scales, levels, squares, gauges, etc.)
    - Circuit testing devices (e.g. voltmeter, multi-meter, ohmmeter, ammeter, megger testers, etc.)
    - Diagnostic equipment (e.g. thermal imaging, hydrometer, torque tester, etc.)
    - Balance of systems (BOS) components (e.g. wires, conduit, fastening devices, fittings, etc.)

8. **Maintenance processes** may include but are not limited to:

    - Electrical inspections (e.g. grounding, voltage and current ratings, component conditions such as corrosion and wear and tear, availability/legibility/accuracy of labelling, etc.)
    - Mounting system inspection (e.g. racking and rails, fastening devices, etc)
    - Routine cleaning (e.g. modules, inverter fans, etc.)
    - Replacing minor electrical components (e.g. connectors, cables, terminals, etc.)
    - Resetting or replacing loose fastening devices
    - Pest management (e.g. removal of nesting birds, rodents, ants, etc.)
    - System performance audit (e.g. expected production vs actual production)

9. **Waste** may include but is not limited to:

    - Routine waste (e.g. cables, conduit, etc.)
    - Hazardous waste (e.g. sharps, corrosive chemicals, etc.)

UNDERPINNING KNOWLEDGE AND SKILLS

Candidates must know and understand:

1. What are the work, health and safety (WHS) requirements and organisational procedures.
2. What are the hazards and risks and how to implement control measures.
3. Why it is important to confirm maintenance schedules and process compliance requirements with the relevant persons and how to sequence work.
4. Why it is important to consult relevant persons to ensure that work is coordinated with others involved on the work site.
5. Why it is important to check the warranties of photovoltaic systems and components.
6. Why it is important to determine the equipment to be maintained from the maintenance schedule and/or system specifications and diagrams and how to do so.
7. How to obtain the required resources to conduct maintenance in accordance with organisational procedures and how to check against job requirements.
8. How to obtain and check the required tools, equipment and testing devices to conduct maintenance for correct operation and safety in accordance with organisational procedures.
9. Why it is important to ensure that work, health and safety (WHS) risk control measures and organisational procedures for carrying out the work are followed.
10. Why it is important to inspect, test or measure live and operating systems in accordance with work, health and safety (WHS) requirements and organisational procedures and how to do so.
11. How to check and isolate circuits as required in accordance with work, health and safety (WHS) requirements and organisational procedures.
12. Why it is important to inspect and evaluate equipment or components for compliance in accordance with maintenance schedules and operational work, health and safety (WHS) requirements and organisational procedures and how to do so.
13. How to document non-compliant equipment or components and arrange for rectification in accordance with organisational procedures.
14. Why it is important to discuss and document methods for dealing with unplanned situations with relevant persons in accordance with organisational procedures.
15. How to conduct quality checks of maintenance in accordance with organisational procedures.
16. How to use sustainable energy practices to conduct maintenance processes to achieve compliance without waste of materials or damage to equipment, the surrounding environment or services.
17. Why is it important to follow work, health and safety (WHS) risk control measures and organisational procedures for work completion.
18. Why it is important to ensure that the work site and equipment are clean and safe in accordance with work, health and safety (WHS) requirements and organisational procedures.
19. Why it is important to make final checks to verify that completed maintenance work complies with work, health and safety (WHS) requirements, manufacturer's specifications and organisational procedures.

20. Why it is important to document maintenance activities and outcomes and notify relevant persons.
21. How to conduct a performance audit on photovoltaic systems and why it is important to do so as part of a maintenance programme.

EVIDENCE GUIDE

For assessment purposes:

(1) Critical Aspects of Evidence

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

(2) Method 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
- Written evidence
- Witness testimony
- Professional discussion

Questioning techniques should not require language, literacy or numeracy skills beyond those required in this unit of competency.

(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 organisational 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 organisational procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

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

UA52903 Diagnose and rectify issues in photovoltaic systems

Unit Descriptor:

This unit deals with the knowledge, skills and attitudes required to diagnose and rectify a range of issues present in photovoltaic systems. Candidates are expected to apply safe working practices, interpret diagrams and technical data, apply knowledge of PV systems to logical fault-finding processes, implement fault rectification, perform safety and functional testing, and report on work activities and outcomes.

