



Australian Government

Department of Education, Employment and Workplace Relations

UEENEEK124A Solve basic problems in micro hydro systems

Release: 1

UEENEEK124A Solve basic problems in micro hydro systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers providing known solutions to predictable problems in micro hydro apparatus and systems operated at ELV and LV. It encompasses working safely, problem solving procedures, including the use of basic voltage, current and resistance measuring devices, providing known solutions to predictable circuit problems.

Application of the Unit

Application of the Unit 2)

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

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace provided equipment is not connected to installation wiring at voltages above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Note.

Competency requirements to be granted a license to carry out installations, fault finding, repair or maintenance on low voltage electrical installations is incorporated in unit

License to practice**3)**

UEENEEG105A and all prerequisite units it specifies

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Note: Those holding an 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory meet the pre-requisite requirements of this unit.

UEENEEG1 Solve problems in electromagnetic devices
01A and related circuits

For the full prerequisite chain details for this unit please refer to Table 2 in Volume 1, Part 2

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|---|---|
| 1 Prepare to work on micro hydro systems | 1.1 OHS procedures for a given work area are obtained and understood |
| | 1.2 OHS risk control work preparation measures and procedures are followed |
| | 1.3 The nature of the apparatus problem is obtained |

ELEMENT	PERFORMANCE CRITERIA
	<p>from documentation or from work supervisor to establish the scope of work to be undertaken</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others</p> <p>1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures</p> <p>1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
2 Solve problem in micro hydro systems	<p>2.1 OHS risk control work measures and procedures are followed</p> <p>2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures</p> <p>2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures</p> <p>2.4 Established routines are used to solve micro hydro problems using measured and calculated values of apparatus operating parameters</p> <p>2.5 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices</p>
3 Complete work and document problem solving activities.	<p>3.1 OHS work completion risk control measures and procedures are followed</p> <p>3.2 Work site is cleaned and made safe in accordance with established procedures</p> <p>3.3 Justification for solutions used to solve micro hydro problems is documented</p> <p>3.4 Work completion is documented and appropriate person(s) notified in accordance with established</p>

ELEMENT**PERFORMANCE CRITERIA**

routine procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and solving basic problems in micro hydro systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK124A Micro hydro systems

Evidence shall show an understanding of micro-hydro systems to an extent indicated by the following aspects:

System components and configuration encompassing:

- structural differences between the Pelton, Turbo Impulse, Francis, and propeller type, Michell or Banki cross flow turbines and PATs (Pumps As Turbines).
- system configuration for each turbine type identifying all major components.
- for impulse and cross flow turbine types, the comparison of bucket and blade shapes, nozzle shapes and types, types of hydraulic and electrical controllers/governors, speed increasers and over speed clutches and their basic operation and appropriate application.
- operational parameters and efficiency of different turbines.
- circumstances under which battery storage would be used.
- respective merits and suitability of various turbine types for various micro hydro-electric applications.
- operation of hydraulic rams or similar water pumps.
 - typical efficiencies of hydraulic ram systems and appropriate applications.
- advantages and disadvantages of water energy storage systems with other energy storage systems such as battery banks.

REQUIRED SKILLS AND KNOWLEDGE

Micro-hydro systems standards encompassing:

- Relevant Australian Standards AS/NZS3000, AS4509, and AS4086.2 requirements for associated with the installation, maintenance and operation of micro-hydro small scale generation units

Micro-hydro systems drawings encompassing:

- Schematic and wiring diagrams for the MHS showing the general circuit layout and protection between the MHS, batteries, inverter and loads.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may

be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence must also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Solve basic problems in micro hydro systems as described in 8) and including:

- | | |
|---|---|
| A | Understanding the nature of the problem |
| B | Using established routines to solve apparatus/system problems |
| C | Providing viable solutions to apparatus/system problems. |

- | | |
|---|---|
| D | Documenting justification for the solutions used |
| E | Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items |

Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving basic problems in micro hydro systems

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG10 Solve problems in electromagnetic devices and
1A related circuits

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to micro hydro systems as they apply to problems related to installation, fault finding, maintenance or development work functions in any of the following:

- In relation to at least three of the following types of micro hydro systems problems and on at least two occasions:
 - determining the operating parameters of an existing apparatus/system
 - identifying and locating electrical faults
 - identifying and locating mechanical fault

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Renewable and Sustainable Energy