Australian Government

UEENEEJ124A Commission refrigeration/ air conditioning hydronic systems

Release: 3

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

UEENEEJ124A Commission refrigeration/ air conditioning hydronic systems

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1)**

1.1) Descriptor

This unit covers the setting-up and adjusting hydronic systems for refrigeration and/or air conditioning optimum performance. It encompasses safe working practices, system parameter testing and analysis, adjusting equipment and controls, following procedures and documenting final operating parameters and settings.

Application of the Unit

Application of the Unit **4)**

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 4 level.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit require a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. 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.

UEENEEJ112A	Diagnose and rectify faults in complex air conditioning/ refrigeration systems
UEENEEJ109A	Verify functionality and compliance of refrigeration and air conditioning installations
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Prerequisite Unit(s) **2)**

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
UEENEEJ111A	Diagnose and rectify faults in air conditioning and refrigeration systems and components
UEENEEJ113A	Commission air conditioning and refrigeration systems
UEENEEJ153A	Find and rectify faults motors and associated controls in refrigeration and

Prerequisite Unit(s)	**2)**	
		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 installation wiring
	UEENEEP017A	Locate and rectify faults in low voltage composite appliances using set procedures
	UEENEEP024A	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply
	UEENEEP025A	Attach cords, cables and plugs to electrical equipment for connection to 1000 Va.c. or 1500 Vd.c. supply

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 commission hydronic systems for refrigeration/air conditioning	1.1	OHS procedures for a given work area are identified, identified, obtained and understood
	1.2	Established OHS risk control measures and procedures are followed in preparation for the work.
	1.3	Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
	1.4	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
	1.5	System operating parameters are identified by reviewing system specifications and component technical data.

ELEMENT	PERFORMANCE CRITERIA	
	1.6	Tools, equipment and testing devices needed for the work are obtained in accordance with established procedures and checked for correct operation and safety.
	1.7	Preparatory work is checked to ensure no damage has occurred and complies with requirements.
	1.8	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	1.9	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
2 Commission hydronic systems for refrigeration/air conditioning.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	Testing/measuring devices are connected and set up in accordance with requirements for a particular system.
	2.3	Measurements and adjustments are made to equipment components and controls to provide optimum system performance in accordance with system specifications and regulatory requirements.
	2.4	Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
	2.5	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
	2.6	Commissioning is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy principles.

ELEMENT	PERFORMANCE CRITERIA
3 Completion and report commissioning activities.	3.1 OHS risk control work completion measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Adjustment settings are documented and an appropriate person or persons notified 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 commissioning hydronic systems for refrigeration and/or air conditioning.

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

KS01-EJ124A Hydronic system commissioning

Evidence shall show an understanding of hydronic system commissioning, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1 Commissioning fundamentals

- building specifications/requirements/responsibilities
- design and as installed drawings
- building codes
- local government regulations
- design conditions
- pre – commissioning checks
- calibration of instruments
- commissioning procedures
- data collection and recording, documentation
- reporting procedures

T2 Hydronic systems operation

- closed/open systems
- pump head/lift, static head (high rise building)
- system friction losses
- nett positive suction head
- system curves

T3 Pumps

- types
- selection criteria
- performance characteristics
- pump curves and system curves
- pump testing

REQUIRED SKILLS AND KNOWLEDGE

- capacity calculations
- bladder tanks
- coil characteristics
- heat exchangers: plate, shell and tube, tube in tube
- flow measurements: types
- flow switchers
- cooling towers: elementary cooling thermodynamics and types

T4 Valves - flow control devices

- types and applications
- balancing valves
- throttling characteristics
- flow measurements
- selection and applications

T5 Piping systems

- balancing and commissioning
- air venting
- water treatment
- vacuum breaking and air breaks

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 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 - 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:

EVIDENCE GUIDE

- 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, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Commission hydronic systems for refrigeration and/or air conditioning systems as described in 8) and including:

  A Identifying system operating parameters

  B Measuring and adjusting system components and controls to provide optimum system performance

  C Ensuring system operates within regulatory requirements

  D Documenting adjustment settings with established procedures

  E 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

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 commissioning hydronic systems for refrigeration and/or air conditioning.

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.

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 commissioning two different hydronic systems for refrigeration and/or air conditioning systems.

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	4	Writing	4	Numeracy	4

2.2) Literacy and numeracy skills

Competency Field **5**)

Refrigeration and Air Conditioning