



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **UEENEEJ180A Install and commission ammonia refrigeration systems, components and associated equipment**

Release: 2

## **UEENEEJ180A Install and commission ammonia refrigeration systems, components and associated equipment**

### **Modification History**

Not Applicable

### **Unit Descriptor**

#### **Unit Descriptor**

**1)**

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

This unit covers specialised procedures for the installation and commissioning of refrigeration equipment using Ammonia as the refrigerant. It reinforces safe working practice and encompasses applying specialised knowledge of refrigeration principles that apply to Ammonia, interpreting plans and specifications, project management principles, supervision of installation, commissioning and completing the necessary commissioning 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

## **Application of the Unit 4)**

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)**

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

UEENEEJ178A Apply safety awareness and legal requirements for ammonia refrigerant

UEENEEJ179A Repair and service ammonia refrigeration systems

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

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 installation wiring

**Prerequisite Unit(s)**

**2)**

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

For the full prerequisite chain details for this unit please refer to Table 2 in Volume 1, Part 2

## **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 must be consistent with the evidence guide.

## **Elements and Performance Criteria**

**ELEMENT**

**PERFORMANCE CRITERIA**

1 Prepare to install and commission Ammonia refrigeration 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.
	1.3	Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the project engineer.

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
	1.4 The nature of work is obtained from documentation or from project engineer to establish the scope of work to be undertaken.
	1.5 Advice is sought from the project engineer 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.
2 Install and Commission Ammonia refrigeration systems.	2.1 Established OHS risk control measures and procedures for carrying out the work are followed. Site establishment carried out
	2.2 Measuring system operating parameters is conducted in strict accordance with OHS requirements and established safety procedures
	2.3 Major components and pipe work is installed in compliance with all applicable Standards, Codes and Regulations
	2.4 Pressure testing is conducted at a pressure compatible with Ammonia and in accordance with applicable standards
	2.5 Precautions are taken to prevent damage to components while pressure testing the system
	2.6 Leaks are located and rectified using testing methods appropriate to the system and in accordance with industry practice
	2.7 System is evacuated in accordance with industry practices
	2.8 System is charged safely with Ammonia and lubricants in accordance with industry practices
	2.9 Pre operational checks are carried out on all operating and safety controls. A "Dry Run" is carried out
	2.10 System is commissioned and all adjustments made to operating and safety controls.

ELEMENT	PERFORMANCE CRITERIA
	Adjustments and setting made to all refrigerant flow metering devices and level control devices.
	2.11 Caution to be taken with temperature reduction of coolrooms and freezers. Temperatures are reduced in accordance with industry practices
	2.12 Maintenance procedures to be carried out which include inspection and cleaning of all strainers, filters and collection of oil sample for analysis
	2.13 Training given to personnel responsible for the operation and maintenance of the refrigeration system.
3 Complete work and report on installation and commissioning of Ammonia 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 Contaminated refrigerant and lubricant is dealt with in accordance with legislative/regulatory requirements
	3.4 Operation conditions and commissioning figures are documented, including identification of any parameter that is not within the specified range for the system.
	3.5 All mechanical and electrical documentation to be marked up "As Installed"

## 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 installing and commissioning refrigeration systems and associated equipment to be charged with a Ammonia refrigerant.

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

#### **KS01-EJ180A Installation and commissioning techniques for Ammonia refrigeration systems**

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

##### **T1 Interpret Drawings**

- Refrigeration Piping Schematic Diagrams
- Refrigeration Layout Diagrams
- Electrical Control Diagrams
- PLC Control Diagrams

##### **T2 Project Management**

- Work Breakdown Structures
- Network Diagrams / Gantt Charts
- Costing
- Dealing with Conflict
- Delegation

##### **T3 Refrigerant Piping**

- Pipe Sizing Principles
- Material Compatibility
- Installation Principles
- Welding
- Hydraulic Shock
- Relief Valves
- Pressure Testing/Evacuation

##### **T4 Insulation and Vapour Barrier**

- Insulation Materials
- Vapour barriers



## **REQUIRED SKILLS AND KNOWLEDGE**

### **T5 Coolroom and Freezer Construction**

- Construction Materials
- Construction Methods
- Underfloor heating
- Defrost Methods
- Commissioning Procedures

### **T6 Refrigeration Control System Testing and Adjustment**

- Refrigerant Level Controls
- Refrigerant Pressure Controls
- Temperature Controls
- Flow Controls
- Defrost methods and controls
- Central PLC System

### **T7 Testing and Commissioning**

- Compressors
- Evaporative condensers
- Water cooled condensers
- Air cooled condensers
- High pressure receivers
- Evaporators (air / fluid cooling)
- Direct contact freezing
- Secondary refrigerants
- Start up and Shut Down Procedures

### **T8 Report on the install and commissioning of Ammonia refrigeration systems**

- Operating conditions are recorded
- Documentation marked up “As Installed”

## **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.

## EVIDENCE GUIDE

### 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, 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 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 must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence must 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

## EVIDENCE GUIDE

must 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:
  - Pressure testing, charging/discharging refrigerant/lubricants and determining the operating conditions of Ammonia vapour compression and liquid recirculation refrigeration system. as described in 8) and including:
    - A Reading and interpreting drawings to pipe work layouts and apparatus locations.
    - B Installing, connecting , securing and aligning components and equipment and ensuring that all equipment and pipe work is compliant with codes and regulations
    - C Pressure testing entire system at the appropriate design test pressures using dry nitrogen
    - D Removing system contaminants and evacuating
    - E Selecting and using appropriate measuring devices correctly
    - F Recording measurements
    - G Using calculation methods accurately

## EVIDENCE GUIDE

- H Discharging / charging refrigerant / lubricants and pressure testing the system without damage to components
- I Locating and rectifying leaks
- J Using methodical and efficient commissioning techniques
- K Optimizing system performance and efficiency
- L Identifying the conditions of the refrigerant (R717) at various locations in the vapour compression and liquid recirculation system.
- M Documenting operating conditions correctly
- N Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a 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.

The resources used for assessment should reflect current industry practices in relation to servicing and repairing as well as determining the operating conditions of Ammonia vapour compression and liquid recirculation systems.

## EVIDENCE GUIDE

### 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 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 Ammonia refrigeration system. These conditions include suction and discharge pressures, ambient, evaporator and condensing temperatures, evaporator, and condenser temperature difference, critical point of Ammonia (R717). Further, this unit must be demonstrated in relation to charging and discharging an Ammonia (R717) system with refrigerant and lubricant 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	4	Writing	4	Numeracy	4
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## 2.2) Literacy and numeracy skills

Competency Field 5)

Refrigeration and Air Conditioning

