



**Australian Government**

# **UEENEEK146A Design energy management controls for electrical installations in buildings**

**Release: 2**

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## **Modification History**

Not applicable.

## **Unit Descriptor**

### **Unit Descriptor**

#### **1) Scope:**

##### **1.1) Descriptor**

This competency standard unit covers designing and developing methods to reduce the energy use without compromising occupancy standards in new buildings and structures. The unit encompasses working safely, setting up and conducting evaluation measurements, predicting energy use from plans and specifications and designing and documenting strategies to effectively reduce energy use in the completed installation. It draws on some multi-disciplinary skills.

## **Application of the Unit**

### **Application of the Unit 2)**

This competency standards unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 6.

## **Licensing/Regulatory Information**

### **License to practice 3)**

The skills and knowledge described in this unit do not require a licence to practice in the work place. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of

**License to practice**

3)

training such as new apprenticeships and the like.

**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.

UEENEEK1 32A Develop strategies to address environmental and sustainability issues in the energy sector

**Literacy and numeracy skills**

4.2)

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

Reading 5 Writing 5 Numeracy 5

**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 design energy management techniques for electrical installations in buildings | 1.1 OHS procedures for a given work area are obtained and understood.                                                                                                  |
|                                                                                            | 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.                                                                     |
|                                                                                            | 1.3 The extent of the electrical design is determined from specifications of building and its services, plant and machinery and discussion with appropriate personnel. |
|                                                                                            | 1.4 Advice is sought from allied trade's areas (e.g. air conditioning) on required energy usage and system design.                                                     |
|                                                                                            | 1.5 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.                                                              |
|                                                                                            | 1.6 Tools, testing devices, and materials needed to carry out the work are obtained and checked for correct operation and safety.                                      |
| 2 Design energy management techniques for electrical installations in buildings            | 2.1 OHS risk control measures and procedures for carrying out the work are followed.                                                                                   |
|                                                                                            | 2.2 Tests and measurements are carried out in strict accordance with OHS requirements safety procedures.                                                               |
|                                                                                            | 2.3 In-depth knowledge of the energy use of building services, plant and machinery is applied to the design process                                                    |

| ELEMENT                                                                         | PERFORMANCE CRITERIA                                                                                                                                                      |
|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3 Design energy management techniques for electrical installations in buildings | 2.4 Energy evaluation tests are set up in accordance with established test methods and procedures for each particular parameter under scrutiny.                           |
|                                                                                 | 2.5 Strategies to reduce energy use without compromising occupancy standards are developed from knowledge of energy management and evaluation test results.               |
|                                                                                 | 2.6 Unexpected situations are dealt with safely and with the approval of an authorised person.                                                                            |
|                                                                                 | 2.7 Design and evaluation is carried out without unnecessary damage to systems, circuits, the surrounding environment or services and using sustainable energy practices. |
|                                                                                 | 3.1 OHS work completion risk control measures and procedures are followed.                                                                                                |
|                                                                                 | 3.2 Work site is cleaned and made safe in accordance with established procedures.                                                                                         |
|                                                                                 | 3.3 Results of design and recommended strategies and their criterion for energy reduction are documented in accordance with established procedures.                       |
|                                                                                 | 3.4 Plans, wiring diagrams and specifications are forwarded to appropriate persons.                                                                                       |

## Required Skills and Knowledge

### REQUIRED SKILLS AND KNOWLEDGE

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

Evidence shall show that knowledge has been acquired of safe working practices and designing energy management controls for electrical installations in buildings.

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

#### **KS01-EK146 Building management control systems**

##### **A**

Evidence shall show an understanding of building management systems to an extent indicated by the following aspects:

T1 Functions of a BMS encompassing:

- autonomous functions
- input
- output
- general I/O
- installation management items
- energy management
- risk management
- information processing
- objectives
- building running costs
- smoke control as per AS 1668 part 1

T2 BMS hardware encompassing:

- system architecture
- communication devices
- substations
- personal computers
- interfaces with other systems

T3 Input and output functions encompassing:

- digital inputs/outputs
- digital output with status feedback
- analogue input/output
- sensors
- alarms

## REQUIRED SKILLS AND KNOWLEDGE

T4 Energy management encompassing:

- night cycle
- optimum stop/start
- time and event programs
- night purge
- outside air percentage control
- enthalpy control
- power demand control
- duty cycle
- presence detection
- lighting control

T5 Information processing functions encompassing:

- computer systems
- central system management
- programs
- system configuration and security
- operator - machine interface
- data points

Risk and maintenance management encompassing:

- system files
- fire, intruder control
- access control

## Evidence Guide

### EVIDENCE GUIDE

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

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all components 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's 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. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

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 nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day 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 practiced. 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 shall be met.

The evidence on which competency in this unit is based shall be considered holistically for each element on at least two occasions comprising:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall 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; and
  - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
  - 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; and
  - Demonstrate an appropriate level of skills enabling employment; and
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design energy management controls for electrical installations in buildings as listed in the Range statement' and including:

- |   |                                                                               |
|---|-------------------------------------------------------------------------------|
| A | Determining the extent of the design                                          |
| B | Setting up and conducting appropriate examinations and tests.                 |
| C | Reporting evaluation including recommendation for improving energy efficiency |

- D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the 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 competency standard unit.

Resources required to assess this unit are listed above in Context of assessment', which should also be used in the formal learning/assessment environment.

Note:

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

The resources used for assessment should reflect current industry practices in relation to designing energy management controls for electrical installations in buildings.

**Method of assessment** 9.4)

This competency standard 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 competency standard unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended 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)

There are no concurrent assessment recommendations for this unit

## **Range Statement**

### **RANGE STATEMENT**

**10)** This relates to the unit of competency 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 competency standard unit shall be demonstrated in relation to designing energy management controls for electrical installations in buildings on at least two buildings each used for a different purpose.

Generic terms are used throughout this Vocational Standard shall be regarded as part of the Range of Variables 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