ELEMENT	PERFORMANCE CRITERIA
Candidates must be able to:	
1. Prepare to work on photovoltaic systems	1.1 Access, interpret and apply relevant site-specific information in accordance with organisational safety procedures.
	1.2 Identify hazards, assess risks, and implement risk control measures according to work, health and safety (WHS) requirements.
	1.3 Identify the nature and extent of the issues affecting photovoltaic systems and components and the required corrective measures and work tasks in consultation with relevant persons and documentation.
	1.4 Consult relevant persons to ensure that work is coordinated with others present at the work site.
	1.5 Identify and obtain required resources for work tasks in accordance with organisational procedures and maintenance requirements.
	1.6 Select the required tools and equipment for required work tasks and check for serviceability in accordance with organisational safety requirements.
2. Resolve issues in photovoltaic systems	2.1 Check and confirm relevant risk control measures have been implemented before commencing work in accordance with organisational safety procedures.

	2.2 Inspect, test or measure live photovoltaic systems and circuits where required, in accordance with task requirements and organisational safety procedures.
	2.3 Check and isolate circuits where required, in accordance with organisational safety procedures and industry best practices.
	2.4 Identify the issues affecting photovoltaic systems and components in accordance with established logical diagnostic and troubleshooting methods and procedures.
	2.5 Identify and confirm the source and cause of issues affecting photovoltaic systems and components using approved testing methods in accordance with industry best practices.
	2.6 Confirm corrective measures that must be implemented to resolve issues in consultation with relevant persons and report those tasks that fall outside the scope of personal ability/responsibility in accordance with organisational procedures.
	2.7 Apply suitable corrective measures to rectify issues in photovoltaic systems and components using approved methods in a manner that results in the photovoltaic system condition and performance meeting or exceeding as-built parameters.
	2.8 Test photovoltaic systems and components using approved methods to verify that they operate as intended and meet specified requirements.
	2.9 Perform diagnostic or corrective tasks in a manner that minimises waste and mitigates compromise to photovoltaic systems and components, and the surrounding environment in accordance with organisational procedures.
3. Complete work and required documentation	3.1 Check and confirm relevant risk control measures have been implemented for the completion of work in accordance with organisational safety procedures.

3.2 Inspect completed diagnostic and corrective tasks and confirm compliance with industry workmanship, quality and safety standards in accordance with organisational procedures.

3.3 Test and measure system performance to confirm compliance with as-built parameters in accordance with industry best practices.

3.4 Restore the work area and dispose of waste in accordance with environmental and organisational safety and policies and procedures.

3.5 List the corrective measures implemented and any additional maintenance requirements in accordance with organisational procedures.

3.6 Notify relevant persons of completed diagnostic or corrective tasks and any additional maintenance requirements in accordance with organisational procedures and industry best practices.

RANGE STATEMENT

All range statements must be assessed:

1. **Site-specific information** may include but is not limited to:

    - Manuals/specification sheets
    - As-built drawings/diagrams
    - Operational information
    - Labels
    - Safety checklists
    - Shutdown and start up procedures
    - Reports (e.g. production, potential/actual faults, maintenance etc.)

2. **Hazards** may include but are not limited to:

    - Physical (e.g. electrical shock, burns, falls, etc.)
    - Biological (e.g. infection risk, disease vectors, etc.)
    - Chemical (e.g. battery electrolytes, fumes, etc.)
    - Ergonomic (e.g. repetitive tasks, lifting heavy objects, etc.)
    - Environmental (e.g. adverse weather conditions, inadequate task lighting)

3. **Risk control measures** may include but are not limited to:

    - Use of personal protective equipment (PPE)
    - Erection of signage
    - Electrical isolation (e.g. tagout and lockout)
    - Use of height access equipment

4. **Issues** may include but are not limited to:

    - Physical damage (e.g. wear and tear, corrosion, sun bleaching, damaged weather seals, etc.)
    - Non-functioning or malfunctioning system/components (e.g. component failures, installation mistakes, etc.)
    - Electrical faults (e.g. ground fault, short circuits, insulation failure, etc.)
    - Structural weaknesses (e.g. loose mounts and rails, missing fastening devices, unreliable/compromised support structures, etc.)
    - Underperformance (e.g. due to shading, dirty module surfaces, etc.)
    - Safety hazards (e.g. exposed live wires, missing insulation, inadequate ventilation, etc.)

