



**Australian Government**

# **UEENEEN114A Install and maintain computer based interlocking rail systems**

**Release: 2**

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## **Modification History**

Not applicable.

## **Unit Descriptor**

**Unit Descriptor**                    **1) Scope:**

### **1.1) Descriptor**

This unit covers the installation and maintenance of computer based electronic equipment for rail network signalling system. It encompasses safe working, regulatory requirements and following work procedures monitoring system, responding to fault information, and replacing faulty equipment.

## **Application of the Unit**

**Application of the Unit**    **2)**

This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.

## **Licensing/Regulatory Information**

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

The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes codes of practice such as the 'Code Of Practice for the Defined Interstate Rail Network' for work carried out on that network.

## 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.

UEENEEN 107A Install and maintain active level crossing equipment

UEENEEN 108A Install and maintain power operated point actuating devices

UEENEEN 111A Install and maintain power operated trackside signal and train protection equipment

AND

Relevant work place requirements in 'Work site protection' have been acquired.

**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

Writing

Numeracy

## Employability Skills Information

**Employability Skills** 5)

This unit contains Employability Skills

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

**Employability Skills**

5)

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 install and maintain computer based interlocking equipment	1.1	OHS procedures for a given work area are identified, obtained and understood.
		1.2	Established OHS risk control measures and procedures are followed in preparation for the work.
		1.3	The extent of installation and/or maintenance work is determined from job specifications, drawings and regulatory requirements
		1.4	Materials needed for the installation and/or maintenance work are obtained in accordance with established procedures and checked against job requirements
		1.5	Tools, equipment and testing devices needed for the installation and/or maintenance work are obtained in accordance with established procedures and checked for correct operation and safety.

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
2 Install and maintain computer based interlocking systems	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Up-to-date reports or fault logs are gained by accessing the diagnostic terminal
	2.3 Fault correction activities are prioritised by reviewing the fault reports and corrective actions are implemented
	2.4 Records of previously actioned faults are deleted/cleared from the terminal
	2.5 The source of the fault is correctly identified by assessing the diagnostics terminal
	2.6 The corrective action required is determined and implemented
	2.7 Appropriate mechanisms for the safe and efficient rectification of the fault are ensured
	2.8 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
	2.9 System monitoring is conducted efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
	2.10 The correct replacement equipment is obtained from spare stock to comply with identified fault repair requirements
	2.11 Faulty component/equipment is correctly identified and removed as per organisation practices and procedures
	2.12 Replacement component equipment is correctly installed, connected and powered up as per manufacturer specifications
	2.13 Correct test procedures are identified and implemented to confirm all operations are within specifications

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
	2.14 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
	2.15 Equipment operations are monitored to ensure system integrity
	2.16 Signal and voltage levels are monitored, checked and adjusted if required to ensure compliance with operational requirements
	2.17 Complete statistical records and equipment/operational management information is accurately recorded and maintained to support ongoing monitoring of systems and equipment performance
3 Complete the installation and maintenance of computer based interlocking systems	3.1 OHS risk control work completion measures and procedures are followed.
	3.2 Non conforming equipment is identified and tagged for repair type and extent of fault is identified and recorded as required
	3.3 Faulty equipment requiring repair is segregated and appropriate records are completed in preparation for dispatch to repairer
	3.4 Spare equipment stocks are reviewed to ensure adequate availability
	3.5 Priority for repair or replacement of equipment is established by evaluation of stock levels and fault logs
	3.6 Work completion is documented and appropriate personnel notified of repair and replacement priorities in accordance with established procedures, and relevant reports produced

## 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 maintain computer based interlocking equipment.

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

#### **KS01-EN114A Computer based interlocking systems installation and maintenance**

Evidence shall show an understanding of computer based interlocking systems installation and maintenance, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1. Electronic communications, principles encompassing:

- Requirements of a basic communications system - satellites, data communications, navigation, telecommunications, noise etc
- Antennae and electromagnetic wave propagation
- Reason for modulation
- Amplitude and frequency modulation, difference, advantages and disadvantages
- Simple transmitter and receiver circuits (Block diagram level)
- Optical communications principles

T2. Rail signalling, electronic equipment encompassing:

- Equipment and their components - telemetry (SCADA), monitoring systems, IASS, train describer, panel processors,
- Operating principles and parameters
- Servicing procedures.

T3. Computer peripherals encompassing:

- Types and applications
- Operating principles
- Software (drivers) installation
- Network management of peripheral devices.

T4. Personal computers, engineering applications software basic encompassing:

- Application software types
- Configurations and preferences
- Use of particular software packages - word processor, spreadsheet, database, presentation software, web/document publisher, CAD/drawing packages, email client, business management

T5. Rail signalling, computer-based interlocking encompassing:

## REQUIRED SKILLS AND KNOWLEDGE

- Equipment and their components - solid state interlocking (SSI), Microlock, Westrace
- Operating principles and parameters
- Servicing procedures.

T6. Rail signalling, computer applications encompassing:

- Types of software and their scope - interrogator software for loggers, monitors and computer based interlocking, data base (work instruction, commissioning work structures, and cable schedules.
- Setting up and use.

T7. Rail signalling, remote control systems encompassing:

- Equipment and their components - PLC, dedicated PCs, prep. systems
- Operating principles and parameters
- Servicing procedures.

## Evidence Guide

### EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must 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-preferred model for apprenticeships. However, where summative (or final) assessment is used it must 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 influence decisions about how/much 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 shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall 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 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 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:
  - Install and maintain computer based interlocking systems as described in 8) and including:
    - a. Maintaining computer based and solid state interlocking equipment to operational requirements, plans and specifications
    - b. Interpreting specifications and plans correctly
    - c. Using appropriate testing and fault finding techniques
    - d. Rectifying faults with minimal disruption to rail traffic and services
    - e. Using tools and test equipment correctly
    - f. Following relevant codes of practice, OHS and environmental protection procedures requirement
    - g. Completing relevant technical reports, records and documentation, and
    - h. 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

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**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 used in 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 maintaining computer based and solid state interlocking 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 in combination with other competencies required by a given enterprise installation, maintenance functions.

Concurrent assessment may include:

UEENEEN118A Find and repair rail signal system faults

## 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 shall be demonstrated in relation to:

- The relevant State/Territory codes of practice and safe working requirements.
- Equipment relevant to a particular rail network.
- Code of practice for the defined interstate rail network.

Activities may include: procedures for maintenance of computer based interlocking equipment in a rail networks and may also include; the use of plans and drawings, manufacturer's / enterprise specifications and manuals.

Maintenance activities may include: finding and repairing faults on computer based interlocking equipment in a rail network and may also incorporate safe working, working according to regulatory requirements and following work procedures, adjust, test and verifying operational integrity and completing report documentation.

Electrical equipment may include: power supplies, indications, processor cards or modules, vital relays, input cards or modules, output cards or modules, non-vital interface cards or modules, diagnostic card or module, EPROMs, modems, network interface equipment

Mechanical equipment may include: mounting bases, clips, cable connectors.

Diagnostic equipment may include: hand held terminals, laptops, personal computers, printers, fault indications, healthy state indications, alarm messages.

Technical report may include: incident report, signal passed at danger report and data log report.

Test equipment may include: multimeters, frequency meters, impedance tester, insulation resistance and continuity tester, current sensing devices.

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, Section 2.1.

## Unit Sector(s)

Not applicable.

## Competency Field

Competency Field 11)

Rail Signalling