Australian Government

Department of Education, Employment and Workplace Relations

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

Release: 2

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

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) **Descriptor**

This unit covers recovery, pressure testing, evacuating, charging and leak testing recovery of refrigerants and lubricants from refrigeration systems and air conditioning systems. It encompasses working safely and to standards, following regulations and industry practices for handling refrigerants and lubricants, and completing the necessary documentation.
Note:
Refrigeration systems may be those used for refrigerating or for air conditioning.

Application of the Unit

Application of the Unit **4**)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training and may be used to augment other electrotechnology qualifications at AQF 3 level or higher.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit may, in some States/Territories, require a license to practice 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.
UEENEEJ102A Prepare and connect refrigerant tubing and fittings
UEENEEJ103A Establish the basic operating conditions of vapour compression systems
UEENEEE101A: Apply Occupational Health and Safety regulations, codes and practices in the workplace

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 is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to recover refrigerants, pressure test, evacuate, charge and leak test refrigeration systems.	1.1 OHS procedures including codes of practice for a given work area are obtained and understood
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed
	1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented
	1.4 The nature and location of the work is determined from documentation or appropriate person(s) to establish the scope of work to be undertaken
	1.5 The work is appropriately sequenced in accordance with job schedule

ELEMENT	PERFORMANCE CRITERIA	
	1.6	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
	1.7	Refrigerants, lubricants and cleaning materials needed for the work are obtained in accordance with established procedures and checked against job requirements
	1.8	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
	1.9	Preparatory work is checked to ensure no damage has occurred and complies with requirements
2 Recover refrigerants, pressure test, evacuate, charge and leak test refrigeration systems.	2.1	OHS risk control measures and procedures for carrying out the work are followed
	2.2	Checks are carried out to ensure the system or component parts are isolated, when necessary, in strict accordance with OHS requirements and procedures
	2.3	Circuits/machines/plant are checked as being electrically isolated where necessary in strict accordance OHS requirements and procedures
	2.4	The systems refrigerant and lubricant are tested for contamination
	2.5	Refrigerants are removed from a system safely into suitably labelled containers in accordance with regulatory requirements and industry practices, using appropriate recovery/reclaim equipment
	2.6	Precautions are taken to prevent damage to components while pressure testing the system
	2.7	Pressure testing is conducted at a pressure compatible with the refrigerant to be used
	2.8	Leaks are located and rectified using testing methods appropriate to the system under test and

ELEMENT		PERFORMANCE CRITERIA	
			in accordance with industry practices
		2.9	Systems are evacuated to the required level and cleaned of all moisture and other containments in accordance with industry practices
		2.10	A 'Drop test' is used to prove effectiveness of the evacuation in accordance with industry practice
		2.11	The system, vacuum pump and recovery/reclaim unit lubricants are checked and maintained in accordance with manufacturer requirements
		2.12	Systems are charged or retrofitted with the appropriate refrigerant in accordance with manufacturer requirements and industry practices. This includes recording refrigerant usage in an auditable recording system, e.g. logbook.
		2.13	Problematic situations that arise during the work are dealt with in an appropriate manner
		2.14	Systems are pressure and leak tested, evacuated and charged efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices
3	Complete and report refrigerants recovery, pressure test, evacuate, charge and leak test work	3.1	OHS work completion risk control measures and procedures are followed
		3.2	Work site and equipment 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	Completion of the work is documented and recorded, including refrigerant usage in an auditable logbook 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 recovering, pressure and leak testing, evacuating and charging refrigerants.
All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EJ108A Refrigerants and lubricants

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

T1 Introduction to refrigerants

- Purpose of refrigerant
- Primary, secondary and expendable refrigerants
- Ideal properties
- Pure, azeotropic, zeotropic and blend refrigerants
- General safety requirements and personal protection equipment

T2 Relevant Acts, Regulations, Codes and Standards

- The ozone layer (function, ozone depleting substances)
- The ozone protection act and regulation
- State and federal agencies (Dept of the environment, water, heritage and the arts; Dept of climate change; Australian Refrigeration Council Ltd etc)
- State and federal licensing requirements
- Refrigerant handling code of practice 2007
- Relevant Standards
  - Standards philosophy and format
  - How to read and apply a standard
- Equipment manufactures specifications

T3 Refrigerant properties

- Commonly used types, including CFC, HCFC, HFC, high pressure and natural refrigerants
- Terms (blend, azeotrope, zeotrope, glide, CFC, HCFC, HFC, HC, bubble point, dew point, critical point, ODP, GWP etc)
- Typical properties and applications of the current refrigerants used in systems (boiling point, glide, composition (components), comparative latent heat performance etc)