5. **Photovoltaic systems and components** may include but are not limited to:

    - Modules
    - Supporting structures (e.g. racking, rails, ground mounts, etc.)
    - Overcurrent protection devices and disconnects
    - Inverters
    - Cables and wiring
    - Battery banks
    - Charge controllers
    - Networking devices (e.g. routers, hubs, etc.)

6. **Corrective measures** may include but are not limited to:

    - Replacing minor electrical components (e.g. connectors, cables, terminals, etc.)
    - Resetting or replacing loose fastening devices
    - System performance audit (e.g. expected production vs actual production)
    - Replacing major electrical components (e.g. modules, inverters, batteries, etc.)

7. **Relevant persons** may include but are not limited to:

    - Clients
    - Supervisors/management
    - Authorities having jurisdiction (AHJ)
    - Manufacturer representatives

8. **Resources** may include but are not limited to:

    - Tools and diagnostic equipment
    - Personal protective equipment (PPE)
    - Personnel
    - Documentation (e.g. checklists, specifications, as-built drawings, etc.)

9. **Tools and equipment** may include but are not limited to:

    - Hand tools (for cutting, tightening, impact, digging, clamping, etc.)
    - Power tools (e.g. drills, saws, screwdrivers, etc.)
    - Measuring tools (e.g. rules, tapes, scales, levels, squares, gauges, etc.)
    - Circuit testing devices (e.g. voltmeter, multi-meter, ohmmeter, ammeter, megger testers, etc.)
    - Diagnostic equipment (e.g. thermal imaging, hydrometer, torque tester, etc.)
    - Balance of systems (BOS) components (e.g. wires, conduit, fastening devices, fittings, etc.)

10. **Waste** may include but is not limited to:

    - Routine waste (e.g. cables, conduit, etc.)
    - Hazardous waste (e.g. sharps, corrosive chemicals, etc.)

UNDERPINNING KNOWLEDGE AND SKILLS

Candidates must know and understand:

1. What are the relevant work, health and safety (WHS) requirements and procedures.
2. What are the various organisational hazards and risks and how to suitably implement control measures.
3. Why it is important to consult relevant persons to ensure that work is coordinated with others involved on the work site.
4. Why it is important to check the warranties of photovoltaic systems and components.
5. How to obtain the required resources to conduct diagnostic and corrective measures.
6. Why it is important to inspect, test or measure live photovoltaic systems and how to do so.
7. How to check and isolate circuits as required in accordance with work, health and safety (WHS) requirements and organisational procedures.
8. What are the various types of tools and equipment used in photovoltaic systems maintenance and what are their characteristics, technical capabilities and limitations.
9. How to inspect tools and equipment for serviceability before use.
10. How to determine the operating parameters of an existing photovoltaic system and its components.
11. What are the various logical diagnostic procedures and troubleshooting techniques that could be administered to identify issues in photovoltaic systems and how to interpret the results.
12. How to identify and locate electrical faults in photovoltaic systems.
13. How to check electrical installations for compliant wiring practice, polarity, earthing and termination integrity.
14. How to determine the operating parameters of an existing photovoltaic energy apparatus/modules.
15. What are the various types of problems (routine and non-routine) and issues that impact photovoltaic systems and what are the ways to obtain solutions to rectify them.
16. How to conduct diagnostic and corrective processes to achieve compliance without waste of materials or damage to equipment, the surrounding environment or services.
17. Why is it important to follow work, health and safety (WHS) risk control measures and organisational procedures for work completion.
18. Why it is important to ensure that the work site and equipment are clean and safe.
19. What are the organisational requirements for the documentation of diagnostic and corrective activities and outcomes and why is it is important to notify relevant persons.

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 work 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 organisational 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 candidates must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant organisational 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.

