



**Australian Government**

# **UEENEEJ182A Repair and service secondary refrigeration systems**

**Release: 3**

# UEENEEJ182A Repair and service secondary refrigeration systems

## Modification History

Not Applicable

## Unit Descriptor

### Unit Descriptor

1)

#### 1.1) Descriptor

This unit covers maintaining the effective and efficient operation of refrigeration equipment using non phase changing secondary refrigerant systems. It reinforces safe working practice, utilises service manuals, encompasses applying specialised knowledge of refrigeration principles to test and perform maintenance operations to these systems and to locate defective components and repair faults, completing reports on service and performance outcomes.

## Application of the Unit

### Application of the Unit 4)

This competency standard is suitable for employment-based programs under an approved contract of training at the AQF level of the qualification in which the unit is first packaged or higher.

The unit may be selected as an elective from the relevant schedule (see qualification packaging rules) provided that all prerequisite units are undertaken or addressed through recognition processes.

This unit may be included in a skill set provided that it is listed in the schedule of electives (see Qualification Framework) and all prerequisite units are undertaken or addressed through recognition processes.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for

**Application of the Unit 4)**

concurrent assessment and relationship with other units (9.5 below).

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.

## Licensing/Regulatory Information

### 1.2) License to practice

The skills and knowledge described in this unit may, in some jurisdictions, require a licence to practise in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in 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, 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 and risk safety measures.

## Pre-Requisites

**Prerequisite Unit(s)**      2)

### 2.1) Competencies

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

UEENEEJ111A      Diagnose and rectify faults in air conditioning and refrigeration systems and components

UEENEEJ113A      Commission air conditioning and refrigeration systems

UEENEEE101A      Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A      Fabricate, assemble and dismantle utilities industry components

<b>Prerequisite Unit(s)</b>	<b>2)</b>
	UEENEEE003B Solve problems in extra-low voltage single path circuits
	UEENEEE105A Fix and secure electrotechnology equipment
	UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work
	UEENEEJ102A Prepare and connect refrigerant tubing and fittings
	UEENEEJ103A Establish the basic operating conditions of vapour compression systems
	UEENEEJ104A Establish the basic operating conditions of air conditioning systems
	UEENEEJ106A Install refrigerant pipe work, flow controls and accessories
	UEENEEJ107A Install air conditioning and refrigeration systems, major components and associated equipment
	UEENEEJ108A Recover, pressure test, evacuate, charge and leak test refrigerants
	UEENEEJ110A Select refrigerant piping, accessories and associated controls
	UEENEEJ153A Find and rectify faults motors and associated controls in refrigeration and air conditioning systems
	UEENEEJ170A Diagnose and rectify faults in air conditioning and refrigeration control systems
	UEENEEJ194A Solve problems in low voltage refrigeration circuits
	UEENEEP012A Disconnect / reconnect composite appliances connected to low voltage

**Prerequisite Unit(s)** 2)

installation wiring

UEENEEP017A Locate and rectify faults in low voltage composite appliances using set procedures

Note:

UEENEEJ111A and UEENEEJ113A - Those holding a 'Certificate III in Refrigeration and Air Conditioning trade qualification or equivalent' meet the requirements of these units and their pre-requisite requirements.

**Employability Skills Information****Employability Skills** 3)

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 will assist in identifying Employability Skill requirements.

**Elements and Performance Criteria Pre-Content**

6) Elements describe the essential outcomes of a unit of competency

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 service and repair secondary refrigeration systems.	1.1 The type of secondary refrigeration system, components and operation are understood.
	1.2 OHS procedures are identified, MSDS are obtained and understood, risk control measures are followed, PPE worn.
	1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented.
	1.4 The extent of faults is determined from reports, other documentation, observation and from discussion with appropriate personnel.
	1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
	1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety
2 Carry out maintenance requirements	2.1 OHS requirements, regulation, workplace procedures and risk control measures and are followed.
	2.2 Components are checked as being isolated, where necessary, in strict accordance OHS requirements and procedures.
	2.3 Maintenance tests are performed on the primary cooling source, operating pressures, operating current, refrigerant charge, secondary flow rates, condenser cooling system, document results including any systems faults or non compliance to operational specifications.
	2.4 Perform operational maintenance tests on the secondary refrigerant pumping / circulation devices, recording pressure and flow rates, document results, including faults or non compliance to system specification.

