



Australian Government

UEERA0066 Repair and service carbon dioxide refrigeration systems

Release: 1

UEERA0066 Repair and service carbon dioxide refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to repair and service carbon dioxide (CO²) refrigeration system.

It includes servicing and repairing refrigeration equipment using CO² as a refrigerant excluding self-contained trans-critical systems. It also includes applying safe working practices and refrigeration principles that apply to CO²; following service manuals; testing, locating and rectifying faults and defective components; and completing the necessary service documentation.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the service and repair of refrigeration systems using CO² refrigerant.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEERA0006 Apply safety awareness and legal requirements for carbon dioxide refrigerant

UEERA0053 Install, commission, service and maintain medium temperature systems

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Prepare to service CO² refrigeration system

PERFORMANCE CRITERIA

Performance criteria describe the performance needed to demonstrate achievement of the element.

1.1 WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied

1.2 Safety hazards not previously identified are assessed, reported and advice on risk control measures sought from work supervisor

1.3 Nature of refrigeration work is obtained from documentation or from work supervisor to determine the scope of refrigeration work to be undertaken

1.4 Advice is sought from work supervisor to ensure refrigeration work is coordinated effectively with others

1.5 Sources of materials required for the work are accessed in accordance with workplace and procedures

1.6 Tools, equipment and testing devices needed to carry out refrigeration work are obtained and checked for correct operation and safety

2 Service and repair CO² refrigeration system

2.1 Measuring refrigeration system operating parameters is conducted in accordance with WHS/OHS requirements and workplace safety procedures

2.2 Inspection and checks are carried out to ensure the refrigeration system or component parts are isolated in accordance with WHS/OHS requirements, industry standards and practices

2.3 Refrigerant is removed from refrigeration system safely in accordance with WHS/OHS requirements, industry standards and practices

2.4 Precautions are taken to prevent damage to components while pressure testing refrigeration system

- 2.5 Pressure testing is conducted at a pressure compatible with CO₂ and in accordance with WHS/OHS requirements, industry standards and practices
 - 2.6 Leaks are located and rectified using testing methods appropriate to the refrigeration system and in accordance with industry standards and practices
 - 2.7 Refrigeration system is evacuated to the required level and cleaned of moisture and other contaminants in accordance with industry standards and practices
 - 2.8 Refrigeration system is charged safely with refrigerant grade CO₂ and compatible lubricants in accordance with industry standards and practices
 - 2.9 Actual and specified range of operating conditions are determined from measured and calculated values as they apply to sub-critical CO₂ vapour compression and liquid recirculation/cascade systems in accordance with workplace procedures
 - 2.10 Unplanned situations are responded to and discussed with appropriate person/s and documented in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
 - 2.11 Refrigeration operating conditions are determined without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
- 3 Complete work and report on servicing CO₂ refrigeration system**
- 3.1 Worksite is cleaned and made safe in accordance with workplace procedures
 - 3.2 Contaminated refrigerant and lubricant are dealt with in accordance with legislative/regulatory requirements
 - 3.3 Operation conditions are documented and include identification of any parameters that are not within the specified range for the refrigeration system
 - 3.4 Work supervisor is notified of the completion of work in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Servicing and repairing CO² refrigeration systems must include at least the following:

- charging and discharging a CO² system with refrigerant and lubricant in a safe and environmentally responsible manner, excluding self-contained systems
- determining:
 - suction and discharge pressures
 - ambient, evaporator and condensing temperatures
 - evaporator and condenser temperature difference
 - critical point, triple point, trans-critical and sub-critical refrigerant conditions

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ185A Repair and service carbon dioxide refrigeration systems.

Links

Companion Volume implementation guides are found in VETNet - -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6>

Assessment Requirements for UEERA0066 Repair and service carbon dioxide refrigeration systems

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant legislative, industry standards and practices
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- completing work and reporting on servicing and repairing sub-critical carbon dioxide (CO²) refrigeration systems
- conducting work observing the relevant legislation, regulations, policies and workplace procedures
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- decontaminating and evacuating the system
- discharging/charging refrigerant/lubricants and pressure testing the system without damage to components
- documenting operating conditions correctly
- identifying the conditions of the CO² refrigerant at various locations in the vapour compression and volatile secondary (liquid recirculation) system
- locating and rectifying leaks
- preparing to service and repair CO² refrigeration systems
- pressure testing, charging/discharging refrigerant/lubricants and determining the operating conditions of CO² vapour compression and volatile secondary (liquid recirculation) system
- recording measurements
- selecting and using appropriate measuring devices correctly
- servicing and repairing CO² refrigeration systems
- using calculation methods accurately.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include

knowledge of:

- CO² refrigeration systems, including:
 - basic CO² refrigeration system
 - basic liquid recirculation /cascade system employing CO² refrigerant at sub-critical condition
 - benefits of using CO² as a refrigerant
 - thermophysical properties
- operating conditions of CO² refrigeration systems, including:
 - applicable standards and codes
 - CO² refrigeration compressors and lubricants
 - system components, construction and operation
- servicing and repair techniques for CO² refrigeration systems, including:
 - moisture problems with CO² systems
 - refrigerant conditions
 - refrigerant cylinders and regulators
 - service gauges
 - service procedures
 - system standing pressure as a result of power loss.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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