UA53003 Maintain and fault-find battery storage systems

Unit Descriptor: This unit deals with the knowledge, skills and attitudes required to maintain and fault-find the battery storage systems incorporated into grid-connected, hybrid or off-grid photovoltaic systems.

ELEMENT	PERFORMANCE CRITERIA
Candidates must be able to:	
1. Plan the maintenance of photovoltaic battery storage systems	1.1 Access, interpret and apply relevant site-specific information to identify maintenance requirements in accordance with industry best practices and organisational safety procedures.
	1.2 Inspect the installation site to identify the maintenance needs in accordance with organisational procedures and industry best practices.
	1.3 Identify organisational hazards, assess risks, and implement risk control measures according to work, health and safety (WHS) requirements.
	1.4 Prepare battery storage system maintenance or fault finding in accordance with system design requirements, relevant industry standards, regulations and manufacturers' specifications.
	1.5 Select the required tools and equipment for required work tasks and check them for serviceability in accordance with organisational safety requirements.
	1.6 Inspect battery storage systems and identify related issues in adherence to industry best practices and established fault-finding methods.
2. Manage photovoltaic battery storage systems	2.1 Check and confirm that relevant risk control measures have been implemented before commencing work in accordance with organisational safety procedures.

		2.2 Check system charge controllers and inverters to confirm compliance with system design parameters in accordance with relevant industry standards, regulations and manufacturer specifications.
		2.3 Perform the required maintenance by servicing or replacing battery system components in accordance with industry best practices.
		2.4 Diagnose and where possible, rectify system issues in accordance with industry best practices and established fault-finding methods.
		2.5 Test and measure system performance to confirm compliance with established performance/operating parameters.
		2.6 Commission and/or reinstate the system in accordance with system design, relevant industry regulations, standards, and manufacturers' specifications.
3.	Complete documentation	3.1 Document compliance for the testing and commissioning of battery storage system and components in accordance with industry best practices and organisational procedures.
		3.2 Document work that was completed and any issues that fall outside the scope of personal authority or ability to rectify and notify relevant persons in accordance with organisational procedures.
		3.3 Update and submit client system documentation where required in accordance with organisational procedures.
		3.4 Brief the client on safe and correct system operation and recommended maintenance.

RANGE STATEMENT

All range statements must be assessed:

1. **Site-specific information** may include but is not limited to:

    - Manuals/specification sheets
    - Maintenance checklists
    - Drawings/diagrams
    - Operational information
    - Labels
    - Safety checklists
    - Shutdown and start up procedures
    - Reports (e.g. production, potential/actual faults, maintenance etc.)

2. **Hazards** may include but are not limited to:

    - Physical (e.g. electrical shock, burns, falls, etc.)
    - Biological (e.g. infection risk, disease vectors, etc.)
    - Chemical (e.g. battery electrolytes, fumes, etc.)
    - Ergonomic (e.g. repetitive tasks, lifting heavy objects, etc.)
    - Environmental (e.g. adverse weather conditions, inadequate task lighting)

3. **Risk control measures** may include but are not limited to:

    - Use of personal protective equipment (PPE)
    - Erection of signage
    - Electrical isolation (e.g. tagout and lockout)

4. **Battery storage system and components** may include but are not limited to:

    - Cells (e.g. lead acid, lithium ion, etc.)
    - Battery module containers (e.g. cabinets, storage units, etc.)
    - Charge controller
    - Overcurrent protection devices, safety switches and disconnects
    - Cooling devices

5. **Tools and equipment** may include but are not limited to:

   - Hand tools (for cutting, tightening, etc.)
   - Power tools (e.g. drills, screwdrivers, etc.)
   - Circuit testing devices (e.g. voltmeter, ohmmeter, ammeter, etc.)
   - Diagnostic equipment (e.g. thermal imaging, hydrometer, torque tester, etc.)
   - Associated materials (e.g. wires, battery terminal lugs, etc.)