REQUIRED SKILLS AND KNOWLEDGE

T4 Safe handling of refrigerants

- Refrigerant identification and the numbering system (AS 1677 part 1 sect 3)
- System refrigerant identification (labeling requirements, Code of Practice)
- Typical hazards (classification groups - AS 1677 part 1 sect 2 and handling precautions - inhalation, skin contact, cardiac sensitization, decomposition, reaction with moisture etc)
- Personal safety (MSDS - all common refrigerants plus phosgene, recommended PPE)
- Cylinders (cylinder terminology (WC, tare etc), transporting safely)
- Safe Filling (density and water capacity methods)
- Decanting methods (pumping, temperature differential etc)
- Recovery cylinders and their safe filling.
- Disposal of recovered refrigerants (including RRA)

T5 Refrigeration oil

- Types (mineral, POE, AB etc) and their applications
- Basic properties (miscibility, dielectric strength, viscosity and hygroscopic abilities)
- Typical issues regarding compatibility (neoprene and POE, POE and mineral etc
- Safe handling (MSDS - POE's, Mineral, AB's - Residual acid's in used oils
- Applications for the various compressor lubricants used in the trade

T6 Recovery and reclaim procedures

- Refrigerant recovery systems and procedures
  - Vapour
  - Liquid
- Recovery cylinders
- Disposing of recovered refrigerants
- Safety and general issues when recovering refrigerant

T7 Pressure testing

- Define
- Pressure testing procedures and test pressures per Standards,
- Codes, Regulations and manufacturers requirements
- Safety and general issues when pressure testing refrigeration systems

T8 Leak detection

- Leak detector types and applications (electronic, halide, bubble, ultra violet, Sulphur stick, litmus paper etc)
- Hazards and related safe working practices (working around rotating machinery, open flame, ultra violet light etc)
- Care and maintenance (delicate electronic equipment, changing sensor tip filters, changing gas cartridges etc)

REQUIRED SKILLS AND KNOWLEDGE

- Calibration (auto calibrating , send to a specialist etc)
- Leak testing methods

T9 Evacuation and dehydration

- Evacuation and dehydration
  - Deep vacuum methods
  - Triple evacuation
- Vacuum Measurement
  - Instruments
  - Drop test
- Vacuum Pumps
  - Types, size and applications
  - Use and connections
  - Care and maintenance
- Safety and general issues when evacuating refrigeration systems

T10 Refrigerant and oil charging

- Refrigerant cylinders, storage and safe handling
- Refrigerant charging methods
  - Vapour
  - Liquid
- Safety and general issues when charging refrigeration systems including personal protection equipment
- Refrigerant oil removal and addition tools, procedures and safety

T11 System contamination

- Contaminants (Non-condensables, moisture, acids, carbon, copper etc)
- Effects of contamination (Acid, motor burnout, oil contamination, copper plating, seizing, RMD blockage, excessive condensing temps etc)
- Practices/procedures that cause contamination
- Methods and components use to remove contamination
  - Filter dryers – liquid, suction, burnout
  - Dry nitrogen
  - Flushing agents
- Evacuation

T12 Basic refrigeration component replacement

- Risks of working with refrigerants and rotating equipment
- Refrigerant isolation/pump down/recovery
- Prevention of system contamination
- Protection of damage to surrounding equipment/ environment
- Replace basic components on a refrigeration system, for example filter dryer, sight

REQUIRED SKILLS AND KNOWLEDGE

glass.

- Pressure testing, evacuation, checking refrigerant charge, refrigerant charging and leak detection

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, 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

EVIDENCE GUIDE

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:
  - 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:
  - Recover, pressure and leak test, evacuate and charge refrigerants and lubricants as described in 8) and including:

    A Selecting appropriate materials and equipment

    B Testing refrigerant and lubricant for contamination

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	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	Decontaminating and evacuating the system to the required level
	G	Charging the system with the appropriate refrigerant
	H	Completing the necessary documentation
	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 recovering, pressure and leak testing, evacuate and charging refrigerants.

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)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEJ007B	Install refrigeration&air conditioning systems, major components and associated equipment

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 recovery, testing and charging refrigeration systems used for refrigeration or air conditioning encompassing the following:

- recovering refrigerant and lubricant from an existing system that may contains contaminants
- pressure and leak testing a newly installed or repaired system
- evacuating a system in preparation for charging with refrigerant
- selection a suitable refrigerant and lubricant for a given application
- charging a system with refrigerant and lubricant with minimal loss

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

Custom Content Section

Competency Field **5)**

Refrigeration and Air Conditioning