



Australian Government

Department of Education, Employment and Workplace Relations

UEENEEJ175A Service and repair self contained hydrocarbon air conditioning and refrigeration systems

Release: 2

UEENEEJ175A Service and repair self contained hydrocarbon air conditioning and refrigeration systems

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers specialised procedures for servicing and repairs to achieve the effective and efficient operation of primarily self contained air conditioning and refrigeration equipment using Hydrocarbon as the refrigerant. It reinforces safe working practice and encompasses applying specialised knowledge of refrigeration principles that apply to Hydrocarbon, following service manuals, testing, locating and rectifying faults and defective components and completing the necessary service documentation.

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 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

Prerequisite Unit(s)

2)

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

UEENEEJ174A Apply safety awareness and legal requirements for hydrocarbon refrigerants and

UEENEEJ155A Service refrigeration appliances

UEENEEJ054B Find and rectify faults in appliance motors and associated controls

UEENEEJ062B Find and rectify faults in appliance motors and associated controls

UEENEEJ102A Prepare and connect refrigerant tubing and fittings

UEENEEJ195A Establish the basic operating conditions of vapour compression systems - appliances

and

UEENEEG006A Solve problems in single and three phase low voltage machines

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

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

or

UEENEEJ153A Find and rectify faults motors and associated controls in refrigeration and air conditioning systems

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEJ108A Recover, pressure test, evacuate, charge and leak test refrigerants

UEENEEJ194A Solve problems in low voltage refrigeration circuits

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

UEENEEE003B Solve problems in extra-low voltage

Prerequisite Unit(s)

2)

single path circuits

or

UEENEEJ111A Diagnose and rectify faults in air

conditioning and refrigeration systems and components

UEENEEJ107A Install air conditioning and refrigeration

systems, major components and associated equipment

UEENEEP017A Locate and rectify faults in low voltage

composite appliances using set procedures

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

UEENEEE102A Fabricate, assemble and dismantle

utilities industry components

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

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 installation wiring

For the full prerequisite chain details for this unit please

refer to Table 2 in Volume 1, Part 2.

Note:

UEENEEJ111A - Those holding a 'Certificate III in

Refrigeration and Air Conditioning trade qualification or

Prerequisite Unit(s)

2)

equivalent" meet the requirements of this unit and its pre-requisite requirements.

UEENEEJ155A - Those holding a 'Certificate III in Appliance Servicing trade qualification or equivalent" meet the requirements of this unit and its 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

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 Hydrocarbon refrigeration and air conditioning systems

1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures
1.2 Established OHS risk control measures and procedures are followed in preparation for the work.

ELEMENT

PERFORMANCE CRITERIA

- | | | | |
|---|--|---|---|
| | 1.3 | Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor. | |
| | 1.4 | The nature of work is obtained from documentation or from work supervisor to establish the scope of work to be undertaken. | |
| | 1.5 | Advice is sought from the work supervisor to ensure the work is coordinated effectively with others. | |
| | 1.6 | Sources of materials that may be required for the work are accessed in accordance with established routines and procedures. | |
| | 1.7 | Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety | |
| 2 | Service and repair Hydrocarbon refrigeration and air conditioning systems. | 2.1 | Established OHS risk control measures and procedures for carrying out the work are followed. |
| | | 2.2 | Measuring system operating parameters is conducted in strict accordance with OHS requirements and established safety procedures |
| | | 2.3 | Checks are carried out to ensure the system or component parts are isolated, when necessary in strict accordance OHS requirements and procedures. |
| | | 2.4 | Refrigerant is removed from a system safely in accordance with regulatory requirements and industry practices. |
| | | 2.5 | Precautions are taken to prevent damage to components while pressure testing the system |
| | | 2.6 | Pressure testing is conducted at a pressure compatible with Hydrocarbon and in accordance with standards |
| | | 2.7 | Leaks are located and rectified using testing methods appropriate to the system and in accordance with industry practices |

ELEMENT	PERFORMANCE CRITERIA
	2.8 Oil is removed from an operational Hydrocarbon system in accordance with industry practices
	2.9 System is charged safely with Hydrocarbon and compatible lubricants in accordance with industry practices
	2.10 Established procedures are used to determine actual and specified range of operating conditions from measured and calculated values as they apply to Hydrocarbon vapour compression systems.
	2.11 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
	2.12 Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.13 Operating conditions are determined without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and report on servicing and repairing Hydrocarbon refrigeration and air conditioning 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 Contaminated refrigerant and lubricant is dealt with in accordance with legislative/regulatory requirements
	3.4 Operation conditions are documented, including identification of any parameter that is not within the specified range for the system.
	3.5 Work supervisor is notified of the completion of the work in accordance with established procedures.