6. **Issues** may include but are not limited to:

   - Physical damage (e.g. bulging, corrosion, leaking electrolytes, etc.)
   - Non-functioning or malfunctioning system/components (e.g. dead batteries, inadequate electrolyte specific gravity, etc.)
   - Electrical faults (e.g. grounding faults, under charging, overcharging, etc.)
   - Underperformance (e.g. due to excessive heat, limited charge retention, reduced battery capacity, etc.)
   - Safety hazards (e.g. exposed live wires, inadequate ventilation, chemical fumes, etc.)

7. **Relevant persons** may include but are not limited to:

   - Supervisors
   - Clients

8. **Client system documentation** may include but is not limited to:

   - Maintenance manual
   - Fault reports

UNDERPINNING KNOWLEDGE AND SKILLS

Candidates must know and understand:

1. What are the relevant types of site-specific information that must be used and how to access, interpret and apply them.
2. How to perform site inspections and identify maintenance needs.
3. Identify organisational hazards, assess risks, and implement risk control measures according to work, health and safety (WHS) requirements.
4. What are the system design requirements, relevant industry standards, regulations and manufacturer specifications that would impact photovoltaic battery storage system maintenance.
5. What are the various types of tools and equipment used in photovoltaic battery systems maintenance and what are their characteristics, technical capabilities and limitations.
6. How to inspect tools and equipment for serviceability before use.
7. What are the various logical diagnostic procedures and troubleshooting techniques that could be administered to identify issues in battery systems and how to interpret the results.
8. How to identify and locate electrical faults in photovoltaic battery storage systems.
9. Why it is important to check and confirm relevant risk control measures have been implemented before commencing work.
10. Why it is important to reference maintenance checklists for battery storage system components.
11. How to perform maintenance by servicing or replacing battery storage system components.
12. How to rectify issues with photovoltaic battery storage systems and components.
13. What are the types of issues that fall outside the scope of personal ability to rectify and who should be notified.
14. What are the relevant methods for testing and measuring battery storage system performance to confirm compliance with established performance/operating parameters.
15. How to commission and/or reinstate a photovoltaic battery storage system.
16. What are the various types of compliance documentation that must be completed.
17. What is client system documentation and how must it be updated and submitted to the client after completing maintenance tasks.
18. How to brief clients regarding the operation and maintenance of photovoltaic battery storage systems.

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 work 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 organisational 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 candidates must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant organisational 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.

UA53103 Provide quotations for photovoltaic systems maintenance work and retrofits

Unit Descriptor: This unit deals with the knowledge, skills and attitudes required to provide quotations for photovoltaic systems maintenance and retrofit work.

ELEMENT	PERFORMANCE CRITERIA
Candidates must be able to:	
1. Establish the extent of maintenance and retrofit works	1.1 Confirm the scope of photovoltaic systems maintenance/retrofit work from job specifications and discussions with relevant persons.
	1.2 Identify and apply work health and safety (WHS)/occupational health and safety requirements and organisational procedures for the project work area.
	1.3 Assess and incorporate WHS and occupational health and safety regulatory requirements into the work specifications on which the quotation is based.
	1.4 Document the scope of installation or service work for quotation as a job specification and seek agreement with relevant persons in accordance with industry best practices.
	1.5 Negotiate requests for alterations to job specifications with relevant persons in accordance with organisational procedures and regulatory requirements.
2. Produce maintenance and retrofit work quotations	2.1 Prepare list of materials and check against job specifications to ensure accuracy.
	2.2 Outline the costs of materials, labour and other relevant services in accordance with organisational costing parameters and current supplier costs.
	2.3 Quantify and cost quotations against job specifications and list of materials for costing accuracy in accordance with organisational procedures.

		2.4 Respond to unplanned client situations in a manner that minimises risks to service project, in accordance with organisational procedures.
		2.5 Confirm that maintenance/retrofit work quotations are reviewed and approved by delegated persons in accordance with organisational procedures.
3.	Document and submit maintenance/retrofit quotations	3.1 Record quotations, including key items, in accordance with organisational policies and procedures.
		3.2 Submit quotations to clients within specified timeframes in accordance with organisational policies and procedures.