**ELEMENT****PERFORMANCE CRITERIA**

- |   |   |  |
|---|---|--|
|   | 2.5                                     | Use test kit and follow approved OH&S procedure including PPE, check the chemical integrity (dilution rate, anti bacterial and anti corrosion rates) of the secondary refrigerant, document result or any non compliance.                                    |
|   | 2.6                                     | Secondary refrigerant pipework checked for leaks, insulation checked for soundness and pipework stability.   |
|   | 2.7                                     | System components evaporators, blowers, other heat exchangers, heat recovery or defrost systems are checked for correct operation and cleanliness.   |
|   | 2.8                                     | Test the control system operation, including safety controls, follow all OH&S guidelines, document results including any faults or non conformity to system specification.   |
| 3 | Repair secondary refrigeration systems. |  |
|   | 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                                     | Justification for solutions used to solve machine problems is documented.  |
|   | 3.4                                     | Work completion is documented and an appropriate person or persons notified in accordance with established procedures.   |
|   | 3.5                                     | Perform any required repairs to systems components to achieve compliance to design operation and manufactures recommendation for effective operation.  |
|   | 3.6                                     | Adjust control system as required to achieve compliance to design operation and manufactures recommendation, for effective operation.  |
|   | 3.7                                     | Record flows, pressures and temperatures obtained before and after repair and compare to specifications, implementing contingency measures where required, to ensure compliance to design operation and manufactures recommendation for effective operation. |



<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
4 Complete reports on maintenance and repair activities	4.1 Work completed safely, compliance is maintained with OH&S risk control measures.
	4.2 Work area is cleaned and made safe in accordance with established workplace procedures and practices.
	4.3 Report is written for service / maintenance and repair activities on secondary refrigeration system, non compliance after repair is reported to appropriate person.

## Required Skills and Knowledge

### REQUIRED SKILLS AND KNOWLEDGE

7) 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 solving problems in single and three phase low voltage machines.

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

### **KS01-EJ182A Service and repair secondary refrigeration systems**

Evidence shall show an understanding the secondary refrigeration systems, components, maintenance service and repair, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

- T1 Secondary refrigeration systems
- Introduction to secondary refrigeration systems
    - Safety
    - Basic operation
    - Typical applications
    - Safety in handling Secondary Refrigerants
    - Types of secondary Refrigerants
    - Need for anti bacterial and corrosion inhibitor use
    - Use of PPE (Personal Protective Equipment)
  - Major components location, purpose and operation
    - Safety
    - Major components Operation
    - Pipe work and insulation
    - Pumps
    - Cooling coils
    - Low temperature defrost systems
    - Heat recovery coils
    - Control system, pressure temperature, and safety
    - Control, balance and operational valves
- T2 Service and repair secondary refrigeration systems
- Carry out repairs to secondary refrigerant systems.

## REQUIRED SKILLS AND KNOWLEDGE

- Safety
- Appropriate personnel contacted before isolation repairs to pumps
- Additions required to maintain chemical integrity of refrigerant
- Repairs to cooling coils/ freezing coils
- Repair system leaks
- Repair pipework or insulation
- Repair / replace defective control valves
- Repair / replace defective control system component
- Refrigerant disposal EPA requirements
- Complete report on repair activities
- Tools and equipment for repair work
- Applicable Standards and Codes

### T3 Maintenance procedures for secondary refrigeration systems

- Maintenance requirements of secondary refrigeration systems.
  - Safety
  - Operation of primary cooling source
  - Tool and equipment
  - Operation of pumps
  - Chemical integrity of refrigerant
  - Cooling coils/ freezing coils operation
  - Leak detection additives
  - Leak test system
  - Pipework and insulation check
  - Control valve test
  - Control system check
- Complete report on maintenance activities
- Tools and equipment for maintenance work
- Applicable Standards and Codes

## 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

## EVIDENCE GUIDE

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'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 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 nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature 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 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 shall 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 - UEE07'. Evidence shall also

## EVIDENCE GUIDE

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:

Service and repair secondary refrigeration systems as described in 8) and including:

- A Applying logical diagnostic methods
- B Using fault scenarios to test the cause of system faults
- C Identifying faults and competency needed to rectify them
- D Rectifying faults in system controls
- E Verifying that the system operates correctly
- F 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

## EVIDENCE GUIDE

### 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.

Evidence should show demonstrated competency in Service and repair secondary refrigeration 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 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.

The critical aspects of occupational health and safety covered in unit UEENEEE001B and other discipline specific occupational health and safety units shall be incorporated in relation to this unit..

## Range Statement

### RANGE STATEMENT

8) 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 service and repair including all of the following

secondary refrigeration systems, incorporating major components, primary chillers and circuits, secondary piping circuits, pumps, defrost systems, heat recovery systems, control systems and other associated secondary refrigeration components

This unit must be demonstrated in relation to service and repair in the following secondary refrigeration systems and components:

- Evaporators/cooling coils, forced, natural draft,
- Refrigerant flow controls,
- Refrigerant piping and accessories,
- Cycling controls,
- Safety controls
- Defrost controls,
- Solenoid valves and associated piping,
- Heat recovery systems,
- Motors
- Pumps, positive displacement and centrifugal,
- Piping, insulation and associated equipment, air purgers.
- Safe handling and testing of glycol and other secondary fluids.

All of the following apparatus:

- Chilled water systems, (primary system)
- Ice bank systems,

All of the following systems

- cool rooms
- freezer rooms
- merchandising and display cabinets
- other commercial or industrial applications.

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

## RANGE STATEMENT

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

### 2.2) Literacy and numeracy skills

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	4	Writing	4	Numeracy	4
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## Custom Content Section

Competency Field 5)

Refrigeration and Air Conditioning