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 determining the operating conditions of Hydrocarbon refrigerating systems. All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EJ175A Self contained Hydrocarbon refrigeration and air conditioning systems

Evidence shall show an understanding of servicing and repair techniques, applying safe working practices and relevant Standards, Codes and Regulations for Hydrocarbon refrigeration systems to an extent indicated by the following aspects:

T1 Hydrocarbon refrigeration systems

- Basic operation system types, applications and design operating conditions
 - Domestic refrigerators
 - Self contained refrigeration cabinets
 - Self contained air conditioners
 - Single head split air conditioners
 - Heat pump water heaters

T2 Operating conditions for hydrocarbon refrigeration systems

- Compressors
 - Functions of the compressor
 - Types, construction and their applications
- Lubrication and lubricators
 - Lubrication methods
 - Safe handling of lubricants
 - Selection of Lubricants
 - Adding and removing oil from Hydrocarbon systems
- Evaporators / Cooling Units
 - Types, construction and applications
 - Evaporator defrost methods and controls
 - Operation and maintenance
- Refrigerant Flow Devices
 - Types, construction and applications
 - Operation and maintenance

REQUIRED SKILLS AND KNOWLEDGE

- Ancillary Components
 - Leak detectors
 - Safety controls
 - Operation and maintenance
- T3 Applicable Standards and Codes
 - Hazards associated with Hydrocarbons
 - AS/NZS 1677
 - AS/NZS 1571
 - IIAR Bulletins
 - ANSI/ASHRAE Standards
 - International Standards EN378
- T4 System access tools
 - Schraeder valves
 - Piercing valves
 - Process tube adaptors
 - Gauge manifold sets
 - Maintenance
- T5 Access procedures
 - Ignition sources
 - Ventilation
 - Gauge manifold hoses
 - System operating values
- T6 Refrigerant removal/recovery and flushing
 - Bleed to atmosphere
 - Recovery to a cylinder
 - Burning
 - Flush with inert gas
- T7 Tube joining methods
 - Lok-ring
 - Flare joints
 - Silver brazed joints
 - Flux
- T8 Compressor lubricants
 - Types
 - Properties
 - Replacing
 - Disposing

REQUIRED SKILLS AND KNOWLEDGE

T9 Pressure testing

- Requirements
- Recommended pressures

T10 Evacuation

- Vacuum pumps
- Vacuum measuring devices
- Maintenance
- Recommended depth of vacuum
- Procedure

T11 Charging

- Precautions
- Liquid or vapour charging
- Suitable methods
- Disposing of contaminated refrigerant and oil

T12 Leak detection

- Methods
- Procedure
- Maintenance

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 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,

EVIDENCE GUIDE

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 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 everyday work influence decisions about how/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 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 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:

Critical aspects of evidence required to demonstrate

9.2)

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

- 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 to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - A Selecting appropriate materials and equipment
 - B Obtaining and recording measurements
 - C Removing and storing refrigerant correctly
 - D Conducting pressure testing at the appropriate pressure level and without damaging components
 - E Locating and rectifying leaks
 - F Evacuating the system to the required standard and using appropriate vacuum measuring instruments
 - G Charging the system with the appropriate type and quantity of hydrocarbon refrigerant
 - H Completing the necessary documentation

Critical aspects of evidence required to demonstrate

9.2)

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

- I 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 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 servicing and repairing as well as determining the operating conditions of Hydrocarbon 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)

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

Critical aspects of evidence required to demonstrate 9.2) Before the critical aspects of evidence are considered all prerequisites shall be met.
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 determining operating conditions, using measurement and basic calculation methods, of primarily self contained Hydrocarbon refrigeration and air conditioning systems.

These systems are confined to those used in the following two Categories of Occupancy described in the Standard EN378-1 Refrigerating systems and heat pumps - Safety and environmental requirements - Part 1: Basic requirements, definitions, classification and selection criteria:

A General Occupancy

B Supervised Occupancy

These systems include domestic refrigerators and freezers; self contained refrigerated cabinets; self contained air conditioning units; single head split air conditioning units; and self contained heat pump water heaters.

It does NOT include systems described in category C Authorised Occupancy. This includes refrigeration and air conditioning equipment installed in plant rooms.

These conditions include suction and discharge pressures, ambient, evaporator and condensing temperatures, evaporator, and condenser temperature difference. Further, this unit must be demonstrated in relation to refrigerant recovery, component replacement, pressure testing, evacuation, charging and leak testing a hydrocarbon system in a safe and environmentally responsible manner.

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

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	3	Writing	3	Numeracy	3
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Custom Content Section

Competency Field 5)

Refrigeration and Air Conditioning