RANGE STATEMENT

All range statements must be assessed:

1. **Relevant persons** may include but are not limited to:

    - Clients
    - Supervisors/management
    - Authorities having jurisdiction (AHJ)
    - Manufacturer representatives

2. **Key items** may include but are not limited to:

    - Description of work and services (i.e. a breakdown of what the client will be receiving)
    - Prices (e.g. all costs for parts and labour, additional fees or expenses)
    - Payment terms (i.e. when and how the client needs to pay for this service)
    - Work schedule (e.g. maintenance/retrofit milestones)
    - Confidentiality agreement
    - Variation (i.e. a list of different applicable rates for additional services)
    - Duration (i.e. time frame the quoted price is valid)
    - Client signature
    - Guarantees/warranties
    - Disclaimers (e.g. client expectations management)

UNDERPINNING KNOWLEDGE AND SKILLS

Candidates must know and understand:

1. What are the relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and how they are to be applied.
2. What are the relevant organisational procedures for communicating with personnel, clients and suppliers.
3. How to communicate effectively with suppliers and clients.
4. How to cost jobs, labour and materials.
5. How to allocate resources to be quantified and costed.
6. How to calculate service costs
7. What are the relevant costing policies, labour rates, purchase prices and discounts for materials
8. What are the relevant equipment manufacturer specifications.
9. What are the relevant risk mitigation processes, including risk control measures.
10. How to deal with unplanned client events/situations in accordance with organisational procedures.
11. How to prepare the list of materials, including type and quantity.
12. How to determine the scope and extent of quotation work.
13. How to develop quotation and check calculations using relevant costing methods.
14. How to document and submit quotations to clients.

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 work 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 organisational 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 candidates must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant organisational 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.

U12902 Deliver reliable customer service

Unit Descriptor:

This unit is all about how you deliver consistent reliable service to customers as part of the job. As well as being good with people, candidates need to work with the organisation's service systems to meet and wherever possible, exceed customer expectations. In the job there will be many examples of how to combine approach and behaviour with the organisation's systems to ensure that candidates are prepared for each transaction, deal with different types of customers under different circumstances, check that what has been done has been effective.

ELEMENT	PERFORMANCE CRITERIA
Candidates must be able to:	
1. Prepare to deal with customers.	1.1 Keep knowledge of products or services offered by the organisation up to date using information from colleagues and organisational literature.
	1.2 Confirm that any equipment used is in good and safe working order.
	1.3 Confirm that the area is tidy and the space is used in an efficient manner.
	1.4 Plan and arrange everything required to deal with customers before the shift or period of work commences.
2. Give consistent service to customers	2.1 Make realistic commitments to customers regarding products or services during service delivery.
	2.2 Make extra efforts to keep commitments to customers.
	2.3 Inform customers when commitments cannot be kept due to unforeseen developments.
	2.4 Acknowledge when customer's needs or expectations have changed and adjust service to meet new requirements.
	2.4 Acknowledge when customer's needs or expectations have changed and adjust service to meet new requirements.

		2.5 Pass customers on to the relevant person or organisation if unable to deal with their needs and expectations and keep them advised about what is happening.
3.	Check customer service delivery	3.1 Confirm that the service given meets customers' needs and expectations.
		3.2 Identify where better service could have been given to customers and how the service could have been improved.
		3.3 Share relevant information with others to maintain the organisation's standards for service delivery.

RANGE STATEMENT

All range statements must be assessed:

1. **Prepare and arrange** may include but is not limited to:

    - Tools and equipment
    - Consumables
    - Documentation

2. **Customers** may include but are not limited to:

    - With clearly stated needs
    - Who are not clear about their needs and expectations
    - Who are unhappy with the level of service being provided

3. **Service** may include but is not limited to:

    - During busy periods
    - During quiet periods
    - During times of disruptions
    - When working with colleagues

4. **Identify** may include but is not limited to:

    - By inviting feedback from colleagues and managers on your performance
    - By asking customers for feedback directly
    - By examining written customer feedback

UNDERPINNING KNOWLEDGE AND SKILLS

Candidates must know and understand:

