



Australian Government

UEERA0047 Install and commission carbon dioxide refrigeration systems, components and associated equipment

Release: 1

UEERA0047 Install and commission carbon dioxide refrigeration systems, components and associated equipment

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 install and commission carbon dioxide (CO²) refrigeration system, components and associated equipment.

It includes installing and commissioning refrigeration equipment using CO² as a refrigerant excluding self-contained trans-critical systems.

It also includes applying safe working practice and refrigeration principles that apply to CO², following design specifications; testing, locating and rectifying faults and defective components; and completing the necessary installation and commissioning documentation.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the installation and commissioning 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

UEERA0053 Install, commission, service and maintain medium temperature systems

UEERA0006 Apply safety awareness and legal requirements for carbon dioxide refrigerant

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Prepare to install CO² refrigeration components and associated equipment

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 reported, assessed and advice on risk control measures is sought from work supervisor

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

1.4 Refrigeration component and equipment installation is appropriately sequenced in accordance with job schedule

1.5 Sources of materials required for refrigeration work are obtained in accordance with workplace procedures

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

2 Install CO² refrigeration system

2.1 Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures

2.2 Refrigeration components and equipment are installed in accordance with technical industry standards, job specifications and requirements with sufficient access to affect electrical and pipe work connections and maintenance

- 2.3 Refrigeration components and equipment are installed straight and square, in the required locations and within acceptable tolerances
 - 2.4 Pressure testing is conducted at a pressure compatible with CO² and in accordance with industry standards
 - 2.5 Leaks are located and rectified using testing methods appropriate to the system and in accordance with industry standards and practices
 - 2.6 Refrigeration system is evacuated to the required level and cleaned of moisture and contaminants in accordance with industry standards and practices
 - 2.7 Unplanned situations are responded to in accordance with workplace procedures, discussed with appropriate person/s and documented in a manner that minimises risk to personnel and equipment
 - 2.8 Installation and tests are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices
- 3 Commission CO² refrigeration system**
- 3.1 Commissioning work is appropriately sequenced in accordance with job specification
 - 3.2 Appropriate person/s is consulted to ensure the work is coordinated effectively with others involved on the worksite
 - 3.3 Extent of the system and location of system components is determined from site inspection and/ or job specifications and diagrams
 - 3.4 System control settings and operating parameters are determined from job specifications and requirements
 - 3.5 Tools, equipment and testing devices needed to commission a CO² refrigerant system are obtained and checked for correct operation and safety
 - 3.6 Refrigeration system is charged safely with refrigerant grade CO² and compatible lubricants in accordance with industry standards and practices
 - 3.7 Refrigeration actual and specified range of operating conditions are determined from measured and calculated values as they apply to CO² vapour compression and

- volatile secondary (liquid recirculation/cascade) system in accordance with workplace procedures
- 3.8** Pre-commissioning checks are undertaken to ensure components are in place and secure in accordance with manufacturer specifications and industry standards
 - 3.9** Need to test or measure live operating CO² system is determined in accordance with WHS/OHS requirements and workplace safety procedures
 - 3.10** CO² refrigeration system pressure controls, valves, pumps and regulators are adjusted to their required settings
 - 3.11** Testing/measuring devices are used to observe the operation of refrigeration system and fine adjustments of controls are made as required in accordance with manufacturer specifications
 - 3.12** Commissioning is conducted efficiently, without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy practices
- 4 Complete work and relevant documentation**
- 4.1** Worksite is cleaned and made safe in accordance with workplace procedures
 - 4.2** Final check of the installed components and equipment is made to verify that it complies with relevant industry standards and job requirements
 - 4.3** ‘As-installed’ refrigeration components and equipment are documented and appropriate person/s notified in accordance with workplace established procedures
 - 4.4** Commissioning results are documented and include final operating parameters of the refrigeration system

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.

Installing, connecting and commissioning CO₂ refrigeration system, components and associated equipment must include at least the following:

- major components:
 - compressors
 - cascade condensers
 - evaporators
 - liquid recirculation pump/s
- associated equipment:
 - refrigerant piping
 - refrigerant flow controls
 - cycling controls
 - safety controls
 - relief valves
 - isolation valves
 - monitoring and inspection accessories

Note: Steel pipe welding competency is not covered by this unit.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ186A Install and commission carbon dioxide refrigeration systems, components and associated equipment.

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 UEERA0047 Install and commission carbon dioxide refrigeration systems, components and associated equipment

Modification History

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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 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
- installing carbon dioxide (CO²) refrigeration system components, pipe work and associated equipment
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- discharging/charging refrigerant/lubricants and pressure testing the system without damage to components
- documenting operating conditions correctly (commissioning)
- identifying the conditions of the CO² refrigerant at various locations in the vapour compression and volatile secondary (liquid recirculation) system
- installing, connecting, securing and aligning components and equipment and ensuring that equipment and pipe work is compliant with relevant industry standards, codes of practice and regulations
- locating and rectifying leaks
- optimising system performance and efficiency
- pressure testing entire system at the appropriate design test pressures using dry nitrogen
- reading and interpreting drawings to pipe work layouts and apparatus locations
- recording measurements
- removing system contaminants and evacuating
- selecting and using appropriate measuring devices correctly
- using calculation methods accurately
- using methodical and efficient commissioning techniques.

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:

- installation and commissioning procedures for CO² refrigeration systems, including:
 - materials and installation procedures:
 - material selection
 - copper pipe standards
 - steel pipe standards
 - pipe connections
 - pipe supports hangers and connections
 - arrangement of isolation valves
 - location of relief valves
 - commissioning:
 - pressure testing
 - evacuation and dehydration
 - charging refrigerant and lubricant
 - system testing and adjustment
 - documentation
- operating conditions of CO² vapour compression and volatile secondary (liquid recirculation/cascade) system/s
- relevant industry standards and practices
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

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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