1. What are customer's rights.
    2. What are the specific aspects of health and safety, data protection, equal opportunity, disability discrimination, legislation and regulations that affect the way the products and services dealt with can be delivered to customers.
3. What are the industry, organisational, and professional codes of practice and ethical standards that affect the way the products or services are dealt with can be delivered to your customers.
4. What are the contractual agreements, if any, that customers have with the organisation.
5. What are the products or services of the organisation relevant to own customer service role.
6. What are the guidelines laid down by the organisation that limits what can be done within the job role.
7. What are the limits of your own authority and when to seek agreement with or permission from others.
8. What are the organisational targets relevant to own job role and the implications for the organisation if those targets are not met.
9. What are the organisational procedures and systems for delivering customer service.
10. What are the methods that the organisation uses or might use to measure its effectiveness in delivering customer service.
11. What are the systems in place for checking service delivery.
12. How to communicate in a clear, polite, confident way and why this is important.
13. How to deal with persons with diverse backgrounds and abilities (e.g. age, cultural, social and religious backgrounds).

EVIDENCE GUIDE

For assessment purposes:

(1) Critical Aspects of Evidence

Candidates must prove that they can carry out **all** of the elements, meeting **all** of the performance criteria, range and underpinning knowledge **on more than one occasion.** This evidence must come from a real work 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
- Written evidence
- Witness testimony
- Professional discussion

Questioning techniques should not require language, literacy or numeracy skills beyond those required in this unit of competency.

(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 organisational 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 organisational procedures, product 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.

UA53203 Use and maintain tools and equipment for photovoltaic systems maintenance

Unit Descriptor:

This unit deals with the knowledge, skills and attitudes required to competently select and use appropriate tools and equipment for work tasks in the photovoltaic maintenance trade.

Candidates are expected to undertake a prescribed range of functions involving known routines and procedures and take responsibility for the quality of own work outcomes.

ELEMENT	PERFORMANCE CRITERIA
Candidates must be able to:	
1. Plan and prepare to use tools and equipment	1.1 Obtain, interpret, and confirm task requirements in accordance with organisational policies and procedures.
	1.2 Access, interpret and apply relevant site-specific information in accordance with organisational safety procedures.
	1.3 Identify and address potential hazards in the work environment and implement control measures in accordance with organisational safety procedures.
	1.4 Select and wear suitable personal protective equipment (PPE) required for work activity in accordance with organisational safety requirements.
	1.5 Confirm onsite emergency procedures and prepare for emergency situations prior to commencing work.
2. Select and use tools and equipment	2.1 Obtain tools and equipment appropriate for the work activity.
	2.2 Inspect tools and equipment for serviceability and report faults in accordance with organisational safety requirements.
	2.3 Inspect power cords, where required, for serviceability and report faults in accordance with organisational safety requirements.

	2.4 Establish a clear route for the safe placement and connection of power cords, where required, in accordance with organisational safety requirements.
	2.5 Clamp or fix materials in position, where required, for tools and equipment application according to organisational procedures.
	2.6 Operate tools and equipment to complete task requirements in accordance with organisational safety procedures and manufacturer's instructions.
	2.7 Store tools and equipment during work when not in immediate use, in accordance with organisational safety procedures.
3. Conduct housekeeping activities	3.1 Restore the work area and dispose of waste in accordance with environmental and organisational safety policies and procedures.
	3.2 Clean, maintain and inspect the serviceability of tools and equipment and report any issues to relevant personnel in accordance with organisational procedures and manufacturer's instructions.
	3.3 Store tools and equipment in accordance with organisational procedures and manufacturer's instructions.
	3.4 Complete written records and reports in accordance organisational requirements and procedures.

RANGE STATEMENT

All range statements must be assessed:

1. **Site-specific information** may include but not limited to:

   - Manuals
   - Drawings
   - Operational information
   - Labels
   - Shutdown and start up procedures

2. **Hazards** may include but not limited to:

   - Physical (e.g. electrical shock, burns, falls, etc.)
   - Biological (e.g. infection risk, disease vectors, etc.)
   - Chemical (e.g. battery electrolytes, fumes, etc.)
   - Ergonomic (e.g. repetitive tasks, lifting heavy objects, etc.)
   - Environmental (e.g. adverse weather conditions, inadequate task lighting)

3. **Control measures** may include but not limited to:

   - Use of personal protective equipment (PPE)
   - Erection of signage
   - Electrical isolation (e.g. tagout and lockout)
   - Use of height access equipment

4. **Personal protective equipment (PPE)** may include but not limited to:

   - Electrically insulated boots
   - Hardhat
   - Electrically insulated gloves
   - Reflective/high visibility vest
   - Safety harness
   - Respirators
   - Arc resistant face shields
   - Goggles/eye protection

5. **Tools and equipment** may include but not limited to:

   - Hand tools (for cutting, tightening, impact, digging, clamping, etc.)
   - Power tools (e.g. drills, saws, screwdrivers, etc.)
   - Measuring tools (e.g. rules, tapes, scales, levels, squares, gauges, etc.)
   - Circuit testing devices (e.g. voltmeter, multi-meter, ohmmeter, ammeter, megger testers, etc.)
   - Diagnostic equipment (e.g. thermal imaging, hydrometer, torque tester, etc.)
   - Balance of system (BOS) components (e.g. wires, conduit, fastening devices, fittings, etc.)

6. **Waste** may include but not limited to:

   - Routine waste
   - Hazardous waste

UNDERPINNING KNOWLEDGE AND SKILLS

Candidates must know and understand:

1. What are the key policies, procedures and documentation required to use tools and equipment for photovoltaic systems maintenance for work health and safety, environmental and emergency incidents.
2. How to use relevant industry and worksite terminology.
3. How to communicate with others to receive and clarify task requirements and to determine coordination requirements prior to commencing and during work activities.
4. Where to locate and how to apply relevant documentation, policies and procedures and confirm that the work activity is compliant.
5. What are the various worksite hazards that could be encountered and how they should be controlled.
6. What are the various kinds of personal protective equipment (PPE) that should be worn during work activities and how they should be used.
7. What are the onsite emergency response protocols and procedures.
8. What are…. the various types of tools and equipment used in photovoltaic systems maintenance and what are their characteristics, technical capabilities and limitations.
9. How to inspect tools and equipment for serviceability before use.
10. How to implement the requirements, procedures and techniques required to operate the various kinds of tols and equipment used in photovoltaic systems maintenance.
11. What are the relevant energy and power sources for power tools and where they are located.
12. How to inspect power cords and place them during use of power tools.
13. How to work with others to undertake the operation of tools and equipment to conduct photovoltaic systems maintenance.
14. How to restore the work area and dispose of waste.
15. How to clean, maintain and inspect the serviceability of tools and equipment.
16. How to store tools and equipment after use.
17. What are the organisational requirements and procedures for written records and reports.

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 work 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

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

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Level 3 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

Organisation/centre approved by the TVET Council to offer full National Vocational Qualifications.

Case Studies

In situations where it is difficult for organisational 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 predetermined 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 levels of competence, from entry level staff at Level 1 through to senior management at Level 5.

Level 3 Glossary of Terms

Level 1 – Entry Level
Recognises 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
Recognises 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
Recognises 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
Recognises 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
Recognises 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 the consistent quality of assessment and competence. He/she needs to be competent to assess to national standards in the area under assessment.

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.

Appendix 2

Level 3 Glossary of Terms

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

This is the centre contact within each approved centre offering NVQs 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 organisation 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 would be 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 on each individual element.

As an assessment method, questioning ensures that an 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 is intended to apply.

Range statements are prescriptive, therefore each category must be assessed.

Appendix 2

Level 3 Glossary of Terms

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 judgement 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 his/her work, or where the candidate needs to develop competence, before being judged competent, for example, in a disciplinary situation.

Simulations

Where possible, assessment should always be carried out by observing **natural performance** in the organisation. **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 him/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 *essential* for a person to possess in order to successfully achieve an element and prove total competence.

Units

A unit of competence describes one or more than one activity which forms 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: These are core to a qualification and must be completed.

Optional units: Candidates must choose the required number of individual units, specified in the qualification structure, to achieve the qualification.

Appendix 2

Level 3 Glossary of Terms

Work-based Projects

Work-based projects are a useful way for the assessor to collect evidence to support any decision he/she makes 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 or observation.

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